The future of freight

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Overview

ACRI
Australasian Centre for Rail Innovation

RESEARCH REPORT

RAIL FREIGHT PRODUCTIVITY REVIEW:
Establishing an Efficient Freight Transport Network

Revision 1.0

Foreword

We are, as a nation, standing at a critical juncture in terms of deciding the fate of freight rail in Australia. Australia needs a resilient, reliable and efficient national rail freight network. Rail is an absolute necessary response to Australia's freight task, which is significant and growing.

Road and coastal shipping cannot fulfil this freight task alone.

Increased use of rail has the ability to provide strong economic benefits and transporting more freight via rail represents one of the most effective means of achieving the Australian Government's legislated emissions reduction target of 43% by 2030.

For a heavily dependent freight nation such as Australia, there remains an obvious and lingering question. Why does rail struggle to win market share on some of the nation's busiest freight routes, connecting some of our largest population centres? This is not a new problem. But time is of the essence if we are to maximise the gains to be made from investments that are underway to support a greater take up of freight on rail (especially Inland Rail).

For rail to realise its full potential, it is important we understand the key drivers of rail modal share and what is preventing the industry from realising its potential in meeting the national freight task. We require solid facts. Understanding dispassionately the changes and the underlying causes of any change in mode share along with a clear view of the role that rail could and should play in an efficient land transport network can help ensure that significant investments are not undermined and achieve their intended goals. With the Inland Rail construction well underway, there is a heightened urgency to understanding these modal drivers and promoting increasing rail utilisation.

The Australasian Centre for Rail Innovation has partnered with the rail industry and the Federal Government to deliver this comprehensive, thought-provoking study into the current market position, barriers and opportunities for rail to improve its modal share in the freight sector. Like all of the Australasian Centre for Rail Innovation research, the study is evidenced based to the maximum extent possible. It identifies the root causes of freight rail inefficiency and offers potential strategies to improve rail productivity. There is no silver bullet to solving the policy challenges that exist, but nor are the challenges insurmountable. There are practical steps industry and government can take together to deliver a more reliable, efficient and sustainable freight rail network.

This study has been prepared with significant input from the Freight on Rail Group (FORG) and the Australasian Railway Association (ARA), and with support from the Department of Infrastructure, Transport, Regional Development and Communications and the Arts (DITRDCA).

I thank all participants for delivering this important study. We have a rare opportunity to ensure our freight transport networks are able to adapt to the challenges of, not just today, but for tomorrow and for the next fifty years.

Hon. John Anderson AC

Chair

Australasian Centre for Rail Innovation

Contents

Tables

1 Introduction

1.1 Background

The potential for rail to play more of a role in the nation's growing freight task is significant and urgent. Increasing rail's modal share represents one of the most effective means of achieving the Australian Government's legislated emissions reduction target of 43% by 2030. The COVID-19 pandemic brought with it many economic and social challenges; but also highlighted the importance of rail to our national freight supply chain sovereign capability and resilience. With Australia's freight task expected to grow, increasing rail's contribution is not just desirable, it is critical to ensuring our transport infrastructure is able to meet Australia's freight needs within an acceptable carbon emissions footprint. Road cannot fulfil the freight task alone. Yet, current operational, regulatory and policy settings are not consistent with objectives of promoting a more efficient rail freight task. This Study has so far presented evidence that shows:

- rail faces significant challenges to capture mode share on key interstate freight routes, particularly along key corridors between Melbourne – Sydney - Brisbane (Mode Share workstream). While Inland Rail and the development of connecting intermodal freight precincts will result in a significant improvement in the quality of service that rail is able to offer, this investment alone will not guarantee the desired modal shift to rail. Other investments to address infrastructure gaps are critical to ensuring rail maximises its full potential, including to achieve greater network resilience to recover from natural disasters and to improve the reliability of the rail network (Infrastructure and Planning workstream);
- a re-alignment of incentives to promote seamless rail freight supply chains when traversing multiple networks and jurisdictions is fundamental to improving rail freight efficiency and maximising rail's ability to compete with alternate modes. This requires improved harmonisation of operational standards and processes with a focus on improving both safety and productivity, as well as improved harmonisation of environmental and access regulation and management. The rail industry, by itself, cannot achieve the necessary change; government facilitation is required in order to provide a regulatory and governance framework for developing guidance on the best practice approaches to each of these issues, as well as to resolve issues where agreement cannot be reached through collaboration alone. This is likely to require a body to have the power to mandate harmonised principles, standards and processes where the benefits outweigh the costs (Safety and Operations workstream);
- increased transparency of freight data and more accurate cost benefit analysis (CBA) frameworks is required to support more informed decision making that can in turn optimise private and public investments infrastructure (Mode Share workstream and Policy workstream).

This report has been prepared by key stakeholders of the Australian rail freight industry. It is intended to provide a common platform from which the industry can effectively engage with relevant policymakers and the Australian community on the policy challenges and solutions for improving freight rail productivity. BITRE, as a member of the Policy workstream working group, has provided input to this paper, however this paper does not and is not intended to reflect a government view.

The study was undertaken in four evidence based workstreams - "understanding conditions influencing modal share", "Infrastructure and planning requirements", "Safety & Operations" and "Policy". This summary report leverages from the presented evidence and contains the Policy Objectives & Strategies to improve rail mode share and five recommended Priority Actions.

2 Recognising rail's strengths in the national freight task

Australia's National Freight and Supply Chain Strategy identifies the importance of developing an integrated transport network to meet Australia's growing freight needs, relying on all transport modes playing their part, including rail. The key point is that rail can and should play a greater role in the performance of the growing national freight task and achieving such an outcome is dependent on a policy environment enabling the most efficient transport solution for a particular task to prevail.

This study has shown that rail has the ability to capture significant mode share, but only in circumstances where the conditions exist to allow rail to exploit its natural competitive advantages. The challenge for policymakers is to create the right conditions to allow rail to flourish in order to reach its full potential in the performance of the growing national freight task, by providing freight owners with the appropriate signals when making modal choice decisions, and equally, providing the appropriate structure to encourage coordination and efficient investment decisions. Each transport mode has areas of strong natural advantage. For example:

- road freight provides high flexibility and speed, and is strongly preferred for express freight and the transport of dispersed freight in small volumes;
- rail is strongly suited to the transport of large freight volumes, and long distance freight movements or movements of relatively dense freight.

However, there is a large volume of 'mode contestable freight' for which modal choice is influenced by both the nature of the transport task and characteristics of the transport service, with the key factors being:

- *Reliability* – which encompasses on-time performance, confidence that the service will run as planned and risk of damage to freight;
- *Frequency/availability* – whether the service is available at times and frequency, and with sufficient capacity, to meet the customer's requirements;
- *Transit time* – end to end transit time is the critical consideration, including, where applicable, the time required for pick up and delivery to the freight terminal;
- *Price* – again, price for the end to end freight movement is the critical consideration, including where applicable, pick up and delivery to the freight terminal;
- Other factors, that influence mode choice decisions include:
  - *Sustainability* – numerous companies have corporate policies in favour of reducing their 'carbon footprint', which may influence their preferred option, while rail currently has a sustainability

advantage over road, this may diminish over time with movement towards alternative fuel sources for trucks;

  - *Complexity* – rail, and shipping, reflect a more complex transport solution which may require greater management effort, with anecdotal reports that rail freight charges need to be around 10% lower than road to compensate for this "hassle factor";
  - *Risk/diversification* – customers may prefer to maintain some diversification in their freight channels, in order to reduce the risks associated with reliance on a single mode.

Policy settings significantly influence these mode share drivers, and therefore the choices that freight customers make. Current policy settings do not necessarily support these decisions being made in a way that best reflects the national interest. For example:

- trends towards approvals for increasingly higher productivity vehicles (both on interstate routes such as the Newell Highway and in urban areas, such as truck movements to Port Botany) can support a more efficient road freight movement, however the consequences and costs of the resulting mode shift to road, including the increased congestion and safety risks, as well as carbon emissions from road transport, need to also be considered; and
- where domestic coastal shipping movements are provided by international carriers as an incremental add-on to the international freight movement, they are able to offer very low rates reflecting only the marginal cost of the movement. This provides shippers with a low cost means of transporting non-time sensitive freight. However, these supply chains are highly vulnerable to the vagaries of the international shipping markets – as clearly demonstrated through the COVID-19 pandemic where the international carriers largely withdrew from the domestic market in order to focus on the more lucrative international opportunities. Policy settings that facilitate a high reliance on coastal shipping via international carriers can undermine the sovereign capability and resilience of Australia's supply chains.

Strategies that seek to optimise rail's inherent strengths and advantages are essential in order to pursue long term improvements in rail's modal share. Increasing rail's contribution to the national freight task is not just desirable, it is critical to ensuring our transport infrastructure is able to meet Australia's freight needs. Road cannot fulfil the freight task alone.

There are now, more than ever before, great opportunities for governments and industry to think more strategically about the role of rail and how increased utilisation and productivity can help to achieve broader government policy objectives in terms of reductions in overall transport emissions and de-carbonisation strategies, especially with the Australian Government's plan to reduce emissions by 43% by 2030. Since early 2022, the Federal Government (through the Clean Energy Regulator) has been consulting with the transport sector around a revised Transport Method under the Emissions Reduction Fund (ERF).[1] This work has continued since the election and has been complemented by a review of the Safeguard Mechanism. These

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[1] See https://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-industry/transport-methods/Transport-Land-and-Sea

processes are important given the potential cost realignment that could result from this outcome through the issuing of carbon credits to the industry. A sound approach to optimising freight rail productivity across the national freight transport system can help to achieve this broader policy objective.

Significant policy developments are already underway to secure and maximise rail's potential contribution to the national freight task, including:

- The establishment of the Inland Rail Project and the associated Interface Improvement Project to build more efficient freight connections between Melbourne and Brisbane and transform regions, communities and our economy now and well into the future;
- The Commonwealth Government's commitment to invest in the development of intermodal freight precincts incorporating new open access intermodal terminals in Melbourne and Brisbane, together with substantial private investment in intermodal terminal development;
- Investments in digital train control, with ATMS currently being trialled on key sections of the interstate East West corridor, to provide a platform for improved rail productivity and safety;
- The National Rail Action Plan, led by the National Transport Commission, in collaboration with industry, to:
  - improve interoperability and deliver a more efficient rail network; and
  - address the critical skills shortages within the rail industry;
- The current review chaired by Mr John Fullerton, into the resilience of Australian road and rail supply chains, which is due to be completed later this year; and
- The establishment of the National Freight Data Hub as a key resource for industry, government and others to improve the efficiency, safety, productivity and resilience of the freight sector.

Understanding the consequences of an inefficient freight task where rail cannot optimise its role in the national freight task should provide the necessary impetus for such strategies to be developed.

3 Understanding the consequences of an inefficient modal distribution of freight

In order to fully appreciate the value of initiatives identified in this paper to deliver improved rail mode share, a comprehensive understanding of the economic, social and environmental consequences of a change in the distribution of freight between rail and road is essential.

There is a commonly held concern within the rail industry that not all of the external benefits of rail are properly taken into account in evaluating rail/road investment decisions and other policies impacting mode share. Our examination of the conventional Cost Benefit Analysis (CBA) frameworks applied to road and rail infrastructure proposals reveals scope for improvements to the way in which standard CBAs have been applied to assess the costs and benefits with different transport modes (and hence the consequences of modal shift). Key issues are:

- There are standard parameter values assigned to a number of external costs and benefits associated with the movement of freight by alternate modes, which significantly influences CBA outcomes with mode share consequences. However, there are legitimate questions as to whether the values attributed to some parameters fully reflect the relevant costs. For example:
    - given the growing national emphasis on addressing climate change and decarbonisation measures, it is not clear whether the current parameter values for emissions properly reflect the cost of emissions (and the associated value of carbon credits), potentially understating the benefits of investments and policies that promote a more environmentally sustainable transport mode;
    - there are questions as to whether the current road cost parameter values fully reflect the additional costs associated with constructing and maintaining roads to the standard necessary for high utilisation by heavy vehicles, and whether they properly reflect the different cost imposed by different truck types (eg whether the costs attributed to lighter trucks are overstated and the costs attributed to the largest truck combinations are understated);
    - there is no standard approach for valuing the security, reliability and resilience of Australia's supply chains, an issue that has been particularly exposed in recent times due to both the impact of the COVID-19 international supply chain disruptions, as well as due to major natural disasters that have significantly impacted key supply chains;
- The high discount rate applied in CBAs relating to social infrastructure results in limited consideration of the long term benefits that can be created through investment – given the capital intensive nature of rail transport, this creates a structural disadvantage in the assessment of rail investment projects with longer term payoffs and greater long term option values;

- While the ATAP guidelines endorsed by all Infrastructure and Transport Ministers explicitly provide that CBAs for rail projects should consider the impact of the project on modal shift[2], the ATAP guidelines include no such requirement for road projects. Noting that the external costs imposed by road freight is significantly higher than for rail, this creates a high risk that the additional costs resulting from road projects attracting freight away from rail are not being considered in these evaluations, and no measures to address this risk are contemplated; and
- There are also concerns that, in practice, business case assessments do not always fully scope road projects (say, for example, where one road project is dependent on another proceeding in order for all of the benefits to be fully realised, only the initial project is costed) therefore understating the costs as well as overstating the benefits of the project, and, potentially, double counting those benefits as attributable to multiple projects.

The ARA's Value of Rail report published in 2020[3] examined some of the key benefits of a mode shift from road to rail. The report identified that a 1% mode shift away from road to rail between major capital cities in Australia will reduce the social costs created through emissions, crashes and accidents and health costs from emissions (even using current parameter value estimates) with total estimated benefits of around $71.9 million (2019 prices) per year.

This provides further evidence that operational, regulatory and policy settings that target improved rail mode share are expected to provide significant economic and social value.

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[2] See Infrastructure and Transport Ministers (2021), Australian Transport Assessment and Planning Guidelines, M3 Freight Rail, August 2021

[3] ARA (2020) Value of Rail 2020, The rail industry's contribution to a strong economy and vibrant communities, November 2020, prepared by Deloitte Access Economics

4 Policy objectives and strategies to improve rail mode share

As noted earlier, the overarching policy objective should be to create an environment that enables transport modes to operate efficiently and incentivises the use of the most economically efficient mode of transport for each freight task, having regard to not only the direct costs, but also the indirect (or external) costs of each mode. Recognising the findings of the mode share analysis prepared for this review, the policy objective should provide for policy changes that enable the increased utilisation of rail freight where there are efficiency gains and economic, environmental and community benefits that would be realised from the increased use of rail. Importantly, road and rail are complementary in particular supply chain tasks as well as being competitive in many specific tasks and on particular freight corridors, and efficient transport outcomes require an optimal combination of the modes.

In this context, we have identified a range of strategies that will aid in promoting rail mode share, so that it can perform a role in the national transport task according to the natural advantages of the mode and we have reviewed a range of policy options designed to address these strategies. This has confirmed that there is no single strategy or pathway that will 'solve' the issues of improving rail's productivity, competitiveness and mode share. Rather, a broad suite of policies, applied in a co-ordinated way, will be required. Each of the identified strategies has an important role to play in the long term pursuit of improved rail productivity. However, there will inevitably be a need to prioritise initial actions to initiate and build momentum for reform.

Therefore, in developing recommendations of the actions that will best promote rail productivity, competitiveness and mode share, we have first considered the broad policy framework that should be pursued (with strategies listed in no particular order).

From this, we have identified a series of priority actions that should be promoted, reflecting the policies that that are most critical to pursue in the short term, having regard to their potential benefit and the extent of constraints.

4.1 Recommended policy framework

4.1.1 Strategy 1 – Specify an overall freight objective

Problem identification

Within a range of industry sectors, an overall objective is specified that then serves to guide the development of further policies, and the implementation of regulation. A clear example of this is in the electricity sector, where a National Electricity Objective is established: "to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to: price, quality, safety and reliability and security of supply of electricity."[4]

Within transport, the National Freight and Supply Chain Strategy encompasses a range of actions across four critical areas:

- smarter and targeted infrastructure investment;
- enable improved supply chain efficiency;
- better planning, coordination and regulation;
- better freight location and performance data

There is a range of action plans and strategies for progressing these critical areas, and the recommendations within this review of rail productivity performance all fall within these broad strategies.

Within the rail sector, there is a broad range of institutions with a variety of policy and regulatory functions. In each case, these institutions operate according to their own objectives. In some cases, these objectives are conflicting, and there are some institutions with internally conflicting objectives as a result of their different functions.

More broadly, there can be misalignment of federal and state policy regarding transport infrastructure. An example of this is the NSW Government's Special Activation Precinct work around Parkes, where specific proposals from the NSW Government for the transport precinct had the potential to act as a barrier to operating the long trains that are central to achieving the expected productivity gains associated with Inland Rail.

However, within this framework, the overall freight transport objective is implicit, rather than explicit.

The solution

Government specification of an overall freight transport objective may help to align policy development and application of regulation to a common long term goal. Key features of this objective could include:

- promoting efficient investment in transport infrastructure and operation of freight transport services to meet a growing national freight task;
- promoting the most efficient mode of transport for each freight task, having regard to both the direct costs (which will in turn be influenced by the strategies recommended in this report), but also the indirect (or external) costs of each mode;
- maximising the long term benefit to consumers of freight services with respect to price, quality, safety and supply chain reliability;

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[4] See https://www.aemc.gov.au/regulation/neo

- strengthening resilience of the national freight supply chains to ensure their ability to withstand and recover quickly from disruptive events to provide effective, reliable services.

4.1.2 Strategy 2 – Ensure economic assessments support efficient modal outcomes

Problem identification

1. Cost benefit assessments

As described in section 3 above, we have examined the conventional CBA frameworks applied to infrastructure proposals and policies influencing mode share, and consider that there is scope for some improvement to the way in which standard CBAs assess the costs and benefits with different transport modes (and hence the consequences of modal shift).

Solution

A comprehensive review of the standard methodologies for CBAs for transport projects/policies should be undertaken in order to ensure that existing parameter values and approaches effectively ensure that economic, social and environmental benefits of a project are fully reflected and taken into account in the evaluation of rail/road investment decisions.

Such a review should include consideration of whether:

- methodologies consistently consider and assess modal implications;
- standard parameters reflect a robust assessment of external costs of each mode; and
- standard parameters reflect changing community priorities particularly in relation to emission reduction.

There are several options for which body should be responsible for undertaking such a review, including by the Federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts, the National Transport Commission (NTC), BITRE or Infrastructure Australia.

Problem identification

2. Carbon reduction methods

The ERF[5] offers landholders, community and business the opportunity to run projects in Australia that avoid the release of greenhouse gas emissions or remove and sequester carbon from the atmosphere. A number of activities are eligible under the scheme and participants can earn Australian carbon credit units (ACCUs). ACCUs can be sold to generate income, either to the Australian Government through a carbon abatement

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[5] Information about the Emissions Reduction Fund (ERF) has been sourced from Clean Energy Regulator at https://www.cleanenergyregulator.gov.au/ERF/About-the-Emissions-Reduction-Fund

contract, or to companies and other private buyers in the secondary market. Alternately, large emitters (such as rail transport operators) can hand ACCUs into the Government in order to ensure that they comply with the Safeguard Mechanism, which requires their net emissions (the emissions that they directly produce ('Scope 1 emissions') less ACCUs) be maintained at below a nominated level.

Under the ERF, the rules for eligible activities are set out in methodology determinations (methods), developed by the Clean Energy Regulator. The Transport Method, covering land and sea transport, was first established in 2015, and sets out the rules for projects that reduce emissions by improving fuel efficiency and changing energy sources to generate ACCUs.

In the context of the current Transport Method, a mode shift project is only possible where a proponent conducts operations across both modes, and directly replaces a vehicle in one mode with a vehicle in another mode (using the same duty cycle).[6] Any abatement created is not based on the difference in emissions intensity between categories of vehicles. Rather, abatement is created by improvements in emissions intensity within the categories of vehicles involved in the project.

Under the current method, a project that reduces truck emissions can create an abatement and qualify for ACCUs, however, a project that switched freight to a lower emissions transport mode such as rail, with potentially significantly greater reduction in total emissions, would not qualify for an abatement and could not earn ACCUs. Further, in the absence of being able to generate ACCUs through mode shift, rail operators will need to acquire ACCUs on the secondary market in order to cover any increase in their own emissions due to their increased mode share (notwithstanding that this reflects a reduction in carbon intensity for the overall transport task).

Therefore, notwithstanding that a mode shift to rail represents one of the most effective means of reducing overall transport emissions, the current Transport Method creates rigidities between modes, and creates a cost barrier to rail operators in increasing the share of freight transported by rail.

The solution

The Clean Energy Regulator is currently consulting with the transport sector around a revised Transport Method, and this is being complemented by a review of the Safeguard Mechanism. Making it easier for rail operators to participate in the ERF, including through enabling mode shift projects to generate ACCUs, is an important step in enabling rail to play its role in the decarbonisation of the Australian economy.

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[6] See https://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-industry/transport-methods/Transport-Land-and-Sea

4.1.3 Strategy 3 – Promote investment in efficient rail freight infrastructure

Problem identification

This study has shown that, for intermodal freight, rail corridors with shorter haulage distances (e.g Melbourne to Sydney, Sydney to Brisbane), face significant challenges to capturing increased mode share. Contributing to this outcome is road's relatively higher productivity performance, where upgrades of major interstate highways have allowed for road productivity to increase by reducing transit times (particularly on the Hume Highway and Pacific Motorway), allowing increased use of larger truck types (particularly on the Newell Highway) and more generally improving the resilience of the road network to withstand major weather events.

Existing rail infrastructure is not necessarily of a standard that enables rail freight operators to provide a service that can effectively compete with road in terms of the key drivers of mode choice – transit time, reliability, frequency/availability and price.

The planned upgrade in rail infrastructure with Inland Rail between Melbourne and Brisbane will provide an important improvement in trunk rail infrastructure, but it is not sufficient to guarantee mode shift to rail. An efficient end to end rail service offering requires other complementary investments in rail infrastructure to occur. As noted earlier, ongoing government commitment for the initiatives delivered by the Interface Improvement Program (IIP) is also an important element of increasing the amount on freight on the IRP.

Focus areas to address

As identified in the Infrastructure and Planning workstream, the infrastructure gaps that are considered to be most critical to improving rail mode share for intermodal and contestable bulk freight are as follows:

Table 1 Recommended actions to address high priority infrastructure gaps

Infrastructure element	Priority requirements	Current Status
Intermodal		
Network reliability and resilience	• Introduction of network improvements and other asset management strategies, to support improved train service reliability, focusing on improved on-time departure from terminals, improved on-time running and fewer network interruptions together with faster restoration of services following interruptions	• Network reliability and resilience is considered by each RIM as part of their asset management strategies, but there is no specific program or industry consensus on what is required to promote enhanced reliability and resilience. • BITRE and its portfolio Department are jointly progressing an investigation into Network Resilience risks and mitigation options as part of their Road and Rail Supply Chain Resilience Review.

Infrastructure element	Priority requirements	Current Status
Interstate intermodal terminals	• New IMT facilities in Melbourne and Brisbane, that are: – Located within publicly funded intermodal freight precincts (enabling co-location with warehousing and distribution centres) close to existing and/or emerging major industrial areas – Provide for efficient arrivals, departures and cargo interchange – Provide sufficient capacity to meet long term demand growth – Non-discriminatory open access – Efficient first and last mile connections, including rail shuttles to ports • Improved IMT facilities will enable reduced time and cost of PUD movements, and more efficient loading and unloading of trains.	• Melbourne: – Location identified for two new IMTs (Beveridge and Truganina) – Commonwealth funding allocated for Beveridge and planning for Truganina – Port shuttle connections being progressed via Victorian Government as part of the Port Rail Transformation Project at the Port of Melbourne • Brisbane: – Preferred IMT location not yet identified – Preferred route for port shuttle services not yet identified
Digital train control systems	• Introduction of digital train control systems across the intermodal freight network involving: – Digital train control being progressed by all RIM's involved in the interstate network – RIM's to ensure that there is a seamless interface between digital control systems on adjoining networks	• ARTC currently rolling out ATMS across interstate network, with initial priority on east-west route. • Sydney Trains, Queensland Rail and MTM currently rolling out ETCS in metro networks. – Interface between ATMS and ETCS not yet resolved.
Optimised network planning and scheduling	• Introduction of automated train scheduling systems across the intermodal freight network enabling: – automation of train handover at network borders, optimised and consistent pathing of train services across networks, optimised real time rescheduling of train services in out of course running, and real time prediction of arrival time. – automated train scheduling to be progressed by all RIM's involved in the interstate network – RIM's to ensure that scheduling systems on adjoining networks are seamlessly linked – requires common rules/definitions to be agreed between RIMs up front (i.e. on-time train arrivals) so that technological solutions can effectively implement those rules	• ARTC currently investigating the introduction of automated train scheduling system (similar to Hunter Valley ANCO) across ARTC interstate network. • No current plans to develop automated train scheduling systems for other RIMs responsible for components of interstate network.
Rollingstock fleet capacity	• Introduction of additional rollingstock to replace near life expired rollingstock and to provide for the operation of additional intermodal freight services, where that rollingstock reflects current best practice technology including, where possible, ability to adapt to future technological change.	• Rail operators are investing in new rollingstock capacity, however there are long lead times on investment and limited local capability to meet demand. Further, it is unclear to what extent this will: – fully address additional demand, having regard to the extent of near life expired rollingstock – incorporate current best practice technology and adaptability to future technological change
Long term corridor protection and preservation	• Ensure corridors are preserved to address long term network capacity requirements (including freight only corridors in urban areas). • Ensure planning for additional passenger services (including long distance passenger services) does not erode capacity and transit times/cycle times for freight services.	• Planning and corridor protection is the responsibility of all levels of government. • A 2017 Infrastructure Australia Study ('Corridor Protection') identified that a national framework for corridor protection was required to guide

Infrastructure element	Priority requirements	Current Status
		coordinated and meaningful action by all levels of government.[7] - The 2019 National Action Plan of the National Freight and Supply Chain Strategy committed to identifying and protecting key freight corridors and precincts from encroachment.[8]
Bulk		
Productivity (incl. cycle times)	- For bulk freight networks with excessive delays (eg Murray Basin), to introduce initiatives including track quality, safeworking systems, capacity and scheduling to reduce the occurrence of excessive delays	- Varies by regional network
Allowable train configurations	- Progressively upgrade regional bulk freight networks (where viable) to allow operation of mainline rollingstock (potentially under speed restriction, provided not excessive in relation to overall cycle time)	- Varies by regional network

Source: Synergies

The solution

The rail industry and Governments should continue to promote investments in infrastructure, some of which are already underway, that enables the operation of efficient rail services, where this can be supported commercially or by a broader cost benefit analysis.

Governments, both Commonwealth and State, have demonstrated a willingness to fund rail infrastructure projects where the economic benefits outweigh the costs (as demonstrated by a full CBA). This proposed solution simply involves focusing investment programs on those rail infrastructure requirements that have been identified as providing the greatest opportunity to promote rail mode share.

We note that a number of the highest priority infrastructure requirements, being intermodal terminal developments within integrated freight precincts, and digital train control on the interstate network (including integration with ETCS), are currently being progressed, supported by Government funding commitments. However, if rail is to play the role that it could in an efficient national freight system, it is essential to look beyond these existing pipeline projects to the next priority infrastructure requirements. The projects required to address the remaining priority infrastructure requirements are less well defined, including a pipeline of resilience and reliability initiatives as well as automated train scheduling. For these, rail participants will need to co-operatively progress the definition of the specific projects required to address

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[7] Infrastructure Australia (2017), Corridor Protection, Planning and investing for the long term, July 2017, p.32. In the report, Infrastructure Australia recommended action to secure seven corridors for projects including the Outer Sydney Orbital, Outer Melbourne Ring, Western Sydney Airport Rail Line, Western Sydney Freight Line, Hunter Valley Freight Line, and the Port of Brisbane Freight Line. The highest priority identified by Infrastructure Australia at the time was preservation of the corridor for the proposed High Speed Rail line between Brisbane and Melbourne via Sydney and Canberra.

[8] Transport and Infrastructure Council (2019), National Action Plan, National Freight and Supply Chain Strategy, August 2019, p.17

the priority infrastructure requirements and to develop options analysis to establish the project need, specific project options and provide a preliminary assessment of financial and economic benefits.

This should be facilitated by:

(a) targeting infrastructure project development and investment to priority rail infrastructure requirements. Priority investment requirements were identified in the Infrastructure & Planning Workstream. Beyond the high priority projects already being progressed, the focus should be:

  (i) a pipeline of network resilience and reliability initiatives (an initial list of potential project investments was identified in the Infrastructure & Planning workstream);

  (ii) automated train scheduling systems, seamlessly integrated across networks (eg ANCO);

  (iii) long term preservation of rail corridors.

(b) Governments directing that rail infrastructure proposals specifically consider interoperability impacts.

This reflects that legacy infrastructure, with inconsistent requirements for rollingstock standards, is a major contributor to the nation's interoperability constraints. However, there is a risk that such incompatibilities will be further perpetuated where RIMs invest in future infrastructure without considering the ramifications for users beyond their network, including interoperability and capacity bottlenecks. It is critical that incremental investments are made on a compatible basis so that overall value and benefits can be extracted rather than investments being made on a 'piecemeal' basis which either shifts the problem to elsewhere along the rail network or makes overall rail operations worse.

It is therefore a welcome development that Infrastructure and Transport Ministers have agreed earlier this year to develop a Memorandum of Understanding on Interoperability which will consider a mechanism to implement interoperability impact assessments for future rail investments.[9] Ensuring that these issues are considered in the scoping of projects, will enable rail stakeholders and Governments to assess whether there is a benefit in additional expenditure to avoid interoperability and capacity problems being created.

(c) the Commonwealth Government should leverage its funding of rail infrastructure projects to encourage State Government support of other recommendations where states have the greatest influence.

In many cases, rail infrastructure projects, including those that are designed to promote rail's mode share, are funded at least in part with Commonwealth Government assistance. As is discussed below, a range of rail efficiency constraints are within the control of the State Governments to address, for example, constraints relating to jurisdictional regulatory fragmentation and freight access to metropolitan rail networks. However, there may not be sufficient incentive for State Governments to address these issues where the benefits are distributed more broadly across the Australian community. For example, limits on freight access through metropolitan rail networks will impact the quality and availability of freight paths across the national network and may discourage long distance freight from

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[9] ARA (Rail Freight Executive Committee (2022) Agenda and Papers, p.14

using rail. There is opportunity for the Commonwealth Government to leverage its investment in state based rail projects to gain State Government commitment to other strategies that will promote broader rail mode share objectives.

4.1.4 Strategy 4 – Promote operational harmonisation through a focus on both safety and productivity

Problem identification

1. **Inconsistent operational arrangements across RIMs (safety standards, operating rules, process and regulation) adversely affects industry productivity**

Rail freight efficiency on key intermodal corridors is constrained by a series of differences that exist between networks and between jurisdictions. These constraints act as a drain on efficiency where they increase the cost of operating rail services, reduce flexibility and stifle future investment and technological innovation.

Poor harmonisation of standards, operating rules, processes and regulation contribute to a broad range of operating constraints that impede the efficiency of the rail sector. The Safety & Operations workstream identified that the most significant causes of inefficient constraints on the rail network, relate to:

(a) increasing network fragmentation, accompanied by differences in standards, operating rules and processes amongst RIMs, which contributes to operational, safety, physical, network pathing and access management related constraints;

(b) jurisdictional differences in regulatory environments, which contributes to environmental and access management related constraints;

(c) technology, being the extent to which the industry has consistently invested in leading edge technology to promote efficiency;

(d) industrial relations flexibility; and

(e) other Government policies, which contributes to fatigue management constraints and passenger priority related constraints.

A lack of strategic alignment was considered a high ranking impediment for many of the issues driving rail's inefficiency, and the most important factors that are driving this lack of strategic alignment relate to structural market design issues (i.e. network fragmentation) as well as the absence of institutional and regulatory arrangements to improve market co-ordination.

- Network fragmentation and mixed organisational focus on intermodal freight:
  - RIMs are largely expected to operate within a commercial framework and are governed by their own commercial drivers. The commercial outcomes for a RIM will be largely driven by its performance in meeting the needs of its major customers (eg passenger services in the metropolitan networks, coal services for the Hunter Valley and Central Queensland coal networks).

  Mode contestable freight (intermodal and mode contestable bulk) can have limited commercial leverage for these networks. The problem is exacerbated where Governments, as owner or funder of networks (particularly metropolitan passenger networks), do not specify any clear objectives or clearly defined performance metrics for freight, including long distance freight that crosses multiple network boundaries.

  - As a result, there is significant misalignment of incentives between RIMs in how they manage inter-network train services. This is not a general criticism of the RIMs, as they are all responding to their own organisational objectives. Rather, it is a predictable outcome of their incentive frameworks. Given the extent of misalignment of commercial objectives, it is unrealistic to expect that the industry should be able to collaboratively reach a commercial agreement on how to address many interoperability issues, as there may be little benefit to some RIMs from doing so and potentially material costs involved.

- Regulatory frameworks that do not promote harmonisation:
  - While there are long term policy agendas to promote harmonisation, the focus of this has been on harmonisation between RIMs through industry collaboration. As discussed above, this approach runs into difficulties where the stakeholders have incompatible commercial objectives. But this approach also runs into difficulties where the stakeholders are subject to differing jurisdictional regulatory requirements and/or are governed by different jurisdictional regulators who may have different priorities and interpretations of requirements.
  - Even in rail safety, where there is a single regulatory framework and a single national safety regulator, significant inter-RIM incompatibilities undermine efficient rail operations. The co-regulatory framework, which provides for each RIM to develop its own safety systems to address the risks on its network, is designed to address the varying characteristics and safety risks of differing networks. This approach does not promote harmonised approaches to managing risks across networks (although it does not prevent harmonised approaches being applied if proposed by the rail operator).
  - Simply put, RIM autonomy is prioritised over transport efficacy, which is not in the long term interests of the freight industry or the communities it serves.

This approach to regulation of rail networks differs materially from the regulation of other cross jurisdictional infrastructure networks, such as electricity, gas and telecommunications, as well as the road network. In these cases, the intrinsic characteristics of the underlying product together with regulatory frameworks are designed to promote a greater degree of consistency in standards and approaches.

The solution

The rail industry and Governments should promote harmonisation of operational standards, systems, processes and technologies.

A range of options were considered as part of the Safety & Operations Workstream, which ultimately recommended pursuing a regulatory and governance model that promotes centralised guidance on rail operations and regulation and empowers mandatory imposition of consistent standards where there is net benefit from doing so, while still, where applicable, enabling regulation to be undertaken at a jurisdictional level.

The preferred model developed within the Safety & Operations Workstream provides for:

- a centrally co-ordinated review of the key differences between the specific obligations, rules, standards and processes across networks, identifying specific opportunities for improved consistency and enhanced harmonisation and providing guidance as to 'best practice' options;
- rail industry participants have the opportunity to consider these specific opportunities, and where possible, agree on a consistent approach to be applied across RIMs;
- to the extent that agreement cannot be reached, but where there is net benefit in applying a harmonised approach, a process for mandated changes to obligations, rules, standards and processes to be made to enforce consistency;
- on an ongoing basis, a process for issues around standards and processes that cannot be collaboratively resolved to be referred to an independent body for resolution via such mandated changes.

Problem identification

2. The need for a productivity focus on safety standards, operating rules, processes and regulation to improve freight rail performance

Many of the operational standards and processes adopted within the rail industry have both safety and productivity consequences, and changes can be designed with a focus on improving safety, improving productivity or improving both. The Safety & Operations Workstream noted that safety and productivity were often positively correlated – in the sense that greater consistency promoted both safety and productivity. Therefore, there is significant overlap in assessment of safety and productivity related to standards and processes.

However, there is no existing body responsible for promoting rail productivity in Australia. This is different to the regulatory framework for road where the National Heavy Vehicle Regulator (NHVR) has responsibility for increasing both safety and productivity of heavy vehicles on the road networks available to them.

The solution

A productivity focus, in combination with a safety focus, should be brought to bear on rail freight performance.

Problem identification

3. The need for an institutional vehicle to drive improved operational harmonisation with a productivity focus

Accepting that increased operational harmonisation and an increased emphasis on rail freight productivity are sensible pathways to improving rail's mode share, the next challenge is determining the vehicle that is most appropriately placed to deliver this mandate.

Under the current institutional arrangements,

- ONRSR's statutory role is regulatory oversight of the National Rail Safety Law which involves improving rail safety, decreasing the regulatory burden on the rail industry, providing seamless national safety regulation and enforcing regulatory compliance[10];
- RISSB is responsible for developing and managing a suite of voluntary standards via a collaborative approach amongst RIMs. This provides RIMs with significant discretion to implement their own processes and standards;
- the National Transport Commission (NTC) is an independent advisory body leading major strategic national land transport reform in support of all Australian Governments.

The solution

Within this preferred model for new centralised guidance, there are a number of possible options to develop a rail industry regulator to drive both productivity and safety performance.

Options generally fall within two broad categories:

(a) One option is to leverage off existing institutions and institutional architecture, with the most efficacious mechanism involving redefining ONRSR's role so that it becomes a regulator with a productivity as well as a safety focus, and empowering it to develop mandatory standards where harmonisation can be expected to yield net benefit but is not agreed or fails to be implemented through collaborative processes. This would involve a major change in ONRSR's role and approach, moving from a safety compliance focus to pro-actively promoting opportunities to enhance productivity while maintaining safety. It would require the acquisition of additional skills and resources to enable an effective assessment of productivity issues and advocacy for mandatory standards where required and a cultural change within the organisation. Significant organisational change, including a change in name would be required to reflect this change in focus. This change would also have implications for the role of other national bodies, such as RISSB and the NTC.

This option, reflecting a modification of existing governance arrangements for rail, could be implemented with modest legislative reform. However, there is a risk that attaching a productivity agenda to an existing safety regulator will not create sufficient impetus for productivity reform.

(b) The other broad option is the creation of a new rail industry regulatory body, with a broader set of objectives, potentially even extending beyond safety and productivity, to include matters such as

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[10] ONRSR Statement of Intent 2021 – 2024, p.3

environmental and/or access regulation. The National Heavy Vehicle Regulator provides a template for how such a 'one stop shop' could operate. The Australian Energy Market Commission provides another model for how rules could be developed and applied across the industry. However, if such an institutional approach were to be adopted, it would be necessary to recognise that, unlike road (and hence the NHVR), the rail network is underpinned by a contractual framework that allocates risk and responsibility between RIMs and rail operators, and any regulatory arrangements need to be cognisant of that.

This option may provide a stronger impetus for productivity related reforms, however, the need to develop a new institutional architecture means that this is likely to involve extended implementation timeframes and costs.

Ultimately, the preferred option will need to be determined in consultation with the State and Commonwealth Governments.

In either case, significant Government and industry commitment will be required to refocus the industry to achieve the productivity gains necessary for rail to achieve its potential in efficiently meeting the national freight task. Reforms extend beyond harmonisation of standards to encompass productivity inhibiting operational and capacity management practices across the industry. Further, recognising that any mandatory standards and requirements ultimately need to be endorsed by all jurisdictional Infrastructure and Transport Ministers, it would be appropriate for the ARA and FORG to have an enhanced role in advocating to the Infrastructure and Transport Ministers Meeting (ITMM) in relation to the rationale and need for identified reforms.

4.1.5 Strategy 5 – Promote regulatory harmonisation

Problem identification

1. There is a need for greater harmonisation of environmental regulation

In Australia, the regulation of environmental requirements is primarily the responsibilities of the state and territories. The state or territory's environmental regulator is responsible for the administration of these controls and ensuring the relevant environmental protection legislation in enforced. Different jurisdictional environmental regulatory frameworks can result in different environmental obligations, forcing operators to persist with outdated technology in order to be able to operate.

Environmental regulators consider rail environmental performance in isolation (instead of relative to the alternate transport mode), which could lead to worse environmental outcomes if rail cannot meet desired standards.

These jurisdictional differences lead to increased rail operating costs by:

- increasing the required specification and cost of rollingstock;
- creating barriers for rail operators to innovate and invest in new technology; and

- reducing incentives to invest in rollingstock to meet freight demand.

The solution

Governments should promote harmonisation of environmental regulation by identifying a national co-ordinating body (eg the national EPA planned to be established by the Commonwealth Government) to investigate opportunities for enhanced harmonisation of environmental requirements, recommending specific harmonisation opportunities by way of common standards and providing a mechanism for the common core national environmental standards to be mandated, by agreement of the relevant Commonwealth and State Ministers.

Problem identification

2. There is a need for greater harmonisation of rail access regulation

There are multiple access regimes in Australia, each administered by different regulators. While each of these regulatory frameworks is based on a consistent set of high level principles, there are significant differences in application and operation. While some of these differences are appropriate, for example, while heavy handed price regulation can be justified in some circumstances (eg coal networks in NSW and Queensland), for general freight networks there is limited value in cost based regulation of access charges.[11] However, in many cases, the differences are unrelated to the economic case for regulation, with a range of different processes applied to achieve the same broad objective. Further, a number of the frameworks, most notably ARTC's interstate and Hunter Valley access undertakings, remain voluntary.

It is a common issue for rail operators using multiple rail networks to have to deal with seven different regulatory frameworks overseen by six different regulators; differences also apply for individual RIMs under a given framework.

The application of economic regulation to rail networks is driven by a combination of the overarching regulatory frameworks, the design of regulatory instruments proposed by RIMs, and the requirements of regulators in approving those instruments. The level of interaction between RIMs and regulators has some similarity with the co-regulatory framework applied for safety regulation.

The solution

The rail industry and Governments should promote harmonisation of access regimes by:

- identifying an independent national co-ordinating body to assess opportunities for improved harmonisation, with the rail industry involved in the assessment. It is possible that the rail industry may be in a position to present a unified position to such a body on a detailed harmonised framework;

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[11] ACCC (2022), Guidance Paper: ARTC's Interstate network access undertaking 2023, p.14

- tasking that body with the role of investigating opportunities for enhanced harmonisation of access regulation and management requirements, and recommending specific harmonisation opportunities by way of common principles and procedures;
- providing a process for individual RIMs and jurisdictional regulators to seek agreement on incorporating those principles and procedures into existing regulatory instruments; and
- providing a mechanism for the principles and procedures to be mandated for application within the existing regulatory instruments, through agreement of the relevant Commonwealth and State Ministers.

4.1.6 Strategy 6 – Promote opportunities to expand the above rail market and to maximise rail's competitive service offering

Problem identification

Rail faces intense competition from road in the provision of intermodal freight. However, in terms of rail on rail competition, on each of long distance/interstate corridors other than Adelaide to Darwin, there are currently two intermodal rail freight operators across Australia. A third operator (Aurizon) exited the intermodal freight market in 2017.

There are various structural reasons to explain the limited number of players in the above rail market to date. These include a combination of rail specific as well as generic challenges confronting any industry entrant:

- the presence of high economies of scale in rail line haul, with the volume of freight required to support the viable operation of a new rail operator large in the context of the size of the market and proportion amenable to rail;
- incumbent customer relationships and contracts, which limit the opportunity for new entrants to attract the necessary freight volumes;
- access to a network of efficient, well located intermodal terminals that support new entrants' ability to offer an attractive freight service;
- access to attractive paths (where applicable integrated with terminal slots);
- access to rollingstock, recognising the cost and time associated with acquiring new rollingstock.

Even in sectors where structural conditions can reasonably only support a small number of participants, increasing contestability through reducing barriers to entry is a well recognised means of encouraging increased productivity. For the rail sector, increased productivity driven by increased market contestability can be expected to enhance rail's ability to attract freight from road.

The solution

Many of the factors that limit new entry to the rail market are not unique to rail. The difficulty of attracting sufficient customers from incumbents to support new entry in an environment of high upfront capital costs and high economies of scale is common to many markets. There is ample evidence that these factors can be overcome where there is sufficient opportunity within the market.

However, there are instances where improved access to infrastructure can improve contestability and, hence improve opportunities for the above rail market to grow. In this regard, the rail industry and Governments should continue to support action already in progress to address barriers to entry, including by:

(a) *Access to new publicly supported intermodal terminals* – continue to support decisions around the land use planning, design, strategic management and operation of intermodal terminals in new publicly funded intermodal freight precincts that facilitates non-discriminatory access by third parties;

(b) *Access to rail paths* – the establishment of Inland Rail, together with the development of new intermodal terminals in the east coast capitals, provides an opportunity on the north-south route for the definition of new train paths (linked to terminal slots). Access to these paths will need to be negotiated and granted in accordance with the provisions set out in ARTC's access undertaking, approved by the ACCC.

4.1.7 Strategy 7 – Encourage efficient modal choice

Price is a critical consideration for influencing modal choice for end to end freight movements. Rather than setting prices so that freight customers are 'agnostic' to mode, prices for each mode should be set in such a way that they provide an appropriate signal to encourage the use of the best, most efficient mode for each freight task.

As discussed in the mode share workstream report, in order to attract freight volumes, rail needs to 'price off road'. However, current pricing structures for road freight do not necessarily result in this encouraging the best, most efficient mode for each freight task. Of particular concern is whether road prices are appropriately set to cover the costs imposed by trucks (including the different costs imposed by different types of trucks), which influences the rail freight prices that can be applied.

Beyond the issue of road pricing, there is an issue of whether rail prices (access charges and freight charges) are appropriately set to attract freight volumes from road across the spectrum of freight types, including freight of different densities and haul distances.

In relation to coastal shipping where domestic coastal shipping movements are provided by international carriers as an incremental add-on to the international freight movement, they are able to offer very low rates reflecting only the marginal cost of the movement. In some cases, this cost is able to be further lowered if the international carriers can avoid compliance with Australian maritime regulation. However, these supply chains are highly vulnerable to the vagaries of the international shipping markets and a high reliance on coastal shipping via international carriers can undermine the sovereign capability of Australia's supply chains.

Problem identification

1. Prices for road infrastructure do not encourage the use of the most efficient mode for the right task

In relation to road, the disparity in charging arrangements between road and rail is commonly cited as a reason for rail's lack of competitiveness. There are substantial differences in the approaches used for road and rail network pricing. While it is acknowledged that PAYGO charging structures largely cover the full ongoing cost of road provision (including construction and maintenance) that can be allocated to heavy vehicles[12], the approach of recovering all costs as they are incurred (measured over a seven year period) rather than recovering a capital charge based on an established value of the existing road networks leaves open a question of whether the full value of existing major roads is properly reflected in these charges.

There are also significant concerns over whether the allocation of these costs to different types of vehicles properly reflects the different costs that they impose. There is a view that the current PAYGO structures result in small heavy vehicles cross subsidising large heavy vehicles.[13] Given rail primarily competes with large vehicles, this cross-subsidy will depress the price that can be charged by rail in order to attract freight from road and impede decarbonisation of the transport sector. This is a long running, known, systemic deficiency in the current road pricing structure that has been the subject of numerous reviews over many years.

The solution

(a) The heavy vehicle road charging framework requires review:

  (i) the use of diesel/petrol excise as a means of road funding lacks transparency and creates confusion in relation to policies aimed for the uptake of electric vehicles to improve the environmental sustainability of Australia's transport task. Clear user based charging for heavy vehicles, delinked to diesel utilisation (the carbon impact of which is to be separately addressed), will assist Australian governments achieve both their environmental and transport objectives; and

  (ii) PAYGO pricing methodologies should be independently reviewed to ensure there is no cross subsidisation between vehicle types. In order to do this, responsibility for administering heavy vehicle road user charges could be transferred from the NTC to another body, such as the ACCC (which would be the most appropriate body under existing institutional arrangements).

(b) Policymakers should re-consider the benefits of Mass Distance Charging in relation to setting road user prices on a basis that are more able to reflect full cost recovery, including sunk capital and externalities. However, in the meantime:

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[12] NTC (2021), Heavy vehicle charges consultation report, January 2021, p.7

[13] This issue was examined by the Productivity Commission in 2006 as part of the Inquiry into Road and Rail Pricing. The PC found that a major problem with PAYGO in practice is created by averaging costs across the network. This blurs price signals and leads to cross-subsidies from operators carrying light loads to those carrying heavy loads, from users of lower-cost roads to users of high-cost roads and, indeed, to those benefiting from roads that may be justifiable on social but not economic grounds. See page xxxiii of the PC inquiry report at https://www.pc.gov.au/inquiries/completed/freight/report/freight.pdf.

(i) Increased HPV permits (either increased volume or geographical scope) should only be granted where this has been subject to a cost benefit assessment including considering the likely consequence on mode share; and

(ii) Government incentive schemes to promote efficient mode utilisation may be appropriate in local instances to encourage a mode shift and/or to address a discrete policy objective, and are most effective when used as a transitional measure until the full benefits of longer term strategies to promote rail productivity are realised.

Problem identification

2. Prices for rail freight do not always enable rail to offer a competitive benefit to road

As discussed in the mode share workstream report, in order to attract freight volumes, rail freight charges for intermodal services need to be set that allows above rail operators to compete with road, noting that they may need to 'price off road'.

As a result, the key issues in rail pricing are:

- whether rail access charges are set at a level and structure that allows rail operators to effectively compete with road, while recovering the long run efficient cost of providing and operating the train services; and
- whether rail prices are appropriately set to attract freight volumes from road across the spectrum of freight types, including freight of different densities and haul distances.

Importantly, in considering the issues around rail access pricing, there is a tension between the objective to enable rail operators to effectively compete with road, while also setting a charge that enables sufficient ongoing maintenance and renewal of the rail infrastructure.

Therefore, this does not indicate that there is long term benefit from a move to 'rock bottom' access pricing to facilitate competition with road; such pricing does not support necessary maintenance and investment and will ultimately lead to further service degradation and reduced modal share. And in any case, given the multi-network and multi-jurisdiction nature of many train services, the application of such an approach by any individual network may not work in practice.

The solution

There is opportunity for the rail industry (operators and RIMs) to continue to evolve their pricing structures to improve the alignment of rail haulage prices with competitive alternatives, including across different cargo densities and different train sizes. This can include for rail operators to:

(a) continue, on an ongoing basis, to evolve their price structures in order to maintain their competitiveness with other modes, including across varying cargo densities; and

(b) work with ARTC (and other RIMs) in order to identify whether alternate rail access charge structures may assist rail operators in more closely aligning rail freight charges with competitive alternatives (eg applying the variable charge by loaded wagon rather than by weight).

Similarly, rail operators can continue, on an ongoing basis, to develop other aspects of their service offering in order to maximise rail's ability to compete with other modes, including:

(c) charges applied for one-way backhaul movement to return empty containers used in coastal shipping;

(d) the extent of differentiated transit time product offerings (eg based on priority of loading/unloading at IMTs) to maximise their competitiveness with road and shipping.

Problem identification

3. Regulation of international shipping companies' carriage of domestic freight

Supply chains that are highly reliant on the carriage of domestic freight by international shipping liners are highly vulnerable to the vagaries of the international shipping markets. These shippers are able to carry domestic freight at marginal cost, as they are an incremental add on to their import/export movements, however, availability of this coastal shipping service is not certain. These rates are insufficient to support investment in rollingstock capacity, and therefore cannot be matched by rail operators who need to invest in dedicated trainsets. Hence, a withdrawal of international shipping capacity may leave a gap unable to be filled by existing domestic freight capacity. As a result, policy settings that facilitate a high reliance on coastal shipping via international carriers can undermine the sovereign capability and resilience of Australia's supply chains.

Further, there are broad concerns that international vessels are not subject to consistent regulation to domestic freight operators, particularly in relation to labour arrangements, providing shipping with a competitive advantage. The Australian Government has introduced a range of regulatory requirements that apply to foreign flagged ships providing domestic freight movements, including that, when in Australian waters, international shipping lines are to pay Australian wages to their foreign crews when carrying domestic freight. However, there is currently no mechanism to effectively assess or enforce compliance with these requirements, with the risk that non-compliance could provide international shipping companies with a further unreasonable competitive advantage over rail (and road) transport.

Solution

Legislative amendments should be considered to incorporate a framework that compels foreign flagged vessels to provide evidence of their compliance with Australian shipping regulations. This will provide confidence that Australian regulations are being upheld. Beyond this, while coastal shipping has provided a low cost means of transport, the sudden loss of shipping capacity availability reported during the recent pandemic highlighted the economic sovereignty concerns with this mode. This is an issue worthy of further policy consideration.

4.1.8 Strategy 8 – Improving freight access in metropolitan areas

Problem identification

Within many of our major cities, there is a need for freight trains to operate over rail networks shared with the metropolitan passenger system. While freight services are not necessarily a major user of these metropolitan networks, the 'last mile' connections through urban areas is a critical component of the end to end movement of the freight train, and the efficiency and reliability of that 'last mile' access has significant repercussions for the entire freight movement.

While the metropolitan networks are understandably primarily focused on the successful delivery of passenger services, the application of inflexible passenger priority Government policies can materially reduce overall rail transport efficiency (particularly in term of freight reliability, on-time performance, path availability and rollingstock utilisation). Government passenger priority requirements and peak period curfews apply in Sydney, Melbourne and Brisbane, although it is in Sydney where there is most significant impact on the national freight task, given Sydney's central location within the national freight network, and the extent to which freight trains are required to operate over shared passenger networks.

Passenger priority and peak period curfews are often inflexibly applied in order to, wherever possible, eliminate the risk of freight trains causing any disruption or delay to passenger services. However, this inflexibility makes the task of operating rail freight services challenging and excessively restrictive, and can result in substantial delays to freight services and increasing cost by reducing rollingstock utilisation and the ability to maximise use of rail network capacity.

Also problematic for freight services is the practice of scheduling maintenance, with metropolitan RIMs typically applying scheduled full weekend closures of network segments in order to maximise maintenance efficiency and minimise disruption to passenger services outside of these closures. However, where through freight services require access to multiple network segments (and so are unable to operate when any of those segments are closed), this practice results in significant service unavailability. As a consequence, freight is increasingly moved by road.

The importance of urban networks in providing effective public transport, particularly in peak periods, is unquestioned. However, given the prohibitively high cost of developing separated freight and passenger networks, it is appropriate to consider whether a more flexible approach may improve the ability of the shared networks to deliver an overall benefit to the community.

The solution

Most metropolitan rail commuter networks are operated with substantial State Government funding support. The networks are usually vertically integrated with the rail operator, and run either by Government owned rail operators (eg Sydney, Brisbane) or under Government franchise (eg Melbourne). The funding arrangements for these operators are usually structured either solely or primarily around their performance in passenger service delivery. Freight services have limited commercial leverage on these metropolitan networks.

However, State Governments have the ability to modify the way in which passenger priority arrangements are applied in order to promote the efficiency of rail freight in the context of the transport system as a whole, and therefore promote rail mode share, both for urban and long distance freight services.

Governments should facilitate improved access for freight services through metropolitan networks by:

(a) incorporating organisational incentives into the funding arrangements for metropolitan RIMs to facilitate freight through urban areas, while continuing to recognise passenger priority

(b) defining a more flexible application of passenger priority.

4.1.9 Strategy 9 – Promote rail provider alignment with customer requirements

Problem identification

The factors that influence mode choice include both price and service quality characteristics, and as a result, understanding customers' needs and ensuring that rail's service offering is closely aligned to best meet those needs are critical for rail to effectively compete with road.

There can be barriers to customers accessing rail services. As is evidenced on the Mount Isa line, particularly for smaller bulk customers, difficulties in gaining access to suitable loading and unloading infrastructure, and the requirement to aggregate volumes to full train loads can lead to customers preferring road, even where this may be a higher cost option. Also, where the demand for transport of bulk products is variable, as is the case for agricultural products such as grain, the typical terms of rail contracts (reflecting rail's high fixed costs) can be a disincentive. There are opportunities for rail providers to identify innovative means of enhancing service delivery, or offering alternate contracting structures, in order to address these barriers to the utilisation of rail.

Another consequence of vertical separation is that rail infrastructure providers can become remote from customers, and may struggle to identify the best opportunities to enhance service delivery to provide an improved outcome for those customers.

The solution

Rail providers should continue to pursue opportunities to improve alignment of their services with freight customer requirements, including rail operators continuing to evolve their operating and contracting strategies to include innovative approaches to addressing barriers to the use of rail, and RIMs seeking more direct input from freight customers into business and network strategies, with options including customer engagement forums or through Board representation.

4.1.10 Strategy 10 – Information disclosure

Problem identification

1. **There is insufficient available information to understand the national freight task and the role of each mode**

While the overview of the national freight task provides a broad indication of mode share, a robust understanding of mode share needs to be undertaken at a corridor level, and requires quantitative analysis of the volume of freight moved on each route by each key origin-destination (separately identifying freight movements in each direction), both in total and for each transport mode used. Regular reporting of data, in order to allow assessment of time series information, is essential in order to understand trends in mode share and the factors driving changes.

The varying quality of data availability reflects institutional constraints and industry culture as well as inherent challenges in data collection, such as free rider problems, perhaps exacerbated by differing levels of confidence amongst industry participants in the utility of the exercise.

However, there are several critical gaps in freight mode share statistics, as noted in the Mode Share Workstream:

- Road freight task - the quality of published information on current road freight volumes and service quality measures is generally poor. Often, the necessary data needed to accurately estimate road's share on particular freight routes is not currently collected in any systematic or ongoing way.
  - ABS freight data is collected irregularly and freight categorisation provides limited information on intercity freight. State government truck counts and weighbridge data where it is published is useful, but only partial information is publicly available.
- Rail freight task - conversely, rail freight statistics are collected at the origin destination level by both the rail operator and the rail infrastructure provider, but are not typically publicly available or only available to Government agencies on an in-confidence basis.[14] This means that information on rail freight volumes is usually not visible (with the information used for our mode share analysis directly provided by rail industry participants specifically for the purpose of this Study).
  - Some rail data that BITRE previously collected and reported (in aggregate) relied on the cooperation of individual rail companies to supply such information (BITRE has no legislative powers to compel information to be provided). Complete aggregated data has been unavailable since 2017. There may be a number of reasons for this, but organisations have little incentive to dedicate resources to provide data. However, in order for industry wide rail freight data to be published, data is required to be collected and aggregated from all parties (not just some).

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[14] For example, BITRE does publish rail freight statistics provide by ARTC and Arc Infrastructure on interstate network tonnages, and operator specific volumes already available to the public, such as Aurizon and Tasrail in their annual reports. Further information on rail freight volumes, however, is usually not available or visible.

- Shipping freight task - for coastal shipping, the majority of required data is collected and published.

As part of the National Action Plan connected to the National Freight and Supply Chain Strategy, BITRE has been pursuing improvements to the availability of information, focussing initially on the collation of currently available information into the National Freight Data Hub. However, in order to maximise the effectiveness of the National Freight Data Hub, it is essential that it continue to be developed – with the cooperation of the freight industry - to include comprehensive, reliable and timely information on freight movements for all major transport modes – road, rail and sea freight.

The solution

(a) Enhanced collection and publication of road use data

  (i) As a priority, in relation to road data, State Government Transport Departments should be encouraged to review their existing data collection via their traffic census programs and publish more of their datasets.

    ▪ The data that is now collected and published by Transport for NSW, including truck numbers, categorisations and weights at key highway points, measured at hourly intervals, provides a wealth of information from which data analysis can be used to gain an understanding of road freight volumes distinguished into local vs long distance truck movements, and can even be used to gain a broad understanding of origin-destination truck movements. Other states should be encouraged to review and, if necessary, upgrade, their traffic census programs in order to collect consistent datasets;

    ▪ comprehensive State Government traffic census datasets should wherever possible be regularly published in the National Freight Data Hub in order to facilitate greater transparency and understanding of the road freight task.

  (ii) In the medium term, if this type of information is collected and published by State Governments, this would enable BITRE to prepare regular periodic data analysis reports, interpreting the traffic census data in order to present quarterly information on road freight volumes, including analysis by origin-destination route to the extent that this is able to be ascertained.

(b) Enhanced publication of rail data

  (i) Rail Infrastructure Managers should commit to regularly provide BITRE with rail freight datasets, that are relevant to informing transport policy decisions, including freight volumes, freight types (to the extent ascertainable) and origin-destination (with the recent MoU between BITRE and ARTC providing a template for this data collection). Rail operators should commit to providing RIMs permission for this data to be disclosed to BITRE on an aggregated and de-identified basis, and published in the National Freight Data Hub. If this is unsuccessful in ensuring the efficient and regular collection of rail freight data, a compulsory data collection arrangement may ultimately be required.

Problem identification

2. **There is insufficient available information to understand rail's service performance**

Building supply chain reliability and resilience is a key priority. Reliability of on-time delivery and certainty of service operation (important in and of themselves for time sensitive freight), and predictability of freight arrival (important for all freight categories in order to facilitate efficient local pickup and delivery arrangements) are key aspects of providing an efficient, competitive rail freight services. However, there is no consistent framework or methodology for monitoring the train service reliability, particularly in relation to end to end train movements across different rail networks, including in relation to on-time departures from terminals, improvements in on-time running and restoration of services following interruptions.

Solution

Accurate, timely and consistent public reporting of train service reliability performance requires RIMs and rail operators to reach a settled, standardised view about the reliability related KPIs to be measured, including the extent to which the cause of delays and cancellations can be attributed (noting that detailed identification of the root cause of delays and cancellations can be complex and time consuming). Therefore, Rail Infrastructure Managers and Rail Operators should commit to working with BITRE to:

(a) confirm the preferred suite of reliability KPIs to be collected by Rail Infrastructure Managers and Rail Operators; and

(b) agree to the inclusion of these reliability KPIs in the aggregated information to be provided by RIMs to BITRE, and published in the National Freight Data Hub.

5 Recommended Priority Actions

Having the potential benefit gain and the materiality of constraints for each recommended strategy, as well as the current status of existing programs that are progressing action on a range of these strategies, we have developed a recommended short term priority focus on the following issues, which we consider will provide the greatest opportunity for progress and real value in terms of promoting rail mode shift.

The other strategies incorporated into the recommended policy framework should be progressed as longer term objectives, but with industry prepared to act quickly as opportunities present.

Priority 1 – Building greater network resilience and reliability

Ongoing investment in efficient rail freight infrastructure should continue, with a focus on building greater network resilience and rail reliability. It is critical that the sovereign capability and resilience of our national network of rail freight supply chains is preserved such that rail infrastructure is able to withstand significant events that appear to be happening more regularly and that industry and the public have confidence in these measures.

However, in order to support ongoing improvements in network resilience and reliability, the rail industry should collaborate on an ongoing basis in the preparation and maintenance of an agreed priority resilience and reliability investment pipeline (with the list of projects identified in the Investment & Planning workstream providing a long-list starting point for this). This will require co-ordination by a central body.

This reflects Strategy 1 and Strategy 3(a)(i).

Priority 2 – Promote operational harmonisation through the use of centralised guidance (including mandatory standards), overseen by a regulator responsible for achieving both enhanced productivity and safety outcomes

Federal and state governments, in conjunction with the rail industry, should promote harmonisation of operational standards, systems, processes and technologies, including through the use of mandatory standards where harmonisation is supported by a cost benefit analysis but not agreed through collaborative/consultative processes. A centralised guidance approach that enables a dual focus on safety and productivity matters is recognised as a sensible way forward to improve overall rail freight supply chain productivity.

Options to achieve this include:

- leveraging off existing institutional architecture, most efficiently achieved by redefining ONRSR's role to incorporate a productivity focus and empowering it to develop mandatory standards. This would require the acquisition of additional skills and resources to enable an effective assessment of productivity issues and advocacy for mandatory standards where required, and should be accompanied by a change in name; or

- developing a new rail industry regulator with a broader responsibility for enhanced productivity and safety outcomes.

The preferred option should be determined by the rail industry in consultation with Commonwealth and State Governments.

This reflects Strategy 4.

Priority 3 – Review economic assessment frameworks that influence transport mode

In order to promote the most efficient transport solution for Australia, it is critical that Government policies and investment decisions facilitate modal shift where this promotes a more efficient outcome.

In the immediate term, the Clean Energy Regulator's review of the Transport Method and the Government's parallel review of the Safeguard Mechanism, should make it easier for rail operators to participate in the ERF, including through enabling mode shift projects to generate ACCUs. Reducing rigidities between modes, and reducing the costs associated with rail operators increasing the share of freight transported by rail, is an important step in enabling rail to play its role in the decarbonisation of the Australian economy.

Beyond this, CBAs are an effective tool that can support decisions to identify the most cost effective infrastructure solution. However, the results generated through these evaluations are only as good as their inputs. Governments should review existing parameter values and approaches to ensuring economic, social and environmental benefits of a project are fully reflected and taken into account before evaluating rail/road investment decisions. This is particularly important as Australian governments seek to achieve broader social policy targets.

This reflects Strategy 2.

Priority 4 – Seamless pathing for freight trains across networks

The extent of network fragmentation means that many long distance freight services operate over multiple RIM networks, however there can be significant constraints on gaining seamless paths across these networks, both in terms of capacity allocation and on the day of operation. The introduction of open access terminals may further complicate the allocation of pathing, with paths for intermodal trains needing to align with terminal access slots. Key strategies that are required to achieve this include:

- developing technological solutions for automated scheduling across the full origin-destination route, and potentially extending to terminal scheduling, allowing optimisation of schedules both in capacity planning, and also in the day of operation environment based on real time information on train location and expected arrival time. This will provide the best opportunity to reduce friction and delays at network changeover points and improve customer information on freight status;

- a key aspect of creating seamless paths through the application of technological solutions is the development of a fully specified rules based approach to scheduling and management of out of course running. While the rules need not be fully consistent across all RIMs, this is likely to require a core set of commonly applied definitions and rules between RIMs – a technological solution will only be effective to the extent that it gives effect to these rules; and
- creating incentives for metropolitan RIMs to facilitate freight through urban networks and defining a more flexible approach to applying passenger priority, which is critical not only to improving reliability, capacity utilisation and efficiency of freight services, but also to improving the freight customer experience with rail so that rail can play its natural role in meeting the national transport task.

Provided that a 'cross-network' rules based technological solution is developed and implemented, management of train operations can still successfully rest with individual RIMs. However, there may need to be a mechanism for resolving the core rules to be commonly applied across RIMs. Adjudicating on this issue could ultimately form part of the productivity remit assigned to ONRSR.

Note, this incorporates Strategy (3)(a)(ii), 4 and 8.

Priority 5 – Information collection and disclosure

Prioritisation of improved information collection and disclosure is essential in order to improve the quality of decision making and policy development. The key areas to focus on include:

- *Road freight* – enhanced collection of road freight data to continue to be facilitated by BITRE through:
  - encouraging State Governments to review and, where applicable, upgrade their traffic census programs in order to collect data consistent with that published by Transport for NSW in relation to truck numbers, categorisation and weights on key national highways;
  - to the extent that the additional data becomes available from State Governments, aggregating and regularly publishing the relevant data in the National Freight Data Hub and, provided that the required information becomes available, publishing regular analysis interpreting the data in order to present an assessment of the national road freight task, including on key origin-destination routes.
- *Rail freight task* – Rail Infrastructure Managers should commit to regularly provide BITRE with rail freight datasets, including freight volumes, freight types (to the extent ascertainable) and origin-destination (with the recent MoU between BITRE and ARTC providing a template for this data collection). Rail operators should commit to providing RIMs permission for this data to be disclosed to BITRE on an aggregated and de-identified basis, and published in the National Freight Data Hub. If this is unsuccessful in ensuring the efficient and regular collection of rail freight data, a compulsory data collection arrangement may ultimately be required.

- *Train service reliability* – Rail Infrastructure Managers and Rail Operators should commit to working with BITRE to confirm a preferred suite of reliability KPIs to be collected by Rail Infrastructure Managers and Rail Operators and agree to the inclusion of these reliability KPIs in the aggregated information to be provided by RIMs to BITRE, and published in the National Freight Data Hub.

This incorporates Strategy 10.

2

Improving modal share

Study Into Establishing an Efficient Freight Transport Network

Workstream 1 - understanding conditions influencing modal share

Prepared by Synergies Economic Consulting Pty Ltd

AUSTRALASIAN RAILWAY ASSOCIATION

ACRI
Australasian Centre for Rail Innovation

FREIGHT ON RAIL GROUP

Australian Government
Department of Infrastructure, Transport, Cities and Regional Development
Bureau of Infrastructure, Transport and Regional Economics

Synergies
ECONOMIC CONSULTING

Executive Summary

The Modal Share Working Group has been tasked with forming an understanding of the structural conditions influencing mode share on the key freight corridors (intermodal and bulk routes) included in this study.

The major focus of this Workstream is to apply an evidenced based approach to identifying current market shares on the selected transport routes and how these have changed, as well as understanding the reasons for these changes given the relative performance of each mode against the primary drivers of mode choice. We have relied upon a range of different sources to form our conclusions including publicly available information, consultations with rail industry stakeholders as well as broader stakeholders involved in the freight task.

Key freight corridors

The workstream assesses modal share and modal choice drivers for the following freight routes and key commodities:

(a) Intermodal – a detailed assessment of the East-West and North-South corridors together with a high level assessment of the Queensland North Coast Line;

(b) Bulk[1] - a high level assessment of the Mount Isa line in Queensland (mineral concentrates), the Murray Basin in Victoria (bulk grain) and the Eyre Peninsula in SA (bulk grain).

Intermodal routes

Identifying current mode share

Our estimates of current mode share for the freight routes included in this study are set out in the following table. Those corridors where rail dominates are highlighted in green; those corridors where road dominates are highlighted in blue.

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[1] Due to a lack of data availability, a separate case study on trends in modal share for the SW WA Grain corridor is not possible. General insights into the South West WA Grain corridors are included in the workstream's overall conclusions where relevant.

Table 1 Mode share (%) by corridor (2020)

CORRIDOR	HEADHAUL			BACKHAUL		
Intermodal	**Rail**	**Road**	**Sea**	**Rail**	**Road**	**Sea**
East West	65%	17%	18%	77%	22%	1%
Adelaide – Perth	56%	42%	3%	63%	37%	-
Brisbane – Perth	45%	31%	24%	56%	44%	-
Sydney – Perth	68%	8%	24%	88%	11%	1%
Melbourne – Perth	70%	9%	17%	87%	11%	2%
North South	11%	88%	1%	7%	93%	-
Melbourne – Sydney	2%	98%	-	4%	96%	-
Sydney – Brisbane	3%	96%	-	2%	98%	-
Melbourne – Brisbane	28%	69%	2%	17%	83%	-
North Coast Line	53%	47%	-	42%	58%	-
Brisbane – Cairns	64%	36%	-	42%	58%	-
Brisbane – Tville	83%	17%	-	66%	34%	-
Brisbane – Mackay	38%	62%	-	21%	79%	-
Brisbane – Glad/Rock	12%	88%	-	24%	76%	-

Source: Synergies

For the intermodal freight corridors, the three supply chains achieve significantly different freight outcomes. The results indicate that rail has the ability to capture significant mode share, but only where the conditions exist to allow rail to exploit its natural competitive advantage of cost effectively transporting significant freight volumes over long distances.

- On the east-west corridor, where the required haul distances are long and rail operators are able to operate with efficient train configurations, rail dominates in both directions.
  - In the headhaul market, rail's mode share has historically varied between 60-75% and is estimated at 65% in 2020. Rail mode share had peaked at 73% in 2013, before gradually eroding to 63% in 2019, a trend that reversed in 2020. Changes in mode share have largely resulted from freight shifting between rail and shipping, with road consistently servicing around 15% of the market.
  - Shipping does not participate in the backhaul market in any significant way, and rail competes with road for backhaul freight.
  - Rail's modal performance is strongest in the major trade routes from Melbourne and Sydney to Perth[2], where it achieves mode share of around 70%, and road's share of the market is less than 10%, likely limited to the express freight task. However, road

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[2] Where in this report we refer to routes from one city to another, this includes the hinterland catchment area around each city from which rail freight is drawn. The size of this catchment area varies according to the route being considered, with rail freight drawing from a larger catchment area as the length of the linehaul movement increases.

captures a third or more of the market from the smaller Brisbane and Adelaide to Perth routes.

- On the north-south corridor, with shorter haulage distances, rail faces significant challenges to capturing mode share.
  - Road is the dominant mode in both directions for all origin-destinations pairs. Over time, road has successfully entrenched itself to capture around 88% of the headhaul task and around 93% of the backhaul task. Rail's modal share has declined significantly from 1995, but has generally stabilised over the last 15 years.
  - Rail's modal share is strongest in the long distance Melbourne-Brisbane leg. Synergies estimates that rail achieves 30% of volumes in the headhaul direction and 17% for the backhaul (total corridor basis). However, on the shorter Melbourne-Sydney and Sydney-Brisbane legs, rail achieves a mode share of under 5%.
  - There is some degree of uncertainty about road freight volumes by line segment on the north-south corridor due to the assumptions made about the geographic zone for each origin-destination pair. However, Synergies' estimates of total road freight volumes along the north-south corridor have been internally reviewed against other available information provided on a confidential basis by BITRE.
- The most intense levels of modal contestability are on the north coast line corridor where road and rail are evenly matched.
  - In the headhaul market, road dominates for route distances up to 1,000km (Gladstone, Rockhampton, and Mackay); however the mode shares are reversed for Townsville and Cairns, where route distances exceed 1,500km.
  - For the backhaul route, road generally captures a stronger share of the backhaul markets, although the exception is Gladstone/Rockhampton, where rail has a strong share of the market, likely influenced by movements of high density industrial products.

Modal choice drivers

Our analysis has categorised intermodal freight through the prism of ‘supply chain needs’, in order to understand the underlying reasons driving the mode share outcomes, and to assess the extent to which freight is structurally advantaged towards a particular mode.

Modal choice is influenced by both the nature of the transport task and characteristics of the transport service. The key factors are:

- *Reliability* - which encompasses on-time performance, confidence that the service will run as planned, and risk of damage to freight;
- *Frequency/availability* – whether the service is available at times and frequency, and with sufficient capacity, to meet the customer’s requirements;
- *Transit time* – end to end transit time is the critical consideration, including, where applicable, the time required for pick up and delivery to the freight terminal;
- *Price* – again, price for the end to end freight movement is the critical consideration, including where applicable, pick up and delivery to the freight terminal;
- Other factors, that may influence mode choice decisions include:
  - *Sustainability* - numerous companies have corporate policies in favour of reducing their ‘carbon footprint’, which may influence their preferred option, while rail currently has a sustainability advantage over road, this may diminish over time with movement towards alternative fuel sources for trucks;
  - *Complexity* – rail, and shipping, reflect a more complex transport solution which may require greater management effort, with anecdotal reports that rail freight charges need to be around 10% lower than road to compensate for this “hassle factor”;
  - *Risk/diversification* - customers may prefer to maintain some diversification in their freight channels, in order to reduce the risks associated with reliance on a single mode.

Rail’s service quality (in terms of reliability, frequency and transit time) is generally poorer for than road, therefore for rail to be competitive against road, the total cost to the customer for rail freight (including terminal and pick up and delivery (PUD) costs) will usually need to be well below the total cost to the customer of alternative road freight services.

However, the modal choice factors are weighted according to the type of freight. For intermodal freight, decisions about mode choice are largely based on the time sensitivity of the product’s delivery, from which price/service trade-offs can then be considered. For our identified freight categories:

- *Express freight* - service quality parameters are paramount and customers are not willing to accept rail's poorer service quality, therefore express freight is almost invariably carried by road or air;
- *Fast moving consumer goods (FMCG)* – delivery of these products is usually time sensitive, with stocks needing to be regularly replenished. Reliability and frequency of freight delivery is very important, however customers may be prepared to accept a modestly longer transit time for lower cost service;
- *Slow moving consumer goods (SMCG) and industrial and construction products* – delivery of these products is usually less time sensitive and customers may be willing to accept lower service quality for a lower cost service, particularly where they have warehousing capacity available at the destination.

Reasons for rail's mode share performance – east-west corridor

The relative service quality performance for the three main transport modes is summarised in the table below:

Table 2 East-west corridor - service quality relative to road

	Rail	Shipping
Transit time	**Comparable to moderately slower** Standard rail services are comparable to standard (solo driver) road services, but express (two driver) road services 40% faster than express rail Except Brisbane-Perth where standard rail transit time is significantly longer than standard road (around 25% longer)	**Much slower** Coastal shipping takes approximately 4 times the time for standard road/rail
Frequency	**Moderately less frequent** Rail offers daily service frequency, compared to road's 'as required' service	**Significantly less frequent** Shipping services usually operate once per week, but multiple liners means services may be available more frequently
Reliability	**Significantly less reliable** Rail's reliability in achieving advertised freight availability times is poor, at 60-70% in the headhaul direction compared to road's average of 98%.	**Significantly to much less reliable** Current international schedule reliability of ~35% with average 7 day delay (but affected by COVID related capacity constraints and high congestion) Historic schedule reliability of ~75% with average 4 day delay Typical delay to freight availability not publicly reported, but average delays significantly exceed assumed 2 day availability allowance
Price	**Significantly lower** Rail freight (including PUD) generally 60-70% of road freight cost	**Much lower** Shipping rates (including PUD) generally 30-40% of road freight costs, or around 50% of rail freight cost

Source: Synergies

From Sydney and Melbourne to Perth, road freight is estimated to hold less than 10% of the market. This is likely to represent the express category of freight that is structurally advantaged towards road, due to its very high requirements for timeliness and reliability. It appears that, from these origins at least, the extent of the freight charge discount offered by rail and shipping (as compared to road) means that largely all of the remaining categories of freight that are willing to accept a tradeoff between service level and price have done so, and that road is at a structural disadvantage to rail and shipping on these routes (except for express freight). However, this structural disadvantage may erode over time if ongoing road improvements allow ongoing productivity gains, eg through reduced transit times or increased product volumes per truck movement. Further, where rail is unable to offer a generally comparable transit time to standard road (such as for Brisbane-Perth), there is increased utilisation of road.

Shipping competes strongly against rail on these corridors, attracting customers who are willing to accept much slower transit times and reliability in return for much lower freight rates. The proportion of the market willing to accept this tradeoff has increased over recent years, as warehousing capacity in Perth has increased. Coastal shipping services are incidental to the liners primary international movements, and rates only need to provide an acceptable margin above incremental cost (which is very low). Reflecting this, changes in mode share between rail and shipping have been primarily driven by changes in the global shipping market – in times of stability, the shipping liners actively pursue the domestic freight task, building market share, but in the event of major disruption in global supply chains (as has occurred most recently with COVID-19) they withdraw to focus on their major international markets. When global supply chains stabilise, it can be expected that shipping lines will again aggressively pursue domestic cargoes, however it should be noted that there will be a natural limit on the capacity that they can make available for the domestic trade, given that this capacity is only offered to the extent that it is not required for international containers. Synergies estimates that, prior to COVID, shipping's increased mode share meant that those carriers that were then participating in the domestic trade were already using most of the capacity that they were at that time able to make available for domestic cargoes.

Reasons for rail's mode share performance – north-south corridor

The relative service quality performance for road and rail is summarised in the table below:

Table 3 North-south corridor - service quality relative to road

	Rail
Transit time	**Significantly slower to much slower** • Melbourne-Brisbane standard rail service is 25% slower than standard (solo driver) road, and 60% slower than express road • For shorter Melbourne-Sydney and Sydney-Brisbane routes, rail is well over double the transit time for road
Frequency	**Moderately less frequent** • Rail offers daily service frequency, compared to road's 'as required' service
Reliability	**Moderately less reliable** • Rail's reliability of achieving advertised freight availability times is around 85% in the headhaul direction, compared to road's average of 98%
Price	**Moderately lower** • Rail freight (including PUD) generally 80-90% of road freight cost

Source: Synergies

The poorer rail mode share on the north-south corridor reflects the combination of poorer service quality and higher cost relative to road. Compared to the east-west corridor, the key difference in service quality relates to transit time where, rather than standard rail being comparable to standard road, rail transit times are significantly to much slower than road. Combined with this, the total price for rail freight (including PUD) provides a much lesser discount to the price for road freight, both in proportional and absolute terms, only marginally greater than the discount required to compensate for the additional "hassle factor" of rail. This impact is particularly evident on the shorter routes.

Contributing to this outcome is road's productivity performance on this route, where upgrades of major interstate highways have allowed for road productivity to increase by reducing transit times (particularly on the Hume Highway and Pacific Motorway), allowing increased use of larger truck types (particularly on the Newell Highway) and more generally improving the resilience of the road network to withstand major weather events. In contrast, rail productivity on this corridor has stagnated. In combination, the gradually increasing service quality gap, and the gradually decreasing price discount for rail, will have led to the gradual trend reduction in rail mode share.

Reasons for rail's mode share performance – Queensland north coast

The relative service quality performance for road and rail is summarised in the table below:

Table 4 Queensland north coast corridor - service quality relative to road

	Rail
Transit time	**Significantly slower to much slower** • Brisbane-Townsville/Cairns is significantly slower than standard road, but can achieve overnight plus one day delivery timeframe preferred by freight customers • For shorter Brisbane-Gladstone/Rockhampton routes, rail is well over double the transit time for road
Frequency	**Moderately less frequent** • Rail offers daily service frequency, compared to road's 'as required' service
Reliability	**Slightly less reliable** • Rail reliability compared to advertised freight availability times for Townsville is around 95%, compared to around 98% for road
Price	**Moderately lower** • Rail freight (including PUD) generally 70-80% of road freight cost for longer distance routes

Source: Synergies

The changes in rail's mode share over the last 10 years have broadly aligned with changes in the size of the total freight market, with rail freight volumes remaining relatively stable, and the road freight task varying more significantly with changes in the total market size. Total freight volumes declined over the period to 2017 – a period in which rail's share of the market gradually increased. From 2017, rail's mode share fell sharply, likely reflecting a combination of an increasing total market size, and a reduction in rail capacity as Aurizon rationalized services before its exit from the intermodal market (with total rail services reducing by 10%). This indicates that rail's market share may be limited more by train service capacity than by rail's competitiveness with road, particularly for the longer haul services.

Key trends and conclusions – intermodal freight

- *The key drivers of mode choice are door-to-door price, reliability and transit time* – however even before reliability and transit time factors are taken into account, the greater logistical complexity of a rail movement means that rail needs to provide a discount to road to account for the "hassle factor" of using rail – anecdotally considered to be around 10%;

- *Rail has poorer service quality than road, but many customers are willing to trade off price and service quality provided their overall service requirements can be met* - where rail can offer the same day daily delivery service as a standard road service, it is able to meet the overall service requirement for time sensitive freight. Where it also offers a substantial (30-40% cost reduction), it is strongly preferred over road, notwithstanding its generally lower reliability. However, even where rail has much longer transit times than road, this is acceptable to non-time sensitive freight if rail can offer a lower cost. As the level of cost reduction offered by rail reduces, we can observe a greater share of the market preferencing road – for these corridors, improving service quality for rail may improve its attractiveness to freight customers at a given price.

- *Haul distance is important to price and service quality* — it is commonly understood that rail's ability to offer a cost effective haulage solution increases as haul distance increases. However, it is also the case that rail's ability to achieve comparable service quality can improve as haulage distance increases. This reflects that the additional time allowances required for rail – being the PUD time and freight cut-off and availability allowances – are a less material component of the total transit time as haul distance lengthens. Further, longer haul distances may allow greater opportunity to 'make-up' delays that occur en-route. Hence, rail is at a structural disadvantage relative to road for most freight types for shorter distance hauls of less than 1,000km. However, there are certain freight types on shorter hauls that remain well suited to rail, such as higher density, non time-sensitive products;

- *Shipping will return as a strong competitor for long distance freight* – once the global shipping market stabilises, it can be expected that international carriers will again focus on capturing domestic freight in order to improve the margin on their international services. Given domestic cargoes are incremental to their primary freight task, their ability to offer very low charges means that shipping will be attractive to customers who can tolerate long and unreliable transit times given their warehousing availability. However, there is a natural limit to the capacity available for domestic cargoes, as vessel capacity will be optimised to the required international cargo task.

- *Road productivity has increased faster than rail* – while productivity for a given truck type has remained stable over time, significant productivity gains are able to be achieved where road can increase the use of high productivity vehicles on a route. Key corridors show a trend of increasing use of larger vehicles within existing limits (i.e. trend to increasing use of road trains on the east-west corridor and increasing use of B-doubles between Melbourne and Brisbane). Recent approval for the unrestricted use of road trains for the full NSW portion of the Newell Highway increases the opportunity for higher productivity vehicles to operate on the Melbourne-Brisbane route in future. In the absence of ongoing productivity gains for rail, this will reduce the relative price advantage that rail can offer freight customers.

- *Inland Rail will facilitate a step increase in rail productivity for Melbourne-Brisbane* – with Inland Rail, rail operators will be able to operate rail services at their productivity frontier, with the potential reduction in door-to-door rail costs estimated to be 20%. However, noting the increased opportunity to run road trains on the Newell Highway, if this corridor reached road's productivity frontier (with similar truck composition as the east-west corridor), road costs could reduce by around 13%. The productivity gains that rail can achieve from Inland Rail will, alone, not be sufficient to guarantee a preference for rail – other strategies to promote the attractiveness and competitiveness of rail will also be required;

- *Efficient access to highly productive intermodal terminals* – efficient access to intermodal terminals, particularly through co-location of warehouses and distribution centres, together with rapid loading and unloading of trains, can significantly reduce the costs and barriers to using rail services, both in terms of the time and cost of the PUD movement, loading and unloading of trains, and the additional logistical complexity associated with using rail. Efficient terminal access will reduce rail's door-to-door cost, allowing it to compete more effectively with road, including over shorter distances. Ensuring the availability of highly efficient intermodal terminals is the most significant issue for promoting the use of the Inland Rail project.

- *The relative attractiveness of rail can be significantly increased by improving rail reliability* – rail's reliability in achieving advertised freight availability times is the key metric from a customer perspective, however this is affected by reliability in each component of the rail freight service, including rail network, rail operator and IMT performance. Improved service reliability can assist rail's attractiveness, not only by directly improving rail's reliability relative to road, but also by reducing effective transit time as a result of reducing the required buffer time built into the freight availability allowance, and also improving rail operating costs by reducing operating variability. However, there is currently insufficient information available on the key factors contributing to rail's reliability performance to analyse how these benefits may accrue;

- *Strategies to improve the productivity and competitiveness of rail* – strategies developed in subsequent workstreams should focus on:
  - their ability to influence the key modal choice factors – being price (for the door-to-door freight movement), reliability and transit time; and
  - the ease of accommodating volume growth, noting that uncertain demand coupled with the high cost of investing in additional trainsets and barriers to entry can disincentivise the provision of increased train services.

Bulk corridors

Identifying current mode share

Table 5 Mode share (%) by corridor (2020)

Corridor	Headhaul		
Bulk	**Rail**	**Road**	**Sea**
Mount Isa Line			
• Mount Isa region to Townville	84%	16%	-
Victoria Murray Basin			
• Murray Basin region to Port	35%	65%	-
SA Eyre Peninsula			
• Eyre Peninsula to Port Lincoln	0%	100%	-

Source: Synergies

Our high level review of a selection of bulk freight tasks shows that rail has had differing levels of success in competing against road.

- *Mount Isa* - rail is the dominant mode for bulk products, achieving mode share for minerals/mineral concentrates in the range 80-90%. Rail's dominant position for bulk haulage has been maintained over a long period of time. However, rail's performance in carrying intermodal freight is mixed, with rail intermodal services being withdrawn in 2017. While intermodal rail services have since been re-introduced, they have not been completely successful in recapturing rail's previous mode share, with increased road mass limits allowing significant improvement in productivity for road transport.
- *Murray Basin* - historically, rail was the dominant form of transport for export grain from the Murray Basin, with a reported mode share of around 90% in 2000. However, rail infrastructure quality was allowed to deteriorate in the early 2000s, with the effect that service quality dramatically declined, as did rail's mode share, falling to around 35% in 2020. Despite recent investments in regional rail upgrades, continuing infrastructure constraints mean that rail operating efficiency remains poor, and road continues to be the dominant mode of transport for export grain. While our case study analysis has focused on grain export movements, deterioration in service quality of rail compared to road is likely to have implications for the modal competitiveness of other freight commodities (e.g. intermodal and mineral sands) that are also reliant on an efficient rail freight solution. Where current investments in the Murray Basin rail network do not deliver the necessary gains to make rail a more attractive freight mode to road, other complementary investments in supply chain solutions that support other rail freight traffic may no longer be commercially viable.

- *Eyre Peninsula* – up until March 2019, grain was transported on the Eyre Peninsula via a combination of road and rail, however rail's infrastructure and service quality was poor. Continued use of rail would have required major reinvestment in the network and rollingstock, which was not commercially viable. The Eyre Peninsula grain network was ultimately closed once the assets reached 'end of life'.

Reasons for rail's mode share performance – bulk corridors

While rail is typically viewed to have an advantage in transporting bulk freight, this is not universally the case. Rather, mode share is driven by factors that are highly specific to each route. Our review of the selected bulk freight corridors has produced the following insights to the factors that influence mode choice for bulk freight:

- *Price, and the ability to deliver large shipments in a timely manner, are the overwhelming determinant of mode choice for bulk freight* - bulk freight is generally not time-sensitive, and given a requirement to move high volumes of freight, customers are willing accept rail services providing a slower transit and poorer reliability, if it is able to offer a lower price than road.

- *Rail is the preferred mode for bulk haulage, provided the infrastructure supports an efficient train service* – for major bulk operations, such as the WA iron ore railways and east coast coal haulage railways, rail is overwhelmingly the preferred mode. For smaller bulk operations, such as those investigated in this study, the ability of rail to offer a significant discount to road depends on its ability to operate efficient rail services. Both the Mount Isa bulk minerals and the trunk routes for the WA bulk grain services operate to contemporary standards in terms of allowable train configurations and speeds (albeit often significantly slower than road). For these routes, provided that freight customers can readily access rail, it remains the preferred mode. However, where rail infrastructure quality creates major impediments to the operation of an efficient rail service, such as in the Murray Basin or the Eyre Peninsula, road transport is dominant.

- *There can be barriers to customers accessing rail services* – as is evidenced on the Mount Isa line, particularly for smaller bulk customers, difficulties in gaining access to suitable loading and unloading infrastructure, and the requirement to aggregate volumes to full train loads, can lead to customers preferring road, even where this may be a higher cost option;

- *Rail's high fixed costs mean that operators require volume commitments to invest, but this can deter freight customers who want to retain flexibility* – rail operators usually require a firm commitment from customers (in terms of volume and term), in order to support the required investment in rollingstock capacity. However, where volume is uncertain, such as is the case in agricultural markets or smaller resource projects, customers may be unwilling or unable to provide this commitment, resulting in a preference for road.

- *Suitable infrastructure quality is critical* - where major infrastructure deficits have accrued, this imposes massive constraints on the ability of rail operators to run an efficient rail service using contemporary standard rollingstock.

- *Major infrastructure deficits are complex and costly to reverse* – major infrastructure deficits are complex and costly to address, and the need for major reinvestment can trigger the closure of marginal rail routes once rail assets reach 'end of life', such as the Eyre Peninsula or WA's 'Tier 3' grain lines. The Murray Basin, where the Government decided to reinvest to reinvigorate rail, demonstrates the complexity of upgrading degraded infrastructure, where considerable investments have occurred but no discernible improvement in rail service quality has been observed.

- *Major reinvestment in rail to achieve contemporary standards may not be economically viable* - where market conditions are less conducive to an efficient rail service, commercial revenues are unlikely to sustain ongoing reinvestment in rail infrastructure and rollingstock to maintain contemporary standards (although it may remain viable to continue to operate by 'sweating' the assets for their remaining physical life). In these instances, it is appropriate that governments comprehensively evaluate the economic benefits of reinvesting in rail compared to allowing the full transport task to be carried by trucks and accordingly investing in road upgrades as required.

- *There are opportunities for rail operators to improve rail's mode share for contestable bulk services* – based on the routes examined:
  - innovative approaches to facilitate the consolidation and loading of freight from smaller producers may help to reduce the barriers to accessing rail services. For example, the recent introduction by Aurizon of a scheduled bulk/intermodal train to the Mount Isa line, together with the development of a common user loading facility, may help to promote rail mode share.
  - commercial arrangements may be structured to promote rail utilisation. In WA, CBH's integration into the rail haulage market (as a result of its acquisition of rollingstock for its services) meant that CBH accepted the fixed costs of rollingstock ownership and the marginal cost to CBH of increased rail utilisation was low. This encouraged CBH to maximise its use of rail services.

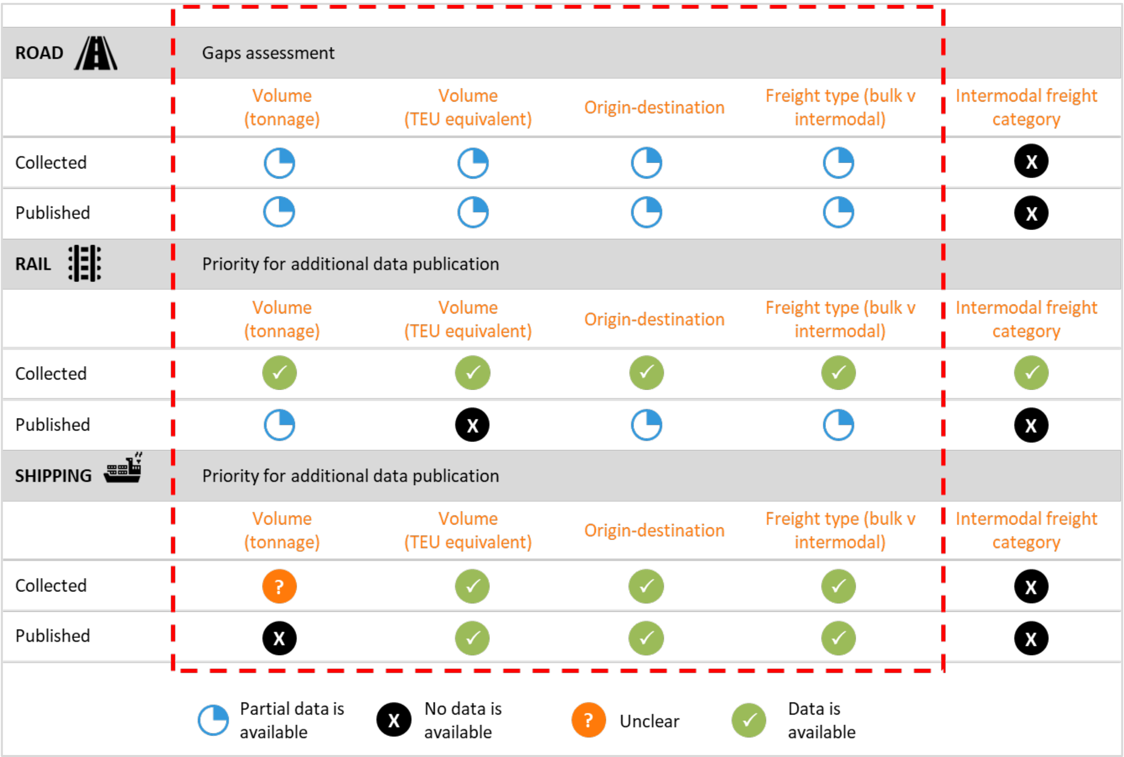
Identifying information gaps and constraints in understanding mode share

The modal share analysis presented above is subject to a number of data limitations. The quality of information varies according to mode, and by route. While there is some data available, there is still an incomplete understanding of where freight moves to, and which routes are utilised. Better data is required for sound planning and policy development.

The critical datasets for understanding mode share by origin-destination route relate to tonnage, a volumetric measure (i.e. TEU equivalent) and broad industry freight type (i.e. bulk vs intermodal). For intermodal freight, information that identifies, at a more granular level, the type of cargo carried (i.e. 'what's in the box') is ideal as it may assist in understanding modal choice drivers, but it is considered to be a 'second order' issue in terms of quantifying the size of the freight task by each mode.

Comprehensive data on each of these key aspects is not publicly available. We have identified a number of limitations and gaps in the existing data available to providing a better understanding of modal share (see the following figure).

Figure 1 Gaps assessment – by mode



ROAD	Gaps assessment				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Collected	◔	◔	◔	◔	X
Published	◔	◔	◔	◔	X
RAIL	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Collected	✓	✓	✓	✓	✓
Published	◔	X	◔	◔	X
SHIPPING	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Collected	?	✓	✓	✓	X
Published	X	✓	✓	✓	X

◔ Partial data is available
X No data is available
? Unclear
✓ Data is available

Source: Synergies

By mode:

- *Road* - ABS freight data is collected irregularly and freight categorisation provides limited information on intercity freight. State government truck counts and weighbridge data where it is published is useful, but only partial information is publicly available;

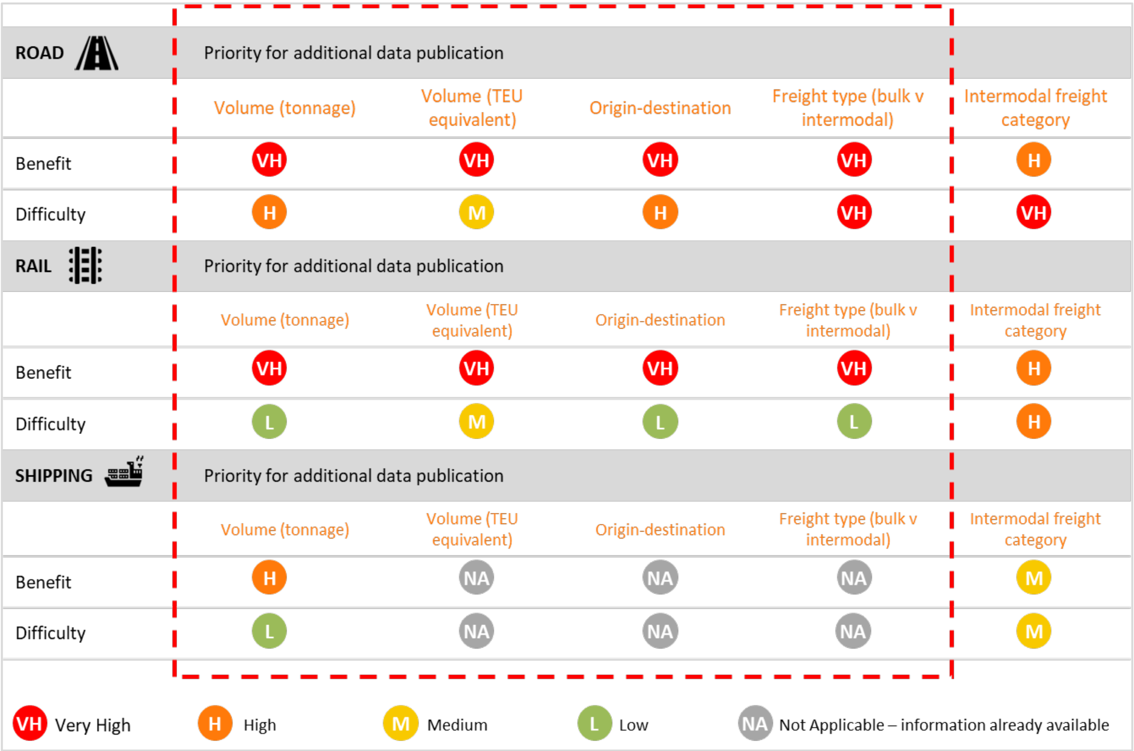
- *Rail* - data is collected for all information requirements by either the rail operator and/or the rail infrastructure provider however, most datasets are not publicly available;
- *Sea* - the most critical datasets are collected and published, however, there is scope for further information to be collected and published, particularly tonnage and type of freight.

A prioritisation framework for addressing the data gaps should have regard both to the potential benefit of the information, and the likely difficulty associated with collecting it. In considering options for collecting data, two key issues are:

- *Source of data* – data is collected by both infrastructure managers (rail infrastructure managers and State Government departments in the case of road) and freight operators. It is likely to be easier to collect data from infrastructure managers, as they already have in place mechanisms to assemble relevant data on a consistent basis, however there are some datasets that infrastructure managers will not be able to provide, particularly in relation to type of freight carried.
- *Compulsory or voluntary data provision* – a voluntary data provision framework is generally problematic, as data may be commercially sensitive and, regardless of sensitivity, organisations have little incentive to dedicate resources to provide data. As a result, there are usually gaps and inconsistencies in the information collected. Given the necessity for comprehensive reporting of statistics, a compulsory reporting mechanism that provides for a consistent dataset to be collected for each rail network may ultimately be required.

A prioritisation framework for the collection of additional data is summarised below. Note, in assessing the difficulty associated with publishing information, we have considered both the difficulty associated with collecting the information (including having regard to the number of parties that would need to provide information, whether they have clear visibility over this information and whether they are likely to have existing information systems that collect this information), and to developing a mechanism for publishing the information.

Figure 2 Prioritisation of data gaps



ROAD	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Benefit	VH	VH	VH	VH	H
Difficulty	H	M	H	VH	VH
RAIL	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Benefit	VH	VH	VH	VH	H
Difficulty	L	M	L	L	H
SHIPPING	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Benefit	H	NA	NA	NA	M
Difficulty	L	NA	NA	NA	M

VH Very High H High M Medium L Low NA Not Applicable – information already available

Source: Synergies

Recommendations

The Infrastructure & Planning, Safety & Operations and Policy workstreams will consider range of strategies that impact the service quality and operational efficiency of rail, as well as the broader incentives to use rail freight as influenced by Government policy. However, there are a number of issues that have been specifically identified in this workstream which directly influence the competitiveness of rail relative to road.

Recommendation 1

(a) As a priority, in relation to road data, BITRE continue to work with the National Freight Data Hub and relevant State Government Transport Departments in order to:

(i) identify and/or confirm a preferred suite of road freight data metrics that should be collected by State Governments through their traffic census programs in order to provide for the collation of consistent information in relation to truck numbers, categorisation and weights on key national highways. The data currently collected and published by Transport for NSW, including truck numbers, categorisations and weights at key highway points, measured at hourly intervals, provides a wealth of information from which data analysis can be used to gain an understanding of road freight volumes. Freight can be distinguished into local vs long distance truck movements, and the data can even be used to gain a broad understanding of origin-destination truck movements. Other states should be encouraged to review and, if necessary, upgrade their traffic census programs in order to collect consistent datasets;

(ii) comprehensive State Government traffic census datasets should wherever possible be regularly published in the National Freight Data Hub in order to facilitate greater transparency and understanding of the road freight task;

(b) In the medium term, if this type of information is collected and published by State Governments, this would enable BITRE to prepare regular periodic data analysis reports, interpreting the traffic census data in order to present quarterly information on road freight volumes, including analysis by origin-destination route to the extent that this is able to be ascertained.

Recommendation 2

In relation to rail data:

(a) Rail Infrastructure Managers should commit to regularly provide BITRE with rail freight datasets, that are relevant to informing transport policy decisions, including freight volumes, freight types (to the extent ascertainable) and origin-destination (with the recent Memorandum of Understanding between BITRE and ARTC providing a template for this data collection); and

(b) Rail operators should commit to providing RIMs permission for this data to be disclosed to BITRE on an aggregated and de-identified basis, and published in the National Freight Data Hub. If this is unsuccessful in enabling the efficient and regular collection of rail freight data, a compulsory data collection arrangement may ultimately be required.

Recommendation 3

That Rail Operators:

(a) continue, on an ongoing basis, to evolve their price structures in order to maintain their competitiveness with other modes, including across varying cargo densities; and

(b) work with ARTC (and other RIMs) in order to identify whether alternate rail access charge structures may assist rail operators in more closely aligning rail freight charges with competitive alternatives (eg applying the variable charge by loaded wagon rather than by weight);

Recommendation 4

That Rail Operators continue, on an ongoing basis, to develop other aspects of their service offering that may maximise rail's ability to compete with other modes, including:

(a) charges applied for one-way backhaul movement to return empty containers used in coastal shipping;

(b) the extent of differentiated transit time product offerings (eg based on priority of loading/unloading at IMTs) to maximise their competitiveness with road and shipping.

Recommendation 5

Given the limited visibility on the factors contributing to delays, that ACRI consider facilitating, in conjunction with rail operators and RIMs, a research investigation into the specific factors contributing to delays, and impacting on rail freight's reliability performance, on the east-west and north-south corridors.

Recommendation 6

That Rail Operators continue, on an ongoing basis, to investigate opportunities for innovative operating and contracting strategies that may promote increased utilisation of rail for bulk products with smaller or more variable volume, eg through greater aggregation of freight from smaller producers.

Contents

Figures and Tables

1 Introduction

1.1 Background

As a nation, Australia is heavily dependent on efficient freight connections, with our capital cities and major towns often separated by large distances. Our freight task is continuing to grow strongly, forecast to increase by 35% by 2040, but freight productivity and costs have plateaued since the 1990's.[3] Australia's National Freight and Supply Chain Strategy identifies the importance of developing an integrated transport network to meet Australia's future freight needs. This Strategy relies on all transport modes playing their part, including rail. However, in order for rail's full potential to be realised, the sector must first overcome a number of entrenched, legacy constraints that inhibit efficient freight solutions.

There are long held concerns in the rail industry about a loss of mode share on some of Australia's key freight corridors. The industry contends that rail freight services have suffered a secular decline in market share on several major routes and jurisdictions across the country. While the current COVID-19 pandemic may have seen the rail industry increase mode share on some routes, there remains a risk that this will be a temporary effect only, with mode share declines recommencing once global and domestic supply chains stabilise.

Understanding the changes and the underlying causes of change can help ensure that the significant investment in the Inland Rail Project delivers on its promise of arresting the decline in rail market share on the north-south corridor. Identifying all of the settings required to deliver an efficient rail service is all the more critical to ensuring this major infrastructure investment achieves its goals. Moreover, understanding the underlying causes of any loss in rail's market share is critical to identifying a pathway for ensuring that rail delivers to its potential in the national transport task.

If Australia is to realise the promise of an efficient transport network, it is important to identify and implement the necessary policy, regulatory and operational settings required to maximise the natural advantages associated with each mode, particularly for an efficient freight rail service.

1.1 Study objectives

In this context, Synergies has been engaged by ACRI to:

- review the current market position of specified freight rail services (both intermodal and bulk) competing with road haulage across key routes;

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[3] National Freight and Supply Chain Strategy, see https://www.freightaustralia.gov.au/what-is-the-strategy/why-we-need-action

- identify factors adversely impacting the freight rail sector delivering its full potential as part of the national freight transportation task;
- identify opportunities to improve freight rail productivity and increase modal share; and
- identify priority policies and industry actions that would allow the increased use of freight rail in ways that provide benefits for freight customers and the community.

This Study has been organised into the following workstreams:

1. Modal share – understand current market share by transport mode, as well as the changes and underlying causes of changes in rail's share of the national transport freight task;
2. Infrastructure and planning - understand infrastructure requirements for successful rail performance;
3. Safety and operational – understand current constraints on rail industry operational efficiency; and
4. Policy - understand policy options to allow the full potential of rail freight to be realised.

The Study is to be evidence based to the maximum extent possible. Its focus will be on understanding industry developments as the key pathway to identifying actions and solutions. The Study will focus on evidence from the east-west and north-south intermodal freight corridors, with a higher level consideration of the Queensland north coast line intermodal freight corridor as well as selected bulk corridors.

1.2 Modal Share Workstream

The Project Brief identifies the following key analytical tasks for the **Modal Share** Workstream:

- identify (based on available data) current market share for alternate modes on the selected transport routes (including both intermodal and bulk routes)
- understand structural conditions influencing modal share
- identify information gaps and constraints in understanding current modal shares
- assess modal choice drivers, and relative structural advantages of different modes
- assess structural changes in the rail market and mode share, including the extent and causes of recent possible mode share decline
- assess relative modal productivity performance.

This workstream is designed to provide a better understanding of the structural conditions influencing mode share where rail competes with other modes, including road and coastal shipping.

It is also designed to highlight where the greatest productivity challenges for freight rail exists — which is in intermodal freight (where road is a fierce, often superior competitor). Some of the learnings from the intermodal analysis have implications for the bulk supply chains, which are also included in the study.

The study methodology that has been used to prepare this analysis adopts an evidence-based approach, as follows:

- estimation of current market shares for alternate modes on key transport routes uses a range of information based on tailored participant information requests and other published sources (section 3.3 presents further details about our approach);
- examination of modal choice drivers is based on desktop review of published studies as well as consultation with rail operators and infrastructure providers; and
- assessments of relative productivity performance draws on a desktop assessment, enhanced by additional information on rail service quality performance outcomes provided by rail industry participants.

1.3 Report structure

This report is set out as follows:

- Part A – Issues and approach
  - Section 2 – freight task overview
  - Section 3 – assessing mode share, and considering information gaps and constraints
  - Section 4 – assessing drivers of mode choice and structural advantage
- Part B – Corridor studies
  - Section 5 – East-west corridor intermodal freight
  - Section 6 – North-south corridor intermodal freight
  - Section 7 – Queensland north coast line intermodal freight
  - Section 8 – Trends and conclusions – intermodal freight
  - Section 9 – Bulk freight corridors
- Appendices
  - Appendix A – Detailed methodology for mode share assessment
  - Appendix B – Heavy vehicle productivity

Part A – Issues and Approach

2 Nature of Australia’s freight task

2.1 Overview

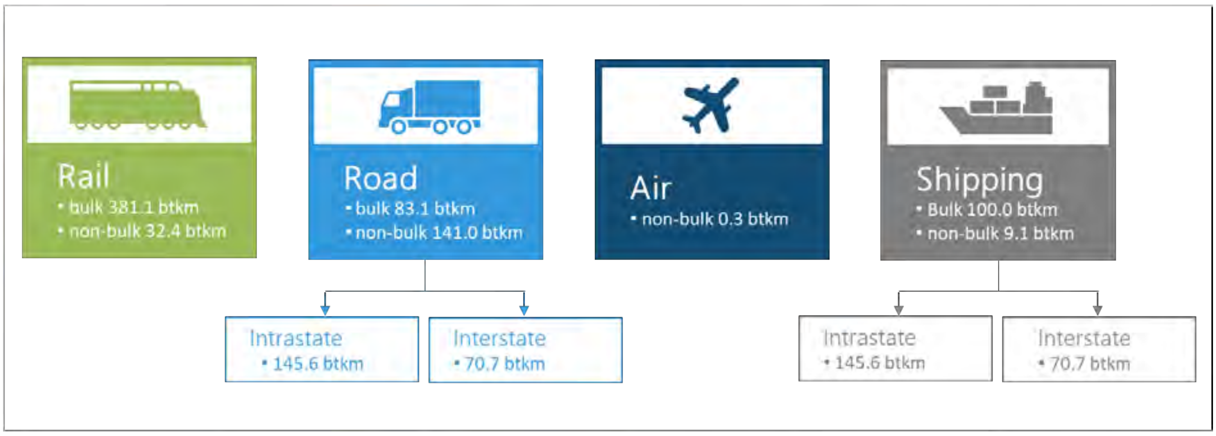
Within the overall freight task, freight is generally broken into two categories; bulk freight and non-bulk (or general) freight.[4] For the purposes of this report, we refer to two broad categories of freight, defined as follows:

(a) *Non-bulk (intermodal) freight* – commodities moved individually and/or in containerised, palletised and/or parcel sized configurations. The terms non-bulk and intermodal cargo are frequently used interchangeably, as when non-bulk freight is transported by rail, it is almost invariably ‘intermodal’ and usually ‘containerised’. However, when this freight is carried by road, it will often be transported in palletised form, rather than as ‘containerised’ cargo.

(b) *Bulk freight* – single commodity movements in high volume or bulk configuration such as: coal, minerals, bauxite, cement, grain, and sugar. When on rail, bulk freight is usually moved using dedicated trains, operated for a single customer.

Australia’s domestic freight task is carried out using a combination of various transport modes. This is shown in Figure 3 below.

Figure 3 Australia’s domestic freight task (2020)



Source: BITRE (2020), Yearbook 2020: Australian Infrastructure Statistics, Statistical Report, Part T: Transport
Notes: Rail data published in the 2020 Yearbook relates to the 2015-16 year; road data is for 2019-20 (except intrastate road freight estimate which is for 2015-16; air freight and coastal shipping data is for 2017-18.

This shows that, at a national level:

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[4] See Department of Main Roads 2013, Moving Freight: A strategy for more efficient freight movement, December 2013, p.14; Productivity Commission (2006), Road and Rail Freight Infrastructure Pricing, Report no. 41, December 2006, p.16

- for non-bulk freight, road carries around 72% of the freight task, with 17% carried by rail and the remaining 5% by sea. Airfreight is used for less than 0.2% of the non-bulk freight task;
- for bulk freight, 68% is carried by rail, 18% by ship and 15% by road.

2.2 Freight categorisation

It is useful consider the types of intermodal freight further through the prism of supply chain needs in order to understand how mode share varies for different categories of freight. This assists the analysis of mode share that is presented later in this report to understand the extent to which freight is advantaged to a particular mode or is contestable between multiple modes. We have therefore considered mode share, and its driving factors, with regard to the following freight categorisation:

Table 6 Freight categorisation

Express Freight	Fast Moving Consumer Goods	Slow Moving Consumer Goods	Industrial and Construction Products
Goods for which rapid delivery is critical, usually transported by road or air	Products that are highly in-demand, affordable, consumed quickly and purchased frequently, such as food, toiletries, beverages, stationery, over-the-counter medicines, cleaning and laundry products, plastic goods, personal care products; stock is replenished on a regular (daily) basis, with timeliness of delivery critical; can be transported by road or rail	Consumer goods which have a longer shelf life and are purchased over time, including items like furniture and appliances; usually have longer delivery timeframes; can be transported by road, rail or shipping	Products required for business, rather than consumer, input. Usually have longer delivery timeframes; can be transported by road, rail or shipping

Structural changes in the Australian economy have caused significant changes in the nature of freight demand over time – with the decline of heavy manufacturing within Australia and the growth in international trade, there has been an ongoing reduction in the volume of industrial and construction products transported to and from manufacturing centres but substantial increases in the movement of consumer and intermediate goods between population centres. This has contributed to a general ‘speeding up’ of supply chains, where an increasing proportion of freight becomes time-sensitive.

Indicative estimates of the size of each of these freight categories is:

- Express freight – less than 10% of the long distance intercity freight market
  - this is informed by road’s mode share on the Melbourne/Sydney to Perth route (as assessed in section 5), where we have concluded that the price benefit of transporting freight by rail or shipping means that all freight that is willing to trade off service quality for price will have done so. On these routes, road mode share is 8-9%;

- Fast moving consumer goods – around 50% of the long distance intercity freight market
  - this is informed by information provided by rail operators on the nature of freight carried on the Melbourne/Sydney to Perth route;
- Slow moving consumer goods and industrial/construction products – together around 40% of the long distance intercity freight market
  - this is informed by shipping's mode share from the east coast capitals to Perth (as assessed in section 5), combined by information provided by rail operators on the nature of freight carried on the Melbourne/Sydney to Perth route.

2.3 Market participants

There are multiple players involved in the intermodal freight transport task. In addition to the actual linehaul transport carriers themselves, logistics companies and freight forwarders add value in consolidating freight and linking each of the transport stages to create a door-to-door delivery service for freight customers.

The major participants in the non-bulk freight supply chain can be grouped as follows:

- freight owners (referred to as beneficial freight owners, or BFOs) – who own the freight that has to be moved;
- freight forwarders – who are engaged by freight owners to arrange for the goods to be moved from origin to destination using one or more different modes of transport;
- linehaul transport providers – they are the providers of the linehaul service used to carry freight from origin to destination, and may include road operators, rail operators and shipping services;
- rail infrastructure managers (RIMs) – are the owners or operators of the rail track networks used by rail linehaul providers; and
- intermodal terminal operators – provide the connecting interface point between the rail network and road-based operations. The core intermodal terminal task is the transfer of freight from one transport mode to another, although other ancillary services may also be provided. Intermodal terminals are usually provided by rail operators primarily for their own use, with only limited examples of intermodal terminals being used by more than one rail operator.

Freight forwarders (or BFOs, where they directly manage their own transport logistics) are the ones responsible for selecting the most effective transport mode.

In terms of the linehaul component, the major transport providers are identified in Table 7.

Table 7 Intermodal freight supply chains

	East West	North-South	Qld North Coast Line
Rail	Above rail operators: • Pacific National • SCT Rail Infrastructure Manager • ARTC (Melbourne/Sydney/Adelaide to Kalgoorlie) • Arc Infrastructure (Kalgoorlie to Perth)	Above rail operators: • Pacific National • SCT Rail Infrastructure Manager • ARTC	Above rail operators: • Pacific National • Linfox Rail Infrastructure Manager • Queensland Rail
Road	• linehaul road transport carriers can be either be fleet or independent operators. In 2014, it was estimated that there were 42,000 operators active in the sector (compared to 33,000 twenty years earlier), ranging from single-truck operators to large corporations. The top three operators account for less than 15% of the road freight sector:[5] • Toll IPEC (8.3%); • Linfox (4%); and • Kain & Shelton (K&S) (1.6%).		
Sea	In normal market circumstances, the major international container services calling at Fremantle as part of an east-west trade movement include: • Maersk/MOL (Boomerang service) • CMA-CGM/HL (Nemo) • MSC (AEX and Capricorn service) • CMA-CGM (ANL) (AAX) • OOCL/PIL (AA1 service) • OOCL/PIL (AA2 service).	• n/a	• n/a

Source: Synergies based on publicly available information

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[5] NTC (2016), Who Moves What Where – Freight and Passenger Transport in Australia, Final Report, August 2016, pp.24-25

3 Assessing mode share

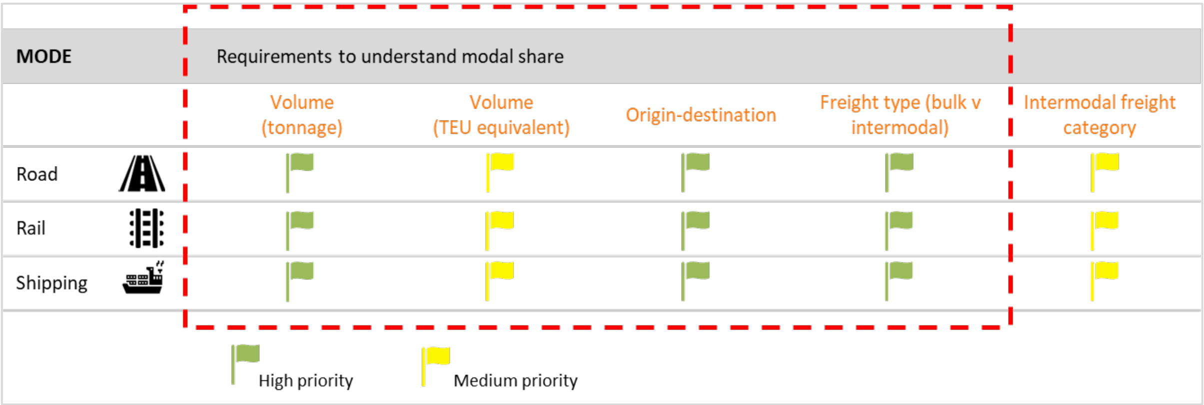
3.1 Overview

While the overview of the national freight task provides a broad indication of mode share, a robust understanding of mode share needs to be undertaken at a corridor level, and requires quantitative analysis of the volume of freight moved on each route by each key origin-destination (separately identifying freight movements in each direction), both in total and for each transport mode used. Regular reporting of data, in order to allow assessment of time series information, is essential in order to understand trends in mode share and the factors driving changes.

The key modes to be assessed in terms of freight mode share are rail, road and shipping. While air transport is used for some freight transport, particularly mail and parcel delivery, its share of the national freight task in volume terms is negligible. As a result, we consider airfreight to be less important in an assessment of freight mode shares, and airfreight has been excluded from our analysis.

The critical datasets for understanding mode share are shown in Figure 4.

Figure 4 Requirements to understand mode share



MODE	Requirements to understand modal share				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Road	🟩	🟨	🟩	🟩	🟨
Rail	🟩	🟨	🟩	🟩	🟨
Shipping	🟩	🟨	🟩	🟩	🟨

🟩 High priority 🟨 Medium priority

Source: Synergies

While ideally volume information would be available on both a tonnage and a volumetric basis, provided that one measure of volume is available, estimates of the other measure can be made. To date, most measures of mode share are based on tonnage, and we consider that it is reasonable to continue to focus on tonnage as the highest priority dataset. For intermodal freight, further information that identifies, at a more granular level, the type of cargo carried (i.e. 'what's in the box') would be ideal, as it assists in understanding modal choice drivers and mode competitiveness for different types of freight. However, this information is not currently available for any transport mode, and is considered to be a 'second order' issue in terms of quantifying the size of the freight task by each mode.

3.2 Existing freight information sources

3.2.1 Road freight task

Only a limited assessment of the size and nature of the road freight task is currently possible, reflecting the partial tonnage, volumetric measures and broad freight type information that is publicly available.

Australia Bureau of Statistics

To date, the ABS has been the primary source of statistics for estimating the size and nature of the road freight task in Australia.

The ABS conducts the Survey of Motor Vehicle Use (SMVU) regularly and the Road Freight Movements Survey (RFMS) on an ad hoc basis. The RFMS was most recently conducted as an additional component of the SMVU in 2014.[6]

The following freight related datasets are published by the ABS through the SMVU:

- motor vehicle use, by state/territory of registration by type of vehicle
- total and average kilometres travelled, by state and territory of registration by type of vehicle by area of operation / by state and territory of registration by type of vehicle by business and private use / by area of operation by type of vehicle by type of fuel / by year of manufacture by type of vehicle by state and territory of registration / by state and territory of operation by type of vehicle
- total and average tonne-kilometres, by type of vehicle by state and territory of registration / by state and territory of registration by type of vehicle by area of operation / by type of vehicle by state and territory of operation / by state and territory of registration by state and territory of operation
- total tonnes carried freight vehicles, by state and territory of registration by type of vehicle by commodity
- total load carried and average load per trip, by state and territory of registration by freight vehicles

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[6] A more detailed analysis of the data gaps that exist in the freight statistics is presented in a report published by iMOVE (2019) Freight Data Requirements Study Data Gap Analysis Final Report, 28 February 2019. That report has helped to inform this discussion.

- total kilometres travelled, by state and territory of registration by type of vehicle by main type of journey
- total and average tonne-kilometres rigid trucks, by number of axles by gross vehicle/combination mass by state and territory of registration
- total and average tonne-kilometres articulated trucks, by trailer configuration by gross combination mass by state and territory of registration.

In summary, while the SMVU provides a high level picture of overall road freight movements, it does not provide data to enable any disaggregated analysis of road freight movements.

The RFMS provides estimates of freight moved by road for 2013-14, collected on a sample survey of 16,000 articulated and rigid trucks that were registered with an Australian motor vehicle registry.[7] The RFMS includes freight flows between geographic areas, classified by origin, destination, commodity and method (solid bulk, other bulk (liquid/gas), containerised or other) and whether the goods are dangerous and/or refrigerated. Commodity data uses selected articles (21 items) from the Australian Transport Freight Commodity Classification (ATFCC).

BITRE is responsible for data collection and dissemination and provides a summary of freight tasks in several publications (eg BITRE Infrastructure Yearbook, BITRE aggregated freight forecasts). BITRE publishes a range of datasets drawn off the SMVU and the RFMS.

There are a number of concerns with the RFMS as a means of understanding and assessing the size and nature of the road freight task:

- Regularity and timeliness – the RFMS has been conducted on an ad hoc basis, with only 3 surveys undertaken since 1993-94. Further, detailed results of the survey take a significant time to be released, with disaggregated results of the 2014 survey not available until 2016;
- Level of confidence – the survey is based on only a small fraction of the vehicle movements, and industry stakeholders have identified concerns about the level of confidence that can be attributed to the results;
- Freight categorisation – the freight categorisation applied does not align particularly well with an analysis of supply chain needs.

In any case, Synergies understands that the ABS does not intend to carry out any further surveys of road freight movements, therefore this data will not be available at any future point in time. The ongoing information published in the SMVU is of limited use in assessing mode share by route, given

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[7] A copy of the Explanatory Notes about the RFMS is available on the ABS website at https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/9223.0Explanatory+Notes112%20months%20ended%2031%20October%202014

the aggregated nature of the data. We understand also that the BITRE is currently exploring alternative methods for collecting information on road freight movements.

State Government traffic data

State Government transport agencies (in particular WA, NSW, Queensland and Victoria) each have a traffic census framework for the state-declared road network. The traffic census collects a range of information on traffic counts by vehicle type. However, there are significant variations in the information availability between the jurisdictions in terms of:

- the extent to which vehicles are broken down by vehicle type;
- the time interval for measurement of traffic counts, for example NSW traffic count data is available for hourly intervals, whereas for other states, data is aggregated over a longer time period, in some cases up to a year;
- the availability of weighbridge data allowing, when combined with traffic counts, the volume of freight carried to be assessed; and
- the extent to which time series data is available.

In some cases, such as Victoria, we understand that data is collected by the State Government transport agencies but not made publicly available. Further, while the WA Government has historically provided access to detailed traffic count data for Eucla, on the Eyre Highway, it has recently ceased making detailed data available (replaced by summarised reporting), cutting off a valuable source of detailed information on road freight movements on the east-west corridor.

Further, where data is made publicly available, different approaches are taken amongst agencies as to whether raw data is made available, or instead published in summary reports.

Where detailed source data is published, such as has recently commenced in NSW where traffic count data is made available that identifies traffic numbers by vehicle types, at hourly intervals, and weighbridge data is also available, it is possible to use sophisticated data analysis to isolate local truck movements from long distance truck movements, which can help to inform conclusions on the broad origin-destination of truck movements. However, this approach is unable to provide any information on freight type.

Road freight operator data

Road freight operators will maintain detailed consignment information on freight movements at an origin-destination level, including information on tonnage, volumetric measure and freight type. Most road freight operators will also collect and maintain GPS based information tracking truck movements. However, this information is not published in any form and is considered by road freight operators as confidential.

3.2.2 Rail freight task

Rail operators and rail infrastructure managers both maintain comprehensive data sets of rail freight movements, and can identify the volume of freight (in tonnes) transported at an origin-destination level. Rail infrastructure managers collect information on freight movements and tonnages (on a train basis) from all operators in a consistent form, however, have only limited information on the type of freight being carried. More detailed information, including information on volumetric measure (i.e. TEU), and in some cases freight type, is maintained by rail operators.

However, only limited amounts of this information is published, and with the exception of reporting by Queensland Rail noted below, this is only where voluntarily made available by rail operators and RIMs to BITRE. Comprehensive information on rail freight volumes relies on all rail freight operators of material size voluntarily making this information available.

Published information on the national rail freight task is presented in Trainline reports prepared by BITRE. The total national rail freight task is estimated using the aggregated data provided by rail train operators. The latest Trainline publication (January 2021) presents information for:

- Bulk and non bulk freight (tonnes, NTKs);
- Bulk freight (by major commodity type);
- Interstate freight (intermodal) by rail line segment (gross tonnes).

It is not possible to identify rail freight movements on an O-D basis from this published data.

Queensland Rail publishes information on freight volumes by corridor and by broad freight category in an Annual Performance Report published in accordance with its QCA approved Access Undertaking.

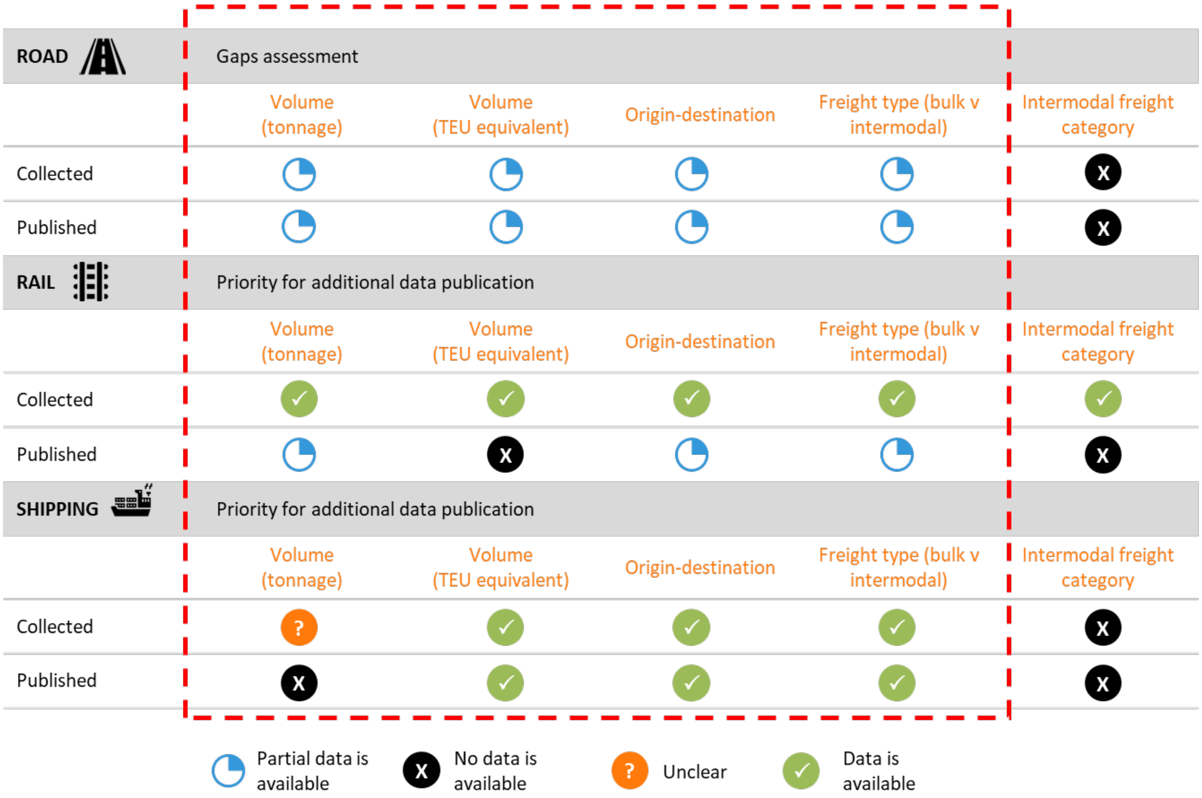
3.2.3 Shipping freight task

Coastal freight statistics by TEU and broad commodity type through Australian ports is available in the Coastal Trading Licensing system maintained by the Department of Infrastructure, Regional Development and Communications allowing identification of interstate coastal shipping movements on an O-D basis. Freight tonnage is not available for containerised freight (although this was collected and published for a limited number of years).

3.2.4 Information gaps

The limitations and gaps in the existing data available to providing a clear understanding of modal share are summarised in Figure 5.

Figure 5 Gaps assessment – by mode



ROAD	Gaps assessment				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Collected	◔	◔	◔	◔	X
Published	◔	◔	◔	◔	X
RAIL	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Collected	✓	✓	✓	✓	✓
Published	◔	X	◔	◔	X
SHIPPING	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Collected	?	✓	✓	✓	X
Published	X	✓	✓	✓	X

◔ Partial data is available
X No data is available
? Unclear
✓ Data is available

Source: Synergies

3.3 Approach for estimating mode share given information gaps

Given the gaps in the information available for a comprehensive assessment of mode share, this section presents an overview of the approach that we have used for analysing mode share and, in particular, the data sources and methodology used to estimate freight movements by mode in consistent terms.

Our approach for estimating freight volumes and determining modal shares for each of the corridors included in the scope of this study is set out briefly below. A more detailed discussion of our methodology is presented in Appendix A.

3.3.1 Intermodal corridors

Rail freight volumes

ARTC has, with permission of the relevant rail operators, provided time series data for rail freight tonnages on the east-west and north-south corridors. Queensland Rail has similarly provided time series data for rail freight tonnages on the Queensland north coast line. Therefore, while information on rail freight volumes is not publicly available, detailed information on origin-destination freight movements has been made available specifically for the purpose of this study. Notably, given that we are using rail infrastructure manager data, this information does not include any details on a volumetric measure of freight volumes (eg TEU) or the nature of the freight (by intermodal freight category) carried in containers.

In our assessment of mode share for intermodal corridors, we have included all rail freight tonnages carried on intermodal trains between the relevant origins and destinations. Steel movements from Port Kembla and Whyalla have been excluded from the rail tonnages, as these products are transported in bulk form.

Shipping volumes

ARTC has also made available its estimate of sea freight tonnages. Synergies' review of shipping freight volumes as sourced from the Federal Government's coastal shipping permit database available aligns to ARTC's sea freight estimates. However, we have relied on ARTC's estimates as it had already undertaken conversions to tonnes.

Road freight volumes

For road freight, Synergies has constructed estimates using the available State Government truck counts and weighbridge data, together with ABS RFMS surveys from 1994, 2001 and 2014, with additional modelling using key macro indicators. The mode share assessment is based on available data for each route.

In order to address potential concerns around the reliability of the ABS RFMS estimation of road freight volumes, we initially reviewed the ABS' reported 2014 total interstate road freight volumes against recorded truck counts and weights at key interstate border locations in 2014. Based on this review, we have concluded that the ABS provides a reasonable estimate of total interstate road freight movements for both the east-west corridors and the north-south corridor, and that it is therefore reasonable to rely on the ABS survey results to undertake analysis of the road freight task, including in relation to type of freight and origin-destination.

The ABS road freight surveys provide estimates of road freight by origin and destination at the SA4 level, with freight broken down into broad commodity classifications. For each origin-destination we constructed a broad classification of the region around each origin and destination city where freight customers can reasonably be considered to have a choice of transport mode. This broad classification is not fixed for an individual city but depends on origin-destination pair. For example, a much broader contestable region is included around Sydney for east-west freight to Perth as compared to the contestable area for Sydney for freight to Melbourne, reflecting that for longer journeys, a longer PUD movement may be viable to enable the use of rail or shipping. Using this classification of contestable area and a broad classification of contestable non-bulk commodities, an estimate of mode contestable road freight was constructed for the relevant survey year.

For the east-west corridors, a long time series of accurate truck counts by vehicle type is available at Eucla on the South Australia and Western Australia boarder. From this, total road volumes moving from east to west are estimated using six years of weighbridge data as a base. Estimates from the ABS freight surveys are then used to adjusted total road freight volumes to mode contestable freight volumes (having regard to origin-destination and freight type) and to estimate the proportion of freight from each of the key origins.

For the north-south corridor and the Queensland north coast line, the available truck count and weighbridge data is more limited, with long time series data unavailable. To account for this, ABS and truck count data are supplemented by modelling using macro-economic variables. The model is calibrated using the years 1994, 2001 and 2014, where ABS data means that total origin-destination freight volumes for our three main modes, rail, road and sea, are available. This modelling is then applied to infer total origin-destination freight volumes for the years in between ABS surveys. Road freight volumes are then calculated as the residual of total freight volumes less rail and sea.

For the north-south corridor, road freight estimates from 2014 backwards are constructed using the macroeconomic modelling. From 2014 forward a combination of macroeconomic modelling and heavy vehicle counts from Transport for NSW are used. This is done by weighting together the implied change from the macroeconomic model, with the percentage changes implied by heavy vehicle counts on the key origin-destination routes.

For Melbourne-Brisbane estimates are based on percentages changes in heavy vehicle counts along the Newell highway. For Sydney-Melbourne heavy vehicle counts along the Hume Highway are used. For Sydney-Brisbane, limited heavy vehicle counts are available on the Pacific Motorway, so just the New England Highway is used. For this reason, relatively less weight is placed on heavy vehicle counts and more weight is placed on the estimates using the macroeconomic model. On each route the low point in the heavy vehicle counts is used in order to minimise the interference from local traffic.

For the Queensland north coast line, the 2014 ABS road freight estimates are again used as the base. A combination of the estimated percentage change predicted by the macroeconomic model, and the percentage changes in heavy vehicle counts along the Bruce Highway are then used to estimate the road freight task forward and backwards from 2014.

3.3.2 Bulk freight

In each bulk corridor included in the study, we have identified the primary commodity for which bulk handling is a realistic logistics alternative but which can also travel in non-bulk form by road (mineral concentrates for Mount Isa, grain in respect of the other supply chains). In each case, the identified commodity was being transported from inland production for ultimate export.

For these bulk export routes/products, we have assessed freight volumes by:

- receiving direct information on rail freight volumes from rail participants;

- accessing published port throughput statistics to serve as an approximate estimate of the total size of the relevant market; and
- inferring road volumes from available data on rail volumes and total export volumes.

3.4 Addressing information gaps

As identified above, reliable detailed information on current road freight volumes and service quality measures is considered to be generally poor. Often, the necessary data needed to accurately estimate road's share on particular freight routes is not currently collected in any systematic or ongoing way. Conversely, rail freight statistics are collected at the origin – destination level, but are not typically publicly available, meaning that information on rail freight volumes is usually not visible (with the information used for our mode share analysis directly provided by rail industry participants specifically for the purpose of this report). For coastal shipping, the majority of required data is collected and published.

While many of these deficiencies will persist in attempting to assess modal share on a historical basis, in order to understand the role of different transport modes in meeting Australia's freight task, and changes in mode share, it is essential that comprehensive, reliable and timely information on freight movements is publicly available for all major transport modes – road, rail and sea freight.

Work is currently underway as part of the National Freight Data Hub in order to aggregate and publish further freight data information, and BITRE is progressing work aimed at developing a more reliable data collection method in relation to road freight statistics. This work is particularly important given that some of the most important data used to assess road freight movements is not currently available on an ongoing basis. In particular:

- the ABS does not intend to conduct any further RFMS studies, meaning that there will be no detailed information collected on road freight movements beyond 2014; and
- the WA Government has ceased making detailed traffic count data at Eucla publicly available, which has been an important source of information on road freight volumes for the east-west corridor.

BITRE has also been working with the rail industry for several years to collect and publish more information on freight rail (both non-bulk and bulk) but greater disclosure of information by rail participants is required.

In light of the gaps that we have identified that limit a more comprehensive and robust analysis of freight modal share being undertaken, we have identified two broad options for improving modal share data.

3.4.1 Option 1 - publication of currently collected data from infrastructure managers

Road data

Traffic census data, including vehicle counts and weighbridges, is already collected by many State Governments. The Commonwealth Government may pursue a commitment from all State Governments to make available detailed data collected through these existing means and, where appropriate, upgrading data collection mechanisms to provide a consistent set of information on nationally important highway locations. This would ideally include:

- Traffic count information categorised by vehicle type (using a consistent categorisation of vehicle types);
- Weighbridge information, again categorised by vehicle type;
- All information to be provided at short (eg hourly) time intervals, in order to enable data analysis on the route travelled by trucks (which can help inform an understanding of whether truck movements are local or long distance).

The detailed data now published by Transport for NSW provides a useful template for the information that would ideally be collected and published.

Collected data would form part of the National Freight Data Hub, enabling data analysis to be undertaken on truck movements by route, truck type, weight and approximate distance travelled, allowing assessment of freight volumes by tonnage and by volumetric measure by broad origin-destination pairs (eg capital city movements). We note the National Freight Data Hub is already working to harmonise state and territory truck count data by bringing together all available API data, and so building on this existing platform of work would be useful.

If this type of information were to be collected and published by State Governments, the Department (or agency) could then prepare periodic (eg annual) data analysis reports, interpreting the traffic census data in order to present quarterly information on road freight volumes, including analysis by origin-destination route to the extent that this is able to be ascertained.

The first key issue to be considered in this option, however, is how to gain a commitment by jurisdictions for collection and publication of this data.

The second key issue to be considered is whether there is opportunity to supplement the existing traffic census datasets that are collected in order to better assist in distinguishing local and long distance truck movements, and, for long distance truck movements, to inform an estimate of origin-destination.

Note, this option will not allow any information on freight types to be ascertained. Therefore, while it will enable a more robust assessment of freight mode share, there will be limitations in the ability of businesses, analysts and policy makers to use this information to understand mode share by freight type and therefore influence freight customer decisions on mode choice.

Rail data

Comprehensive rail freight statistics for all high priority categories of information are already collected by rail infrastructure managers, as this forms the basis of their access billing systems. However, at present there is only limited publication of this data.

Under this option, rail infrastructure managers could publish aggregated (de-identified) data on train numbers, GTKs and net tonnages by origin-destination pair. This data would be published on a regular basis, and the collected data would again form part of the National Freight Data Hub. The National Freight Data Hub would facilitate the sharing of data between RIMs and governments, and may well have the potential to report and release a wider set of rail freight information (that goes beyond the scope of this current modal share workstream).

As is the case with the road data, this option would not allow any information on freight type by intermodal freight category to be ascertained.

Again, a key issue to be considered in this option is how to gain a commitment by rail infrastructure managers and rail operators for publication of this data. This could be delivered either by:

(a) voluntary agreement of rail infrastructure managers (with permission from rail operators as required); or

(b) compelled through a regulatory instrument (as is the case with Queensland Rail's annual performance reports required under its Access Undertaking).

Voluntary provision of rail freight statistics has historically been problematic, both in terms of the willingness of the rail businesses to provide data, and the ease and regularity of collection. Given the necessity for comprehensive reporting of statistics, unless rail participants agree to a voluntary protocol that will ensure the regular provision of consistent information, a compulsory reporting mechanism that provides for a consistent dataset to be collected for each rail network is likely to be required.

Shipping data

Detailed information on interstate coastal freight movements is already published through the coastal trading permit database administered by the Department. The published information is of high quality and allows a robust analysis of shipping volumes on an origin-destination basis mode share. There remain some opportunities to enhance this data to include:

- additional information on the cargo weight for containerised freight; and
- information on intrastate coastal freight movements.

3.4.2 Option 2 - data reporting by freight operators

Data reporting by freight operators is the only approach that will provide detailed information on type of freight (for all transport modes, albeit that there may still be limitations on this to the extent that freight operators do not have visibility over the specific type of freight being carried) and origin-destination (for road freight) to be published, allowing a comprehensive understanding of the volume and nature of Australia's freight task.

A viable framework would need to define a consistent set of information to be collected from road freight operators, rail freight operators and shipping companies. Such an option would need to consider how to de-identify and aggregate information to minimize concerns that the publication of this information would result in the release of commercially confidential information and potential loss of competitive advantage.

Options for data reporting by freight operators involve either periodic survey or compulsory comprehensive reporting.

Examples where such information is compulsorily provided include:

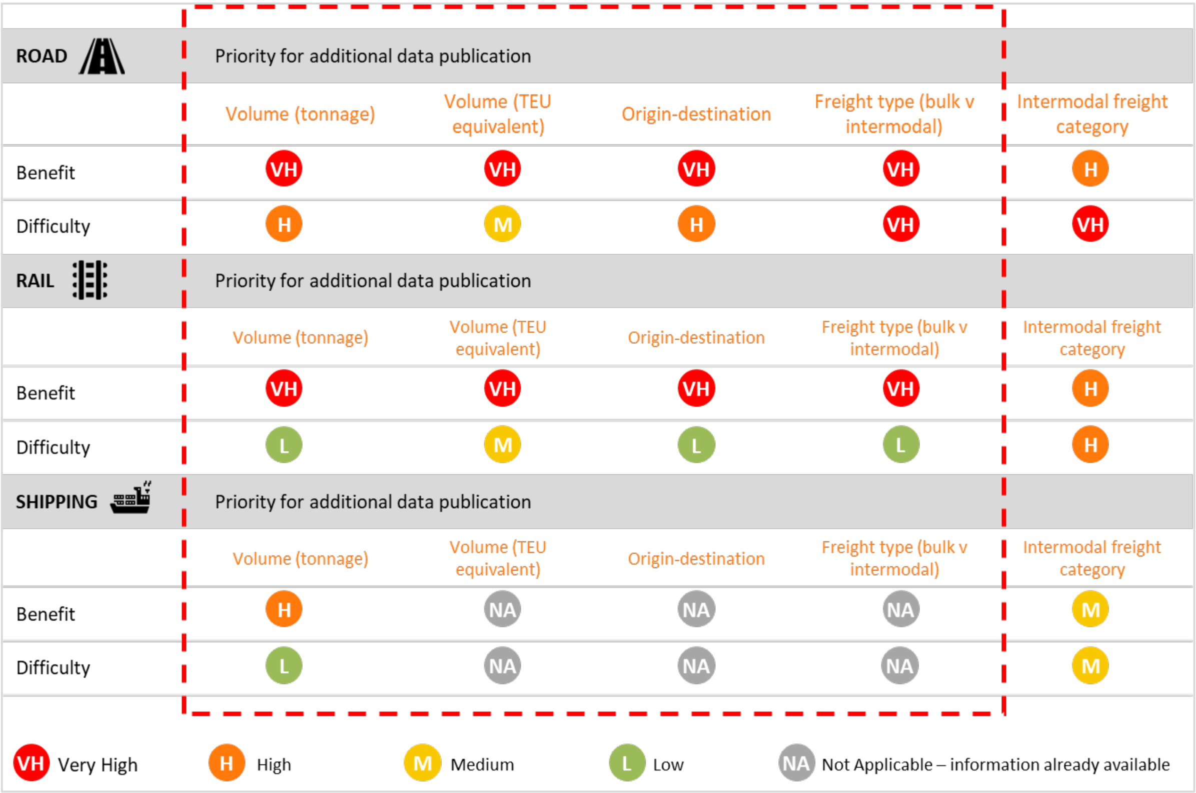
- Container stevedoring – the ACCC collects information from container stevedores (revenues, costs, volumes) under a legislative direction pursuant to Part VIIA of the *Competition and Consumer Act 2010 (Clth)*. The ACCC publishes information at an aggregated level as part of an annual report.
- Airports (monitoring and service quality) – airport operators provide information on prices, costs (and profits) and quality of aeronautical and car parking service at selected Australian airports to the ACCC. This is also under a Part VIIA legislative direction and the ACCC publishes information on an annual basis.
- Bulk wheat exports (monitoring) – Bulk wheat exporters provide information on export volumes and capacity utilisation at selected bulk grain terminals to the ACCC as part of an ongoing monitoring role.

In either case, there is likely to be a high degree of complexity and cost associated with comprehensive data reporting by road freight operators, given the very large number of road freight operators that would be captured by the framework. As noted previously, some freight operators may not have sufficient visibility over the freight that is carried, particularly where consignments are contracted out to third parties.

3.4.3 Prioritisation of data gaps

A prioritisation framework for addressing the data gaps should have regard both to the potential benefit of the information, and the likely difficulty associated with collecting it. This is summarised in Figure 6 below. Note, in assessing the difficulty associated with publishing information, we have considered both the difficulty associated with collecting the information (including having regard to the number of parties that would need to provide information, whether they have clear visibility over this information and whether they are likely to have existing information systems that collect this information), and to developing a mechanism for collating and publishing the information.

Figure 6 Prioritisation of data gaps



ROAD	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Benefit	VH	VH	VH	VH	H
Difficulty	H	M	H	VH	VH
RAIL	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Benefit	VH	VH	VH	VH	H
Difficulty	L	M	L	L	H
SHIPPING	Priority for additional data publication				
	Volume (tonnage)	Volume (TEU equivalent)	Origin-destination	Freight type (bulk v intermodal)	Intermodal freight category
Benefit	H	NA	NA	NA	M
Difficulty	L	NA	NA	NA	M

VH Very High
H High
M Medium
L Low
NA Not Applicable – information already available

Source: Synergies

We consider that there is merit in initially focussing on data collection from infrastructure managers (both road and rail) as this is expected to provide a simpler mechanism for collecting consistent datasets on an aggregated (de-identified basis).

While this prioritisation framework shows a high benefit and relatively low difficulty of making additional rail freight statistics available, it is important to recognise that, from the perspective of using this data to assess relative modal performance, a material benefit will only accrue if similar information is also available for road. Therefore, we consider that there would be value in placing an initial focus on mechanisms for capturing and reporting road volume information – in the first instance through comprehensive and detailed reporting of traffic census data for key road locations.

We note that, in the event that Australian Governments adopt a Mass Distance Charging framework for road transport, this will provide for the collection of comprehensive road freight movement data.

The consolidation and reporting of this data would significantly improve the availability and quality of road data for the purpose of assessing mode share.

3.5 Recommendations

Recommendation 1

(a) As a priority, in relation to road data, BITRE continue to work with the National Freight Data Hub and relevant State Government Transport Departments in order to:

(i) identify and/or confirm a preferred suite of road freight data metrics that should be collected by State Governments through their traffic census programs. The data currently collected and published by Transport for NSW, including truck numbers, categorisations and weights at key highway points, measured at hourly intervals, provides a wealth of information from which data analysis can be used to gain an understanding of road freight volumes. Freight can be distinguished into local vs long distance truck movements, and the data can even be used to gain a broad understanding of origin-destination truck movements. Other states should be encouraged to review and, if necessary, upgrade their traffic census programs in order to collect consistent datasets;

(ii) comprehensive State Government traffic census datasets should wherever possible be regularly published in the National Freight Data Hub in order to facilitate greater transparency and understanding of the road freight task;

(b) In the medium term, if this type of information is collected and published by State Governments, this would enable BITRE to prepare periodic (eg annual) data analysis reports, interpreting the traffic census data in order to present quarterly information on road freight volumes, including analysis by origin-destination route to the extent that this is able to be ascertained.

Recommendation 2

(c) In relation to rail data:

(i) Rail Infrastructure Managers should commit to regularly provide BITRE with rail freight datasets, that are relevant to informing transport policy decisions, including freight volumes, freight types (to the extent ascertainable) and origin-destination (with the recent Memorandum of Understanding between BITRE and ARTC providing a template for this data collection); and

(ii) Rail operators should commit to providing RIMs permission for this data to be disclosed to BITRE on an aggregated and de-identified basis, and published in the National Freight Data Hub. If this is unsuccessful in enabling the efficient and regular collection of rail freight data, a compulsory data collection arrangement may ultimately be required.

4 Assessing drivers of mode choice and structural advantage

4.1 Overview

As part of examining trends in modal share, it is important to understand the underlying factors driving mode choice. Decisions about linehaul transport options are made by freight customers based on an entire freight movement outcome that balances several factors.

In assessing the drivers of mode choice, we have conducted a comprehensive literature review, supplemented by interviews with key stakeholders.

Our analysis has categorised intermodal freight through the prism of ‘supply chain needs’, in order to understand the underlying reasons driving the mode share outcomes, and to assess the extent to which freight is structurally advantaged towards a particular mode. However, there is a fine line between a ‘competitive advantage’ and a ‘structural advantage’, and care must be taken to not label all advantages as structural. For example, while road may have a transit time advantage over rail, there may be opportunities for rail operators to offer innovative solutions to customers in order to reduce either the size or impact of this advantage. As a result, performance differences between modes will only be considered to provide a structural advantage where the difference is both large and important to customers for the relevant category of freight.

4.2 Modal choice factors

Modal choice is influenced by both the nature of the transport task and characteristics of the transport service. The factors influencing choice of transport mode have been examined in a wide range of studies, undertaken by Government agencies, market participants and academics. There is extensive literature on the determinants of modal choice and the weighting of the various factors affecting the selection process. While various studies have focused on different factors affecting the selection process, relevant features of the transport cargo are commonly found to include the density of the cargo, its perishability and fragility; relevant characteristics of the transport service include the price, frequency/availability, transit time and reliability.[8,9,10] The intrinsic value of the commodity may also be a relevant factor.

These factors are discussed in more detail below.

4.2.1 Reliability

Intermodal freight customers consistently identify reliability as the primary non-price consideration in decisions on modal choice,[11] where reliability is perceived broadly to encompass the following features:

- delivery on time and in full (DIFOT) performance, which relates to the on-time performance for the total door-to-door journey – reliability of the train service contributes to this, but it is also determined by the terminal and PUD elements of the freight movement;
- confidence that the services will be run (akin to corridor availability), noting that outages occur for a range of planned events (i.e. track possessions to enable maintenance works to occur) as well as unplanned events; and
- risk of damage to freight.

The primacy of reliability in mode choice decisions has been confirmed in stakeholder interviews.[12]

Road transport is generally perceived to offer high reliability, with studies indicating in the order of 98% arrival within expected times.[13] The expansive road network, together with high capacity on key road routes, means that road transport has greater flexibility and can readily divert to an alternative route if infrastructure issues prevent the primary route from being used.

Reliability is potentially more important for rail than for road - whereas a delay in a truck arrival will impact 2-4 TEU and may be considered manageable, a delay in freight availability from a train service creates a 'multiplier' effect, given the large volume of freight on each service (often in excess of 300

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[8] These attributes, together with haulage distance, were identified as most important by Booz Allen and Hamilton in a study undertaken for the ARTC in 2001 (documented in Meyrick and Associates 2006, Rail Freight Price Elasticities, report prepared for the Essential Services Commission, Victoria).

[9] SMEC Australia (2016), North Coast Line Freight Terminal Consolidation Project: Stage 1 Report – Final, August 2016, p.13

[10] CRC for Rail Innovation (2014), Choice of mode for contestable non-bulk freight on the Melbourne-Sydney-Brisbane East Coast corridor, May 2014, p.iv

[11] ARTC (2007), North-South Corridor Strategic Investment Outline, September 2007, p.8

[12] Stakeholder consultation interviews – SCT (November 2021), Pacific National (December 2021)

[13] Ernst & Young, ACIL Tasman and Hyder Consulting (2006), North-South Rail Corridor Study, Detailed Study Report, p.2-17, p.3-7, p.3-26, p.2-37. See also Department of Transport and Regional Services (2007), Melbourne-Brisbane Corridor Strategy: Building our National Transport Future, June 2007, p.11

TEUs).[14] Rail service reliability is affected both by linehaul service reliability, which is in turn affected by infrastructure reliability and operational issues, and terminal operations. The extent to which delays in linehaul service arrivals are reflected in delays in freight availability will depend on the time allowance adopted by operators before their nominated 'freight availability time', and their ability to employ additional resources where necessary to meet this time.

Rail reliability was historically perceived as poor but has improved over the last two decades. In relation to the linehaul component of the rail transit, BITRE reported that, in 2004 only 45% of trains arrived within 15 minutes of their scheduled arrival time. This later improved to 62% in 2007-08. Most recent statistics show that the proportion of interstate trains arriving at their destination within 15 minutes of their scheduled arrival time remains at around 62%, with 73% arriving within one hour of their scheduled time.[15] Ultimately however, DIFOT performance is the most important measure of reliability. There is limited data available to measure rail's performance on this measure, although anecdotally it is claimed that rail's reliability is generally in the order of 75%. Rail services also suffer from disruption due to network outages occurring for a range of reasons, including weather related impacts. Recent flooding in South Australia impacting the east-west rail network provides an example of the significant delays that can occur, with restoration of the rail network taking 24 days. While such events will also impact roads, there is usually greater opportunity to divert around affected roads, and roads are often able to be more quickly re-opened to traffic.

However, more recently, COVID has highlighted a weakness in road's reliability and resilience, given its high ratio of drivers to freight carried. COVID driven restrictions on driver mobility, as well as driver shortages, resulted in significant disruption to road freight supply chains. Rail operators report that rail freight was been less affected by these issues, given the much lower ratio of drivers to freight carried. The Australian Government has recently announced an enquiry, to be led by BITRE, into the resilience of Australia's road and rail supply chains, due to conclude by the end of 2022.[16]

4.2.2 Frequency and availability

The availability of services to meet a customer's needs in transporting its freight task is an important determinant of mode choice, and is an increasing challenge given the ongoing trend towards speeding up of supply chains, requiring frequent replenishment of stock. In this context availability refers not only to the number of services that are operated, but to the ability to access services at the required departure and arrival times – for the time sensitive component of the freight task, there

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[14] Stakeholder consultation interviews – Pacific National (December 2021), Booz Allen Hamilton (1998), Report to Rail Access Corporation, p.17

[15] This is a weighted average of the reliability percentages of services which exit the Network no later than schedule, within tolerance. ARTC (2021) Performance Indicators 'Reliability', posted 21 October 2018, p.9,13. A copy is available at https://www.artc.com.au/customers/access/access-interstate/performance-indicators/reporting/ [accessed December 2021].

[16] See https://www.bitre.gov.au/road-rail-supply-chain-resilience-review

is strong demand for late evening departures and early morning arrivals, to allow for efficient local pickup and delivery arrangements.

Road freight transport for the non-bulk freight task is considered a ‘bespoke’ service, tailored to each customer’s requirements. Typically, a truck will carry cargo on behalf of a single customer — either the freight owner or a freight forwarder acting on its behalf. The road haulier will provide the number of trucks required to meet the needs of the cargo task, and it will provide the trucks when they are required by the customer. The service is therefore effectively continuous.

Rail freight service offers considerably less flexibility; a single rail service typically serves a number of customers and operates according to a pre-determined schedule. The frequency and timing of train services is governed by both by the number of available train paths on the network and the level of demand (for all rail users, not just intermodal trains), and can be impeded by restrictions associated with operating during the morning and afternoon commuter peaks in capital cities. The actual train service frequency is determined by the decisions of the rail operator on how many trains to run and at what times, which will reflect the level of intermodal freight demand and customer requirements. As a result, when using rail transport, a customer will have less ability to stagger departure times (or alternately, can stagger departure times to the intermodal terminal, but with the consequence of a longer door to door transit), and the consequence of a late departure from the customer’s premises may mean an extended delay until the next scheduled service.

The frequency and capacity for international shipping lines services are largely fixed by the needs of their international customers, and determined as part of the shipping lines’ broader internal shipping schedule and rotation.

For bulk services, the ability to transport large volumes in short time windows (eg to achieve efficient delivery of product to port) is more important that specific time of arrival.

4.2.3 Transit time

Freight transit times are a significant consideration for freight customers when choosing their mode of transport. When considering transit time, the critical issue for freight customers is whether it is sufficient to meet their delivery time requirements.

For time sensitive freight such as fast moving consumer goods, customers typically prefer evening departures together with early morning arrival in destination city on the next day (plus one or two days for more distant destinations) in order to allow delivery of goods to their destination during the morning. For non-time sensitive freight, transit time will usually be a less important factor.

Trucks will typically travel directly from origin distribution centre to the destination distribution centre, which means road transit time is simply the time taken to drive from ‘door-to-door’, plus the on and off loading of the cargo.

Rail transit times are more complex. In addition to the linehaul transit time, rail transit times also reflect the time required for carriage of the freight to the intermodal terminal and the cutoff time for freight to be loaded onto the train. After arrival, there is a further time interval before the container is available for pickup, and it must then be loaded onto another truck for transport to the final destination, where it must be unpacked. Even when linehaul durations are comparable, rail is therefore at a competitive disadvantage with road when it comes to transit times.

While rail transit time can be reduced through infrastructure improvements aimed at increasing the average speed of trains, it can also effectively be reduced by reducing train servicing times (that is, the time required to load or unload trains), by improving rail reliability (which can reduce the extent of reliability buffer built into freight cut-off and availability allowances), or by reducing the extent of required PUD movements, eg through co-location of warehouses with rail terminals, or through use of efficient loading practices at modern intermodal terminals (IMTs).

Rail operators also have the capability to offer multiple transit time options (or products) using a single train service. For example, a later freight cutoff can be offered for 'last-on' freight, or an earlier freight availability time can be offered for 'first-off' freight. Non time sensitive freight can be offered a 'standby' service, allowing the rail operator flexibility to choose from a number of train service, allowing the freight to act as a 'slot filler'. These options rely on the use of sophisticated loading and unloading arrangements at IMTs.

Shipping transit times involve similar steps to the rail transit, however, the timeframes are significantly extended. Not only is the shipping linehaul movement considerably slower than road and rail, the volume and complexity of vessel loading and unloading means that the freight cut-off time prior to loading, and availability time following unloading is much longer, typically measured in days, rather than hours.[17] As such, shipping is only a viable option for non-time sensitive freight that can accommodate extended transit times.

4.2.4 Price

Both the literature and freight studies consistently show that the non-price characteristics (transit times, frequency, reliability) for rail are usually inferior to road (although the extent to which this is the case can only be assessed on a route-by-route basis).

Therefore, for rail to be competitive against road, the total cost to the customer for rail freight (including terminal and PUD costs) will usually need to be well below the total cost to the customer of alternative road freight services, in order to compensate for rail's poorer service quality and higher

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[17] See for example, Freight Controller, Coastal Container Shipping – How does it compare to Rail and Road? Available at https://freightcontroller.com.au/coastal-container-shipping-how-does-it-compare-to-rail-and-road/ [viewed 9 December 2021].

logistics complexity (the "hassle factor") compared to road.[18] It is anecdotally considered that the discount compared to road freight costs that freight users seek for the "hassle factor" alone is in the order of 10%, before further tradeoffs for poorer service quality are considered. Similarly, given shipping's poorer service quality compared to rail (and road), in order for shipping to effectively compete, its total cost will need to be well below the total cost to the customer for rail freight.

As a result, in competing for intermodal freight, rail operators generally need to 'price off road'. That is, rail prices need to be set with regard to road prices, but at a discount to road prices that compensates users for PUD costs and differences in service quality as well as the increase in logistics complexity and risk.

While it is inevitable that, for intermodal freight, the service quality of rail will be perceived to be lower than for road, the size of the service quality gap is material to the competitiveness of rail transport. As the service quality gap increases, the proportion of the intermodal freight market that is able to accept that lower service quality will decline (with an increasing number of freight customers not willing to accept the gap at any price) and, for those that are willing to accept the poorer service quality, the discount that they require off road to compensate may increase. Therefore, the viability of operating rail freight services will depend heavily on the relative efficiency of each mode, reflected by their cost structures and quality of service.

While the service quality offered by coastal shipping is significantly inferior to rail, coastal shipping has the opportunity to compete fiercely on the basis of price. This is because coastal shipping is provided as part of an existing international vessel movement, and the incremental cost incurred in the incidental carriage of domestic containers is low. The costs of providing and operating the ship are fixed once the vessel is chosen and the itinerary is determined. The incremental cost faced by the shipping line in the incidental carriage of domestic containers is essentially confined to the cost incurred in getting the container on and off the ship. Therefore, domestic coastal shipping freight rates can be reduced to the level needed to generate the required level of additional demand while still allowing lines to make some margin over incremental costs.

4.2.5 Other factors

Other significant factors that influence modal choice include:

- Environmental and safety performance – over the last decade, sustainability has increasingly emerged as a factor considered in modal choice. Numerous companies have corporate policies in favour of reducing their 'carbon footprint' and thus favour using rail or sea freight, provided

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[18] Jan de Maeyer and Tom Pouwels 2003, A literature review on the role of Quality of Service attributes and their monetary valuation in freight demand models, Department of Regional and Transport Economics, University of Antwerp, provides a useful summary of a wide range of these studies.

that it presents a sufficiently competitive option.[19] Environmental, health and safety issues are likely to become increasingly important to customers, but it should be recognised that there are significant opportunities for improved environmental performance for the road sector, including through the use of alternative fuel technologies, and rail's current advantage may not be enduring;

- Complexity - the use of rail or shipping involves a more complex transport movement, requiring PUD movements to/from the freight terminal as well as the need to pack freight in containers and meet freight cutoff times, resulting in higher potential for delays and imposing an additional cost (the 'hassle factor'); and
- Contracting strategies and risk management – larger intermodal freight customers will seek competitive tenders for their freight tasks, and enter into term contracts with transport providers (although these contracts do not normally include volume commitments). Large intermodal customers will often prefer to maintain some diversification in their freight channels, in order to maintain competitive pressure between modes and reduce the risks associated with reliance on a single mode. For bulk freight, rail operators will often require a take or pay volume commitment for a defined term, in order to support the required investment in dedicated rollingstock resources. A similar commitment is not usually required by road freight operators. This differing contract risk may influence mode choice for bulk freight customers.

4.2.6 Weighting of factors

For intermodal freight, decisions about mode choice are largely based on the time sensitivity of the product's delivery, from which price/service trade-offs can then be considered. Price appears to be the major determining factor for less time-sensitive goods. But for time critical goods, service quality parameters are paramount, with price being factored in only if delivery time expectations can be met with a high level of reliability.[20]

The Inland Rail Study, undertaken by the ARTC in 2010 on the proposed inland rail route from Melbourne to Brisbane, specifically considered the factors impacting mode choice on the north-south route. This study notes that the importance of these different attributes of the transport service varies with the nature of the cargo. Discussing results from its survey of freight shippers, the report states:[21]

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[19] ARTC (2010), Melbourne-Brisbane Inland Rail Alignment Study – Final Report, Appendix B: Market Take Up; July 2010, p.24

[20] Booz Allen Hamilton (1998), Report to Rail Access Corporation, p.22,23

[21] ARTC (2010), Melbourne–Brisbane Inland Rail Alignment Study: Final Report, July 2010, p.10

> The survey also showed that the importance of the above price, reliability, availability and transit time factors varies by the type of freight, though price was usually the most important. For express and other just-in-time freight (e.g. postal and retail chains), minimum transit time and high reliability are essential, so little use is made of rail freight.

For bulk freight, the weighting applied to factors will differ. As the transport of bulk freight is generally not time sensitive, cost will be the primary driver of mode choice.

4.3 Cost of alternate modes

There are significant differences in the cost structures of road and rail transport that influence the types of freight service that each mode is more suited to, and whether it is viable for rail operators to provide rail services, given the price discount off road required to attract the freight.

The key factors impacting on the cost competitiveness of rail are:

- Distance - rail transport generally has lower linehaul cost than road, especially for large volumes and over longer distances. However, PUD and handling costs incurred transferring cargo between road and rail at the terminals add significantly to the door-to-door cost of intermodal rail operations. As a result, for the provision of non-bulk freight services, rail is generally more suited to longer haul distances which offer greater opportunity for lower linehaul costs to outweigh the additional PUD and handling costs. Road freight has historically been the lowest cost mode for shorter distances.[22]
- Volume – once a decision is made to operate a train service, the cost of the train is largely fixed, and the competitiveness of rail will depend on its ability to maximise the use of the train's capacity;
- Product density - freight density is an important matter for freight carriers as both road and rail hauliers will seek to maximise utilisation to ensure that, subject to loading constraints, there is no wasted (unutilised) space. However, road and heavy vehicle mass limits mean that, for high density cargoes, road is not able to fully utilise its available volumetric capacity. Rail is generally more suited to the carriage of high density cargo. For a train, as density increases, the unit costs per tonne decline.[23] Similarly, shipping is well suited to high density cargoes.
- Relative efficiency of each mode – this is strongly influenced by the quality of the road and rail infrastructure on which they operate. Decades of sustained, high value road investment has

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[22] BITRE (2009), Road and rail freight: competitors or complements? Information Paper 34, Canberra, p.8

[23] BITRE (2016), Why short-haul intermodal rail services succeed, Research Report 139, March 2016, pp.85-86

allowed the introduction of larger, higher productivity vehicles on national highways.[24] The increased efficiency associated with high productivity vehicles reduces the cost of road services on these routes, increasing the distance required for rail to be cost competitive. Similarly, the efficiency of rail services is influenced by the quality of the infrastructure on which they operate, however there is variation in the standard of rail infrastructure on Australia's inter-city rail network, in terms of allowable train lengths, ability to double stack and the route distance relative to road. The location and efficiency of intermodal terminals will also have a substantial impact on the efficiency of intermodal services.

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[24] The Senate Rural and Regional Affairs and Transport References Committee (2017), Australia's rail industry, October 2017, p.27

Part B – Corridor Studies

5 East-West corridor intermodal freight

5.1 Geographic scope

The east-west corridor broadly refers to the pathways for the interstate movement of freight between the east coast capitals and Perth. The key origin-destinations pairs along the corridors (in both directions) are:

- Melbourne – Perth
- Sydney – Perth
- Brisbane – Perth
- Adelaide - Perth

Note, where in this report we refer to routes from one city to another, this includes the hinterland catchment area around each city from which rail freight is drawn. The size of this catchment area varies according to the route being considered, with rail freight drawing from a larger catchment area as the length of the linehaul movement increases. The methodology used to assess the hinterland catchment area for each origin-destination pair is described in Appendix A.

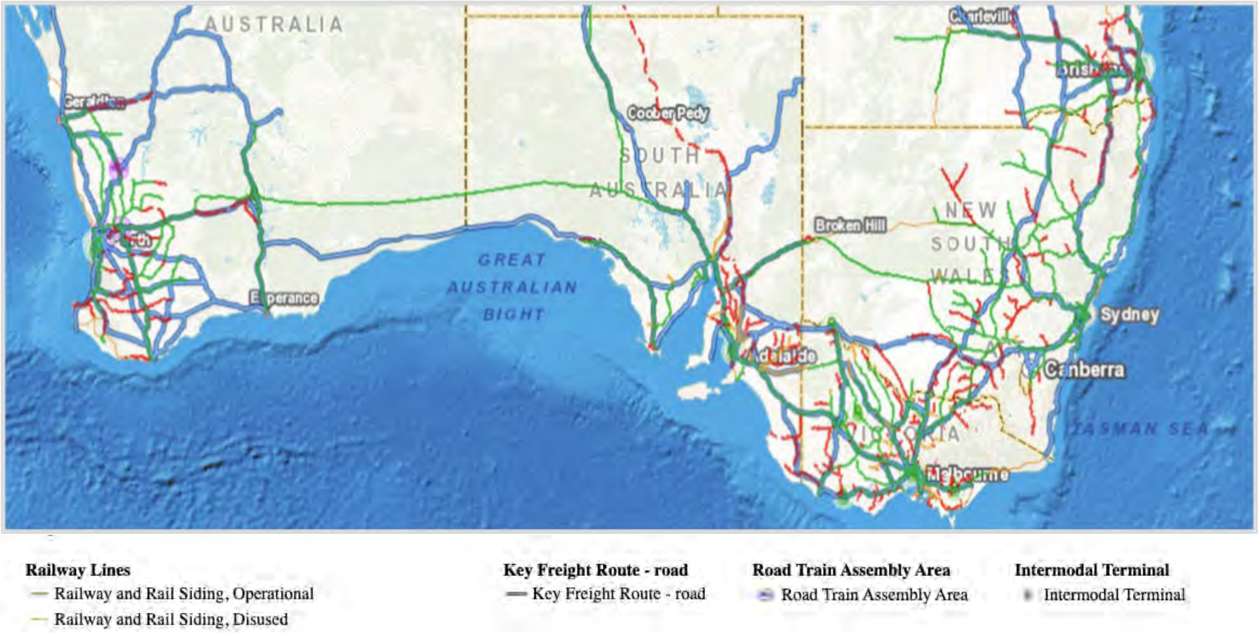
The key transport infrastructure supporting this route is as follows:

- Rail: the rail distance from Perth to Melbourne is approximately 3,400 km, from Perth to Sydney over 4,000 km. Much of the route is unconstrained by bridges and tunnels, allowing the use of double-stacked trains (west of Adelaide and Parkes) and train lengths are standardised at 1,800m. Most of the interstate standard gauge is managed by ARTC and allows for 21 tonne axle loads at 110/115 km/hour.
- Road: the road distance between the east coast capitals and Perth range are similar to rail distance. All of the intercity road freight passes across the Eyre Highway from Port Augusta linking Western Australia and South Australia via the Nullarbor Plain.
- Sea: sea freight between the eastern seaboard ports and Fremantle is mostly done as part of broader international shipping movements by the major international container services that

include one or more calls in Fremantle in their itinerary.[25] The east west shipping trade is almost exclusively a westbound movement. It is largely comprised of full containers carried from Sydney and Melbourne to Fremantle, although a smaller number of containers are also moved from Brisbane and Adelaide.

See the figure below.

Figure 7 East-West corridor – key freight routes



Source: Australian Government, National Map at https://nationalmap.gov.au/

5.2 Freight task

Around 5.6 million tonnes (equates to 19.8 billion ntk) of intermodal freight is estimated to have collectively moved between Perth and the east coast capital cities via road, rail and coastal shipping in 2020-21.[26]

Total freight volumes are estimated to have doubled over the last 25 years, with consistent growth occurring between 2000 and 2012, interrupted only by the GFC in 2008-09. However, since 2012, total headhaul volumes have declined by 21% (on an NTK basis), appearing to largely reflect a

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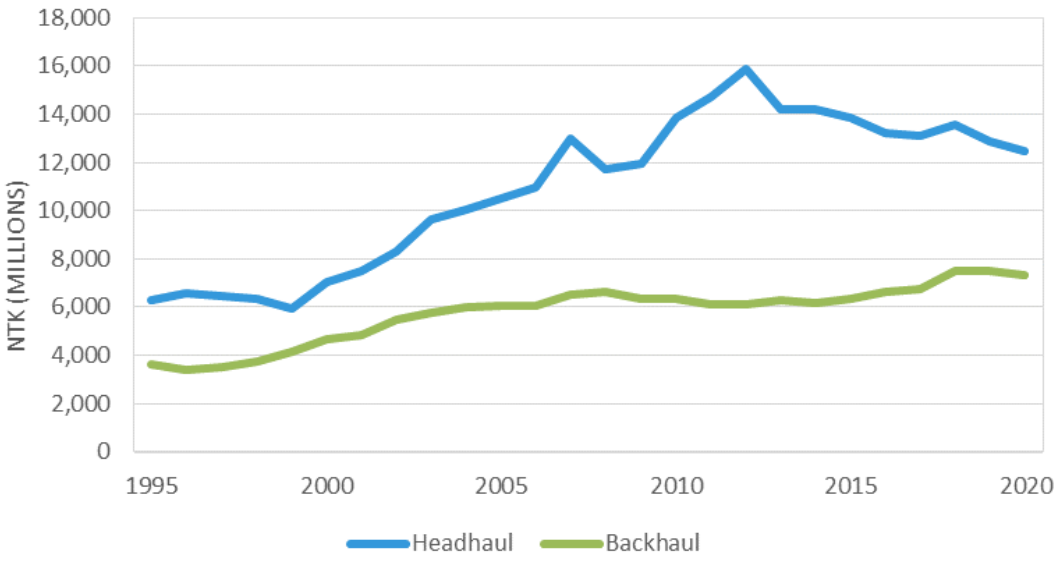
[25] ANL offers services for the carriage of cargo from container ports of the eastern seaboard to Adelaide and Fremantle. ANL also offers carriage of coastal cargoes in the opposite direction, and between eastern seaboard ports. Like ANL, PIL has been a long term participant in the Australian coastal trade and has been carrying containerised cargoes domestically since the 1990s. However, the range of services offered by PIL is more limited than that offered by ANL. The services currently advertised by the company are limited to the East-West route, and do not include the carriage of cargoes from Brisbane. There are also a number of third party logistics service companies that offer to ship domestic containers (for example, AAW Global Logistics, Superfreighter, Australian Coastal Shipping and BCR.

[26] Synergies calculation. Based on methodology as set out in section 3.2.1.

slowdown in economic activity in Western Australia.[27] Backhaul volumes remained relatively flat over much of this period, however, have risen slightly since 2015 (see Figure 8 below).

Figure 8 East-West corridor – intermodal freight volumes (NTK) 1995 – 2020



Source: Synergies analysis based on (a) rail: ARTC (b) road: ABS road freight movements and other supplementary information ie. truck count statistics WA Dept of Transport (c) Sea: ARTC

Notes: Routes (BNE/SYD/MEL/ADEL to PER (both directions). Excludes BNE-ADEL, SYD-ADEL, MEL-ADEL. Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

The figure below shows the relative significance of each major origin-destination pair on a headhaul and backhaul route basis.

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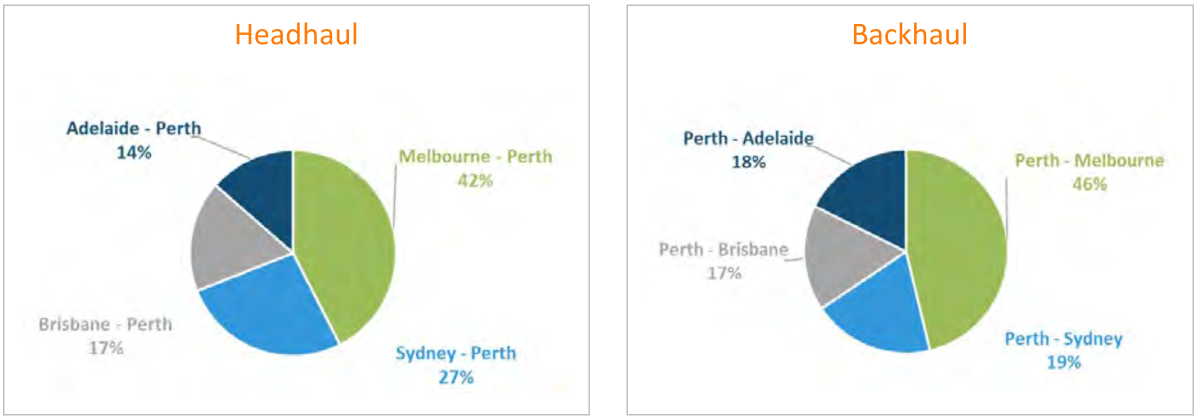
[27] Full container imports through Fremantle increase on average by 7.9% p.a. during the decade 2001 to 2011. Between 2011 and 2020, this rate of growth fell to 2.7%. Between 2012 to 2017 the growth rate was only 0.8% p.a. This coincides with an easing in state economic activity over that same period. Gross State Product in WA grew on average by 3.7% between 2012 and 2020, which shows an easing in growth compared to the 8 years prior 2012. More markedly, state real incomes fell even more significantly during 2012 to 2017 and by 2018 incomes were around the same level as in 2011.

Figure 9 East-West corridor – intermodal freight volumes (NTK) 2020 – by O-D pairs



Source: Synergies analysis based on (a) rail: ARTC (b) road: ABS road freight movements and other supplementary information ie. truck count statistics WA Dept of Transport (c) Sea: ARTC

Notes: **R**eferences to a city includes the hinterland catchment area around the city from which rail freight is drawn. Excludes BNE-ADEL, SYD-ADEL, MEL-ADEL

This shows that:

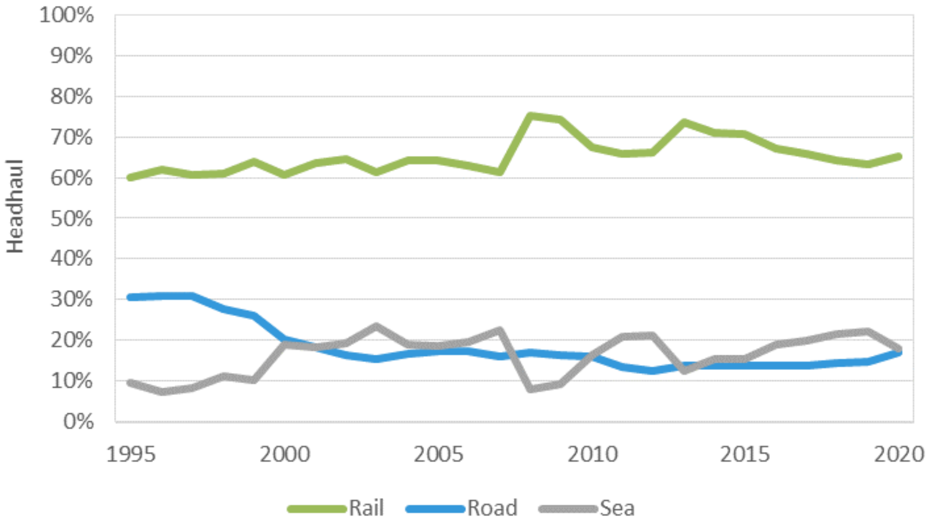
- the Melbourne-Perth route dominates the freight task on both a headhaul and backhaul basis, encompassing just under half of the total freight movements on the corridor;
- in the headhaul direction, Sydney-Perth is the largest of the other routes;
- in the backhaul direction, the remaining volume is spread quite evenly amongst the other routes.

5.3 Mode share

5.3.1 Mode share overview

Rail is the dominant mode in both directions for intermodal freight on the east-west corridor. (see Figure 10 and Figure 11 below), with shipping carrying a significant share of freight in the headhaul direction only. While rail transport has long been the primary mode, the relative modal shares have varied considerably over time, as shown in the figures below.

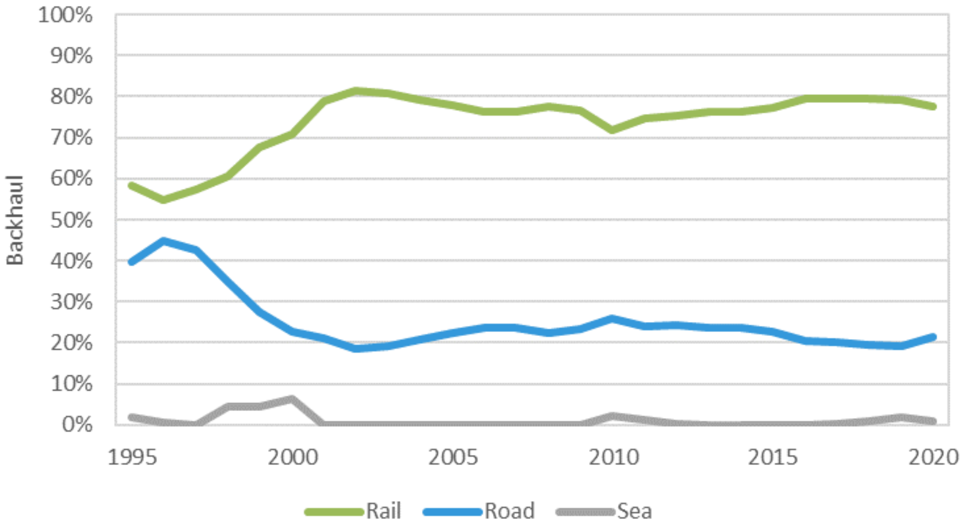
Figure 10 East-West corridor – headhaul mode share (NTK) 1995 – 2020



Source: Synergies analysis based on (a) rail: ARTC (b) road: ABS road freight movements and other supplementary information ie. truck count statistics WA Dept of Transport (c) Sea: ARTC

Notes: Routes (BNE/SYD/MEL/ADEL to PER (both directions). Excludes BNE-ADEL, SYD-ADEL, MEL-ADEL. Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

Figure 11 East-West corridor – backhaul – modal share (NTK) 1995 – 2020

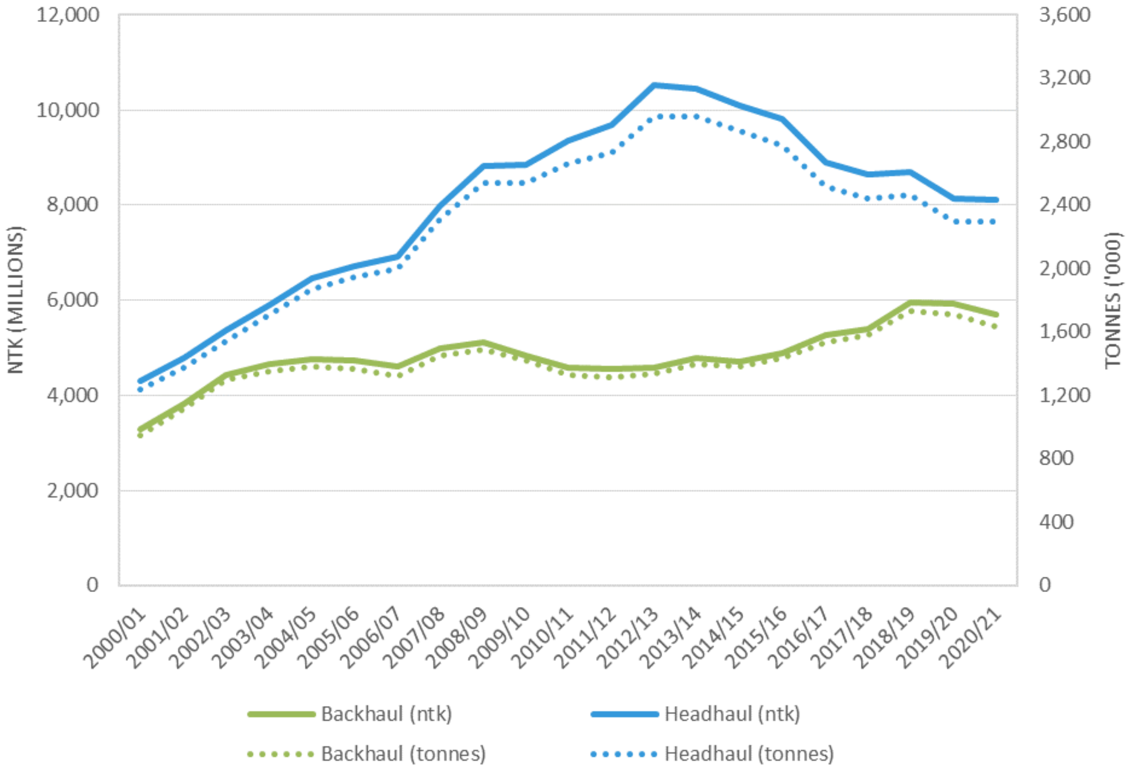


Source: Synergies analysis based on (a) rail: ARTC (b) road: ABS road freight movements and other supplementary information ie. truck count statistics WA Dept of Transport (c) Sea: ARTC

Notes: Routes (BNE/SYD/MEL/ADEL to PER (both directions). Excludes BNE-ADEL, SYD-ADEL, MEL-ADEL. Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

The trend in rail volumes (on a ntk and tonnage basis) between 2000 and 2021 is shown below. In the headhaul (westbound) market, rail volumes increased significantly between 2000 and 2013, but have declined since then. For the backhaul (eastbound) market, rail volumes have gradually increased between 2000 and 2021.

Figure 12 East-West corridor – headhaul and backhaul – rail volumes (NTK, tonnes) 2000 – 2021



Source: Synergies analysis based on (a) rail: ARTC (b) road: ABS road freight movements and other supplementary information ie. truck count statistics WA Dept of Transport (c) Sea: ARTC

Notes: Routes (BNE/SYD/MEL/ADEL to PER (both directions). Excludes BNE-ADEL, SYD-ADEL, MEL-ADEL

Confidence level

Synergies' confidence in the quality and reliability of the freight volume information differs by mode, and the level of disaggregation. We have high confidence in the rail and shipping volumes, which are collected on an origin-destination basis. For road:

- there is some uncertainty on headhaul volumes as although a long time series of truck count data is available, weighbridge information (required to convert truck counts to freight volume) is only available for a small subset of years, however uncertainty is minimised as ABS road freight statistics at 2014 broadly correlate with truck count statistics;
- there is greater uncertainty on backhaul volumes as only a small window of truck count information is available and no weighbridge information is available.
- there is lower confidence for road freight O-D volume estimates, as we are relying on traffic patterns remaining consistent since the last ABS road freight survey in 2014.

Given the data uncertainty relates to road freight, and road freight comprises a relatively small proportion of east-west freight, we consider that the modal share estimates are reasonably robust.

Key trends

For freight travelling in the headhaul (westbound) direction (see Figure 10), rail mode share has historically ranged from 60-70%. During the period 2008 to 2013, rail mode share increased to 73%, before suffering a gradual downward trend to reach 63% in 2019. Rail mode share has subsequently risen to 65% in 2020. Combined with the contraction in the overall size of the market, rail volumes have declined by 23% since 2013.

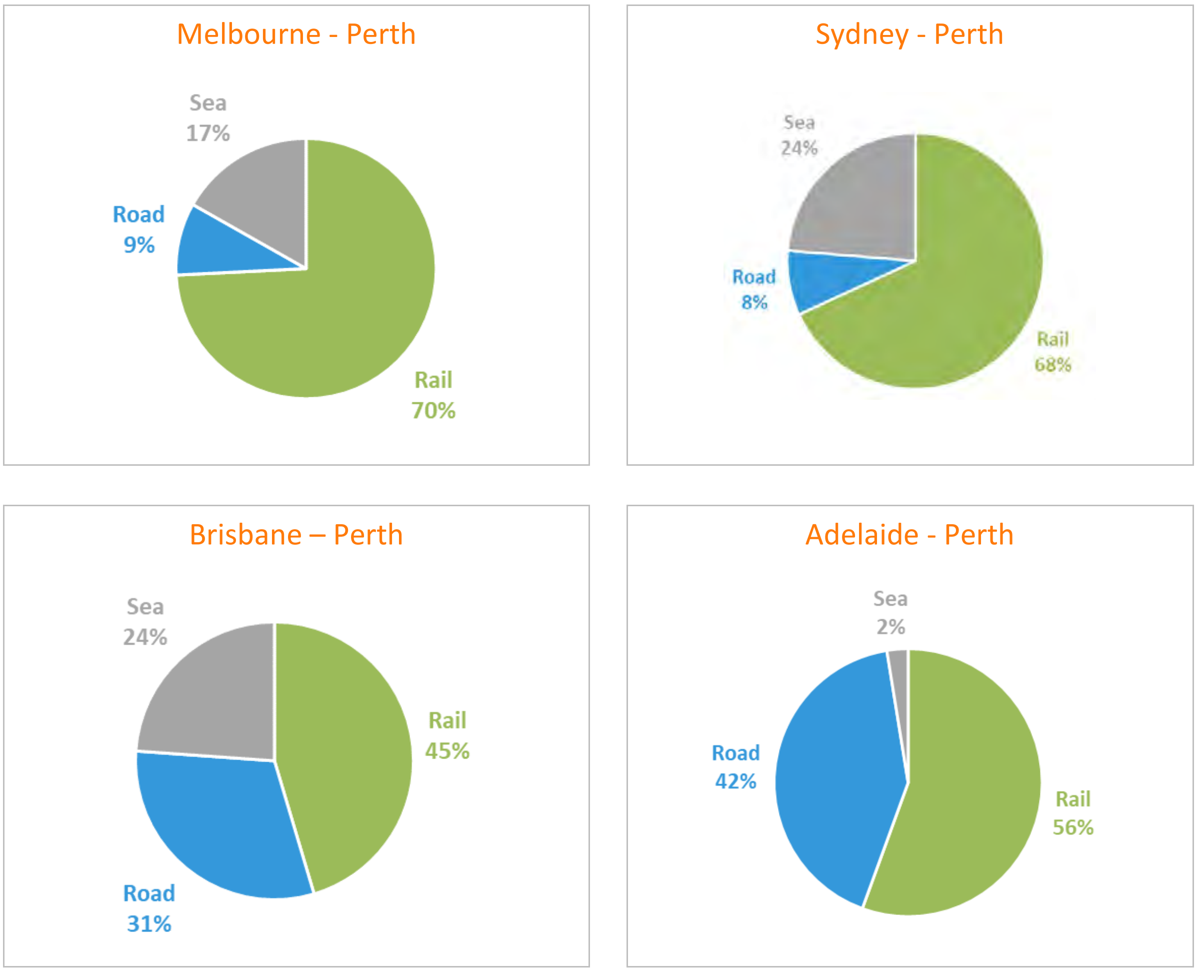
Since around 2000, changes in mode share have largely resulted from freight switching between rail and shipping – while road's mode share fell substantially in the period to 2000, it has remained quite stable since that time. Changes in mode share follow a pattern of shipping progressively building its mode share, followed by a sudden reduction in shipping volumes. Reflecting this, shipping's mode share (headhaul direction) increased from 10% in 1999 to 23% in 2007, before dropping to 8% the following year. It then rebuilt to 21% mode share by 2012 before falling to 12% in 2013. Shipping again rebuilt its mode share to 22% to 2019, but reduced to 18% in 2020. These variations can be largely traced to changes in the global shipping markets with shipping lines strongly pursuing domestic freight, but then withdrawing capacity at times of disruption in international shipping markets. In 2008-09, this was the result of the GFC, whereas in 2020-21, this has been driven by the impacts of COVID-19 on international supply chains and shipping demand.

For freight travelling in the backhaul direction, that is eastbound from Western Australia (see Figure 11), shipping does not participate in the market in any significant way, and rail competes with road for backhaul freight. Since 2000, rail's market share has ranged between 70% to 80%, varying with changes in the total size of the market, as road's backhaul volumes are estimated to remain quite steady. Rail's share of the backhaul market has grown since 2010 (72%) to 2020 (77%). With the backhaul market being significantly smaller than the headhaul market, there is also a requirement for empty container movements from Perth to the east coast. Given the absence of shipping services in the backhaul direction, this movement of empty containers has usually occurred by rail.

5.3.2 Mode share by origin-destination pair

A snapshot of mode share in 2020-21 for each major origin-destination pair in the headhaul (see Figure 13) and backhaul (see Figure 14) directions are shown below.

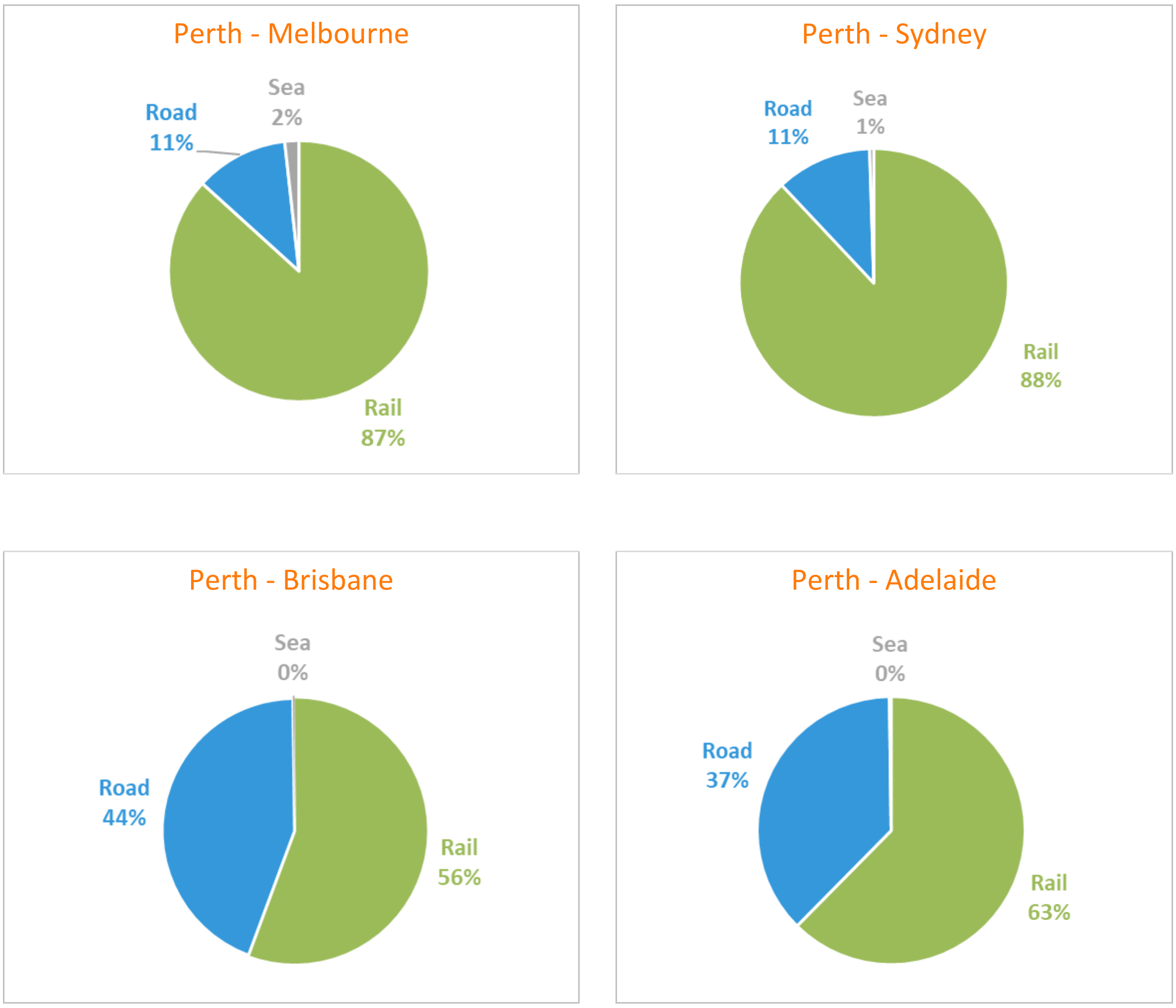
Figure 13 East-West corridor – Origin/Destination – headhaul – modal share (NTK) 2020-21



Source: Synergies analysis based on (a) rail: ARTC (b) road: ABS road freight movements and other supplementary information ie. truck count statistics WA Dept of Transport (c) Sea: ARTC

Notes: Routes (BNE/SYD/MEL/ADEL to PER (both directions). Excludes BNE-ADEL, SYD-ADEL, MEL-ADEL. Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

Figure 14 East-West corridor – Origin/Destination – backhaul – modal share (NTK) 2020-21



Source: Synergies analysis based on (a) rail: ARTC (b) road: ABS road freight movements and other supplementary information ie. truck count statistics WA Dept of Transport (c) Sea: ARTC

Notes: Routes (BNE/SYD/MEL/ADEL to PER (both directions). Excludes BNE-ADEL, SYD-ADEL, MEL-ADEL. Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

While rail is the dominant mode across all services, there are significant differences amongst the pairs:

- For the major corridors from Melbourne and Sydney to Perth:
  - this is where rail's modal performance is strongest, reflecting long linehaul distances and efficient train configurations;
  - shipping's mode share is strong, with Melbourne and Sydney being Australia's largest container ports, and with multiple weekly international shipping services calling at these ports prior to a Fremantle call;

  - the road market share on these routes is low, estimated at less than 10%, reflecting the high quality and availability of lower cost rail and shipping services.

- From Brisbane to Perth, rail achieves a lower mode share than from the southern capitals, made up by an increase in road's mode share. While linehaul distances are significantly longer, rail provides a less efficient service from Brisbane, using the north-south corridor prior to transshipping at Parkes.
- For Adelaide to Perth, shipping services are limited, but this is made up by an increase in road's mode share rather than rail. This is the case even though route distance is in excess of 2,500km and rail infrastructure supports a highly efficient rail service.

5.4 Relative service characteristics by mode

5.4.1 Transit time

Road

Transit time for road freight will reflect a combination of the driving time (given route distance and average speed), together with rest periods required to meet the Heavy Vehicle National Law (HVNL) and its regulations.[28] For long road trips, such as those on the east-west route, substantial rest periods are required for solo drivers. As a result, significant reductions in road transit times can be achieved either by using two drivers, or by replacing drivers at intermediate points on the journey. Estimated road transit times for each route (in the head haul direction) are shown in Table 8.

Table 8 Typical road transit times – east-west corridor (hours)

	Melbourne-Perth	Sydney-Perth	Brisbane-Perth	Adelaide-Perth
Standard (solo driver)	62	75	82	52
Express	39	46	59	30

Note: Express transit times based on two driver operation. All transit times have been rounded up to the nearest whole hour.
Source: ATS Logistics; see: atslogistics.com.au/australiandrivetimes/

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[28] The Heavy Vehicle National Law (HVNL) and its regulations commenced in New South Wales, the Australian Capital Territory, Queensland, South Australia, Tasmania and Victoria on 10 February 2014. Each of these jurisdictions passed a law that either adopts or duplicates the HVNL (with some modifications) as a law of that State or Territory. Refer: https://www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations

Rail

For the east-west corridor, ARTC offers both express and standard intermodal freight train paths. The average transit times for each type of service are shown in

Table 9 Typical rail transit times – east-west corridor (hours)

	Melbourne-Perth	Sydney-Perth	Brisbane-Perth	Adelaide-Perth
Standard				
Linehaul	49	58	76	36
Freight cut-off and availability allowance	12	20	20	12
PUD allowance	2	2	2	2
TOTAL	63	80	98	50
Express				
Linehaul	49	58	76	36
Freight cut-off and availability allowance	3	4	7	6
PUD allowance	2	2	2	2
TOTAL	54	64	85	44

Note: All transit times have been rounded up to the nearest whole hour.
Source: Linehaul transit time based on ARTC modelled transit time as advised by ARTC, Timetable information as advised by rail operators, Synergies allowance for PUD.

Shipping

Shipping from the East Coast ports to Fremantle occurs on scheduled international shipping services that call at multiple Australian ports as part of a broader international shipping movement. The transit time can vary materially depending upon the schedule for the specific vessel, including the extent of additional calls being made. For example, ANL's current shipping service schedules provide linehaul transit times from Sydney to Perth of 6, 8 and 11 days, while Pacific International Line (PIL) schedules allow 9 or 10 days transit.

Reflecting this the estimated transit times for each route (in the headhaul direction) are a point estimate within the typical range of transit time outcomes for shipping movements, and are shown in Table 10.

Table 10 Typical shipping transit times – east-west corridor (hours)

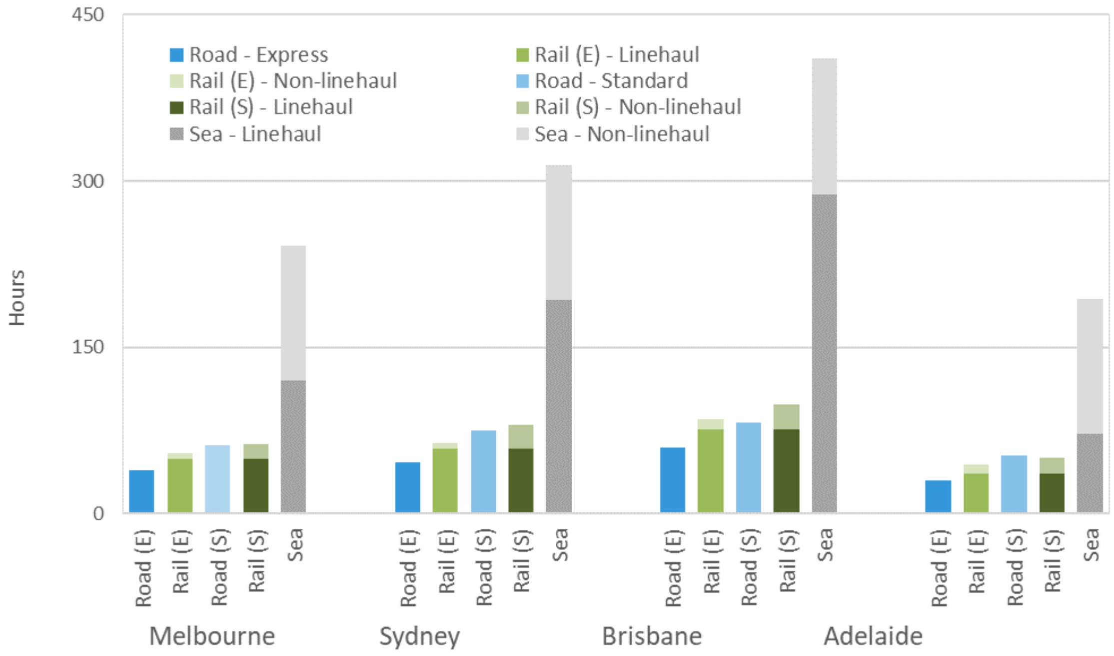
	Melbourne-Perth	Sydney-Perth	Brisbane-Perth	Adelaide-Perth
Linehaul	120	192	288	72
Freight cut-off and availability allowance	120	120	120	120
PUD allowance	2	2	2	2
TOTAL	242	314	410	194

Source: ANL shipping schedules, see https://www.anl.com.au/ebusiness/schedules/routing-finder, Synergies estimated allowance for PUD and freight availability allowance

Comparison of mode performance

Comparative transit times by mode are show for each route below:

Figure 15 Comparative transit times by mode – east-west corridor (hours)



Source: Synergies analysis

From a transit time perspective, the standard rail transit time is reasonably comparable to the standard road transit time for freight from Melbourne, Sydney and Adelaide. From Brisbane, standard rail transit times are around 25% higher than standard road, requiring a full additional day for the freight movement, although if an express rail service is used, the transit time is comparable to standard road. However, express road freight services can achieve a materially shorter transit time than can express rail freight services, with the express rail freight service transit times being approximately 40-50% higher than express road for each route, effectively requiring an additional day for the freight movement.

Transit times for rail have been stable over time, however transit times for road have gradually reduced, particularly from Sydney to Perth.[29]

In all cases, shipping provides an effective transit time far in excess of that offered by road or rail – for each route being around 4 times the standard rail transit time, with freight taking 10-17 days from the east coast to its destination in Perth.

5.4.2 Reliability

Road

There is no generally available measure of road transport reliability on a route specific basis. However, road transport is generally perceived to offer high reliability, with studies indicating in the order of 98% arrival within expected times.[30] We consider it is likely that road will achieve a similar reliability on all major interstate routes.

Rail

Rail freight reliability can be considered in terms of both the reliability of the rail service arriving as scheduled, and in terms of the reliability of the freight being available from collection from the terminal (or otherwise delivered to the required destination) as advertised (delivery in full and on time, or DIFOT). The freight availability reliability is the critical issue from a customer perspective, however the rail service reliability is important, as it directly contributes to the freight availability reliability, contributes to the freight transit time (by impacting the margin that is allowed between train arrival time and advertised freight availability) and impacts the operating efficiency of the rail service.

Rail's reliability performance on the east-west route is summarised below:

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[29] Estimated by comparing driving distances and hours specified in Road Transport (Long Distance) Award 2010 with current estimate of driving hours (2 driver) according to ATS Logistics, differences of greater than 10% assumed to reflect impact of road improvements.

[30] Ernst & Young, ACIL Tasman and Hyder Consulting (2006), North-South Rail Corridor Study, Detailed Study Report, p.2-17, p.3-7, p.3-26, p.2-37. See also Department of Transport and Regional Services (2007), Melbourne-Brisbane Corridor Strategy: Building our National Transport Future, June 2007, p.11

Table 11 East-west rail freight reliability indicators

	Headhaul		Backhaul		All services	
	2020-21	**3 yr avg**	**2020-21**	**3 yr avg**	**2020-21**	**3 yr avg**
% services departing on time[a]	55%	59%	43%	56%	50%	57%
% services arriving on time[a]	27%	36%	40%	47%	33%	41%
% services cancelled	4%	3%	5%	4%	5%	3%
% freight availability as scheduled	60%	67%	93%	94%	77%	81%

a Measured as being within 30 minutes of schedule

Note: 3 year average covers period 18-19 to 20-21

Source: Rail operator data returns, February 2022

From this it can be seen that rail's train service reliability – the proportion of times that the trains depart and arrive on time – is poor on the east-west route, and has declined significantly in 2020-21 (although the 2020-21 performance is likely to have been impacted by COVID-19 related restrictions on mobility). Train service reliability issues are clearly apparent both prior to departure (where less than 60% of services depart the IMT on time), and en-route, where on time arrivals at the destination IMT fall to 41%.

However, freight availability as scheduled is significantly higher, reflecting the buffers built into schedules to accommodate expected variation in train service performance. There are significant differences in freight availability reliability in the fronthaul and backhaul directions, which is substantially influenced by the greater buffer times built into the freight cutoff and availability margins. In the headhaul direction, rail's reliability in achieving its advertised freight availability is generally poor, at only 60-70%. Further understanding of the factors impacting reliability can be drawn from ARTC's performance reports. ARTC manages the majority of the east-west rail network and reports that, over the 2020-21 year, around 58% of east-west services exited the ARTC network on time (within 15 minutes of schedule), with around 73% of services no more than one hour late. This reflected a decline in performance, where over the previous five years, on time exit reliability ranged between 60-70%, and 80-85% of services were no more than an hour late.[31] In terms of the factors contributing to this reliability outcome, ARTC reports that, over 2020-21:

- just under 55% of services entered the ARTC's network on time, with around 60% of services operated in a healthy manner (that is, generally speaking, not delayed due to rail operator issues);
- around 95% of healthy services exit the ARTC network on time, and over 90% of unhealthy services do not deteriorate further;

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[31] ARTC performance indicators "Reliability" and "Transit Time"; October 2021 [see https://www.artc.com.au/customers/access/access-interstate/performance-indicators/reporting/]

- of delays during transit, less than one minute per hour is due to ARTC cause, while 6-8 minutes per hour are operator delays, and 1-2 minutes per hour are unattributable to either ARTC or operators.

From this data, it can be seen that:

- a large proportion of train delays occur prior to trains leaving the originating IMT, with only 50% of services departing the IMT on schedule in 2020-21 (57% over the three year average). This is generally consistent with ARTC's reports on the proportion of train services entering the ARTC network on time;
- train on-time performance deteriorates through the journey, with a further 15% suffering further delays such that they arrive late at their destination. The factors contributing to these delays are unclear, noting that the % of services exiting the ARTC network on time slightly exceeds the % of services entering the ARTC network on time. This indicates that there may be additional delays being incurred on connecting networks (such as Arc Infrastructure's network from Kalgoorlie to Perth or the Sydney Trains network for those trains that are routed through Lithgow); and
- while ARTC infrastructure issues do contribute to on-time outcomes, they represent a relatively small share of total train delays.

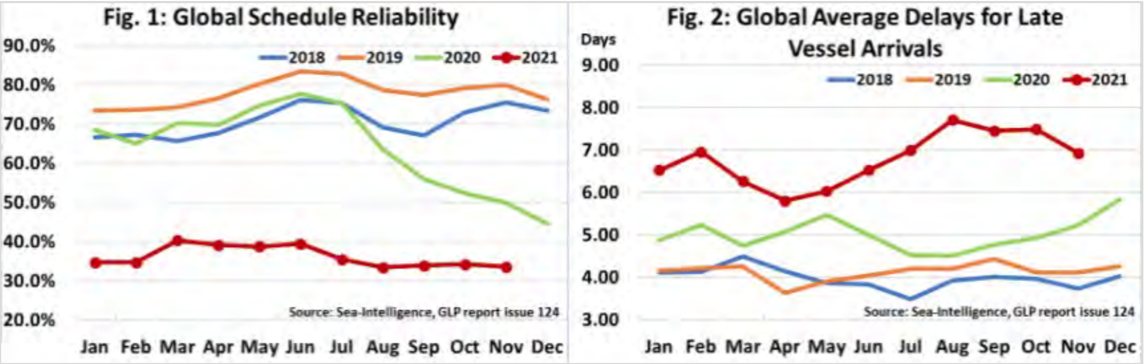
Rail is more likely to be affected by major route outages caused by extreme weather events, with rail services typically taking longer to restore than road. The recent major flooding in South Australia provides an extreme example of this impact, with flooding on 21 January 2021 causing widespread damage to the rail network, taking 24 days to repair and resume services. The Eyre Highway, while also affected by flooding was re-opened for traffic within days. While the scale and duration of this event was highly unusual, rail services may be disrupted for days at a time due to weather events or derailments causing damage to the network. It can be difficult and expensive for freight customers to source alternate transport (eg by road) during these events, due to limitations on available capacity and high demand for contingency transport.

Shipping

Shipping from the East Coast ports to Fremantle occurs on scheduled international shipping services that call at multiple Australian ports as part of a broader international shipping movement. The reliability of the shipping services, in terms of compliance with schedule, will reflect not only their performance on the Australian coastal route, but also their performance against their broader international schedule.

An assessment of global shipping liner reliability against schedule over the period from 2018-2021 shows that, prior to the supply chain disruptions resulting from COVID-19, schedule reliability was around 75%, with delays for late vessel arrivals averaging around 4 days. However, since late 2020, reliability has plummeted and average delays have increased, reflecting the impacts of significant increases in global freight demand, tight capacity and COVID related performance restrictions. Globally, congestion at ports has increased significantly, including limits on equipment, unavailability of empty containers and a lack of room for containers and vessels. This has resulted in global schedule reliability falling to just over 30%, with average delays of around 7 days.

Figure 16 Shipping reliability



Source: Sea Intelligence, GLP report issue 124

Stevedores report similarly poor reliability for vessel arrivals within designated windows at Australian ports, with reports that on-window arrivals fell to between 10-30% during 2020-21.[32]

This performance relates to the shipping linehaul movement, as compared to the total freight movement from the shippers' perspective. However, current average delays for late vessel arrivals are well above Synergies' assumed 'freight availability' allowance of 2 days, meaning that a large proportion of shipping delays will cause corresponding delays to the expected availability of freight.

As global shipping supply chains stabilise and investment in additional vessel capacity comes on line, shipping capacity constraints will lessen, and it can be expected that shipping reliability will increase to historic levels. However, even at historic reliability levels, shippers need to take account that actual transit times can extend well beyond the schedule. For the east-west route, these impacts are anecdotally reported to cause delays to freight availability of up to a week.[33]

Comparison of mode performance

Relative service reliability, by mode, on the east-west corridor is summarised in the figure below:

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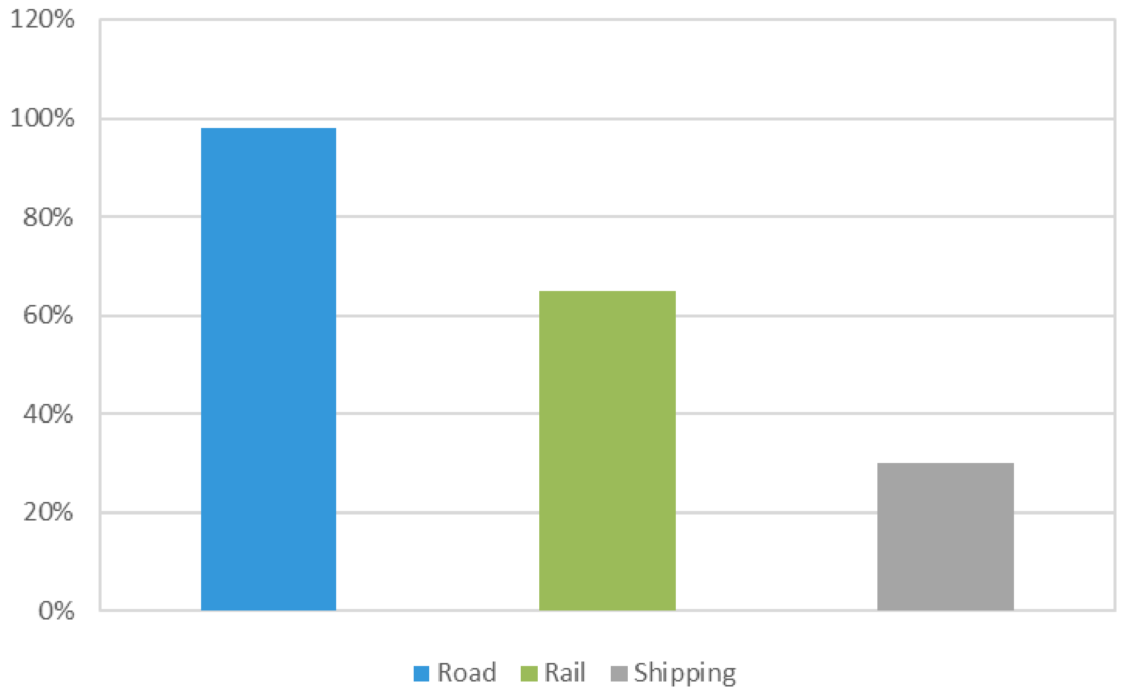
[32] ACCC (2021), Container stevedoring monitoring report 2020-21, p.14

[33] Freight Controller, Coastal Container Shipping – How does it compare to Rail and Road? See https://freightcontroller.com.au/coastal-container-shipping-how-does-it-compare-to-rail-and-road/

Figure 17 East west corridor freight arrival reliability



Source: Synergies analysis

Rail freight provides for significantly poorer reliability of freight arrival than does road. While shipping reliability is substantially poorer again than rail, and with significantly greater average delays for late services, the much longer transit time for shipping means that it is not used where there is any real time sensitivity associated with its delivery. Shipping is only an option for freight customers who are willing and able to accommodate long transit times and uncertain freight availability, which can be managed through the warehousing of sufficient stock buffers in WA.[34]

5.4.3 Service frequency and availability

Road

Road freight transport for the non-bulk freight task is considered a 'bespoke' service, tailored to each customer's requirements, with services provided as required by the customer. The service is therefore effectively continuous.

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[34] Freight Controller, Coastal Container Shipping – How does it compare to Rail and Road? See https://freightcontroller.com.au/coastal-container-shipping-how-does-it-compare-to-rail-and-road/

Rail

Approximately 20 trains run on the east-west route to Perth each week[35], with connections to other services providing at least daily coverage for most key east-west routes. Services are operated by Pacific National and SCT. This reflects a reduction from the 25 trains per week run in 2017, when Aurizon exited the intermodal freight market.

Operators report that the increasing volume of freight carried over the course of 2020-21 means that these rail services are now effectively operating at capacity, with material increases in freight volumes only able to occur with the introduction of new rail services (note, there is sufficient capacity on the rail network to operate additional services). Pacific National and SCT are both investing in additional rail capacity, with Pacific National intending to increase its containerised freight capacity by more than a third, compared to pre-pandemic levels, in less than three years.[36] SCT is similarly increasing capacity, with an additional 12 locomotives delivered over 2021-22,[37] however we understand that these will largely be directed to other service areas (eg fulfilling the Bluescope steel contract).

Shipping

As noted previously, shipping of intermodal freight occurs as part of an international freight movement, with shipping schedules designed to meet these requirements. Services generally operate weekly, however the existence of numerous carriers means that, prior to the COVID-19 related disruption to international supply chains, there were up to four services operating from east coast ports to Fremantle, depending on the specific route (with less services available from Brisbane).[38]

However, there are limits on the supply of this capacity for domestic freight. It is very unlikely that international carriers will increase their capacity purely to cater for the domestic trade, and therefore the scope for carriage of domestic cargoes will be determined by the surplus space available on services designed to meet the needs of international cargo. On the assumption that the shipping lines will structure their routes and adjust their supply of capacity to depart Fremantle with a full load, it is reasonable to assume that the space that can be made available for east-west domestic cargoes is limited to the space that is needed for international containers that are loaded in Fremantle, less any space required for containers that will be discharged in Fremantle.

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[35] BITRE (2021), Trainline 8 Statistical Report, p.80.

[36] Rail Express (2021); Full capacity for Pacific National, September 16 2021 see https://www.railexpress.com.au/full-capacity-for-pacific-national/#:~:text=We%20are%20also%20committed%20to,in%20the%20next%20four%20years.

[37] See https://en.prnasia.com/releases/apac/crrc-delivers-four-additional-second-generation-sda1-locomotives-to-sct-logistics-in-australia-349949.shtml

[38] Synergies analysis based on published shipping line schedules

By making some reasonable assumptions, we can make a sensible estimate of the likely limit on space for domestic containers on international carriers.

The share of space that could in principle be made available for domestic containers on east-west services will be different for each service. This is because some of these services will also carry international import cargos to be discharged in Fremantle. There is no publicly available information about the share of total exports shipped on each service that is loaded in Fremantle. However, taking the services as a group, Fremantle's share of national container exports provides a reasonable indication of the proportion of available capacity that needs to be reserved for Fremantle export cargoes.

BITRE reports that the total exports from the five capital city container ports during 2018-19 (prior to any COVID impact). These totals are shown in Table 12 below.

Table 12 Imports and exports at main container ports, 2018-19 (TEU)

Direction	Adelaide	Brisbane	Fremantle	Melbourne	Sydney	Total	Fremantle Share
Export	209,800	668,000	384,900	1,508,800	1,326,200	4,097,700	9.4%
Import	198,600	674,000	401,400	1,509,900	1,317,600	4,101,500	9.8%
Total	**408,400**	**1,342,000**	**786,300**	**3,018,700**	**2,643,800**	**8,199,200**	

Source: BITRE Waterline 65, December 2019.

On this basis, we estimate that the share of capacity that international lines offering East-West service could make available for domestic cargoes will be limited to around 10%[39].

We then examined the approximate ship capacity of services with an ability to carry westbound domestic containers, and estimated an indicative share of Fremantle imports for each carrier, based on consideration of the vessel rotation and alternate options for handling Fremantle imports. On this basis, we have estimated the indicative capacity available for domestic cargoes in 2019 as follows:

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[39] We use a round figure of 10% rather than the calculated 9.3% from Table 13 to emphasise that this number is properly regarded as an indicative estimate only.

Table 13 Supply side limit to carriage of East-West domestic containers (2019)

		Capacity allocation on East-West transit			
Group	**Capacity (TEU)**	**Exports from other ports**	**Import for Fremantle**	**Available for domestic**	**Capacity available for domestic**
CMA CGM (AAX)	299,000	90%	0%	10.0%	29,900
Maersk (Boomerang)	288,600	90%	2.5%	7.5%	21,600
OOCL/PIL (AAA1)	228,800	90%	2.5%	7.5%	17,200
MSC (AEX)	364,000	90%	1.0%	9.0%	32,800
	1,180,400				**101,500**

Source: Synergies, based on shipping service schedules and port trade statistics

While this analysis is indicative only, noting that MSC does not currently apply for Temporary Licences for its vessels (and therefore does not participate in the coastal trade),[40] this would suggest that, at 2019, international carriers had around 70,000 TEU capacity available for the domestic trade. Based on actual throughput trends, this indicates that increases in shipping's mode share had the result that, by 2019, carriers were using most of the capacity that they were able to make available for domestic cargoes. The main opportunities for increasing the potential supply are:

- changing vessel allocations (due to changes in demand for international trade) providing increased capacity for domestic containers; or
- MSC — the only line with significant potential capacity that does not currently apply for Temporary Licences for its vessels — deciding to carry domestic cargo on its AEX service.

However, more recently, service availability and capacity for coastal shipping has been withdrawn from the market. This reflects the high level of international shipping demand together with high levels of port congestion, and the corresponding very large increases in global freight rates means that carriers currently have little incentive to participate in the domestic trade. Once international shipping patterns stabilise and carriers renew their interest in the domestic market, there would be merit in reviewing the amount of capacity likely to be available for carriage of domestic containers on international services.

Comparison of mode performance

While rail is not able to provide the 'continuous' service of road, the regularity of rail services on the corridor, with services available on most days, means that rail services are provided at a frequency

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[40] See https://www.infrastructure.gov.au/infrastructure-transport-vehicles/maritime/business/coastal_trading/licencing/voyage_reports

that meets the requirements of most freight types. Shipping services are less frequent, with services available from east coast ports to Fremantle 1-4 times per week, depending on the route.

However, there are currently significant constraints on the availability of services, with shipping capacity having been withdrawn from the market during COVID-19 supply chain disruptions, and rail services operating at full capacity. It can, however, be expected that these constraints will alleviate over the next 1-3 years.

5.4.4 Cost, price and productivity

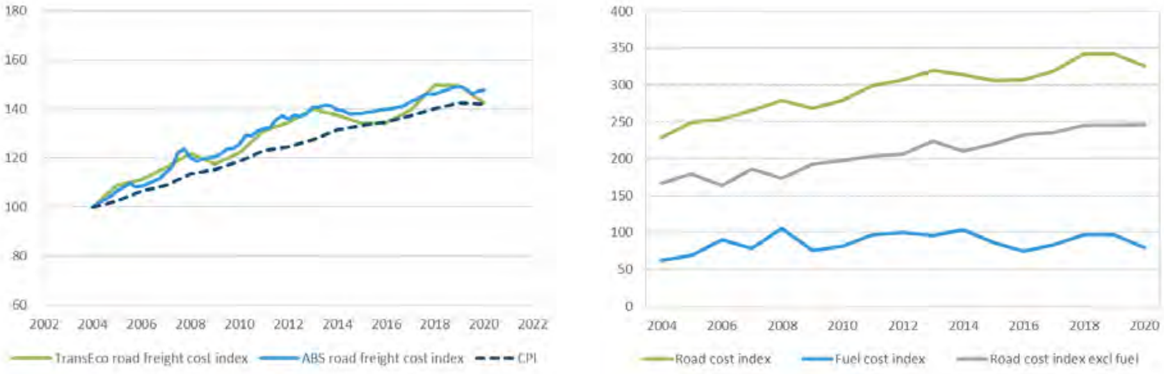
Road

Road cost and productivity

As described in section 2.3, there are a large number of participants in the Australian road freight market. The market is highly competitive, with haulage capacity provided in relatively small increments. As a result, it is reasonable to assume that the price charged for road transport will be equal to the cost of providing the service, including a reasonable rate of return on invested capital. To the extent that productivity gains are achieved, it is reasonable to expect that this will be reflected in lower road transport costs.

Key drivers of heavy vehicle productivity are discussed in Appendix B. For the Australian market overall, changes in productivity of road transport can be seen through movements in the TransEco linehaul road freight cost index and the ABS road freight transport index, as shown below:

Figure 18 ABS and TransEco road freight cost indexes



Source: ABS 6427.0 Producer Price Indexes, Australia, Table 21, TransEco road cost index, indices normalised to 2004

The ABS road freight cost index and TransEco road cost index both show that, since 2004, road costs have roughly tracked CPI. However, once the impact of changes in fuel costs are excluded, road costs have increased by 4% in real terms over the period. This increase has been offset by a 9% decrease in fuel costs over the period.

The TransEco linehaul index is based on a constant linehaul fleet mix, comprising 50% B-Doubles and 50% single articulated vehicles. Notwithstanding that there have been no material productivity gains over the last decade for a given truck fleet, the road industry has significant opportunity to achieve productivity gains where changing technology and mass vehicle limits enables a greater use of larger, higher productivity vehicles.

The cost differential for different truck types is illustrated below:

Table 14 Operating cost of trucks by type

Truck Type	Cost Of Truck per km	Cost of 10 Pallets per km[a,b]
Single	$1.82	$1.328
B-double	$2.28	$1.072
Road train	$2.28	$0.832

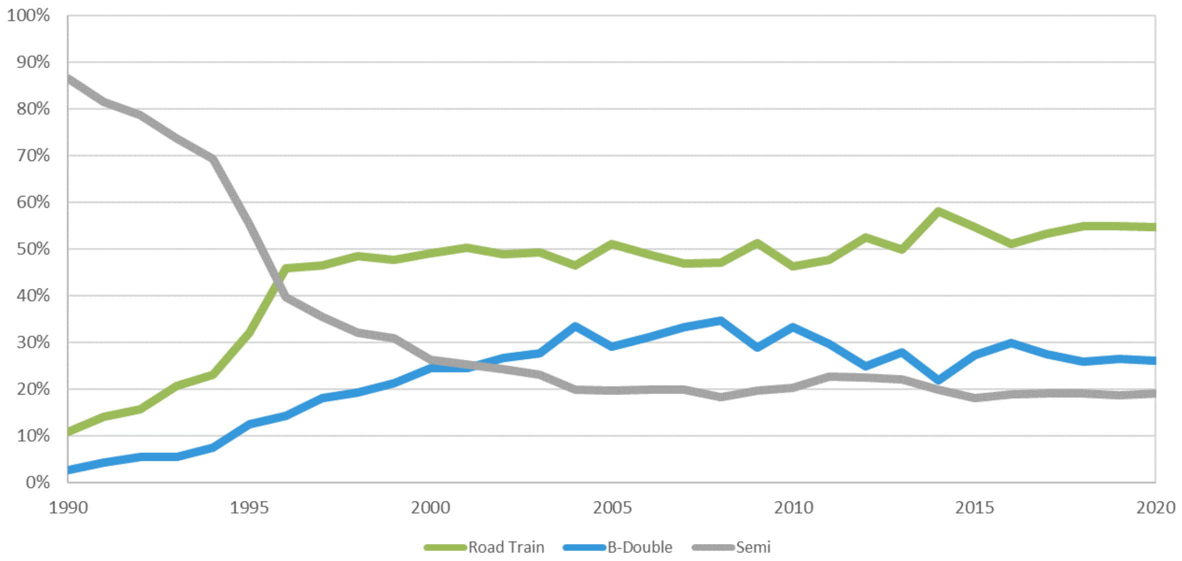
a: 10 pallets is assumed to be broadly equivalent to the carrying capacity of one TEU

b: Estimated headhaul cost, assuming 80% of round trip costs recovered from headhaul service

Source: WA department of transport Owner-Driver's cost calculator

It is possible to assess the productivity improvements on specific routes having regard to changes in the composition of truck types over time. Figure 19 shows how truck composition has changed over time on the east-west route.

Figure 19 East-west truck composition

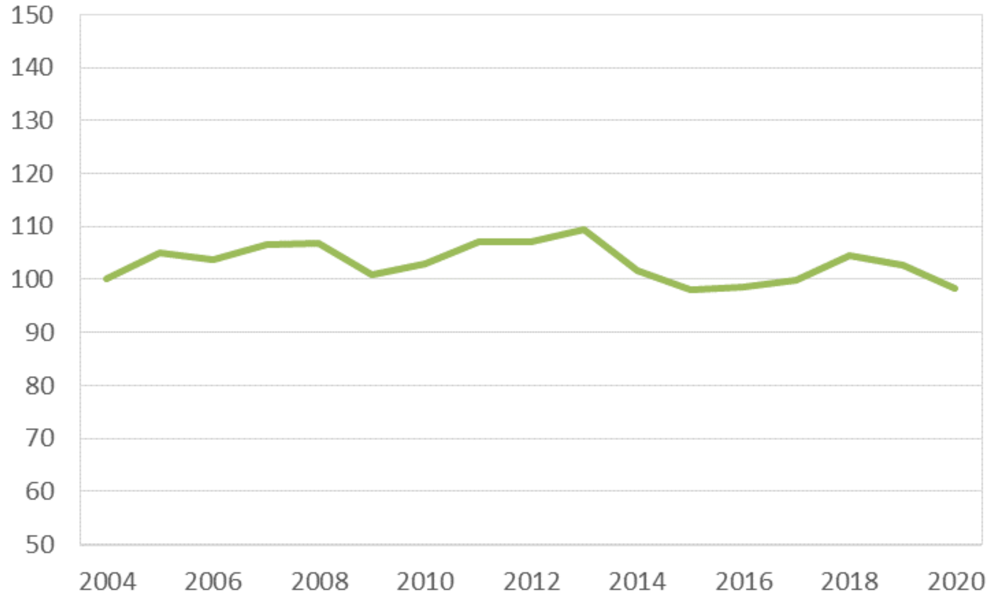


Source: Eucla truck count statistics, WA Dept of Transport

This shows there was a significant shift in truck composition on the east-west route in the early nineties as B-Doubles and road trains were introduced. However, since the mid 2000s, the mix has been relatively stable, with a slow trend towards road trains, predominantly at the expense of B-doubles.

Figure 20 shows the road cost index, in real terms, adjusted to reflect changes in truck types on the east-west corridor.

Figure 20 East-West road cost index adjusted for truck mix and CPI



Source: Synergies analysis

This shows that, even accounting for changes in truck composition, there has been limited changes in the cost of road freight on the east-west route, in real terms, over the last 15 years.

Based on the road freight costs per truck type shown in Table 14, and the truck composition in Figure 19, the weighted average cost of road freight on the east-west route is estimated at around $1.125 per km for 10 pallets. However, actual haulage rates will depend on the specific origin-destination, with limits on the operation of road trains directly from the east coast capitals resulting in either the use of lower productivity trucks, or in the consolidation of freight onto road trains at an intermediate location.

Productivity frontier

As can be seen from Table 14, significant reductions in the cost of road freight can be achieved through the use of higher productivity vehicles. The east-west route allows the operation of high productivity vehicles such as road trains over the majority of the route (although there are constraints on the operation of road trains out of the east coast capital cities), and this route may legitimately be considered to reflect the productivity frontier for interstate road haulage within Australia.

The road haulage characteristics assumed for the productivity frontier are summarised as:

Table 15 Road productivity frontier characteristics

	East-west route	
Maximum permitted truck type	Road train	
Truck composition	Road train	55%
	B-double	25%
	Semi-trailer	20%
Average speed (express)	90km/hr	

Source: Synergies analysis

There remains the potential for further productivity gains on this route, particularly to the extent that approval for higher productivity vehicles extends over addition roads connecting to the east coast capitals, enabling increased utilisation of road trains without the need for consolidation.

Rail

Unlike road transport, which is provided in small increments of capacity, a single train service provides a large amount of transport capacity, with up to 380TEU able to transported on a single train. Once the decision is made to operate a train service, the costs are largely fixed, although there are some costs that will vary according to the weight of the train (eg fuel, track access). Rail prices are designed to attract sufficient volume of freight to rail services (noting that rail services are competing with other modes) while recovering, in total, the cost of providing the service. As a result, there is a high degree of judgement in pricing for specific consignments.

The costs of providing rail services, and the extent to which productivity gains are achieved, will influence the total cost of providing each train service, and will influence the average price able to be offered by rail operators. Therefore, while price is not a direct measure of productivity, over time changes in average price should broadly reflect changes in productivity.[41]

The ABS rail freight index provides a measure of movements in rail freight pricing over time, covering a full suite of rail freight services including agriculture, bulk freight, manufactured goods and general freight. This index is not a direct measure of prices for intermodal freight, but does provide a general indication of changes in rail haulage prices over time. As can be seen in Figure 21, average rail freight prices were reducing in real terms until around 2008, but since then have been increasing both in real terms, and relative to road freight prices.

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[41] Note, prices will also be materially impacted by the extent of available train capacity, given the high capital costs and risks associated with investing in additional train capacity. Prices are likely to increase when train capacity is limited, and reduce where excess capacity exists. This can be seen from the effects prior to and following Aurizon's exit from the intermodal market in 2017, where surplus capacity existed prior to its exit. As a result, there may be periods where prices materially vary from the efficient long run cost of providing services.

Figure 21 ABS rail freight and road freight indexes

Source: ABS 6427.0 Producer Price Indexes, Australia, Table 21

As with road, significant productivity changes can be achieved on a particular corridor where rail operators are able to implement changes in technology, train configuration or service offering in order to achieve greater productivity benefits relative to the industry overall. However, on the east-west corridor, train consists and loading capacity have remained virtually unchanged over the last two decades, and there has been little change in rail's service offering over this period. This indicates that rail is unlikely to have achieved productivity gains on this corridor that exceed those of the rail freight sector overall.

Productivity frontier

The characteristics of intermodal trains operating on Australia's key intermodal routes are summarised below:

Table 16 Train characteristics

	Melbourne-Perth	Sydney-Perth	Melbourne-Sydney	Sydney-Brisbane	Melbourne-Brisbane	Tarcoola-Darwin	Queensland NCL
Train length	1,800m	1,800m	1,800m	1,500m	1,500m	1,800m	650m
Axle load	25tal	25tal	25tal	25tal	25tal	25tal	20tal
Double stacking	Yes (west of Adelaide)	Yes (west of Parkes)	No	No	No	Yes	No

	Melbourne-Perth	Sydney-Perth	Melbourne-Sydney	Sydney-Brisbane	Melbourne-Brisbane	Tarcoola-Darwin	Queensland NCL
Maximum speed	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	110km/hr(21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	100km/hr
Average speed	71km/hr	68km/hr	61km/hr	52km/hr	55km/hr	71km/hr	50km/hr

Source: Average speed based on ARTC modelled transit times where provided, otherwise data sourced from BITRE Trainline 8 and stakeholder data returns

From this, the most productive train types can be seen on the Melbourne-Perth and Tarcoola-Darwin corridors, where trains can operate at 1,800m with double stacking, with an average speed of 70km/hr. The Inland Rail project is intended to permit these same characteristics to be achieved between Melbourne and Brisbane. These characteristics represent the current 'productivity frontier' for rail.

Shipping

Unlike rail and road freight, the price for shipping freight bears little correlation with the total cost of the shipping service. This reflects that the shipping services are primarily servicing international freight, with the domestic carriage of freight being an opportunistic use of available capacity. The costs of providing and operating the ship are fixed once the vessel is chosen and the itinerary determined. The incremental cost faced by the shipping line in the incidental carriage of coastal containers is essentially confined to the costs incurred in getting the container on and off the ship.[42]

Shipping lines typically charge a flat rate for a container movement, regardless of tonnage, differentiated only based on container size (20' and 40' containers). Lines do not publish standard or reference tariffs for the carriage of domestic containers. However, rail market participants have periodically sought market information on sea freight rates which indicate that, prior to any impact of COVID-19, sea freight rates from Melbourne to Perth were in the order of $850 per 20' container, increasing to around $1,000 from Sydney and $1,160 from Brisbane.[43] In addition to the sea freight rates, PUD costs, terminal access charges (levied by stevedores on trucks accessing the port terminal) and miscellaneous minor charges (including broker charges) will be incurred, in order to complete the freight movement.

The shipping rates applied by liners will reflect the extent to which they are vigorously competing for the domestic trade, with rail market participant information indicating that sea freight rates had

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[42] There will also be an increase in wages due to the regulatory requirements associated with the Temporary License for the carriage of domestic cargoes, and an increase in fuel burn due to the additional cargo weight, however these costs are likely to be minor.

[43] Market information sourced by ARTC

declined by in excess of 10% (in nominal terms) over the five years from 2014 to 2019 – coinciding with the period of sea freight significantly increasing its mode share.

However, since 2019, with COVID-19 impacts leading to a significant increase in global shipping demand together with increased port congestion and shipping capacity constraints, average global shipping rates have nearly doubled.[44] In this environment, shipping liners have withdrawn capacity from the domestic freight market, in order to reduce shipping delays and focus more effectively on their international trade. Shipping rates for domestic freight are understood to have risen accordingly.

Comparison of mode performance

Historically, shipping rates for the movement of containers from the east coast to Perth are significantly lower than for road and rail freight. Broad rules of thumb suggest that door to door rail freight costs are typically 60-70% of road freight costs, with shipping costs typically around 35-40% of road freight costs. This will however, vary by consignment including due to:

- the density of the cargo, noting that both road and shipping modes primarily price freight by volumetric capacity (within maximum mass limits for road), whereas rail freight is priced by a combination of volumetric capacity and weight, with the result that relative prices vary by cargo density[45]; and
- the extent to which the rail operator must offer a reduced price for rail to compensate for rail's lower service quality – which will vary by freight type reflecting that the service differences have a greater value for some freight categories (most notably for fast moving consumer goods, where transit time/reliability are valued more highly).

For the east-west corridor, where average rail prices are significantly lower than road, rail haulage costs are generally materially lower than road regardless of cargo density, but particularly for dense products where road reaches its mass limit (and requires additional trucks to carry the cargo). However, for shipping, which can accept very dense cargoes with the same volumetric charge, the price discount to rail for very dense cargoes will be significantly higher than the rule of thumb average described above.

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[44] Drewry's World Container Index shows that shipping rates in January 2022 were 80% higher than the same period in 2021. See also Daily Cargo News, "Drewry's container Index Increases Slightly on Last Week", 14 January 2022.

[45] CRC for Rail Innovation (2014), Choice of mode for contestable non-bulk freight, May 2014, p.7-10

5.5 Factors influencing mode share

5.5.1 Supply chain requirements by freight category

Based on consultation with intermodal rail operators[46], Synergies has assessed the supply chain requirements for each category of intermodal freight.

Express freight is often shipped in relatively small volumes and places a premium on service quality. Express freight is generally unwilling to trade off reduced service quality for reduced price.

Fast moving consumer goods require regular replenishment, and place a high priority on timely, reliable and frequent services. However, freight volumes are often large and freight customers may be willing to vary service requirements (in particular, the lead time for ordering – that is, transit time) in order to achieve lower cost transport, provided that there is a high reliability of goods being received within the time windows allowed, and service frequency is maintained. This is particularly the case for interstate movements, where national distribution centres tend to be used for relatively slower moving product lines, and faster moving lines held at major regional distribution centres. The supply chain requirements for beverages provide a good example of this tradeoff – beverages are very high density and are transported in high volumes. Sea transport is often used in order to reduce the freight costs, but this requires a greater extent of warehousing in order for freight customers to accept the longer transit time and lower reliability of shipping.

Slow moving consumer goods are generally high value products, moved in moderate volumes, but with less imperative for goods being available for consumers on demand. They are often bulky, resulting in high warehousing and inventory cost when significant storage is required. As a result, freight customers are generally willing to vary service requirements in order to achieve lower cost transport. Slow moving consumer goods will not necessarily have a fixed delivery date requirement, but will still require reasonably timely delivery in order to meet consumer expectations.

Industrial and construction products are often moved in moderate volumes as part of a regular planned supply chain movement (although demand for construction productions may be more variable). Freight density for these products is often relatively high. Freight customers are generally willing to vary service requirements in order to achieve lower cost transport.

Apart from the FMCG category of freight, which is time sensitive, other freight categories will not necessarily have a specific transit time requirement and have the ability to accept an extended transit time (which can be accommodated by adopting a longer lead time for ordering). However, there will be limits on the extent to which this may be accepted, for example, a slow moving consumer freight customer may be willing to extend transit time by a day or two, but may find it unacceptable to extend transit time by a week or more.

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[46] Stakeholder consultation, SCT (November 2021), Pacific National (December 2021)

The supply chain requirements for each freight category are summarised as follows.

Table 17 Supply chain requirements by freight category – east-west

	Melbourne - Perth	Sydney - Perth	Brisbane - Perth	Adelaide - Perth
Express freight				
Transit time	Overnight + 1-2 days	Overnight + 1-2 days	Overnight + 2-3 days	Overnight + 1 day
Reliability	Very high (eg 98%)			
Frequency/availability	Daily or on demand			
Price sensitivity	Low			
Fast moving consumer goods - excluding beverages				
Transit time	Overnight + 2-3 days	Overnight + 2-3 days	Overnight + 3-4 days	Overnight + 1-2 days
Reliability	High			
Frequency/availability	Daily with preference for late evening departures and early morning arrivals			
Price sensitivity	Medium			
Fast moving consumer goods - beverages				
Transit time	Moderately to significantly extended			
Reliability	Low			
Frequency/availability	Weekly or 2-3 times per week			
Price sensitivity	High			
Slow moving consumer goods				
Transit time	Moderately extended			
Reliability	Medium			
Frequency/availability	Daily or 2-3 times per week			
Price sensitivity	Medium			
Industrial and construction products				
Transit time	Moderately to significantly extended			
Reliability	Medium			
Frequency/availability	Daily or 2-3 times per week			
Price sensitivity	Medium to high			

5.5.2 Changes in mode share and structural influences

Rail vs road

It can be seen from section 5.3 that, over the last decade, the major changes in mode share on the east-west route have been between rail and shipping modes. For the major freight markets from Melbourne and Sydney (which together account for nearly 70% of the east-west freight in both headhaul and backhaul directions), road freight is estimated to hold less than 10% of the market. This is likely to represent the express category of freight that is structurally advantaged towards road, due to its very high requirements for timeliness and reliability. It appears that, from these origins, the extent of the freight charge discount offered by rail and shipping (as compared to road) means that largely all of the remaining categories of freight that are willing to accept a tradeoff between service level and price have done so. At the current price differential between rail and road of approximately 30-40%, the current level of rail service quality (including transit time, reliability and frequency) appears to be acceptable to freight customers, including for time sensitive fast moving consumer goods.

The exception to this is freight from Brisbane and Adelaide to Perth, where there is a greater use of road transport.

The extent to which rail and shipping have consistently captured the non-express freight market (particularly from Melbourne and Sydney) indicates that road is at a structural disadvantage in these markets, given the acceptable service quality of rail together with its significantly lower price. This in turn is influenced both by the long distances involved and by rail freight operating near to its productivity frontier.

However, there is potential for ongoing improvements in road productivity, primarily driven by ongoing road improvements resulting in high productivity vehicles being permitted over additional road connections around the east coast capital cities. This may allow road freight to gradually erode this structural disadvantage, and increasingly compete with rail for more time sensitive elements of the fast moving consumer freight task.

Ongoing improvements in rail productivity will be necessary for rail to maintain its dominant pricing position as compared to road on the east-west route.

Rail vs shipping

The more significant changes in mode share on this route occur between rail and shipping which compete primarily for less time sensitive freight, such as slow moving consumer freight and industrial and construction products, as well as beverages. Rail operators report that shipping has been most effective in attracting high density freight (noting that the price for sea freight does not vary by product weight), with average cargo density for rail freight declining as shipping mode share increased.[47]

Productivity changes in the shipping industry are not a significant factor in these modal shifts, as domestic freight movements are incremental to the international shipping schedule, and liners will be willing to accept domestic carriage provided it makes an acceptable margin above incremental

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[47] Stakeholder consultations interviews - SCT Logistics (November 2021)

cost. Rather, the key factor influencing these changes in mode share is the aggressiveness of shipping liners in pursuing domestic volumes – influencing the extent of capacity that they make available for domestic freight and the margin that they are willing to accept for this freight.

While the relative service standards of rail and shipping mean that shipping customers must be willing to accept much slower transit time and reliability, this can be accommodated for many of these freight types if the customer has sufficient warehousing capacity in Perth. While over time freight customers have generally pursued reductions in warehousing capacity in order to optimise total warehousing and inventory costs, in recent years this trend has been reversed in WA. Freight customers are instead investing in warehousing capacity[48], increasing the size of the market that has the ability to accept the lower service quality (and lower price) offered by shipping.

Reflecting this, changes in mode share between rail and shipping have been primarily driven by changes in the global shipping market – in times of stability, the shipping liners actively pursue the domestic freight task, building market share, but in the event of major disruption in global supply chains (as has occurred most recently with COVID-19) they withdraw to focus on their major international markets. The extent of this withdrawal has placed significant pressure on rail operators, who are now essentially operating at maximum capacity on the east-west route.[49]

Once stability returns to the international shipping market, it is likely that the liners will again pursue domestic freight. Provided there is sufficient warehousing capacity available in Perth, a return shift in mode share to shipping could then occur quite quickly.

There will, however, be a natural cap on the capacity able to be offered by shipping services. Because domestic freight movements are incremental to the liner's international freight service, the capacity and scheduling of the service will be driven by the international freight task. Liners will only offer domestic freight to the extent that it can be incidentally accommodated within these services – the liners are unlikely to increase the capacity of international vessels to cater for the domestic trade, as if they were to do so, this would increase the incremental cost of providing domestic freight, and increase the rates that they would need to charge.

Synergies estimates that, in around 2019, the 'cap' on the supply of domestic freight by international shipping liners was around 70,000 TEU, indicating that most available capacity was being used at that time. There would be merit in reviewing this estimate once global shipping routes stabilise and carriers again seek to compete aggressively for domestic freight.

Further productivity improvements in rail will assist rail in effectively competing with shipping once stability returns to the global shipping markets and the liners again turn their attention to capturing domestic freight to provide increased margin recovery. However, noting the particular

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[48] Stakeholder consultation interview - SCT Logistics (November 2021)

[49] Stakeholder consultation interviews - SCT Logistics (November 2021), Pacific National (December 2021)

characteristics and limitations of the shipping market, there may also be options for rail freight operators to offer commercial arrangements to freight customers to support rail mode share, including:

- pricing model – and in particular the extent to which prices vary according to volumetric capacity or weight;
- long term capacity commitment – with the demonstrated variability in the capacity made available by international shipping liners for domestic freight, rail operators may be able to attract customers by offering a secure long term commitment to provide capacity for their services;
- return of empty containers – international shipping liners generally offer a one way service only, and do not provide a ready option for the return of empty containers to the east coast. Rail is the primary means of transporting empty containers from the west coast to east coast centers. There may be opportunity for rail operators to reduce the price benefit of coastal shipping through the arrangements that they are willing to offer for the one-way transport of empty containers.

Importantly, rail operators have noted that they are currently operating at capacity on the east-west route – therefore in order for rail to maintain or increase its mode share as freight volumes increase, it will be necessary for operators to invest further in rollingstock capacity. While both Pacific National and SCT are currently increasing their containerised freight capacity, given the limited number of rail operators in the market, there is a risk that rail operators will perceive greater commercial advantage in continuing to operate existing services with high utilisation, rather than investing further to cater for uncertain demand growth. The development of arrangements (whether commercial or other) that provide rail operators with confidence in future demand (which in turn requires that rail mode share can be maintained) will be critical in incentivising rail operators to invest in further rail capacity over the medium to long term.

6 North-South corridor intermodal freight

6.1 Geographic scope

The north-south interstate corridor is comprised of three elements (in both directions):

- cargo moving between Melbourne and Sydney;
- cargo moving between Sydney and Brisbane; and
- cargo moving between Melbourne and Brisbane.

Note, where in this report we refer to routes from one city to another, this includes the hinterland catchment area around each city from which rail freight is drawn. The size of this catchment area varies according to the route being considered, with rail freight drawing from a larger catchment area as the length of the linehaul movement increases. The methodology used to assess the hinterland catchment area for each origin-destination pair is described in Appendix A.

The key transport infrastructure supporting this route is as follows:

- **Rail**: The north-south rail corridor linking Melbourne-Sydney-Brisbane is 1,952 kms long (much shorter than the east-west corridor) and currently requires all intermodal trains on the north-south corridor to traverse the Sydney metropolitan rail network (using dedicated freight lines where available).[50] Intermodal terminals play an important role along the corridor and are in place Brisbane, Sydney and Melbourne, as well as in the in the regional centres of Parkes, Newcastle and Albury-Wodonga.
- **Road**: transport connecting to each of the origin-destination pairs include:
  - Sydney-Brisbane, by the New England Highway or the Pacific Motorway;
  - Melbourne-Sydney, by the Hume Highway; and
  - Melbourne-Brisbane, by the Newell Highway which bypasses Sydney, cutting more than 250km from the comparative rail journey.

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[50] See Department of Transport and Regional Services (2007), Melbourne-Brisbane Corridor Strategy: Building our National Transport Future, June 2007, p.2

  - The entire road route is a capable of accommodating B-double vehicles.[51] Road trains are now able to run along the entire NSW portion of the Newell highway without a permit,[52] but restrictions on road train operation still exist on the Victorian section of the corridor.

- **Sea**: very limited volumes of coastal shipping occurs on the north-south route (mainly between Melbourne and Brisbane) and is carried by international shipping lines calling at those ports as part of a broader international shipping schedule.

These transport corridors on the north-south routes are shown in Figure 22.

Figure 22 Melbourne-Brisbane road and rail infrastructure

Source: Department of Transport and Regional Services (2007), 2007 Melbourne-Brisbane Corridor Strategy: Building our National Transport Future, June 2007, p.3

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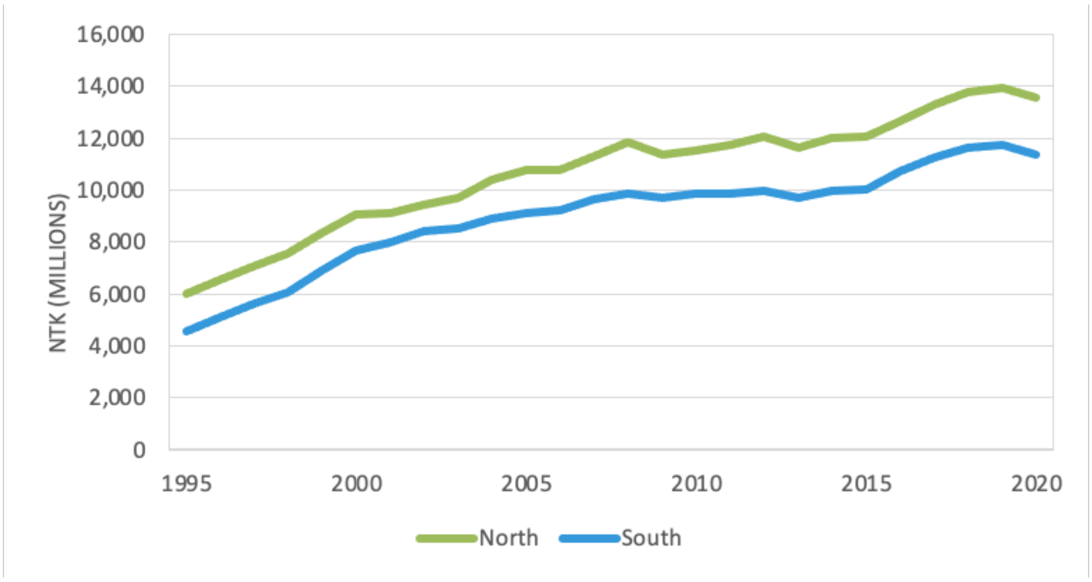
[51] A new weighbridge at Wardell was opened in 2020 which has enabled B-double Higher Mass Limit (HML) vehicles to travel directly between Sydney and Brisbane along the Pacific Highway. See media article at https://www.trailermag.com.au/sydney-brisbane-transport-link-opens/

[52] In September 2021, the NSW Minister for Regional Transport and Roads announced that gazetted access would now be available to all eligible vehicles up to 36.5 metres long along more than 1000 kilometres of highway included through Parkes irrespective of the cargo carried. Road trains have been granted permanent access to the last remaining section of the highway around Parkes without the need for a permit. See media article at https://www.grenfellrecord.com.au/story/7417309/access-for-road-trains-on-the-newell-highway/

6.2 Freight task

Around 24 million tonnes (or 24.9 billion tonnes in NTK terms) of intermodal freight is estimated to have moved along the north-south corridor in 2020-21. Estimated freight volumes have grown steadily over the last two decades, with headhaul (i.e. northbound) and backhaul (ie. southbound) freight volumes relatively closely matched (see Figure 23 below).

Figure 23 North South corridor – intermodal freight volumes (NTK) 1995 – 2020

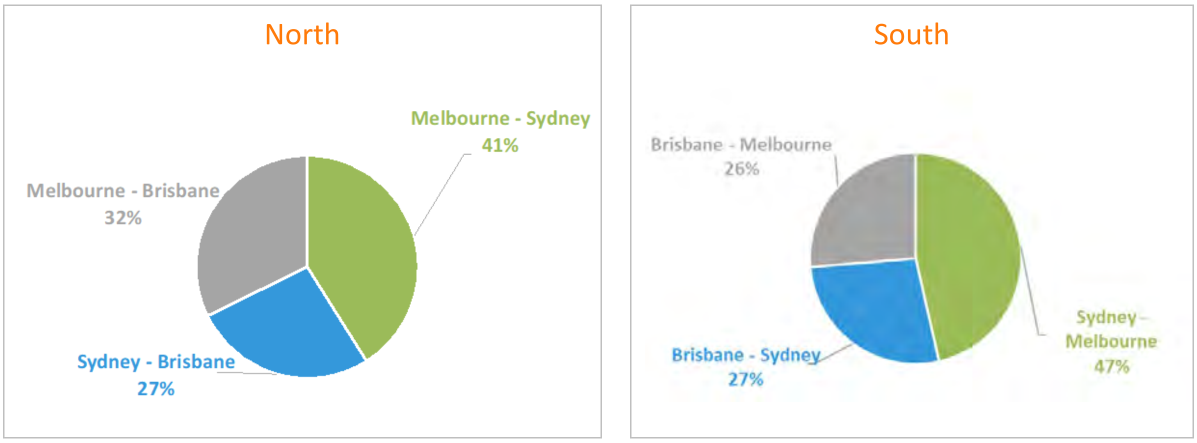


Source: Synergies analysis based on (a) rail: ARTC (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Transport for NSW truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure

Notes: This analysis excludes steel products railed from Port Kembla to Melbourne and Brisbane, which are primarily railed using a bulk train

The figure below shows the relative importance of each major origin-destination pairs on a headhaul and backhaul route basis.

Figure 24 North South corridor – intermodal freight volumes (NTK) 2020 – by O-D pairs



North

South

Source: Synergies analysis based on (a) rail: ARTC (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2019 and Transport for NSW truck count site information (c) Sea: ARTC

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

The figure shows that:

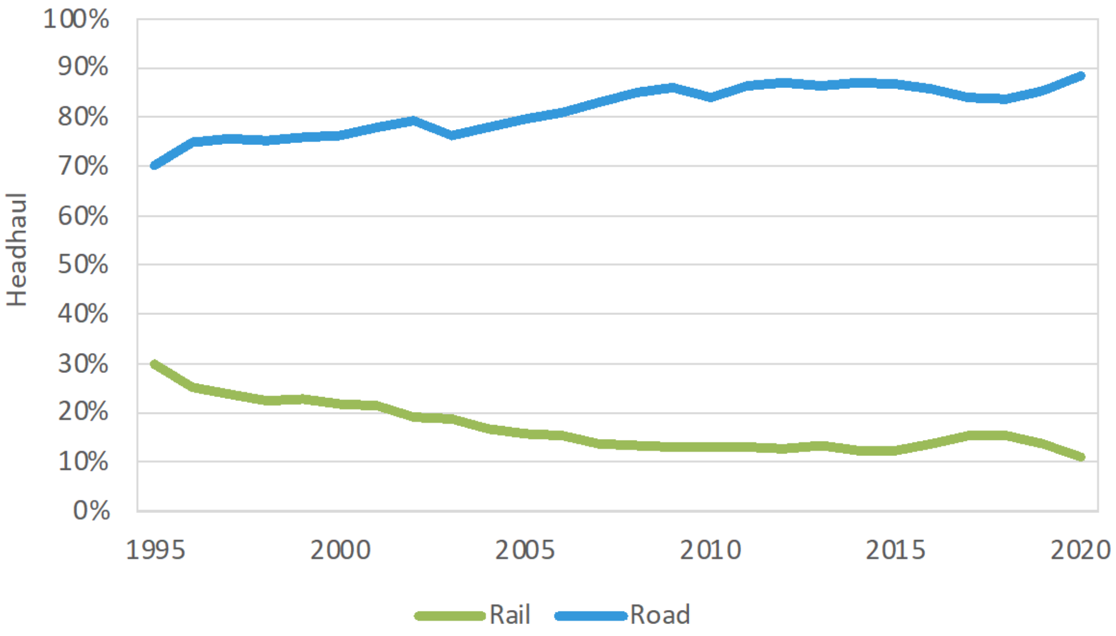
- The Melbourne-Sydney pair is the most significant route for both northbound and southbound freight traffic;
- The Sydney-Brisbane and Melbourne-Brisbane freight legs carry broadly comparable volumes of freight.

6.3 Mode share

6.3.1 Mode share overview

Road is by far the dominant transport mode in both directions on the north-south corridor. Over time, road has successfully entrenched itself to capture around 88% of the headhaul task (see Figure 25) and around 93% of the backhaul task (see Figure 26). Rail's modal share declined significantly from 1995, but has generally stabilised over the last 15 years.

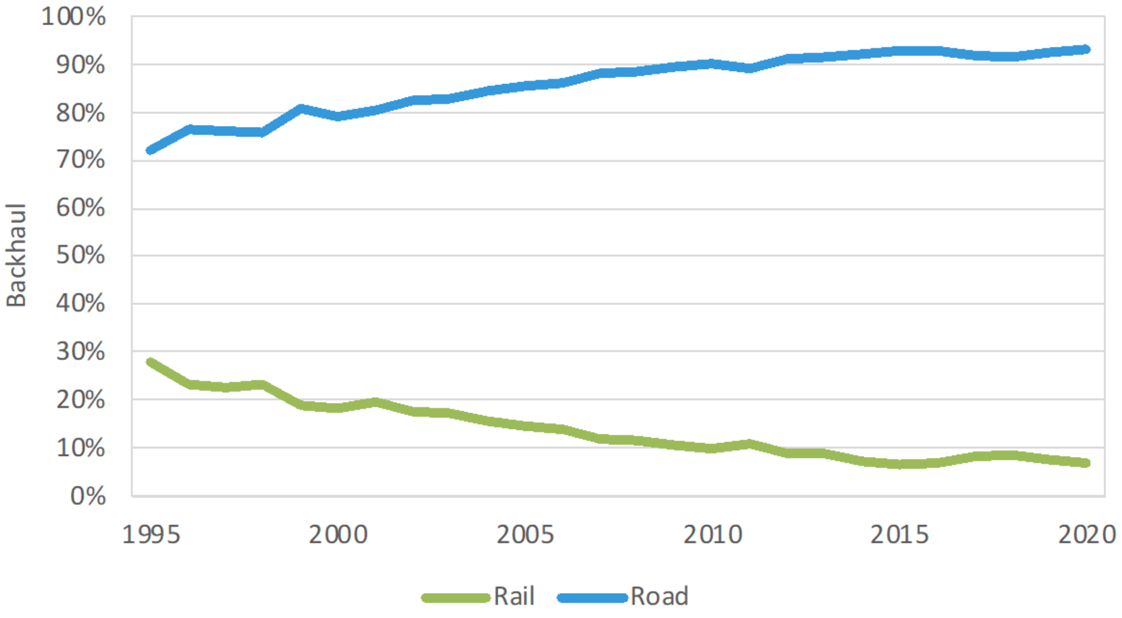
Figure 25 North South corridor – headhaul mode share (NTK) 1995 – 2020



Source: Synergies analysis based on (a) rail: ARTC (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Transport for NSW truck count site information (c) Sea: ARTC

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn. This analysis excludes steel products railed from Port Kembla to Melbourne and Brisbane, which are primarily railed using a bulk train

Figure 26 North South corridor – backhaul – mode share (NTK) 1995 – 2020

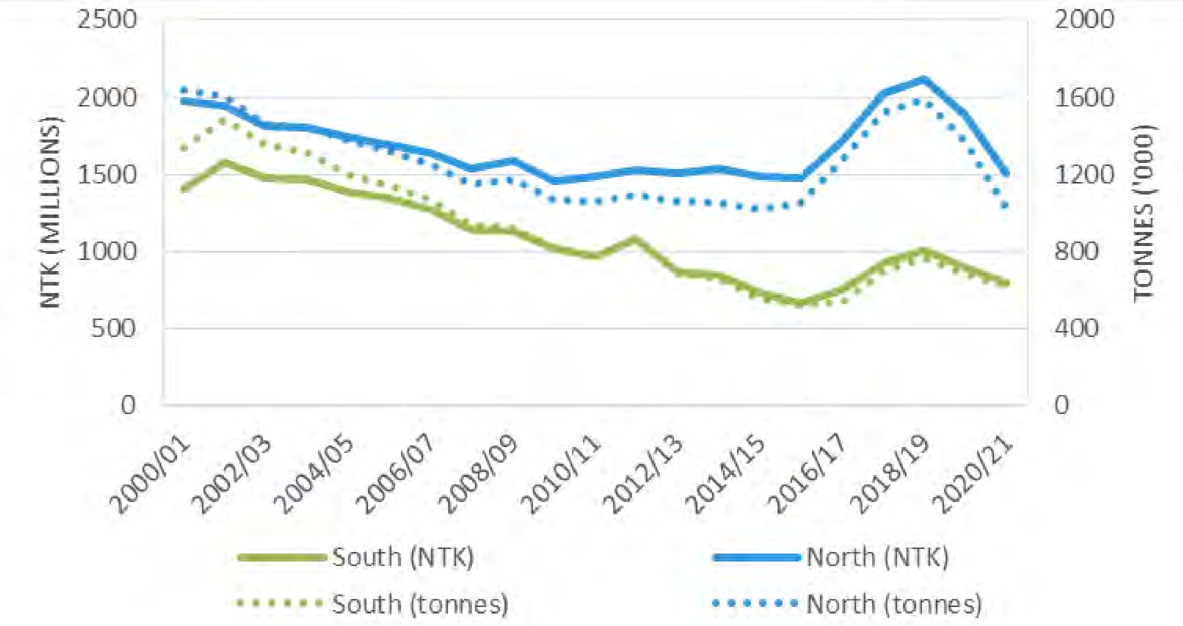


Source: Synergies analysis based on (a) rail: ARTC (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Transport for NSW truck count site information (c) Sea: ARTC

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn. This analysis excludes steel products railed from Port Kembla to Melbourne and Brisbane, which are primarily railed using a bulk train

The trend in rail volumes (on a ntk and tonnage basis) between 2000 and 2021 is shown below. In the headhaul (northbound) market and backhaul (southbound) markets, rail volumes have generally fallen, although the COVID-19 pandemic in 2020 brought an unexpected, temporary boost when some freight shifted from road to rail.

Figure 27 North South corridor – headhaul and backhaul – rail volumes (NTK, tonnes) 2000 – 2021



Source: Synergies analysis based on (a) rail: ARTC (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Transport for NSW truck count site information (c) Sea: ARTC

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn. This analysis excludes steel products railed from Port Kembla to Melbourne and Brisbane, which are primarily railed using a bulk train

Note, the significant increase and decline in rail volumes in the period 2017-18 to 2020-21 related to the movement of construction waste from Sydney to Brisbane for landfill. This movement has ceased following Queensland's introduction of a waste levy. Excluding this, rail's headhaul volume has remained broadly unchanged since 2007-08, but backhaul volumes have reduced. Over the decade to 2010, tonnes reduced at a significantly faster rate than ntk, indicating that average haul distances were increasing. This is likely to reflect a loss in volume on the shorter haul Melbourne-Sydney and Sydney-Brisbane routes, and an increase in volume between Melbourne and Brisbane. However, excluding the impact of construction waste from Sydney to Brisbane during 2017-18 to 2020-21, these relationships appear to have stabilised over the last ten years.

Confidence level

Synergies' confidence in the quality and reliability of the freight volume information on the North South corridor differs by mode, and the level of disaggregation. We have high confidence in the rail and shipping volumes, which are collected on an origin-destination basis. For road, for the purpose of assessing the total market and key origin-destination pairs, the quality of road data, particularly over a longer time series, is generally poor and there is significant uncertainty around truck volumes. This reflects the shortcomings of the key sources of data:

- NSW traffic census information is patchy, with information not available for all years, and is subject to difficulty in distinguishing between interstate and local/regional truck movements. However, the most recent years data is comprehensive, and allows greater confidence in the assessment of truck volumes on key routes; and
- the ABS road freight survey data is dated (with the most recent data from 2014), and the difficulty in distinguishing between interstate and local/regional truck movements from traffic census data means that we have less confidence that the two measures align.

Given the overwhelming dominance of road freight on the north-south corridor, the data limitations for road freight mean that our overall level of confidence in these results is less than for the east-west corridor.

Key trends

Figure 25 and Figure 26 show that road is the dominant mode for all origin-destinations along the North-South corridor. Shipping volumes are immaterial. Total rail volumes have declined throughout the last 25 years, although they have remained mostly steady over the last decade.

In the headhaul (northbound) market, rail mode share fell sharply over the decade 1995-2005, almost halving from 30% to around 16%, with a slowing decline thereafter. It has since stabilised at just over 10% for the last decade.

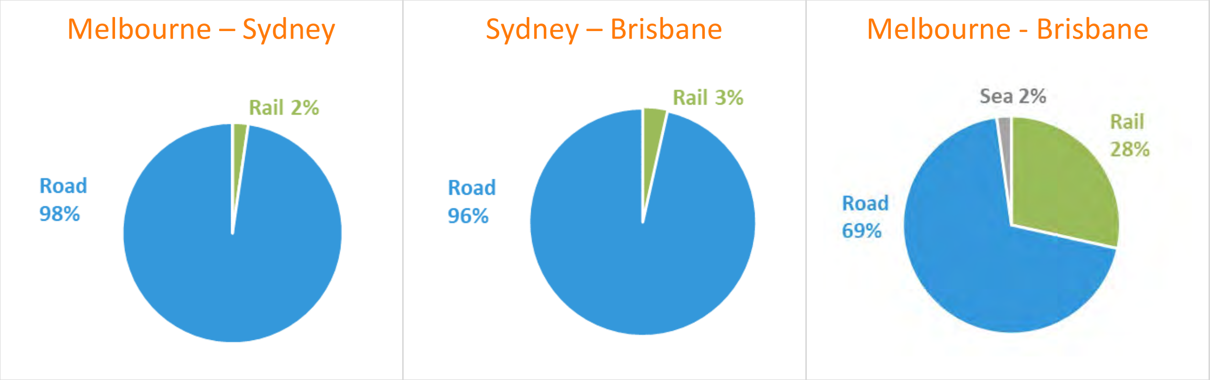
Similarly, in the backhaul (southbound) market:

- rail's market share followed a similar pattern as headhaul, but with a larger overall decline, with rail mode share consistently under 10% over the last decade;
- since 2005, rail's total backhaul volumes have slightly declined.

6.3.2 Mode share by origin-destinations pairs

A snapshot of mode share in 2020-21 for each major origin-destination pair in the headhaul (see Figure 28) and backhaul (see Figure 29) directions are shown below.

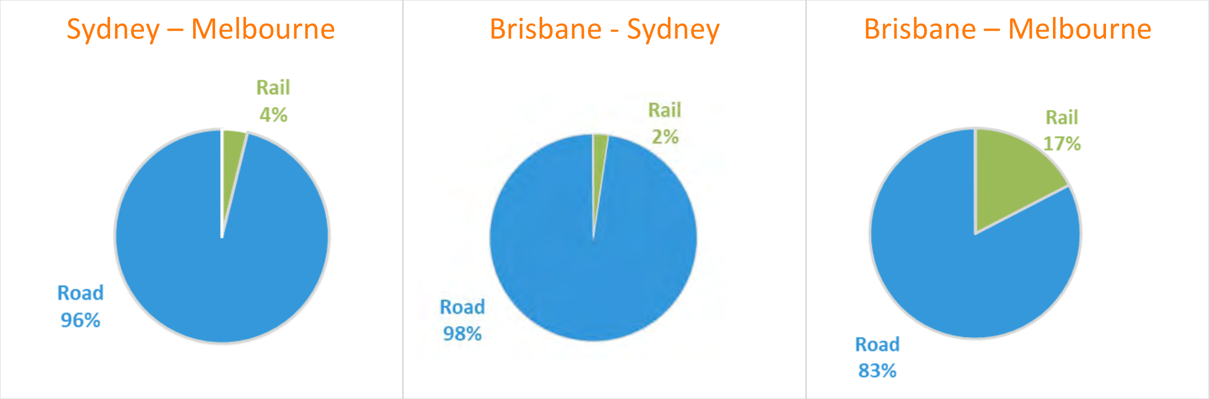
Figure 28 North-South corridor – Origin/Destination – headhaul – modal share (NTK) 2020-21



Source: Synergies analysis based on (a) rail: ARTC (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Transport for NSW truck count site information (c) Sea: ARTC

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn. This analysis excludes steel products railed from Port Kembla to Melbourne and Brisbane, which are primarily railed using a bulk train

Figure 29 North-South corridor – Origin/Destination – backhaul – modal share (NTK) 2020-21



Source: Synergies analysis based on (a) rail: ARTC (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Transport for NSW truck count site information (c) Sea: ARTC

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn. This analysis excludes steel products railed from Port Kembla to Melbourne and Brisbane, which are primarily railed using a bulk train

The figures above show that:

- as expected, rail's mode share is strongest in the long distance Melbourne-Brisbane leg - Synergies estimates that rail achieves 28% of volumes in the headhaul direction and 17% for the backhaul;
- for the shorter Melbourne-Sydney and Sydney-Brisbane legs, rail's mode share is under 5% in both directions.

6.4 Relative service quality

6.4.1 Transit time

Road

Transit time for road freight will again reflect a combination of the driving time (given route distance and average speed), together with rest periods required to meet the Heavy Vehicle National Law (HVNL) and its regulations.[53]

For Melbourne-Brisbane, significant reductions in road transit times can be achieved either by using two drivers, or by replacing drivers at intermediate points on the journey. However, for the shorter trips between Melbourne and Sydney, or between Sydney and Brisbane, only a standard road transit time is assumed.

Estimated road transit times for each route (in the head haul direction) are shown in Table 18:

Table 18 Typical road transit times – north-south corridor (hours)

	Melbourne-Brisbane	Sydney-Brisbane	Melbourne-Sydney
Standard (solo driver)	32	14	12
Express	24		

Note: Express transit times based on two driver operation. All transit times have been rounded up to the nearest whole hour.
Source: ATS Logistics; see: atslogistics.com.au/australiandrivetimes/

Rail

On the north-south corridor, there are no express rail freight services, and the average transit times for freight service is shown in Table 19.

Table 19 Typical rail transit times – north-south corridor (hours)

	Melbourne-Brisbane	Sydney-Brisbane	Melbourne-Sydney
Standard			
Linehaul	31	18	14
Freight cut-off and availability allowance	5	6	8
PUD allowance	2	2	2
TOTAL	**38**	**26**	**24**

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[53] The Heavy Vehicle National Law (HVNL) and its regulations commenced in New South Wales, the Australian Capital Territory, Queensland, South Australia, Tasmania and Victoria on 10 February 2014. Each of these jurisdictions passed a law that either adopts or duplicates the HVNL (with some modifications) as a law of that State or Territory. Refer: https://www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations

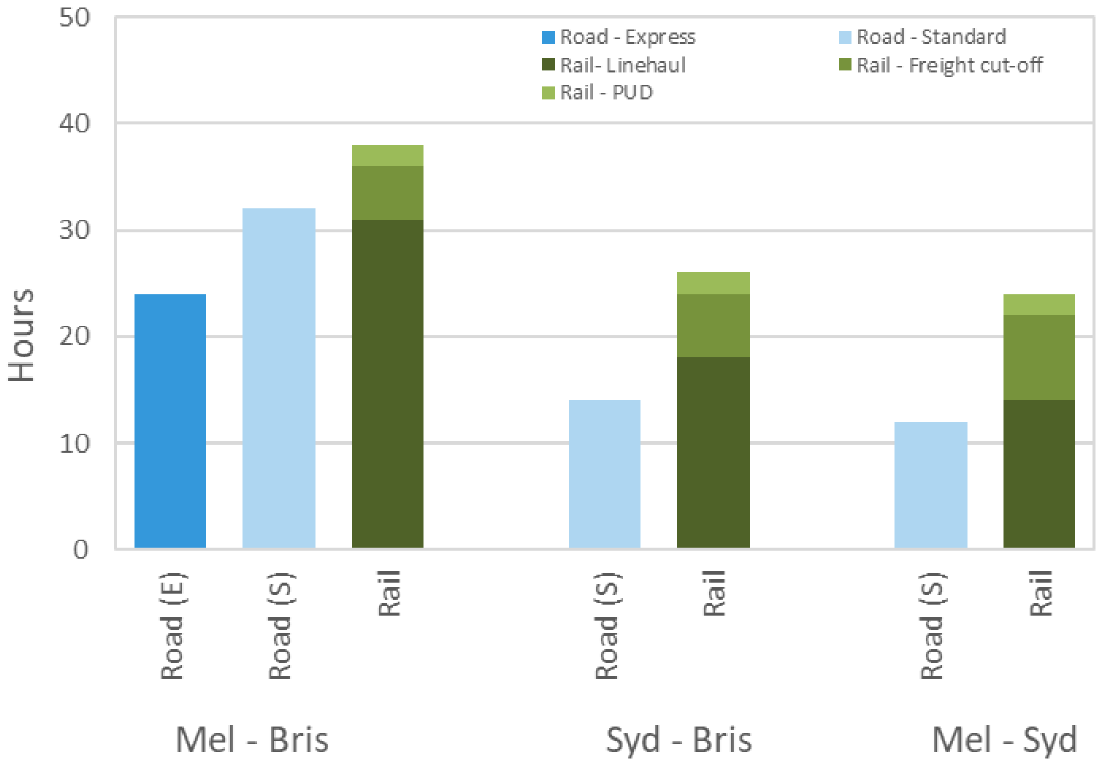
Note: All transit times have been rounded up to the nearest whole hour.

Source: Linehaul transit time based on ARTC modelled transit time as advised by ARTC, Timetable information as advised by rail operators, Synergies allowance for PUD

Comparison of mode performance

Comparative transit times by mode are show for each route below:

Figure 30 Comparative transit times by mode – north-south route



Source: Synergies analysis

For Melbourne-Brisbane, the rail transit time is moderately longer than the standard road transit time, requiring an additional 7 hours or 22%. However, rail is 15 hours (or more than 60%) longer than the express road transit time. A key objective of the Inland Rail Project is to achieve rail linehaul transit of under 24 hours, in order to allow the end to end freight movement to be completed in a timeframe comparable with the standard road transit time.

Transit times for linehaul rail movements have remained broadly stable over time, however it appears that transit times for the shorter haul routes between Melbourne-Sydney and Sydney-Brisbane have reduced in recent years, due to tightening of the freight cut-off and availability allowances. Reductions in end-to-end transit time for freight have been 2-3 hours for each route.[54]

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[54] Rail operator data returns, February 2022

Road transit times for Melbourne-Brisbane have also remained stable, however, road transit times for Melbourne-Sydney and Sydney-Brisbane have each declined over the last decade due to the effect of ongoing road upgrades, with the effect estimated to be a reduction of more than one hour for each route.[55]

6.4.2 Reliability

Road

There is no generally available measure of road transport reliability on a route specific basis. However, studies of the north-south corridor indicate in the order of 98% arrival within expected times.[56]

Rail

Rail freight reliability can be considered in terms of both the reliability of the rail service arriving as scheduled, and in terms of the reliability of the freight being available from collection from the terminal (or otherwise delivered to the required destination) as advertised. Freight availability reliability is the critical issue from a customer perspective, however the rail service reliability is important, as it directly contributes to the freight availability reliability, contributes to the freight transit time (by impacting the margin that is allowed between train arrival time and advertised freight availability) and impacts the operating efficiency of the rail service.

Rail's reliability performance on the east-west route is summarised below:

Table 20 North-south rail freight reliability indicators

	Headhaul		Backhaul		All services	
	2020-21	3 yr avg	2020-21	3 yr avg	2020-21	3 yr avg
% services departing on time[a]	77%	79%	81%	84%	79%	81%
% services arriving on time[a]	45%	49%	73%	67%	59%	58%
% services cancelled	9%	8%	10%	9%	10%	8%
% freight availability as scheduled	81%	85%	96%	94%	88%	90%

a Measured as being within 30 minutes of schedule
Note: 3 year average covers period 18-19 to 20-21
Source: Rail operator data returns, February 2022

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[55] Estimated by comparing driving distances and hours specified in Road Transport (Long Distance) Award 2010 with current estimate of driving hours according to Google Maps, differences of greater than 10% assumed to reflect impact of road improvements.

[56] Ernst & Young, ACIL Tasman and Hyder Consulting (2006), North-South Rail Corridor Study, Detailed Study Report, p.2-17, p.3-7, p.3-26, p.2-37. See also Department of Transport and Regional Services (2007), Melbourne-Brisbane Corridor Strategy: Building our National Transport Future, June 2007, p.11

It can be seen from this that rail's reliability performance on the north-south route is very different to that on the east-west. Train on-time departure on the north-south route is much higher than on the east west, with around 80% of trains departing on time. However, a greater proportion of trains are subject to further delays en-route, with just under 60% of services arriving on time.

Freight availability as scheduled is significantly higher than on the east-west route, at 85% over the last three years. The reliability of the freight availability time is higher again on the backhaul journey, reflecting the larger buffers built into the freight cutoff and availability times.

Further understanding of the factors impacting reliability can be drawn from ARTC's performance reports. ARTC manages the majority of the north-south rail network and reports the following reliability performance over 2020-21 year:

Table 21 Reliability indicators – north-south route

	Melbourne-Brisbane	Melbourne-Sydney	Sydney-Brisbane
% services that exit ARTC network on time (within 15 minutes)	45%	62%	78%
% services that exit ARTC network within one hour of schedule	60%	78%	90%
% services that enter ARTC network on time	66%	80%	90%
% services that operate in healthy manner	55%	69%	87%
% healthy services that exit ARTC network on time	81%	90%	90%
% unhealthy services that do not deteriorate further	87%	91%	94%

Source: ARTC performance indicators "Reliability" and "Transit Time"; October 2021 [see https://www.artc.com.au/customers/access/access-interstate/performance-indicators/reporting/]

Of delays during transit, around 1-2 minutes per hour is due to ARTC cause. For the Sydney-Brisbane and Melbourne-Brisbane routes, around 3-4 minutes per hour relates to operator delays, increasing to 6-10 minutes on the Melbourne-Sydney route. Generally around 2-3 minutes per hour are unattributable to either ARTC or operators.

From this data, it can be seen that reliability performance varies significantly by route:

- the longer haul Melbourne-Brisbane route has poorer reliability of on-time departure than the shorter haul routes, although still higher than the east-west services (with 60% of Melbourne-Brisbane trains entering the ARTC network on time, compared to around 80-90% for the shorter haul services). The poorer on-time departures for the longer haul services may be due to these services competing for time-sensitive freight – with greater risk of delays to freight being received at the terminal resulting in delays to the loading and departure of trains. The shorter haul services, which are not able to meet the required delivery times for time-sensitive freight, appear less likely to be subject to delays in loading and departure;

- there appears to be a greater propensity for delays en-route for north-south services, where around 30% more trains are late on arrival than were late on departure. Unlike the east-west route, a substantial proportion of these delays occur while on the ARTC network, with the proportion of services exiting the ARTC network on time being up to 20% less than the proportion of services entering the ARTC network on time;
- Whereas 95% of healthy east-west services exit the ARTC network on time, on the north-south corridor, this declines to 90% for the short haul services, and 81% for the long haul Melbourne-Brisbane services. While this is influenced by factors other than infrastructure performance (eg delays due to third parties), it indicates that infrastructure performance on the north-south corridor is generally poorer than on the east-west corridor.

As is the case with other corridors, rail is more likely to be affected by major route outages caused by extreme weather events and derailments, with rail services typically taking longer to restore than road.

Comparison of mode performance

Reliability against advertised freight availability is significantly stronger than the east-west route, achieving around 85% in the head haul direction. However, this remains materially lower than road, which generally achieves on time reliability of around 98%.

6.4.3 Service frequency and availability

Road

Road freight transport for the non-bulk freight task is considered a ‘bespoke’ service, tailored to each customer’s requirements, with services provided as required by the customer. The service is therefore effectively continuous.

Rail

Approximately 18 trains run on the north-south route each week[57], with 10 weekly services running between Melbourne and Brisbane (in some cases also servicing Sydney). Services connecting the

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[57] BITRE (2021), Trainline 8 Statistical Report, p.80.

Sydney routes are provided 5 days per week. Services are operated by Pacific National and SCT (although SCT does not provide services to/from Sydney).

Comparison of mode performance

While rail is not able to provide the 'continuous' service of road, the regularity of rail services between Melbourne and Brisbane, with both rail operators providing at minimum 6 day/week services and daily calls available for most origin-destinations, means that rail services are provided at a frequency that meets the requirements of most freight types. However, the 5 day per week service frequency for Sydney routes is unlikely to meet the service frequency demand for faster moving supply chains.

6.4.4 Cost, price and productivity

Road

The factors influencing road productivity and pricing have been discussed in section 5.4.4, including how costs have changed over time for specific truck types, and the impact of changes in truck composition in achieving productivity changes on specific routes, particularly where changes in mass vehicle limits allow the introduction of larger, higher productivity vehicles.

Over the last decade, there have been significant road upgrades on the major interstate highways, including:

- Hume Highway completion of duplication in 2013, creating increased road capacity permitting faster transit times and greater resilience;
- Pacific Motorway completion of duplication in 2020, creating increased road capacity permitting faster transit times and greater resilience;
- Newell Highway upgrades and increases in truck mass limits, with unrestricted use of road trains permitted along the NSW portion of the Newell Highway since September 2021.[58]

In addition, there has been significant investment in 'ring road' infrastructure within the major cities. This has combined with a gradual movement of distribution centres to cheaper land located in major industrial precincts well removed from the city centres and located close to these motorways. The improved access from distribution centres to motorways reduces transit time and can allow for increased use of higher productivity vehicles.

These road upgrades will have contributed to truck productivity increasing on the north-south corridor at a faster rate than for the overall Australian market, leading to reduced road freight

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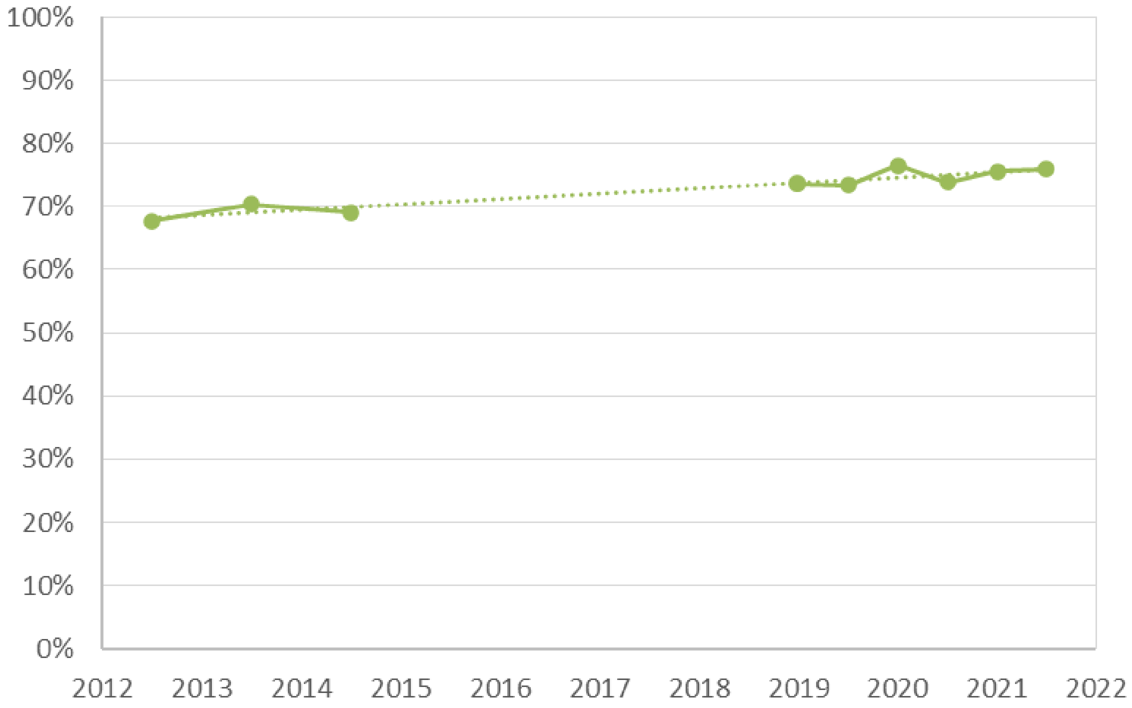
[58] Transport for NSW (2021); Full Access for Road Trains on Newell Highway, 6 September 2021, see https://www.transport.nsw.gov.au/news-and-events/media-releases/full-access-for-road-trains-on-newell-highway

charges on this corridor. As discussed in section 3.2, there are significant limitations on the information available on truck movements as required to fully understand changes in truck composition for interstate freight, however, an estimate of changes in truck productivity for the Newell Highway (the major route for Melbourne-Brisbane freight) can be seen from Transport for NSW truck count data. The data shows that, to date, road trains have remained a small proportion of the overall truck movements, but that the use of B-doubles is gradually increasing at the expense of semi-trailers:

Figure 31 Proportion of B-Doubles (Class 10) northbound at Jerilderie

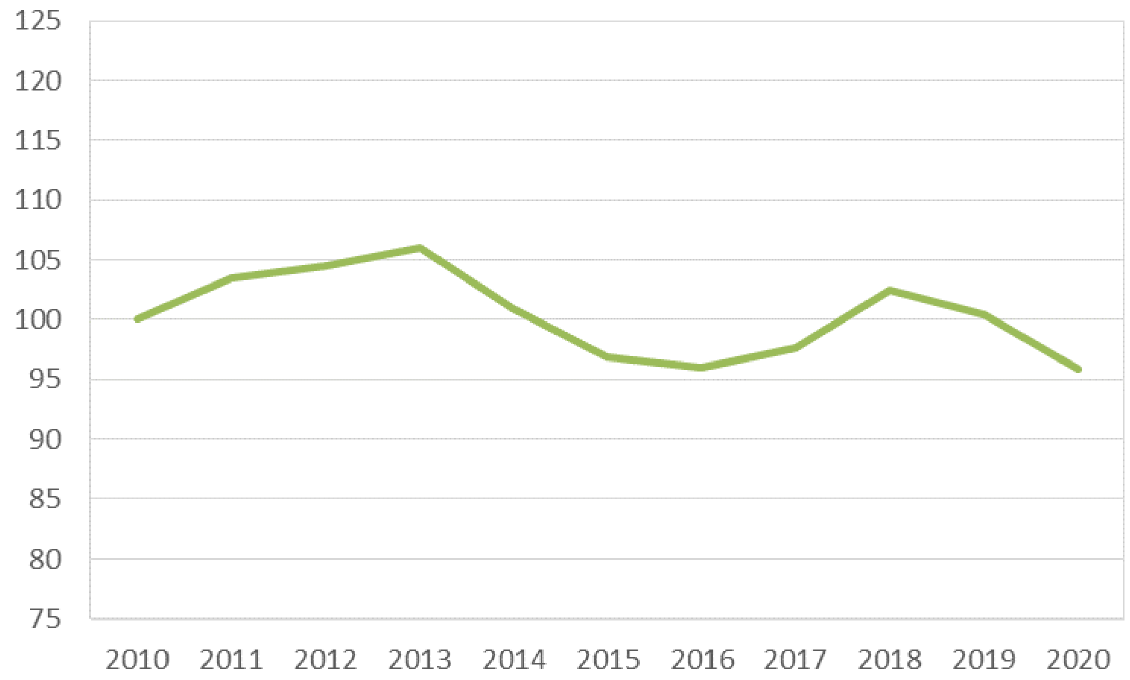


Note: B-doubles (class 10 vehicles) as a proportion of Semis (Class 9) and B-doubles (Class 10) that are northbound at Jerilderie near the NSW and Victoria border.

Source: Transport NSW https://geocounts.com/traffic/au/nswwim/ and road count data provided by ARTC

The changed truck composition on the north-south route has enabled road freight to achieve real reductions in average costs over the last decade, as shown in the figure below.

Figure 32 Real cost index for north-south road freight



Note: This index is based on the Transeco road freight index, and is adjust for CPI and truck mix.
Source: Transeco, ABS, Transport NSW https://geocounts.com/traffic/au/nswwim/ and road count data provided by ARTC

Based on the road freight costs per truck type shown in Table 14, and the truck composition in Figure 19, weighted average cost of road freight on the north-south route is estimated at around $1.304 per km for 10 pallets. This again assumes that 80% of the total journey costs are recovered from the headhaul service, however, the traffic task on the north-south route is much more evenly matched than on the east-west route, providing greater opportunity for backloading, potentially enabling greater cost recovery on the backhaul journey and more competitive rates on the fronthaul.

Productivity frontier

The north-south freight task is currently largely handled by trucks up to B-double size. While it is unlikely that road trains will be permitted on the major coastal routes, unrestricted use of road trains has been permitted on the NSW section of Newell Highway since September 2021. If, as can be expected, road train access is extended over time into Victoria, it can be anticipated that this will be reflected in increased use of road trains.

If road train penetration on the Newell Highway were to increase to the level achieved on the east-west route, this would enable a reduction in average road freight rates of around 13%.

Rail

As noted in section 5.4.4 above, while average rail freight prices fell in real terms to around 2008, since then average rail freight prices have increased in real terms, and have increased at a faster rate than average road freight prices. While not a direct measure of productivity, it can be anticipated that, over time, productivity changes will be reflected in average prices.[59] Therefore, this indicates that average rail freight productivity performance has declined compared to road over the last 15 years.

Also as noted in section 5.4.4 significant productivity changes can be achieved on a particular corridor where rail operators are able to implement changes in technology, train configuration or service offering in order to achieve greater productive benefits relative to the industry overall. However, on the north-south corridor, train consists and loading capacity have remained virtually unchanged over the last two decades, and there has been little change in rail's service offering over this period. This indicates that rail is unlikely to have achieved productivity gains on this corridor that exceed those of the rail freight sector overall.

The Inland Rail project, currently under construction, will transform the train service characteristics of the Melbourne-Brisbane route, and will enable the operation of trains consistent with the current 'productivity frontier' for rail, that is, trains that can operate at 1,800m with double stacking, with an average speed of 70km/hr. ARTC's Inland Rail business case estimates that this may allow a reduction in the operating cost of rail linehaul services by around 25%,[60] and a reduction in the door-to-door cost of rail freight of around 20%.[61] The development of efficient IMTs with co-located warehousing precincts provides another opportunity to reduce door-to-door rail freight costs.

While the anticipated cost reduction for rail services following completion of Inland Rail and operation of train services at their productivity frontier is significant, it should be noted that the potential productivity gains from road services operating at their productivity frontier is, at a 13% potential cost reduction, only moderately less than for rail.

Comparison of mode performance

On the north-south route, on average, the total price for transport by rail (including PUD costs) is generally considered to be approximately 85-90% of the equivalent road freight charge. In 2015, it was estimated that the relative door-to-door price for rail was, on average, 85% of road.[62] Since 2015, road's productivity performance has improved faster than that of rail, potentially leading to a lessening of the price difference since that time.

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[59] Note, prices will also be materially impacted by the extent of available train capacity, given the high capital costs and risks associated with investing in additional train capacity. Prices are likely to increase when train capacity is limited, and reduce where excess capacity exists. This can be seen from the effects prior to and following Aurizon's exit from the intermodal market in 2017, where surplus capacity existed prior to its exit. As a result, there may be periods where prices materially vary from the efficient long run cost of providing services.

[60] ARTC (2015); ARTC 2015 Inland Rail Programme Business Case, p.161

[61] ARTC (2015); ARTC 2015 Inland Rail Programme Business Case, p.98

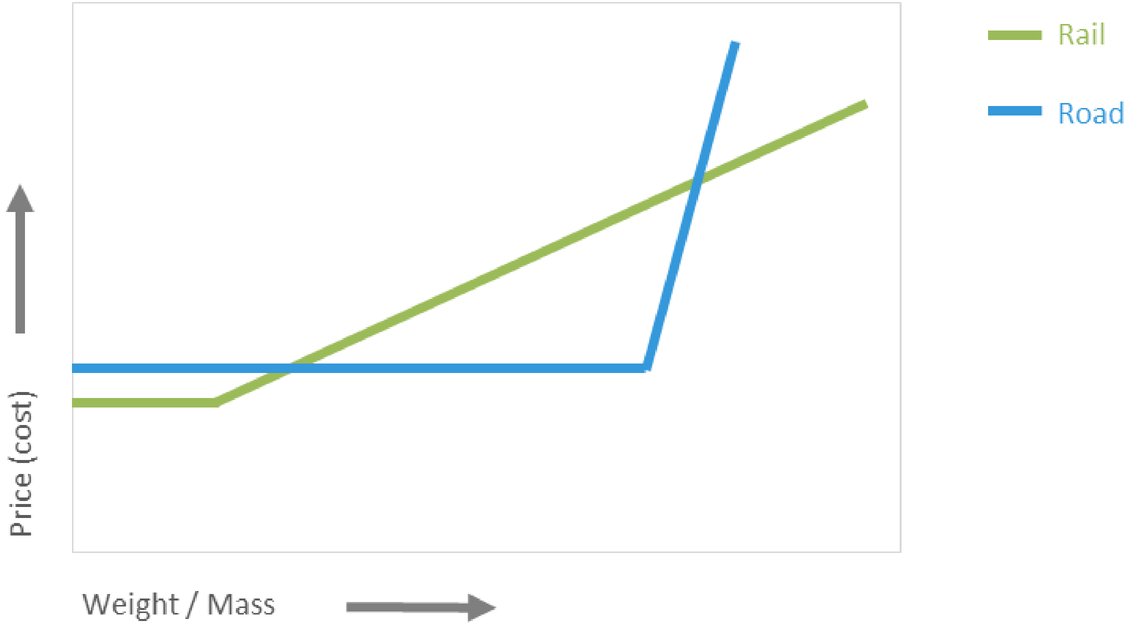
[62] ARTC (2015); ARTC 2015 Inland Rail Programme Business Case, p.98

This price difference will however, vary by consignment including due to:

- shorter haul (Melbourne-Sydney and Sydney-Brisbane) vs longer haul (Melbourne-Brisbane);
- the density of the cargo, noting that road primarily prices freight by volumetric capacity (within maximum mass limits), whereas rail freight is priced by a combination of volumetric capacity and weight, with the result that relative prices vary by cargo density; and
- the extent to which the rail operator must offer a reduced price for rail to compensate for rail's lower service quality – which will vary by freight type reflecting that the service differences have a greater value for some freight categories (most notably for fast moving consumer goods, where transit time/reliability are valued more highly).

Research previously undertaken by the CRC for Rail Innovation highlights the significance of the differing price structures of road and rail freight in mode performance on the north-south route.[63] In that report, it was identified that the pricing structure of rail freight generally applied a base (flagfall) rate plus charges for each tonne above a threshold value. When compared to the pricing structure for road, which is charged by space (up to the mass limit of the truck), the CRC considered that this created an outcome where rail had a pricing advantage for really light freight and for dense freight, however, for mid-weight products, road had a pricing advantage. This is shown, in a stylised way, in the following diagram:

Figure 33 Price relativity for rail and road



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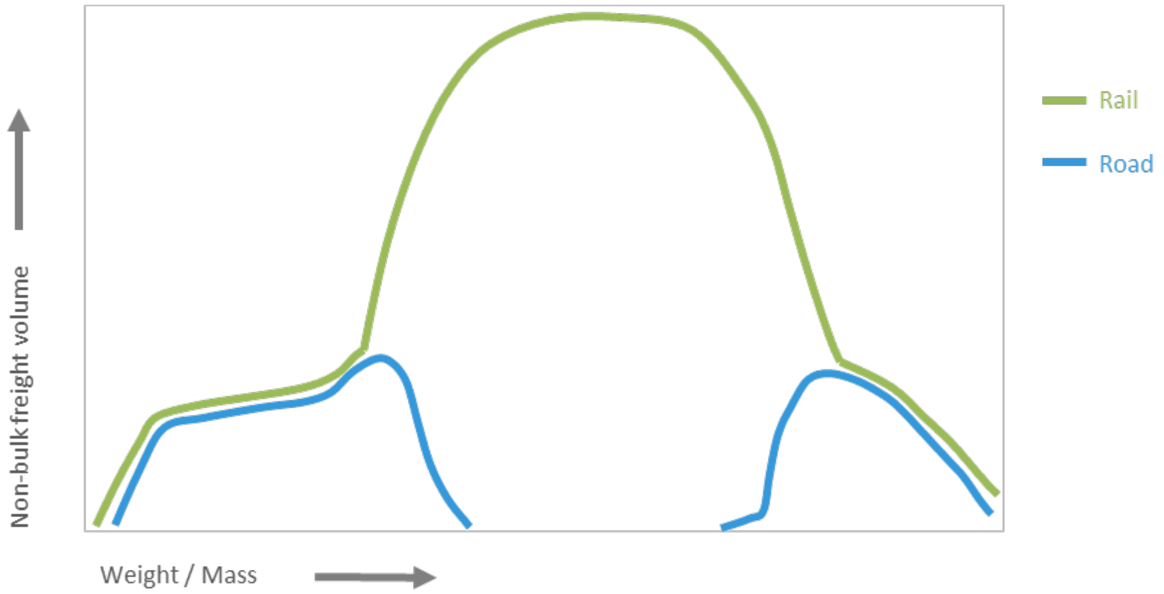
[63] CRC for Rail Innovation (2014), Choice of mode for contestable non-bulk freight, May 2014, p.7-10.

Source: CRC for Rail Innovation (2014) re-imaged by Synergies for presentational purposes

However, the CRC identified that the major segment of freight on the north-south corridor involved mid-weight products and that, as rail did not offer a price advantage for the majority of freight (notwithstanding that, on average, rail freight costs were lower than road), the mid-weight products were generally carried by road. This is shown, again in a stylised way, in the following diagram:

Figure 34 Volume of freight carried by rail – Melbourne-Brisbane corridor



Source: CRC for Rail Innovation (2014) re-imaged by Synergies for presentational purposes

The CRC concluded that, on the Melbourne-Brisbane corridor, rail carried the light freight (eg insulation, motor vehicle parts) and the dense freight (eg polyethylene granules), but that the freight in the middle largely goes by road.

We note that rail freight charges are commercial in confidence, and we do not have information available through this study to assess the accuracy of the CRC's assessment or conclusions. However, the analysis clearly demonstrates the potential for different charging structures between rail and other modes to create varying price relativities for cargoes of differing densities.

Further, while price structure for rail freight haulage is set by rail operators, it is influenced by ARTC's access charges, which we note are applied as a fixed fee per path (approximately 25% of the fee) and a variable fee dependent upon weight.

6.5 Factors influencing changes in mode share

6.5.1 Supply chain requirements by freight category

Based on consultation with intermodal rail operators[64], Synergies has assessed the supply chain requirements for each category of intermodal freight.

Table 22 Supply chain requirements by freight category

	Melbourne - Brisbane	Melbourne-Sydney	Sydney-Brisbane
Express freight			
Transit time	Overnight	Overnight	Overnight
Reliability	Very high (eg 98%)		
Frequency/availability	Daily or on demand		
Price sensitivity	Low		
Fast moving consumer goods - excluding beverages			
Transit time	Overnight + 1 day	Overnight	Overnight
Reliability	High		
Frequency/availability	Daily with preference for late evening departures and early morning arrivals		
Price sensitivity	Medium		
Fast moving consumer goods - beverages			
Transit time	Moderately to significantly extended		
Reliability	Medium		
Frequency/availability	Daily or 2-3 times per week		
Price sensitivity	High		
Slow moving consumer goods			
Transit time	Moderately extended		
Reliability	Medium		
Frequency/availability	Daily		
Price sensitivity	Medium		
Industrial and construction products			
Transit time	Moderately to significantly extended		
Reliability	Medium		
Frequency/availability	Daily or 2-3 times per week		
Price sensitivity	High		

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[64] Stakeholder consultation interviews, SCT Logistics (November 2021), Pacific National (December 2021)

6.5.2 Changes in mode share and structural influences

Road freight is used for the vast majority of freight on the north-south corridor. It can be seen from section 6.3 that rail's mode share on this corridor has steadily declined from the mid 1990's, before stabilising at around 10% over the last decade. Within this, there is a marked difference between rail's mode share on the long distance Melbourne-Brisbane route (around 29%) and the shorter Melbourne-Sydney and Sydney-Brisbane routes, both of which are less than 5%.

Rail's poor mode share on this corridor reflects a combination of two impacts:

- rail's average discount to road is 10-15%, significantly less than the 30-40% achieved on the east-west corridor. Importantly, rail's average discount to road is only slightly greater than the discount required simply to offset the additional "hassle factor" for rail; and
- rail has a greater service performance gap compared to road than on the east-west corridor, particularly for the shorter haul Melbourne-Sydney and Sydney-Brisbane routes.

This impact is particularly evident on the shorter routes, where rail does not provide the overnight delivery timeframe preferred by customers. While customers may be persuaded to accept a longer delivery time, this would require a greater discount to road than rail currently offers. As a result, rail is at a structural disadvantage for time sensitive freight on these shorter routes, where priority is placed on timely delivery. But even for those freight categories that are not particularly time sensitive, the price reduction currently achieved from rail is not sufficient to offset the additional time and 'hassle' associated with using rail for all but a very small proportion of freight, leading to an overwhelming preference by freight customers for road.

Further contributing to this outcome is a gradual increase in the service quality gap and a gradual decrease in price benefit able to be provided by rail, given road's productivity performance on this route, where upgrades of major interstate highways have allowed for increasing road productivity. Over the last ten years, we estimate average road freight costs from Melbourne-Brisbane will have reduced by around 5% in real terms, given the trend to greater utilisation of B-double trucks. With the removal of the requirement for permits for the use of road trains on the NSW portion of Newell Highway as from September 2021, there is significant potential for road freight to achieve significant future productivity gains through the increased use of road trains on the Melbourne-Brisbane route.

In contrast, rail productivity on this corridor has stagnated. In combination, the gradually increasing service quality gap, and the gradually decreasing price discount for rail, will have led to the observed gradual trend reduction in rail mode share.

While the anticipated cost reduction for rail services following completion of Inland Rail and operation of train services at their productivity frontier is significant, it should be noted that the potential productivity gains from road services operating at their productivity frontier is, at a 13% potential cost reduction, only moderately less than for rail.

7 Queensland North Coast Line intermodal freight

7.1 Geographic scope

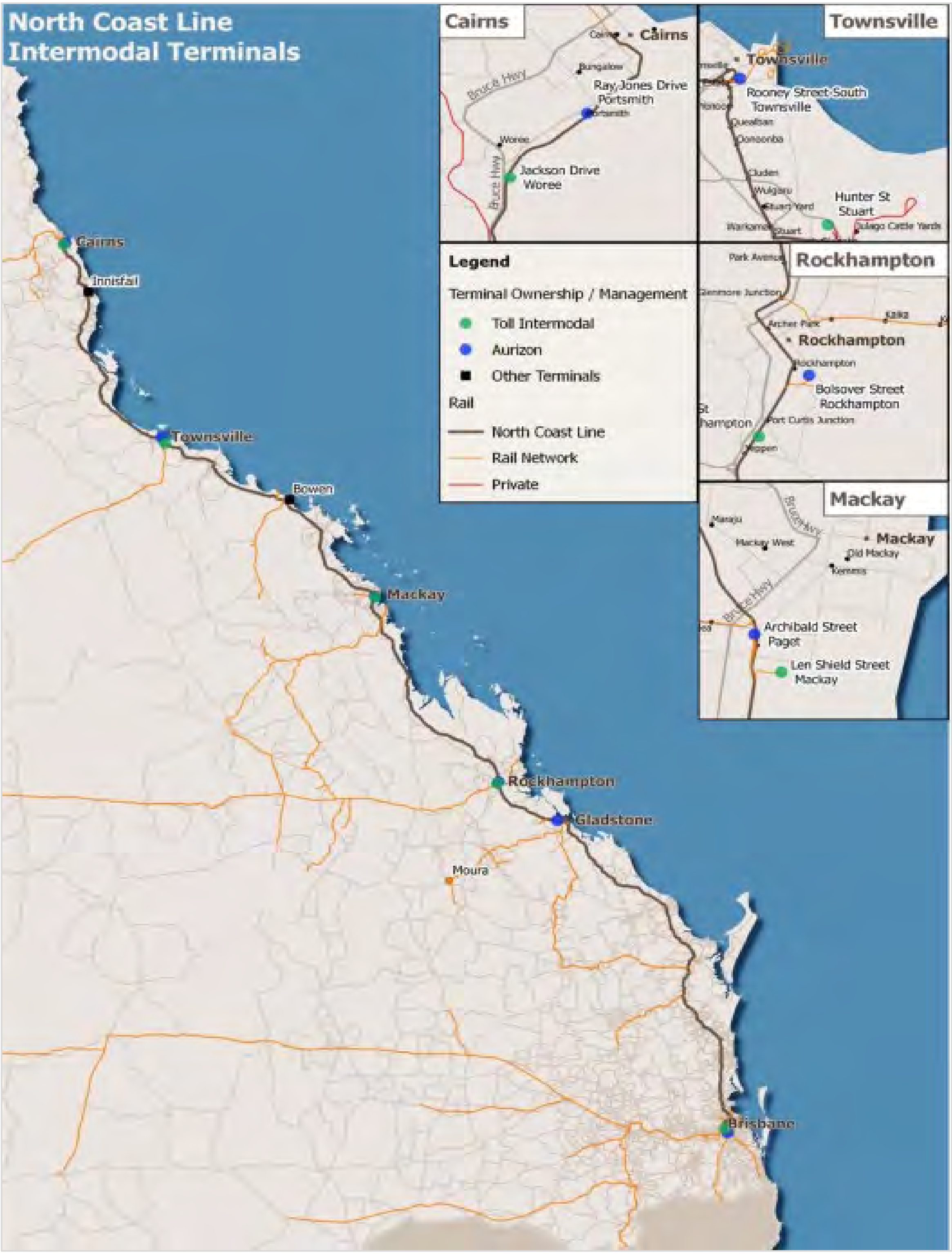
This corridor consists of a rail line (the Queensland north coast line or QNCL) running along the coast from Cairns to Acacia Ridge, with a spur to the Brisbane Multimodal Terminal (BMT) in the Port of Brisbane. There are only a limited number of terminals along this route at which containers can be loaded onto, or unloaded from, trains, which limits the cargo that can be effectively served by the intermodal rail system to goods moving:

- between Brisbane and the regional cities served by intermodal terminals (and the immediate hinterland of these cities); and
- between two regional cities served by intermodal terminals (including the immediate hinterland of these cities).

The QNCL closely follows the route of the Bruce Highway, which is the primary route used by road transport on the north coast corridor. The Bruce Highway provides a road connection between Brisbane and all of the regional centres serviced by intermodal terminals.

The figure below shoes a map of the QNCL, including the location of intermodal terminals. The key routes (in both directions) are Brisbane to Gladstone, Rockhampton, Mackay, Townsville and Cairns.

Figure 35 North Coast Line corridor



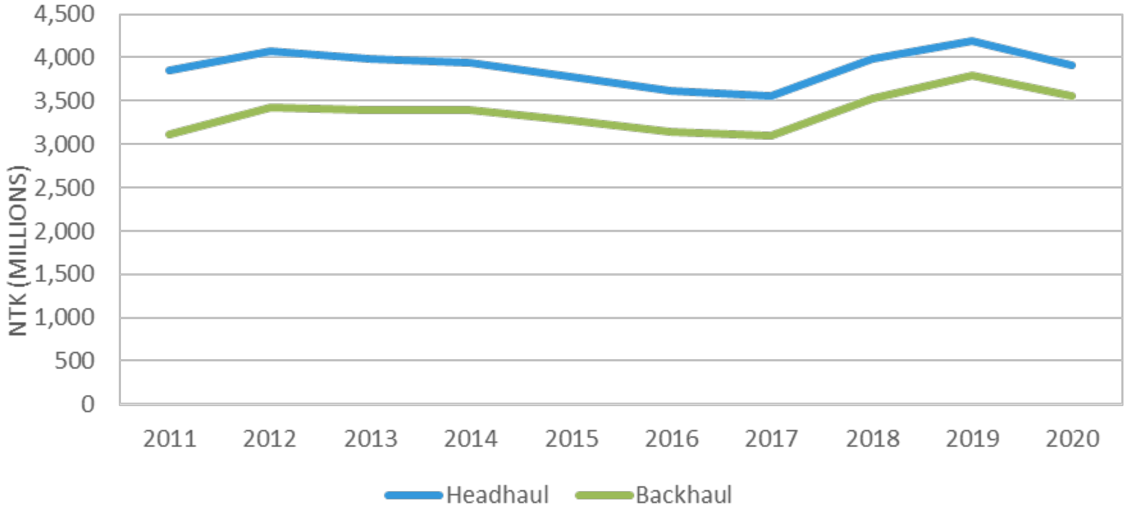
Source: SMEC Australia 2016, North Coast Line Freight Terminal Consolidation Project: Stage 1 Report – Final

7.2 Freight task

As is the case for the north-south corridor, data limitations mean that it is not possible to provide a precise estimate of the volume and composition of the intermodal freight cargo task on the QNCL corridor. However, we have built up estimates for the total volumes of intermodal cargo from ABS and truck count data, as well as rail volumes reported by Queensland Rail.

The estimated total intermodal freight task is around 6.9 million tonnes (7.5 billion ntk) between Brisbane and Cairns in 2020-21. Fronthaul and backhaul total volumes have remained relatively stable over the last decade (see Figure 36 below).

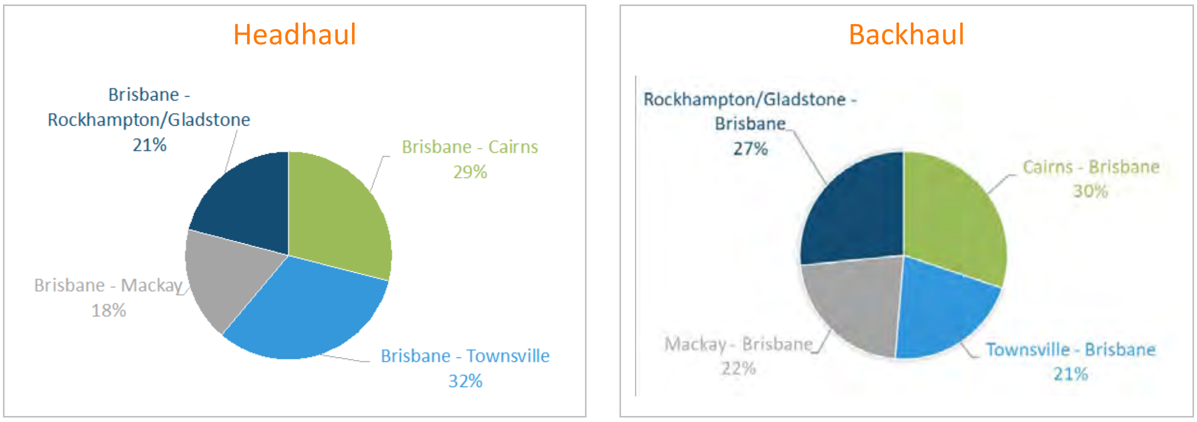
Figure 36 NCL corridor – intermodal freight volumes (NTK) 2011 – 2020



Source: Synergies analysis based on (a) rail: QR (rail data is only available from 2011) (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Queensland Department of Transport and Main Roads truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure, Transport, Regional Development and Communications

The figure below shows the relative significance of each major origin-destination pair on a headhaul and backhaul basis.

Figure 37 NCL corridor – intermodal freight volumes (NTK) 2020 – by O-D pairs



Source: Synergies analysis based on (a) rail: QR (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Queensland Department of Transport and Main Roads truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure, Transport, Regional Development and Communications

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

The figure shows that freight volumes, in both the headhaul and backhaul direction, are reasonably evenly split between the four key population centres, although somewhat weighted towards the more distant locations of Townsville and Cairns.

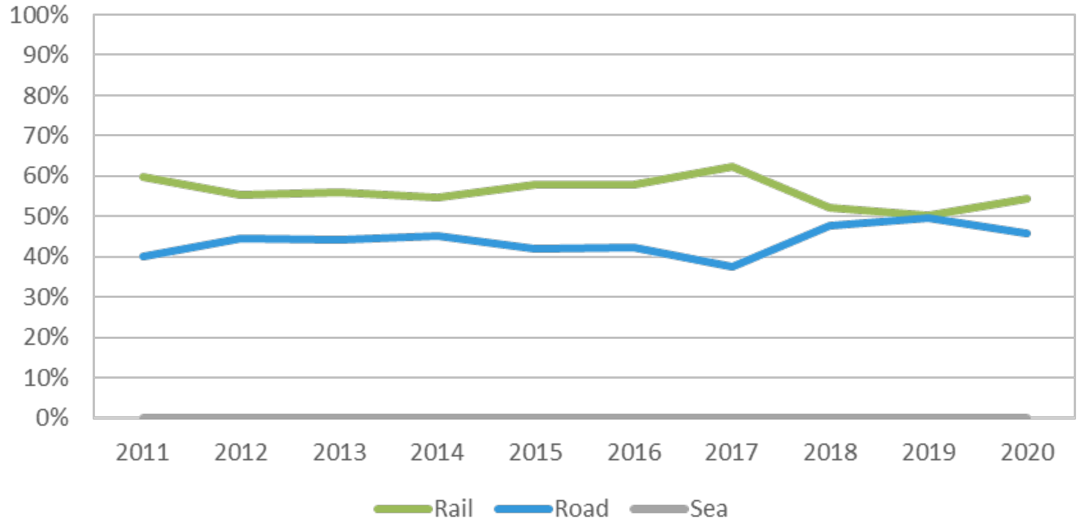
7.3 Mode share

7.3.1 Mode share overview

Road and rail mode shares are quite evenly split in both headhaul and backhaul markets. No material volume of cargo movements are transported via coastal shipping.

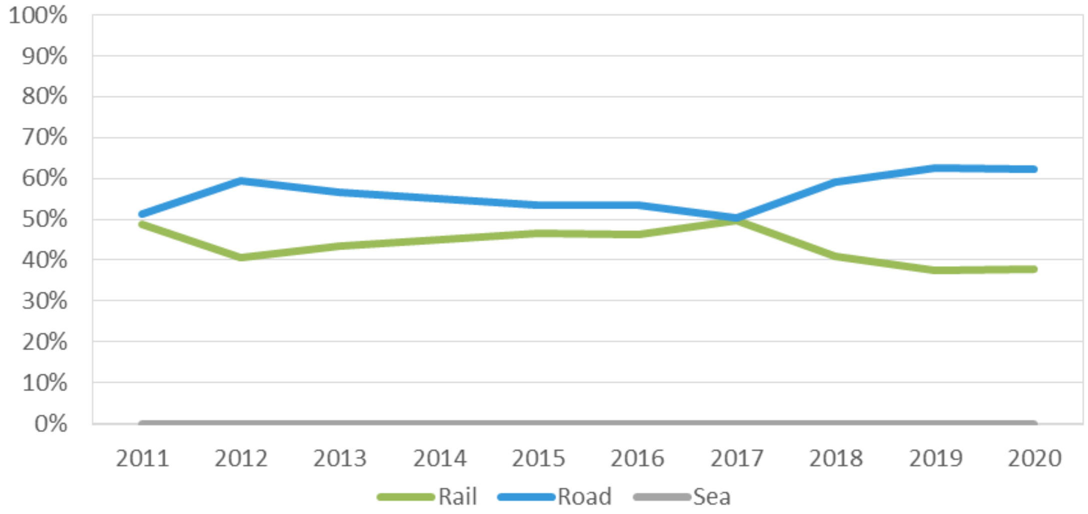
Rail mode share has declined since 2017 from 62% to 54%, with rail volumes remaining largely unchanged and increases in the size of market being captured by road (see Figure 38 and Figure 39). The figures might suggest some broad correlation between the date of Aurizon's announcement in August 2017 of its intention to exit its intermodal business and the loss of rail share which may have reflected some degree of material uncertainty in the market around that time. Since the sale of the intermodal business to Linfox, there appears to have been a small uptick in rail share.

Figure 38 NCL corridor – headhaul – mode share (NTK) 2011 – 2020



Source: Synergies analysis based on (a) rail: QR (rail data is only available from 2011) (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Queensland Department of Transport and Main Roads truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure, Transport, Regional Development and Communications

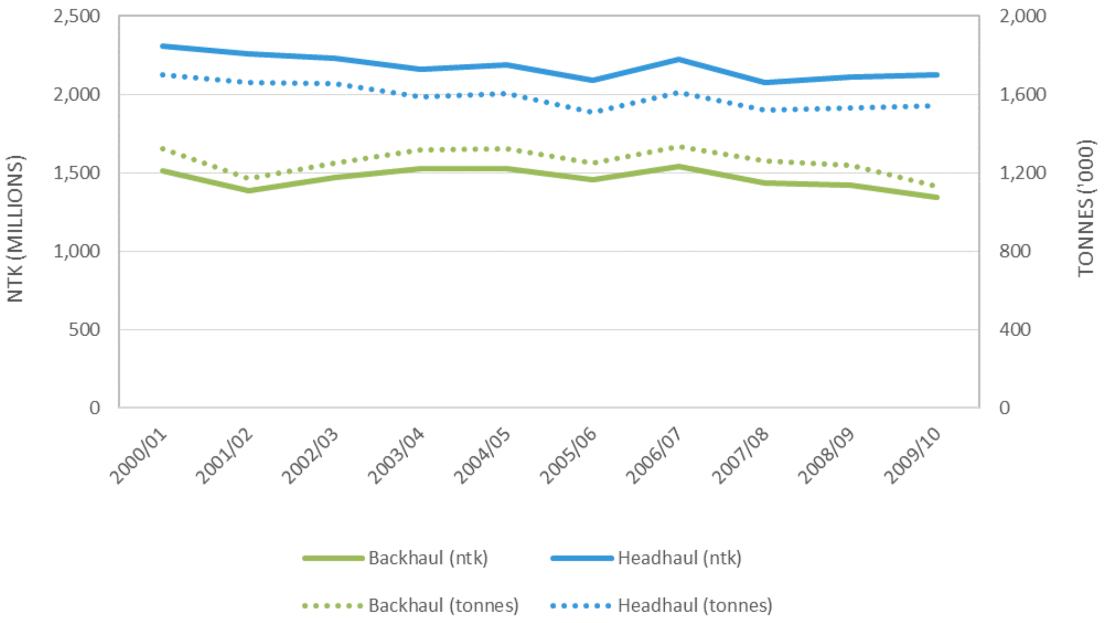
Figure 39 NCL corridor – backhaul – mode share (NTK) 2011 – 2020



Source: Synergies analysis based on (a) rail: QR (rail data is only available from 2011) (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Queensland Department of Transport and Main Roads truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure, Transport, Regional Development and Communications

The trend in rail volumes (on a ntk and tonnage basis) between 2000 and 2021 is shown below. In the headhaul (northbound) market and backhaul (southbound) markets, rail volumes have remained mostly stable over that period.

Figure 40 NCL corridor – headhaul and backhaul – rail volumes (NTK, tonnes) 2000 – 2021



Source: Synergies analysis based on (a) rail: QR (rail data is only available from 2011) (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Queensland Department of Transport and Main Roads truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure, Transport, Regional Development and Communications

Confidence level

Synergies' confidence in the quality and reliability of the freight volume information on the NCL corridor differs by mode, and the level of disaggregation. Confidence in rail volumes is high, however for road, as for other corridors, there is significant uncertainty around the road freight volumes. The primary source of information is the 2014 ABS Road Freight Movements Survey, with only limited availability of traffic census data.

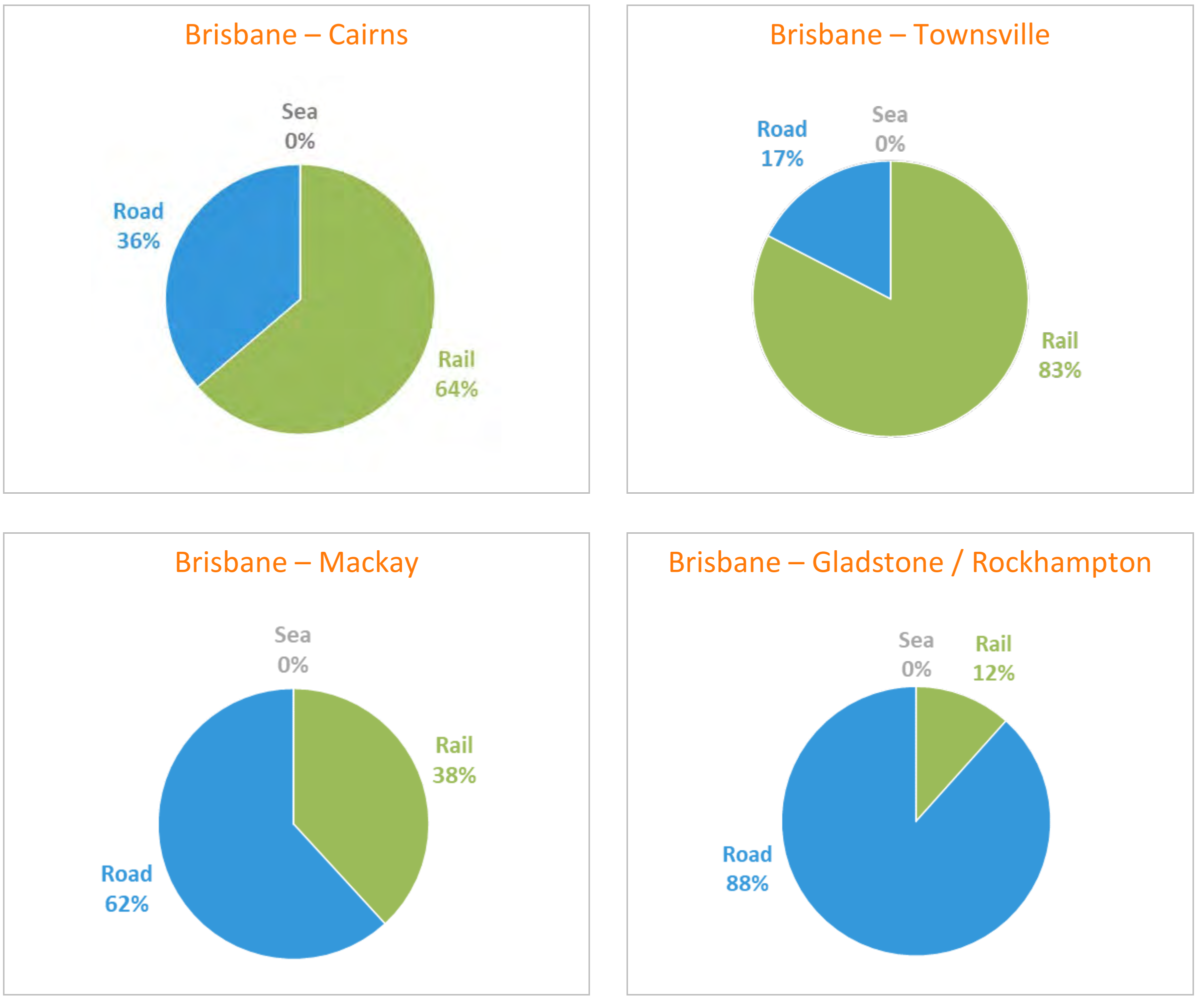
Key trends

Total headhaul volumes for the QNCL declined over the period to 2017. Rail volumes also declined over this period, but at a slower rate than the total market, leading to a gradual trend increase in rail's mode share up to 60% in 2017. However, from that date, the total headhaul volumes have increased, but rail volumes have declined, leading to a rapid decline in rail's mode share to 50% by 2018. It is likely that a significant contributor to rail's declining mode share related to Aurizon's exit from the Queensland intermodal market, announced in 2017 and completed in 2019. In 2018, rail haulage capacity offered (i.e. the total number of rail services provided on the route) declined by 7%, and total rail volumes declined by 6%, with the uncertainty over future provision of rail services likely to have influenced customer decisions on transport choices. Rail mode share has recovered slightly in 2020, with rail volumes remaining stable in the face of an overall decline in total headhaul volumes, likely influenced by COVID supply chain disruptions.

7.3.2 Mode share by origin-destination pair

A snapshot of mode share in 2020 for each major origin-destination pair in the headhaul (see Figure 41) and backhaul (see Figure 42) directions are shown below.

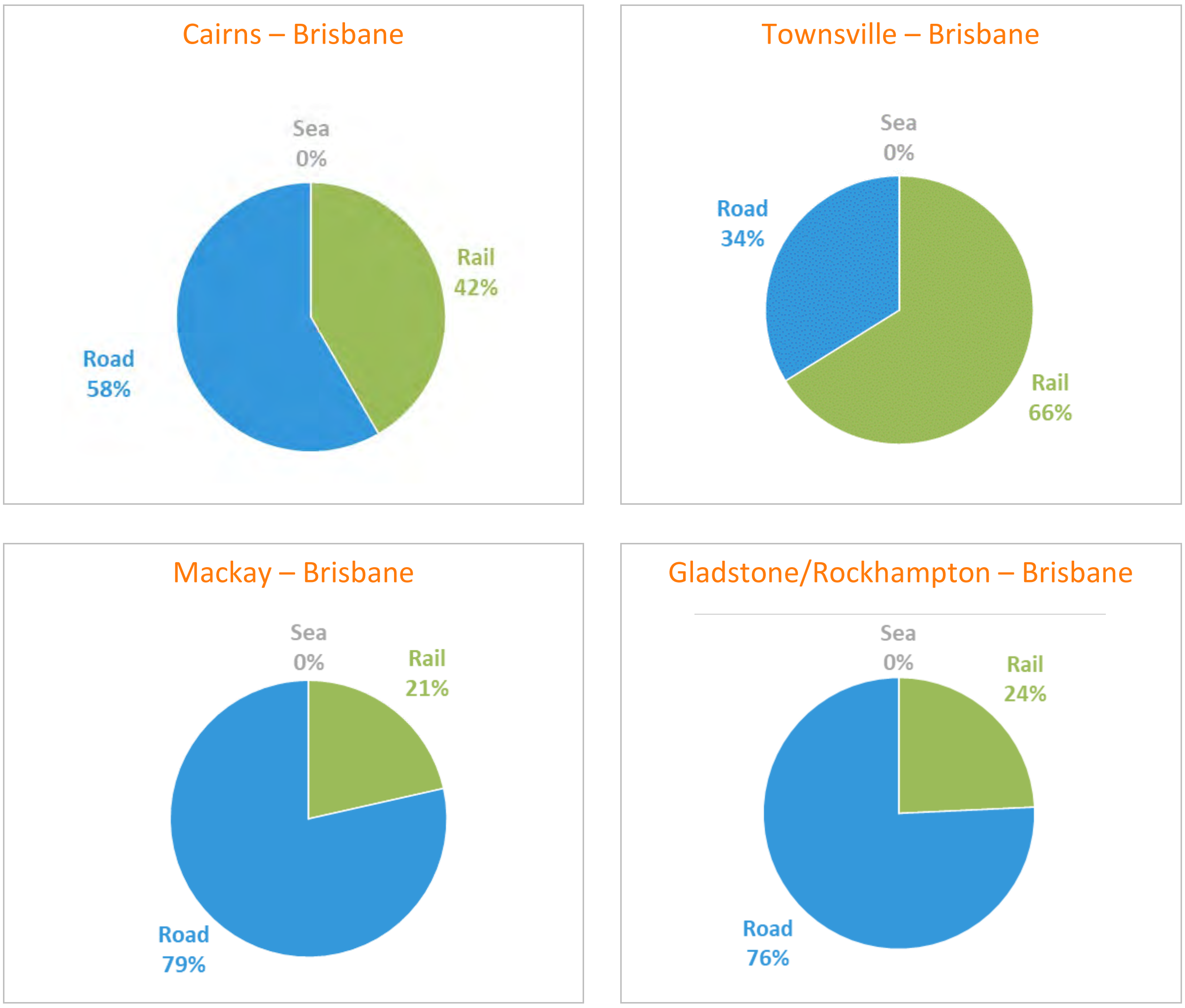
Figure 41 NCL corridor – Origin/Destination – headhaul – modal share (NTK) 2020



Source: Synergies analysis based on (a) rail: QR (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Queensland Department of Transport and Main Roads truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure, Transport, Regional Development and Communications

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

Figure 42 NCL corridor – Origin/Destination – backhaul – modal share (NTK) 2020



Source: Synergies analysis based on (a) rail: QR (b) road: weighted statistics of ABS road freight movements survey for 2014 escalated to 2020 and Queensland Department of Transport and Main Roads truck count site information (c) Sea: Coastal Shipping Maritime Statistics, Department of Infrastructure, Transport, Regional Development and Communications

Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

For the headhaul route:

- road dominates for route distances up to 1,000km (Gladstone, Rockhampton, and Mackay);
- the mode shares are reversed for Townsville and Cairns, where route distances exceed 1,500km.

For the backhaul route:

- road generally captures a stronger share of the backhaul markets;
- the exception is Gladstone/Rockhampton, where rail has a strong share of the market, likely influenced by movements of high density industrial products.

7.4 Relative service quality

7.4.1 Transit time

Road

Transit time for road freight will again reflect a combination of the driving time (given route distance and average speed), together with rest periods required to meet the Heavy Vehicle National Law (HVNL) and its regulations.[65]

For the routes from Brisbane to Townsville and Cairns, significant reductions in road transit times can be achieved by replacing drivers at intermediate points on the journey. However, for the shorter trips to Rockhampton and Mackay, only a standard road journey is assumed.

Estimated road transit times for each route (in the head haul direction) are shown below:

Table 23 Typical road transit times – north coast line corridor (hours)

	Brisbane-Rockhampton	Brisbane-Mackay	Brisbane-Townsville	Brisbane-Cairns
Standard (solo driver)	8	13	28	32
Express			19	24

Note: Express transit times based on two driver operation. All transit times have been rounded up to the nearest whole hour.
Source: ATS Logistics; see: atslogistics.com.au/australiandrivetimes/

Rail

On the Queensland north coast corridor, there are no express rail freight services, and the average transit times for freight service is shown in the table below.

Table 24 Typical rail transit times – north coast line corridor (hours)

	Brisbane-Rockhampton	Brisbane-Mackay	Brisbane-Townsville	Brisbane-Cairns
Standard				
Linehaul	18	21	27	34
Freight cut-off and availability allowance	5	4	10	5
PUD allowance	2	2	2	2

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[65] The Heavy Vehicle National Law (HVNL) and its regulations commenced in New South Wales, the Australian Capital Territory, Queensland, South Australia, Tasmania and Victoria on 10 February 2014. Each of these jurisdictions passed a law that either adopts or duplicates the HVNL (with some modifications) as a law of that State or Territory. Refer: https://www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations

	Brisbane-Rockhampton	Brisbane-Mackay	Brisbane-Townsville	Brisbane-Cairns
TOTAL	**25**	**27**	**39**	**41**

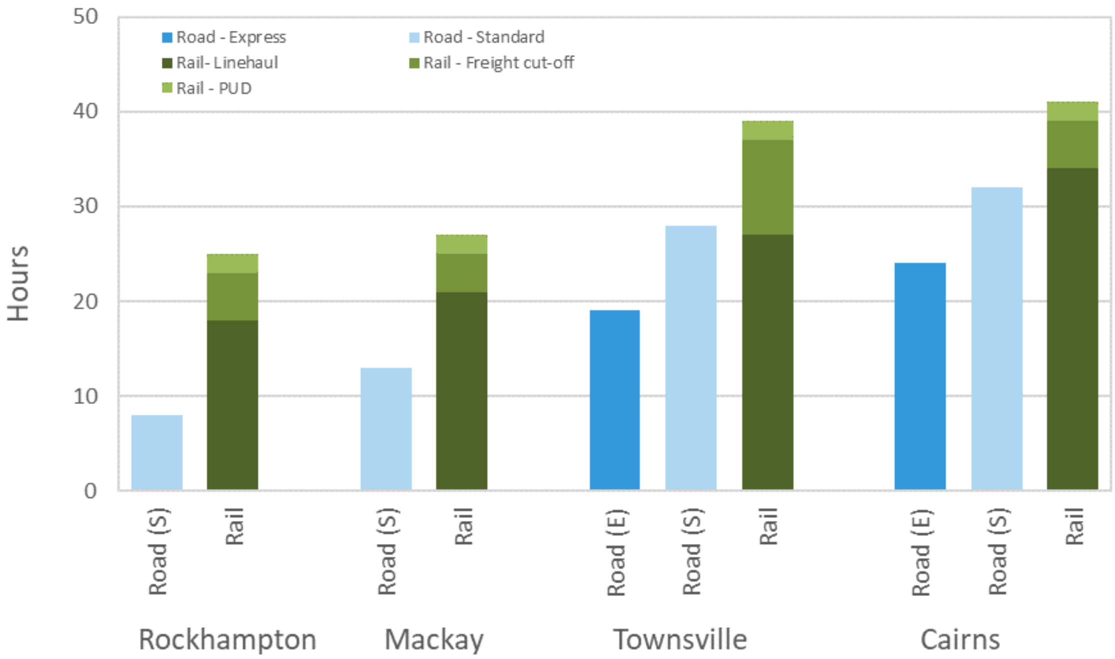
Note: All transit times have been rounded up to the nearest whole hour.

Source: Linehaul transit time based on Queensland Rail data return, timetable information as advised by rail operators, Synergies allowance for PUD

Comparison of mode performance

Comparative transit times by mode are show for each route below:

Figure 43 Comparative transit time by mode – north coast line



Source: Synergies analysis

While rail transit times for the longer routes to Townsville and Cairns exceed standard road, this is unlikely to be perceived negatively by most customers, as rail is able to achieve an overnight plus one day delivery, the same as a standard road service. Note, the relatively longer freight cut-off and availability allowance for the Townsville rail service is likely to be a matter of convenience, with trains arriving through the night and freight generally available for collection first thing in the morning.

For the shorter haul service to Rockhampton, rail has a much longer transit and is unable to match the overnight delivery time of road.

7.4.2 Reliability

Road

There is no generally available measure of road transport reliability on a route specific basis. However, it is anticipated that the road freight reliability on the Queensland north coast corridor will be similar to the 98% achieved on other routes.

Rail

Rail freight reliability on the Queensland north coast line is summarised in the table below:

Table 25 Queensland north coast line rail freight reliability indicators

	All services	
	2020-21	**3 yr avg**
% services departing on time[a]	89%	87%
% services arriving on time[a]	82%	80%
% freight availability as scheduled	97%	96%

a Measured as being within 30 minutes of schedule
Note: 3 year average covers period 18-19 to 20-21
Source: Rail operator data returns, February 2022

Operator reported reliability appears to be somewhat higher than reported by Queensland Rail, who manages the majority of the north coast line. Queensland Rail reports that, over the 2021 year, around 68% of north coast line freight services reached their destination on time (however this may reflect the inclusion of freight services other than intermodal services, who also use this corridor). Of delays during transit, operator performance was responsible for around 15 minutes delay per 100km, while QR was responsible for around 3 minutes delay per 100km. Around 8 minutes delay per 100km was unattributable to either QR or operators.[66]

Comparison of mode performance

It can be seen from the above data that, on the Queensland north coast line, rail operators are able to achieve reliability of freight arrival times at levels approaching road. High reliability is likely to particularly be achieved for services to Townsville where there is an extended freight availability time to coincide with customers preference for early morning freight collections.

As for other routes, rail is more likely to be affected by major route outages caused by extreme weather events, with rail services typically taking longer to restore than road.

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[66] Queensland Rail (2022); Public Quarterly Performance Report, second quarter 2021/2022; January 2022

7.4.3 Service frequency and availability

Road

Road freight transport for the non-bulk freight task is considered a ‘bespoke’ service, tailored to each customer’s requirements, with services provided as required by the customer. The service is therefore effectively continuous.

Rail

Rail services on the Queensland north coast corridor are provided by PN and Linfox. There are currently, on average, 35 intermodal services operating on the north coast corridor each week.[67] This service frequency has remained stable over the last few years, although it is noted that the service frequency was a little higher (38-40 services per week) until 2018, around when Aurizon exited the intermodal business, selling its Queensland intermodal business to Linfox. Service frequency is split reasonably evenly between the two operators, with PN operating around 60% of the scheduled services.[68] Most services call at Townsville, with all destinations on the corridor receiving at least one call per day per rail operator.

Comparison of mode performance

While rail is not able to provide the ‘continuous’ service of road, the regularity of rail services on the corridor, with both rail operators providing daily calls to all destinations and multiple daily calls to Townsville on most days, means that rail services are provided at a frequency that meets the requirements of most freight types.

7.4.4 Cost, price and productivity

Road

Productivity drivers for road freight on the Queensland north coast line are similar to other corridors, and while there has been no major change to allowable truck types on this route, it is likely that there is similarly a gradual trend towards the use of larger capacity trucks within the existing limits. However, road infrastructure quality on the Bruce Highway is significantly poorer than the interstate routes, with identified problems including safety concerns, poor flooding immunity, poor connectivity to regional centres and capacity constraints around key economic clusters.[69] These constraints potentially limit the attractiveness of road freight on this corridor.

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[67] Queensland Rail data return

[68] Railway operator data returns

[69] Infrastructure Australia, Bruce Highway Upgrade

Rail

Similar to road, productivity drivers for rail freight on the Queensland north coast line are similar to other corridors, except that rail infrastructure quality is significantly poorer than the interstate routes, with the result that gap between current rail operations and rail's productivity frontier is much greater on this route.

Comparison of mode performance

On the Queensland north coast line, there are anecdotal reports that the total price for transport by rail (including PUD costs) is approximately 70-80% of the equivalent road freight charge. This cost difference will however, vary by consignment including due to:

- shorter haul (Brisbane to Gladstone, Rockhampton and Mackay) vs longer haul (Brisbane to Townsville and Cairns);
- the density of the cargo, noting that road primarily prices freight by volumetric capacity (within maximum mass limits), whereas rail freight is priced by a combination of volumetric capacity and weight, with the result that relative prices vary by cargo density; and
- the extent to which the rail operator must offer a reduced price for rail to compensate for rail's lower service quality – which will vary by freight type reflecting that the service differences have a greater value for some freight categories (most notably for fast moving consumer goods, where transit time/reliability valued more highly).

While rail competes strongly with road over longer distances on the Queensland north coast line, there is a significant risk to this outcome over the medium to long term, given the Queensland and Commonwealth Government plans to progressively upgrade the highway, and the resulting potential for road productivity to significantly increase. In the absence of similar improvements in rail's productivity, the ability of rail to continue to offer a significant cost benefit relative to road will diminish.

7.5 Factors influencing changes in mode share

The changes in rail's mode share over the last 10 years have broadly aligned with changes in the size of the total freight market. Rail continues to be strongly preferred over road for the longer haul services to Townsville and Cairns, reflecting acceptable service quality (and in particular high reliability) combined with a materially lower total door-to-door price than road.

Rail volumes have generally changed in line with changes in total market volumes, but at a slower than the total market. As a result, rail mode share increased as total market volumes decreased. However, when total market volumes increased rapidly from 2017, this increase was largely met by road freight, and rail mode share fell sharply (noting this coincided with a withdrawal of rail capacity by Aurizon prior to its exit from the market).

Therefore, changes in mode share appear to be more closely related to available rail service capacity, than rail's competitiveness with road. This clearly demonstrates road's superior flexibility and its ability to rapidly respond to market changes.

8 Intermodal freight – key trends and conclusions

8.1 Key trends

We have examined specific intermodal freight corridors (a) the east-west corridor (where rail dominates), (b) the north-south corridor (where road dominates) and (c) the Queensland north coast line corridor (where road and rail are evenly matched).

Our analysis shows that all three intermodal supply chains achieve different freight outcomes despite having largely the same market participants and commercial structures. However, by observing the different outcomes supply chain for each of these supply chains, some insight can be gained into the reasons for the modal choices made by freight customers. The table below summarises the relative performance and outcomes for each mode.

Table 26 Relative performance of rail and other modes

Corridor	Service Quality Difference	Price Difference	Outcome
East-west			
Melbourne/ Sydney – Perth	Moderate (road) – rail has comparable transit times with substantially lower reliability than road, but can generally achieve same daily day delivery outcomes Substantial (shipping) – rail offers a much faster and more reliable service than shipping	Substantial (road) – rail door to door delivery is on average 30-40% cheaper than road Substantial (shipping) – door to door delivery is on average 50-60% cheaper than rail	Rail strongly preferred over road, but shipping is attractive for non-time sensitive freight: Rail – 68-70% share Shipping – 17-24% share Road – 8-9% share
Brisbane – Perth	Significant – standard rail is significantly slower and less reliable than standard road, taking an additional day for delivery	Substantial – rail door to door delivery is on average 30-40% cheaper than road	Rail moderately preferred over road: Rail – 45% share Shipping – 24% share Road – 31% share
North-south			
Melbourne-Brisbane	Significant – standard rail is slower and less reliable than standard road, generally able to achieve same day daily	Moderate – rail door to door delivery is on average 10-15% cheaper than road	Road substantially preferred over rail: Road - 69% share

Corridor	Service Quality Difference	Price Difference	Outcome
	delivery outcomes but not within preferred windows		Rail – 29% share Shipping 2% share
Melbourne/Brisbane – Sydney	Substantial – rail is slower and less reliable than standard road, and does not achieve overnight delivery	Moderate – rail door to door delivery is on average 10-15% cheaper than road	Road strongly preferred over rail: Road – 96-98% share Rail – 2-3% share
Qld north coast line			
Brisbane – Rockhampton	Substantial – rail has similar reliability as road but is slower than standard road, and cannot achieve overnight delivery	Significant – rail door to door delivery is on average 20-30% cheaper than road	Road substantially preferred over rail: Road – 88% share Rail – 12% share
Brisbane – Townsville/Cairns	Moderate – rail is slower than standard road but can generally achieve same daily day delivery outcomes with reliability comparable to road	Significant – rail door to door delivery is on average 20-30% cheaper than road	Rail substantially preferred over road (particularly to Townsville): Rail – 64-83% share Road – 17-36% share

Source: Synergies analysis

- *The key drivers of mode choice are door-to-door price, reliability and transit time* – however even before reliability and transit time factors are taken into account, the greater logistical complexity of a rail movement means that rail needs to provide a discount to road to account for the “hassle factor” of using rail – anecdotally considered to be around 10%;

- *Rail has poorer service quality than road, but many customers are willing to trade off price and service quality provided their overall service requirements can be met* - where rail can offer the same day daily delivery service as a standard road service, it is able to meet the overall service requirement for time sensitive freight. Where it offers a substantial (30-40% cost reduction), it is strongly preferred over road, notwithstanding its generally lower reliability. Where rail has much longer transit times than road, this is acceptable to non-time sensitive freight if rail can offer a lower cost. As the level of average cost reduction offered by rail reduces, we can observe a greater share of the market preferencing road – for these corridors, improving service quality for rail may improve its attractiveness to freight customers at a given price;

- *Haul distance is important to price and service quality* — it is commonly understood that rail’s ability to offer a cost effective haulage solution increases as haul distance increases. However, it is also the case that rail’s ability to achieve comparable service quality can improve as haulage distance increases. This reflects that the additional time allowances required for rail – being the PUD time and freight cut-off and availability allowances – are a less material component of the total transit time as haul distance lengthens. Further, longer haul distances may allow greater opportunity to ‘make-up’ delays that occur en-route. Hence, rail is at a structural disadvantage relative to road for most freight types for shorter distance hauls of less than 1,000km. However, there are certain freight types on shorter hauls that remain well suited to rail, such as higher density, non time-sensitive products;

- *Shipping will return as a strong competitor for long distance freight* – once the global shipping market stabilises, it can be expected that international carriers will again focus on capturing domestic freight in order to improve the margin on their international services. Given domestic cargoes are incremental to their primary freight task, their ability to offer very low charges means that shipping will be attractive to customers who can tolerate long and unreliable transit times given their warehousing availability. However, there is a natural limit to the capacity available for domestic cargoes, as vessel capacity will be optimised to the required international cargo task;
- *Road productivity has increased faster than rail* – while productivity for a given truck type has remained stable over time, significant productivity gains are able to be achieved where road can increase the use of high productivity vehicles on a route. Key corridors show a trend of increasing use of larger vehicles within existing limits (i.e. trend to increasing use of road trains on the east-west corridor and increasing use of B-doubles between Melbourne and Brisbane). Recent approval for the unrestricted use of road trains for the NSW portion of the Newell Highway increases the opportunity for higher productivity vehicles to operate on Melbourne-Brisbane route in future. In the absence of ongoing productivity gains for rail, this will reduce the relative price advantage that rail can offer freight customers;
- *Inland Rail will facilitate a step increase in rail productivity for Melbourne-Brisbane* – with Inland Rail, rail operators will be able to operate rail services at their productivity frontier, with the potential benefit to door-to-door rail costs estimated to be 20%. However, noting the increased opportunity to run road trains on the Newell Highway, if this corridor reached road's productivity frontier (with similar truck composition as the east-west corridor), road costs could reduce by around 13%. The productivity gains that rail can achieve from Inland Rail will not alone be sufficient to guarantee a preference for rail – other strategies to promote the attractiveness and competitiveness of rail will also be required;
- *Efficient access to highly productive intermodal terminals* – efficient access to intermodal terminals, particularly through co-location of warehouses and distribution centres, together with rapid loading and unloading of trains, can significantly reduce the costs and barriers to using rail services, both in terms of the time and cost of the PUD movement, loading and unloading of trains, and the additional logistical complexity associated with using rail. Efficient terminal access will reduce rail's door-to-door cost, allowing it to compete more effectively with road, including over shorter distances. Ensuring the availability of highly efficient intermodal terminals is the most significant issue for promoting the use of the Inland Rail project;

- *The relative attractiveness of rail can be significantly increased by improving rail reliability* –rail's reliability in achieving advertised freight availability times is the key metric from a customer perspective, however this is affected by reliability in each component of the rail freight service, including rail network, rail operator and IMT performance. Improved service reliability can assist rail's attractiveness, not only by directly improving rail's reliability relative to road, but also by reducing effective transit time as a result of reducing the required buffer time built into the freight availability allowance, and also improving rail operating costs by reducing operating variability. However, there is currently insufficient information available on the key factors contributing to rail's reliability performance;
- *Strategies to improve the productivity and competitiveness of rail* – strategies developed in subsequent workstreams should focus on:
  - their ability to influence the key modal choice factors – being price (for the door-to-door freight movement), reliability and transit time; and
  - the ease of accommodating volume growth, noting that uncertain demand coupled with the high cost of investing in additional trainsets and barriers to entry can disincentivise the provision of increased train services.

8.2 Recommendations

The Infrastructure & Planning, Safety & Operations and Policy workstreams will consider range of strategies that impact the service quality and operational efficiency of rail, as well as the broader incentives to use rail freight as influenced by Government policy. However, there are a number of issues that have been specifically identified in this workstream which directly influence the competitiveness of rail relative to road.

Recommendation 3

That Rail Operators:

(i) continue, on an ongoing basis, to evolve their price structures in order to maintain their competitiveness with other modes, including across varying cargo densities; and

(ii) work with ARTC (and other RIMs) in order to identify whether alternate rail access charge structures may assist rail operators in more closely aligning rail freight charges with competitive alternatives (eg applying the variable charge by loaded wagon rather than by weight);

Recommendation 4

That Rail Operators continue, on an ongoing basis, to develop other aspects of their service offering that may maximise rail's ability to compete with other modes, including:

(i) charges applied for one-way backhaul movement to return empty containers used in coastal shipping;

(ii) the extent of differentiated transit time product offerings (eg based on priority of loading/unloading at IMTs) to maximise their competitiveness with road and shipping.

Recommendation 5

Given the limited visibility on the factors contributing to delays, that ACRI consider facilitating, in conjunction with rail operators and RIMs, a research investigation into the specific factors contributing to delays, and impacting on rail freight's reliability performance, on the east-west and north-south corridors.

9 Bulk freight

In this section, we review a selection of bulk freight tasks where road transport provides a competitive alternate to rail, but where road has had different levels of success in competing against rail. Consideration of bulk supply chains with different mode share preferences can help illuminate the drivers of mode share for bulk traffic.

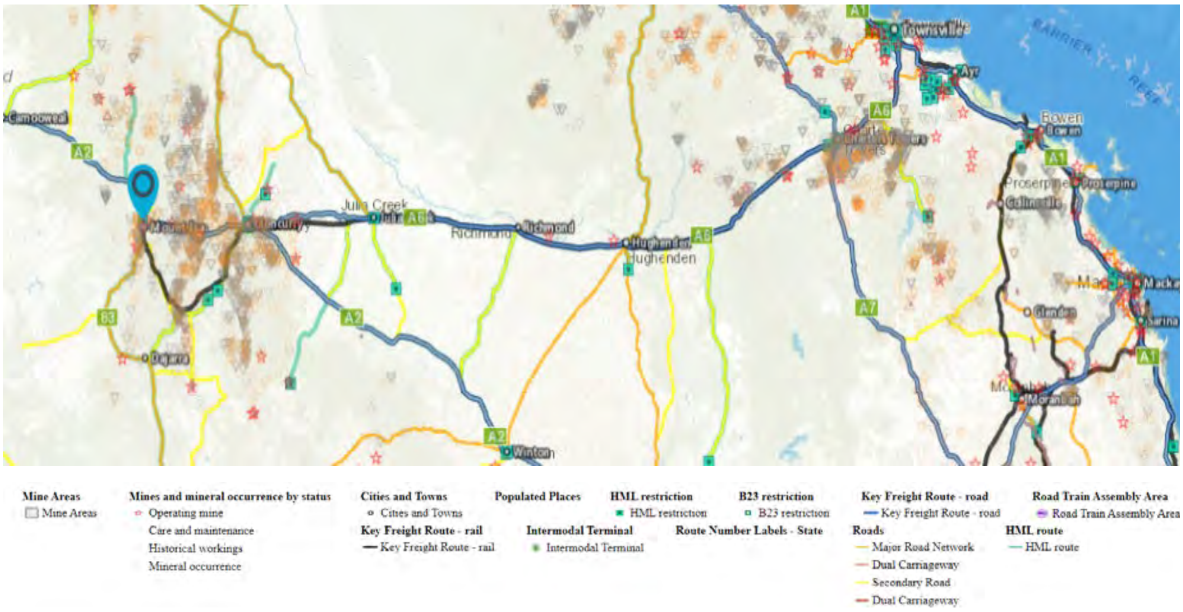
The bulk freight tasks selected for review are:

- Queensland Mount Isa line mineral products;
- Victoria Murray Basin grain; and
- SA Eyre Peninsula grain.

For each of these freight tasks, we provide an overview of the freight task, geographic scope and modal infrastructure. We then present the mode share outcomes for that freight task before discussing the key issues that have driven that mode share outcome.

9.1 Queensland Mount Isa Line

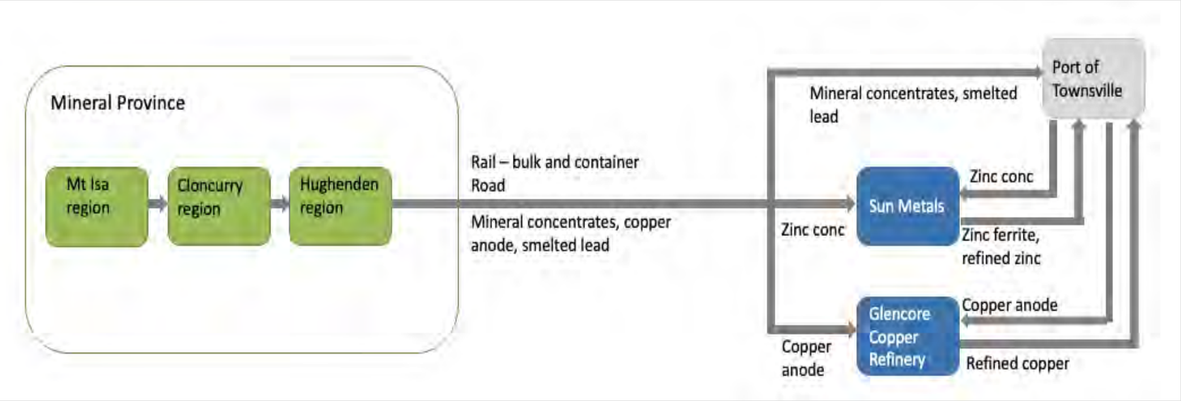
9.1.1 Freight task and geographic scope



Source: Australian Government, National Map at https://nationalmap.gov.au/

Freight type	Primary commodity: • Mineral concentrates and refined minerals Other commodities • Industrial products (eg fertiliser, sulphuric acid) • Mining inputs (eg cement, fuel)
Supply chain	• Mineral concentrates are mined at various locations in the North West Mineral province, and are either: • Transported in mineral concentrate form to Townsville for export; • Processed at Mt Isa with refined metals transported to Port of Townsville for export; or • Transported in mineral concentrate form to Townsville for processing, with refined metals exported from Port of Townsville. (Refer Figure 44) • Typical freight haulage distance exceeds 800km
Market volume	Average volume is estimated at around 2 million net tonnes per year, however, there are significant fluctuations around this average, primarily driven by changes in conditions in the global resources market, with total volumes falling to around 1.5 million tonnes in 2015-16 when mineral prices were low, and increasing to over 2.3 million tonnes in 2019-20 following strong price increases.
Rail market participants	Rail Operators: • Aurizon • Pacific National • Qube Rail Infrastructure Manager: • Queensland Rail
Rail infrastructure	Mount Isa rail line • Distance – 1032km • Axle load – 20tal • Gauge - narrow • Max train length – 1000m • Max speed – 100km/hr
Road infrastructure	Flinders Highway • Distance – 903km • Permitted vehicles – high capacity Type 2 road trains

Figure 44 Mount Isa minerals supply chain

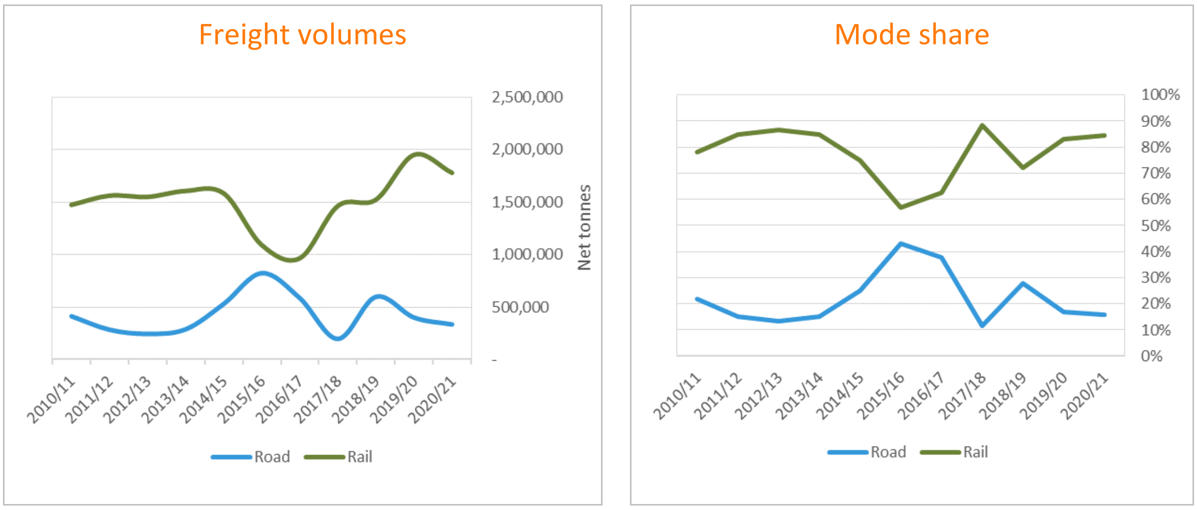


Source: Synergies

9.1.1 Mode share overview

Mineral products are almost entirely transported in the eastbound direction.[70] The total market volume and mode share are shown below.

Figure 45 Mount Isa freight volumes and mode share



Source: (a) Rail: QR (b) total volumes sourced from multiple sources including Port of Townsville's annual throughput estimates and estimated volumes for Sun Metals Zinc Refinery and Glencore's Copper Refinery (c) Road: treated as the residual of total volumes less rail volumes

Rail is the dominant mode, often achieving mode share for minerals/mineral concentrates in the range 80-90%:

- the 2019-20 reduction in mode share to 72% coincided with a long term infrastructure outage resulting from major flooding;
- rail also suffered a material decline in mode share for minerals/mineral concentrates in the period 2014-15 to 2017-18, reducing to under 60% before recovering to historic levels.

9.1.2 Drivers of mode share

Rail services achieve an average scheduled transit time between Mount Isa and Townsville of 28 hours.[71] While trains operate with a maximum speed of 80km/hr (restricted to 60km/hr during summer), the effective average speed for the entire journey is less than 40km/hr. Reliability has historically been an issue for rail, with around 61% of trains arriving at their destination on time[72].

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[70] Small volumes of copper concentrate are imported via Port of Townsville and transported to Mt Isa to maintain the required concentrate volumes at the Mt Isa Copper Refinery.

[71] Queensland Rail data return November 2021, 20-21 performance

[72] Queensland Rail Public Quarterly Performance Reports, average on-time arrival for bulk minerals trains on the Mt Isa Network, 2020-21 Q2 to Q4 and 2021-22 Q1, see https://www.queenslandrail.com.au/forbusiness/access/qca-reporting (viewed December 2021)

Extreme heat and heavy monsoonal rains during the summer months causing a reduction in allowable train speeds and reduced reliability, including due to regular flood events.[73] Historically, investment in the Mount Isa line rail infrastructure has primarily been aimed at improving reliability and resilience, by progressively introducing heavier rail and concrete sleepers. This track strengthening program is continuing.

By comparison, the transit time that can be achieved by road for a 900km haul is around half that for rail[74]. While there is no specific data on reliability of road transport on the Flinders Highway, reliability for road transport is generally reported to be around 98%. While flood events also cause disruption for road transport on the Flinders Highway, highways are typically able to be reopened more quickly than rail. Ongoing investment in improved road infrastructure on the Flinders Highway has also occurred to improve road freight transit times, improve network resilience to weather events and promote freight efficiency.

While the transit time and reliability outcomes for rail result in a substantially slower freight movement than road, for non-time sensitive products such as minerals, these appear to be acceptable, and are not reported as a significant factor driving mode share. Rather, the primary drivers of mode share for minerals products are price, accessibility and (for the larger miners) ability to transport product at sufficient scale.

The very large miners – Glencore and BHP, who each produce in excess of 500,000tpa of ore - primarily transport mineral concentrates by rail in bulk form. The Mount Isa line allows the operation of 1000m, 20tal trains, and transportation in bulk form allows for the efficient movement of high volumes of concentrates. While high capacity Type 2 Road Trains are able to operate on the Flinders Highway with direct access to the port via the Port Access Road,[75] bulk transport by rail remains substantially more cost effective than road.

However, bulk transportation requires access to bulk loading and unloading facilities at mine site and at the port. The existing bulk loading and unloading facilities are privately owned by the major mining companies, and their operation is integrated within their specific supply chains. Smaller miners do not have access to bulk loading and unloading facilities, and do not have sufficient scale to support the required investment in their own bulk facilities.

Mid-size and smaller producers can utilise rail by transporting concentrates in half height containers, which are then unloaded at the port at a common-user facility using a rotainer system which allows the concentrate to be shipped in bulk form.

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[73] Queensland Rail (2012); Mount Isa Infrastructure Master Plan 2012; p.6

[74] Assuming average speed of 80km/hr and allowance for rest breaks, road transit time from Mt Isa to Townsville is approximately 14 hours.

[75] Queensland Rail (2019); Declaration Review: QR's Response to the QCA's Draft Recommendation, 11 March 2019, p.33-35

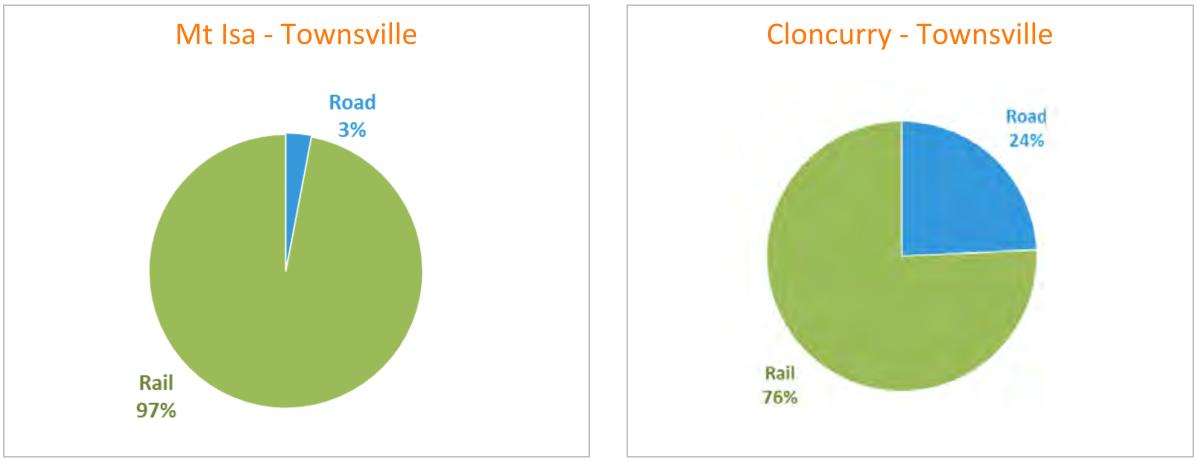
However, transportation of mineral concentrates in containerised form is a less efficient rail transport method than using bulk wagons, meaning that transportation by road is likely to be more cost competitive. Noting that smaller producers will generally produce less than 100,000tpa (and potentially down to 20,000tpa) and may opportunistically vary production levels significantly to reflect market conditions, there remains a range of issues for smaller producers in accessing rail transportation, including:

- access to facilities/equipment for loading concentrates into containers;
- access to facilities/equipment for loading containers onto train;
- the volume of product required to fill a train and the resulting regularity of service.

These smaller producers may wish to minimise upfront capital costs and/or be unwilling to provide a long term commitment in order to secure rail capacity and may therefore prefer the more flexible road transport option. Further, for those producers located a material distance from the rail line, it may not be cost effective to truck product to a rail load point for transportation by rail.

These influences can be seen in the estimated mode share for different origin-destination combinations on the route, as shown below. This estimate groups smaller export producers around the broader Cloncurry region, as this is where there is opportunity for them to load containerised minerals and mineral concentrates onto trains:

Figure 46 Mount Isa line by origin – 2020 (net tonnes)



Source: (a) Rail: QR (b) total volumes sourced from multiple sources including Port of Townsville’s annual throughput estimates and estimated volumes for Sun Metals Zinc Refinery and Glencore’s Copper Refinery (c) Road: treated as the residual of total volumes less rail volumes

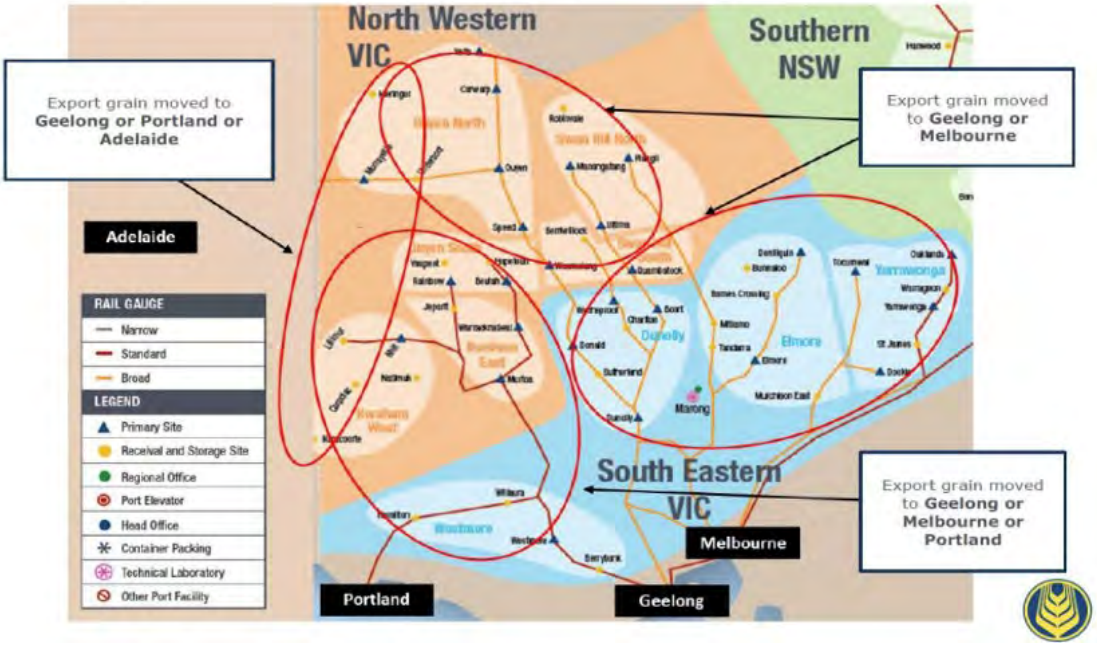
Notes: Note, references to a city includes the hinterland catchment area around the city from which rail freight is drawn.

Opportunities to increase rail mode share for mineral products will primarily accrue where rail operators are able to develop innovative solutions to allow the aggregation of volume from smaller producers at a common use facility to allow the efficient loading and transportation of their product on a shared service. We understand that Aurizon has recently introduced a scheduled combination intermodal/bulk service for this purpose.

In addition to mineral products, there are a range of mining input products transported in the westbound direction, including cement, lead, sulphur and fuel. From early 2017, Aurizon ceased the provision of intermodal rail services for these products following a loss of other contract volumes, and they were all transported by road. Since Aurizon's recommencement of a combination bulk/intermodal service, some of these products have returned to rail, however a portion still remain on road. While this is heavy freight, which is not time sensitive and thus ideal for transportation by rail, Queensland Rail understands that factors causing users to continue to use road transport include a reluctance of end-customers to enter into longer term take or pay contracts that rail operators seek and the flexibility of road to chase backloading opportunities to be more competitive.[76]

9.2 Victoria Murray Basin

9.2.1 Freight task and geographic scope



Source: GrainCorp (2014), Submission in support of exemption for its Geelong and Portland Ports 5 December 2014.

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[76] Queensland Rail (2019); Declaration Review: QR's Response to the QCA's Draft Recommendation, 11 March 2019, p.34-35

Freight type	Primary commodity • grain: including wheat, barley, canola and lentils. Other commodities • other products such as fruit and vegetables, wine, nuts, hay are transported by rail and road
Supply chain	• Grain from the Murray Basin (covering the North West of Victoria extending into New South Wales and South Australia, is exported via the Victorian ports of Portland, Geelong and Melbourne and is transported to port via the region's road and rail networks. • Grain haulage distances to port primarily range from 200-350km, with an average distance to port of 250km[77]
Market volume	Although production varies seasonally, on average the Murray Basin region grows 70% of Victoria's grain. On average grain production in Victoria is around 6.2 mt[78], however the majority of this is for domestic consumption. Total estimated grain exports through Victorian ports is, on average, around 2.8mt [79], although this is subject to significant seasonal variation. In 2019-20, total Victorian grain exports were around 1.6mt (where prolonged drought conditions have created increased demand for domestic grain). In the vast majority of cases, the majority of grain in Australia is exported in bulk form. However, in Victoria, there is a substantial proportion of grain that is exported in containerised form as well as bulk form. Synergies has excluded the containerised grain volumes from its modal share assessment on the basis that rail operators do not carry significant volumes of containerised grain and is therefore not considered a significant part of the contestable market
Market participants	Rail Operators: • Pacific National • Qube • Southern Shorthaul Railroad (SSR) Rail Infrastructure Manager • V/Line
Rail infrastructure	The Murray Basin freight rail network is connected to Victoria's Interstate freight network and comprises 6 connected rail lines with a total distance of 1,129km, connecting to the ARTC interstate network at Ararat and Gheringhap, and providing access to the ports of Melbourne, Geelong and Portland. In 2016, the Victorian Government commenced a program of rail improvements ('Murray Basin Rail Project' or MBRP) which sought to upgrade the entire Murray Basin Network by converting it from broad to standard gauge and increasing train axle load capacity from 19 to 21 tonnes.
Road infrastructure	The road network consists of 8 key routes which are all major highways used to transport material (not just grain) to and from the Murray Basin. Local roads are also used. The routes have previously been assessed by the applicable state government's road authority heavy vehicle requirements and have been classed as Class 'C' Level. The major highway road networks are not limited by capacity but in many cases local roads are under pressure from limited capacity to sustain the impacts of larger and heavier vehicles.[80]

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[77] Aegic (2018), Australia's grain supply chains, October 2018, p.22

[78] ACCC (2020), Bulk grain monitoring report 2019-20. Average grain volumes between 2014-15 and 2019-20.

[79] ACCC (2020), Bulk grain monitoring report 2019-20. Includes bulk and containerised grain exports

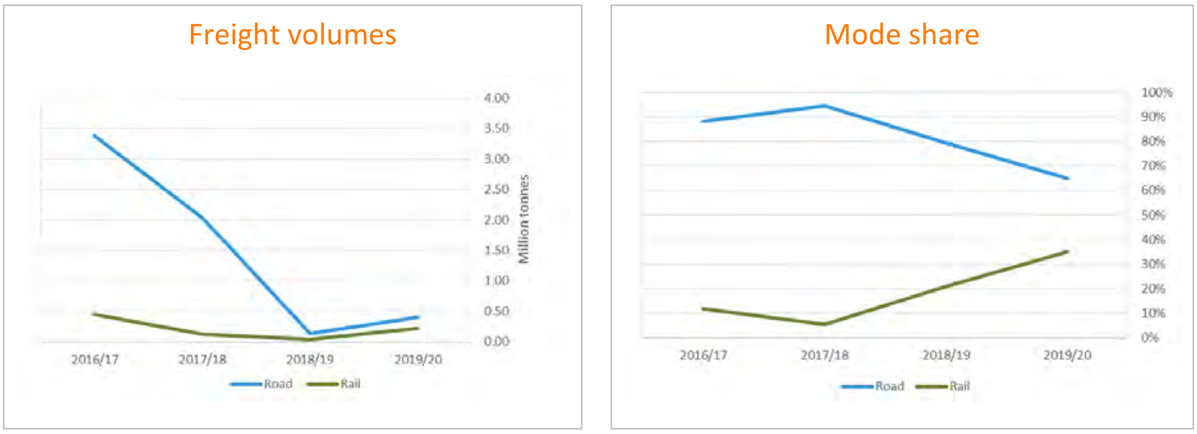
[80] GHD for the Department of Planning and Local Infrastructure (2014), Murray Basin Region Freight Demand & Infrastructure Study, July 2014, p.30

9.2.2 Mode share overview

Historically, rail has been the dominant form of transport for export grain from the Murray Basin, with a reported mode share of around 90% around 2000. However, rail's mode share declined dramatically over the following 15 years, falling to around 45% by 2015.[81] Road is now the dominant mode of transport for export grain.

Total estimated export grain freight volumes and mode share are shown below.

Figure 47 Murray Basin exports - bulk freight volumes and mode share



Source: Rail volumes provided by PN; road volumes treated as residual of bulk export grain volumes less rail volumes. Containerised export grain volumes currently excluded from analysis. Bulk export grain volumes have been sourced from ACCC bulk grain monitoring report 2019-20.

This data demonstrates that road continues to be the dominant mode for the transportation of grain from the Murray Basin to Victorian ports. Rail's low mode share may have been further reinforced by the disruption caused by the delivery of the MBRP.[82] While the data indicates that there has been some recent improvement in rail's mode share, the measurement of mode share in the period 2018-20 needs to be interpreted with caution given the devastating effects of drought which caused grain export volumes to plummet.

9.2.3 Drivers of mode share

Over the last two decades, rail utilisation on the Murray Basin rail network became increasingly constrained by a mixture of broad and standard gauge lines, a 19 tonne axle load limit and declining levels of service due to long-term underspends on rail infrastructure maintenance. This resulted in fragmentation of the network, reducing its accessibility and flexibility. As a consequence, transit times for rail freight were much longer and significantly less reliable than road. Increasing rail freight

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[81] Victorian Government (2015), The Murray Basin Rail Project, Final Business Case, August 2015, p.6

[82] Victorian Department of Transport (2020), Murray Basin Rail Project – Business Case Review, April 2020, p.3

cycle times, which led to increased rail operating costs, ultimately resulted in an increase in road freight in the Murray Basin region.[83]

In particular, during the period of private control of the regional rail network from 1997 to 2009, the condition of the regional rail track declined substantially. In a 2020 report, the Victorian Auditor General commented:[84]

> …from 1999 to 2007, the private sector lessees took a contractually compliant 'minimum maintenance' approach to freight-only lines, and effectively allowed some lines to fall out of service. On some sections of track, the lessees restricted speeds to only 20 kilometres per hour.
>
> Due to the ineffective maintenance obligations in the lease, the infrastructure deteriorated further, which compounded the previous maintenance backlog. These allowed parts of the rail freight network to deteriorate to a very poor condition. This lack of investment in the freight-only network, and resulting poor operational performance, accelerated a shift by freight users from rail to road freight, increasing the potential for adverse environmental, social and economic consequences.

While rail performance was declining (and rail costs were increasing), road freight productivity was improving, with bigger and heavier vehicles approved to operate throughout the state. Changes in grain marketing arrangements also led to increased truck transport of grain to handle customer requirements for small grain shipments and 'just-in-time demand'. Conditions of contracting also contributed to a shift towards road transport, with rail freight companies requiring volume commitments accompanied by take or pay obligations.[85]

In order to reverse the declining rail mode share, in 2014, the Victorian Government announced and funded a package of rail improvements ('Murray Basin Rail Project' or MBRP) which sought to upgrade the entire Murray Basin Network by converting it from broad to standard gauge and increasing train axle load capacity from 19 to 21 tonnes.

The MBRP was expected to be completed in 2019. The Victorian Government paused the project in June 2019 (on advice that the $440 m MBRP project budget was fully expended and that urgent

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[83] Infrastructure Australia, Murray Basin Rail Project Evaluation Summary, p.1. A copy is available at https://www.infrastructureaustralia.gov.au/sites/default/files/2019-06/Murray_Basin_Rail_Project_Evaluation_Summary_0.pdf

[84] Victorian Auditor-General (2020), Freight Outcomes from Regional Rail Upgrades, March 2020, p.45

[85] Rail Futures Institute (2016), Getting freight back on track in Victoria, June 2016, p.3

repairs costing $23 m were required on the Manangatang line[86]) pending a review by the Victorian Auditor General on whether regional rail upgrades were delivering improved rural freight outcomes in a timely and cost effective way.[87] Following the review the Victorian Government extended the MRBP.

Service quality and operational constraints on the network remain. The work to remediate the MBRP are continuing, with much of the works expected to be completed by mid-2023. However, ongoing construction work is continuing to cause issues resulting in reduced capacity, increased journey times and increased costs for operators and producers. The majority of grain leaving prime farming areas is continuing to go by road, with the following problems persisting:[88, 89, 90]

- while the Ararat to Maryborough track section was substantially rebuilt during the MBRP Stage 2 works, this was undertaken with legacy rail and the track remains constrained. The legacy rail was produced in 1912, with trains operating on this section limited to 25 km/h and 19 tonne axle load. This section is expected to be re-railed again in 2022-23, with most of the speed restrictions then able to be removed.
- the track between Murrayville and Ouyen cannot be used when the temperature is forecast to be 32 degrees or more. This section is also expected to be remediated in 2022-23, with heat restrictions then able to be removed.
- four rail corridors were to be converted from broad gauge to standard gauge to bring it in line with other freight networks, but there remain hundreds of kilometres between Manangatang, Sea Lake and Maryborough that are still broad gauge – this has resulted in claims of a ‘mismash’ of tracks, with rail operators continuing to need to run two sets of wagons to service the area. Moreover, despite urgent works being performed on these broad gauge sections of track, significant speed restrictions remain that reduce train cycle times and increase operating costs. To illustrate this, PN recently converted a complete broad-gauge grain train (that had been operating on these sections) to standard-gauge, because the train could be more efficiently used in NSW;
- the rail line has been upgraded further north-west around Mildura, and the disused line between Ararat and Maryborough was re-opened (linking the network to the Port of Portland), but freight operators say those lines are ‘riddled’ with limits on wagon weights and speed restrictions, with trains travelling as slow as 25 km per hour;

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[86] Victorian Auditor-General (2020), Freight Outcomes from Regional Rail Upgrades, March 2020, p.34

[87] Victorian Auditor-General (2020), Freight Outcomes from Regional Rail Upgrades, March 2020.

[88] See for example, ABC (2020), Troubled Murray Basin rail project subject of complaint to Victoria’s IBAC, 17 March 2020. [viewed 7 December 2021].

[89] Stakeholder consultation - Pacific National, February 2022

[90] Victorian Auditor-General (2020), Freight Outcomes from Regional Rail Upgrades, March 2020, p.13

- since the re-opening of the Maryborough to Ararat line in 2018, rail operators have expressed concerns about the line. Although the nominal speed limit on the rail line is 65 kilometres per hour, operators note that this applies to only 22 of 87 kilometres of this section of track and only for trains that meet certain technical conditions. For all operators, V/Line currently limits the rolling stock speed to 40 kilometres per hour. V/Line has placed additional speed restrictions on the line due to level crossing sighting issues, which further reduces the average speed along its entire length. The track loading is limited to 19 TAL for the majority of rail freight operators using the network. For rail operators, these speed restrictions mean that it is now slower to move freight to port than before the line closed. Other than the line re-opening for scheduled freight trains, the MBRP works have made no overall performance improvements to the Ararat to Maryborough rail section;

- the project removed around 13.5 km of passing loops and wagon storage roads[91] . This had the effect of limiting the number of trains that could operate on the network at the same time, thereby restricting the amount of freight that can be moved on the line. Many of the crossing loops and storage roads are expected to reinstated during 2022-2023 as part of the remediation program;
- slow travel times require additional crews to ensure that employees do not exceed their maximum allowable driving hours due to fatigue management;
- Graincorp (Australia’s biggest grain handler) had reportedly stated that up to $50 million set aside for new grain-loading infrastructure in Victoria had gone interstate.

Operational constraints and slow travel times mean that rail operators unable to achieve the train turnaround times anticipated in the MBRP business case, with a consequential loss in capital efficiency, and an increase in train operating costs (primarily labour). Reflecting this, PN advises that it is running only a quarter of the grain trains predicted in the MBRP business case.

While our case study analysis has focused on grain export movements, deterioration in service quality of rail compared to road is likely to have implications for the modal competitiveness of other freight commodities (e.g. intermodal and mineral sands) that are also reliant on an efficient rail freight solution, even where strong commercial opportunities might exist.

While the MBRP has been extended, the Ballarat corridor (Maryborough to North Geelong) is no longer going to be converted from broad gauge to standard gauge. This change means that trains will have to travel further to reach the Port of Melbourne (via Ararat). Where further distance adds costs to a train journey, this risks any gains from increased investment in rail being undermined and reinforces rail as a less attractive option relative to road. Planned terminal developments currently

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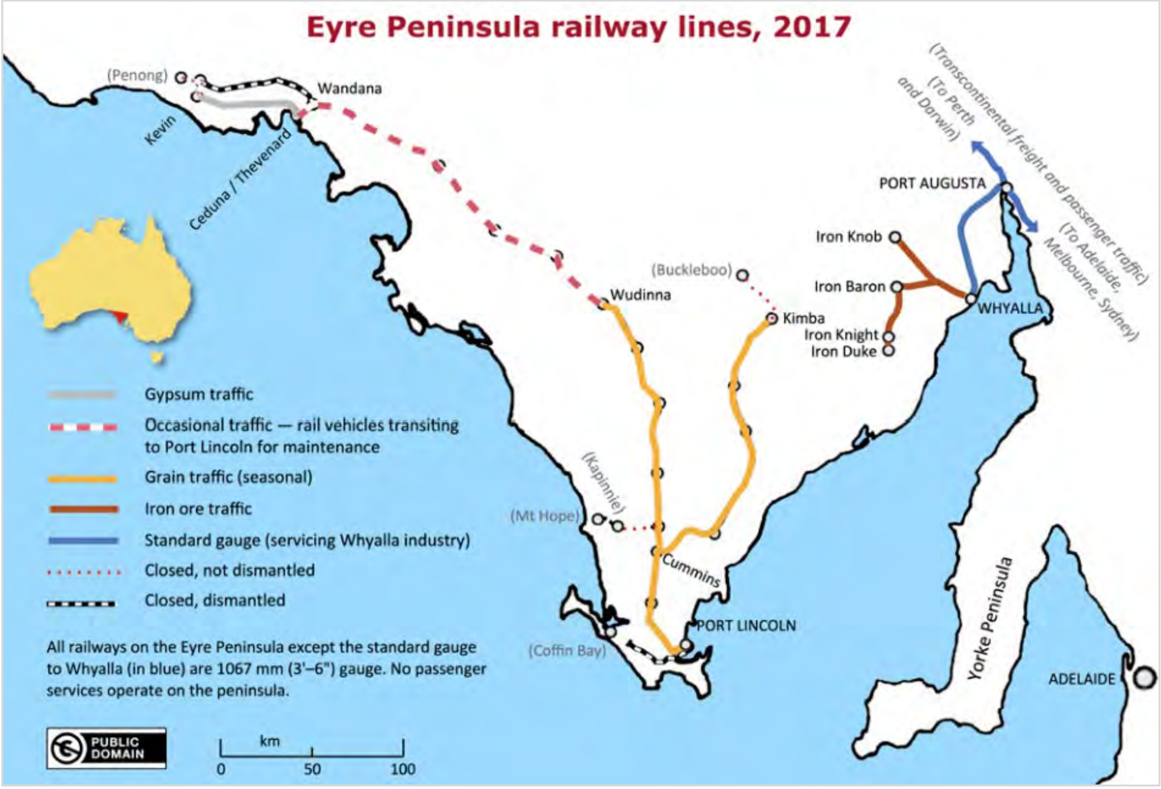
[91] Victorian Auditor-General (2020), Freight Outcomes from Regional Rail Upgrades, March 2020, p.14

underway to support the broader movement of commodity traffic from the Murray Basin catchment to port may be discouraged or undermined where investments in rail are not successful in promoting increased rail mode share.

Victoria's Murray Basin Rail network demonstrates the complexity and high cost associated with reinstating a good quality rail service where a long term infrastructure deficit has been allowed to accrue. Once infrastructure quality on a route becomes highly degraded, rail operators are unable to operate a reasonably efficient train service due to axle load and/or speed restrictions, which are driven by the combined effect of multiple infrastructure constraints. Significant improvements in train service efficiency may require upgrades across the full route, with the full benefit of partial upgrades potentially being unable to be realised where addressing one infrastructure issue simply changes the critical constraint in the supply chain, but does not allow for a significant overall increase in service quality. Co-ordination across all elements of the supply chain is essential in order to allow for early progress in improved service quality to be achieved.

9.3 SA Eyre Peninsula

9.3.1 Freight task and geographic scope



Source: SMEC (2018) Eyre Peninsula Freight Study, September 2018, p.22

Freight type	• Primary commodity: – Grain • Other commodities: – Gypsum, iron ore
Supply chain	• Grain is moved from the Eyre Peninsula grain producing regions to port terminals at Port Lincoln, Thevenard and a new terminal at Lucky Bay. The Eyre Peninsula rail network connected only to Port Lincoln (the largest of the terminals, handling around 80% of grain volumes), with other terminals serviced only by the road network. • Grain producing regions are clustered close to the coast, so the haulage distance to port is generally short, typically ranging between 100-200km and averaging about 144 km.[92]
Market size	• Grain production in the Eyre Peninsula region averages around 2.5 million tonnes per year[93] however is subject to significant seasonal variation.
Market participants	Rail Operators: • One Rail Australia Rail Infrastructure Manager: • One Rail Australia
Rail infrastructure	• The rail network in the Eyre Peninsula comprised two key routes: – narrow gauge line between Port Lincoln and Kimba (with a further section between Buckleboo and Kimba currently closed but not dismantled). – narrow gauge line between Port Lincoln and Wudinna (with a further section between Wudinna and Thevenard used for rollingstock maintenance traffic only). • The grain rail network closed in 2019, as the investment required to improve the standard of rail infrastructure has previously been deemed 'not commercially viable' by Viterra, One Rail and the SA Government. • Policy decisions have supported the transition to road for all Eyre Peninsula grain movements.
Road infrastructure	Roads are a combination of National Highway (Eyre Highway), state arterial roads and local roads. Roads are generally regarded as being in good condition, reflecting a history of investment, and the quality of road infrastructure is significantly higher than the rail infrastructure.

9.3.2 Mode share overview

The total estimated grain freight volumes and mode share are shown below.

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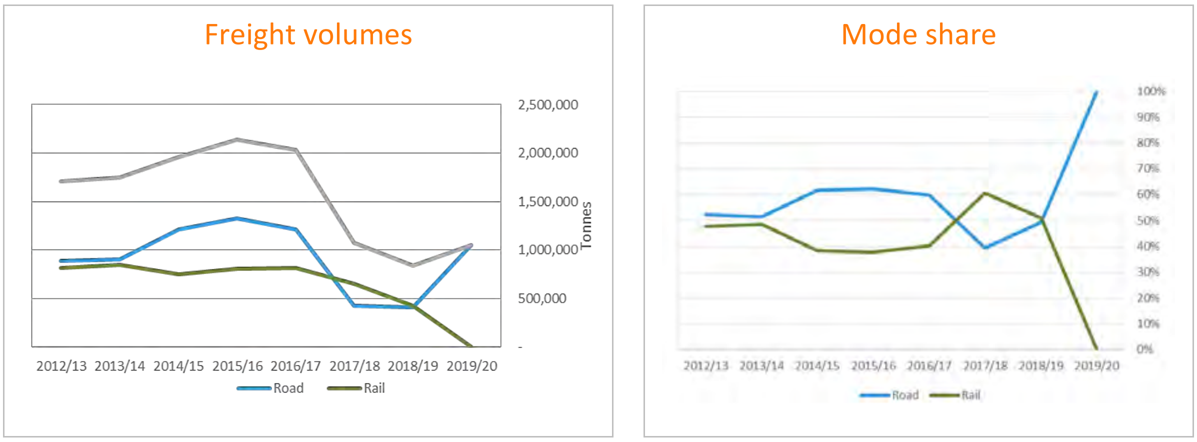
[92] Aegic (2018), Australia's grain supply chains, October 2018, p.22

[93] PIRSA (2017), SA Grain Industry Overview, May 2017, p.11, 10 year average

Figure 48 SA Eyre Peninsula – Origin to Port Lincoln - freight volumes and mode share



Source: Rail data is supplied by One Rail Australia as part of this freight study. Port Lincoln port throughput statistics have been sourced from Flinders Ports.

Notes: Port throughput data is published on a calendar year basis so the average of two years has been taken to present throughput on a financial year basis.

9.3.3 Drivers of mode share

Up until March 2019, grain was transported on the Eyre Peninsula via a combination of road and rail. Of the 1.9 million tonnes delivered to Port Lincoln in 2017, 816,000 tonnes were delivered by rail. The remaining 1.1 million tonnes was delivered by road. This included a portion of the grain delivered to road/rail sites along the rail corridors as well as 100% of the grain delivered to road only sites.[94]

One Rail Australia operated a single train consist on the network (which had reduced from two in 2014-15) comprising 64 wagons with a maximum axle load of 16 tonnes and total carrying capacity of approximately 2,750 net tonnes. The majority of the corridor (over 99%) was under speed restriction due to the deterioration of track geometry, sleeper and rail joint conditions. A total of 600 minutes was estimated to be lost in speed restrictions for a complete combined up and down passage of the existing network between Wudinna and Port Lincoln and between Kimba and Port Lincoln, with sections of the network limited to 20kph operating speed. There was also reduced reliability of locomotives and wagons given their age. Some wagons were removed from service in 2017 due to major cracking, rendering them unsafe.

In contrast, roads are generally regarded as being in good condition, reflecting a history of investment. Road transport efficiency has been improving due to the use of B-triples and AB-Triple Road Trains.[95] For example, the average truck size delivering into the Viterra network increased by about 20 per cent from 2009–10 to 2016–17, reducing freight costs and the total number of vehicle journeys.

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[94] SMEC (2018), Eyre Peninsula Freight Study – prepared for the Department of Planning, Transport and Infrastructure September 2018, p.14

[95] See https://www.dpti.sa.gov.au/infrastructure/eyre_peninsula_freight_study

By 2018, the rollingstock used to provide the service was effectively life expired, and new rollingstock investment was required to continue operations. In the South Australian Government's 2018 Freight Study of the Eyre Peninsula freight task, it was identified that the cost to upgrade the rail network to a satisfactory standard (suitable for the operation of new rollingstock) would be around $150 million.[96] The required level of investment was considered likely to result in significant increases in rail freight charges.

The study also identified there was no guarantee that there would be sufficient grain volumes to justify this investment, noting the development of alternate options in the provision of grain marketing and bulk handling services, such as the development of new (road only) grain handling terminals, and a growing trend for farmers to directly source grain transport.[97] This diminishes the volume of grain that can be serviced by rail, as well as adding a new source of demand uncertainty where farmers may increasingly switch between terminals.

Both One Rail Australia and Viterra concluded that it was not commercially viable to invest in renewal of the rail infrastructure and rollingstock and that, as a result, rail operations were not viable.[98] Viterra's contract with One Rail Australia for rail grain delivery expired in March 2019 and was not renewed. Road is now the sole mode of grain transport in the Eyre Peninsula.

Accepting the conclusion that the rail corridor "was no longer commercially viable for grain going forward", the South Australian Government rolled out a package of works to upgrade roads on the Peninsula in order to alleviate the expected impacts from the transition of rail to road.[99]

The closure of the Eyre Peninsula grain network was ultimately the outcome of several impediments to rail providing a commercially viable service given the need for major reinvestment. The three major factors are:

- transport distances - the clustering of grain producing regions close to the coast means that there is generally only a small haulage distance between grain growing regions and up-country storage sites and grain ports. Given the high fixed costs associated with providing rail services, high traffic volumes are required in order to achieve a competitive cost structure for short hauls;
- traffic volumes - while in aggregate South Australia's export grain volumes are substantial, these are distributed across multiple terminal locations. For Port Lincoln, up-country storage is dispersed across two rail routes, as well as locations that are only accessible by road. As a result, the potential volume catchment for each rail route is only modest, and is subject to significant

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[96] See https://www.dpti.sa.gov.au/infrastructure/eyre_peninsula_freight_study

[97] See https://www.dpti.sa.gov.au/infrastructure/eyre_peninsula_freight_study

[98] See https://www.dpti.sa.gov.au/infrastructure/eyre_peninsula_freight_study

[99] See https://www.dpti.sa.gov.au/infrastructure/eyre_peninsula_freight_study

seasonal variability. While this issue can be alleviated where the rail network is shared with other traffics, the Eyre Peninsula railway was not used by any other traffic; and

- high quality road infrastructure – road transport provided a highly competitive option for the transport of grain given the existence of high quality road infrastructure, with road freight rates creating a cap on the potential rail freight charge.

The problems with providing a commercially viable rail service on the Eyre Peninsula were well known, with prior Government studies in 2002 identifying similar issues.[100]

9.4 Bulk freight key trends and recommendations

9.4.1 Key trends and conclusions

While rail is typically viewed to have an advantage in transporting bulk freight, this is not universally the case. Rather, mode share is driven by factors that are highly specific to each route. Our review of the selected bulk freight corridors has produced the following insights to the factors that influence mode choice for bulk freight:

- *Price, and the ability to deliver large shipments in a timely manner, are the overwhelming determinants of mode choice for bulk freight* - bulk freight is generally not time-sensitive, and given a requirement to move high volumes of freight, customers are willing to accept rail services providing a slower transit and poorer reliability, if it is able to offer a lower price than road;

- *Rail is the preferred mode for bulk haulage, provided the infrastructure supports an efficient train service* – for major bulk operations, such as the WA iron ore railways and east coast coal haulage railways, rail is overwhelmingly the preferred mode. For smaller bulk operations, such as those investigated in this study, the ability of rail to offer a significant discount to road depends on its ability to operate efficient rail services. Both the Mount Isa bulk minerals and the trunk routes for the WA bulk grain services operate to contemporary standards in terms of allowable train configurations and speeds (albeit often significantly slower than road). For these routes, provided that freight customers can readily access rail, it remains the preferred mode. However, where rail infrastructure quality creates major impediments to the operation of an efficient rail service, such as in the Murray Basin or the Eyre Peninsula, road transport is dominant.

- *There can be barriers to customers accessing rail services* – as is evidenced on the Mount Isa line, particularly for smaller bulk customers, difficulties in gaining access to suitable loading and

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[100] See https://www.dpti.sa.gov.au/infrastructure/eyre_peninsula_freight_study

unloading infrastructure, and the requirement to aggregate volumes to full train loads can lead to customers preferring road, even where this may be a higher cost option.

- *Rail's high fixed costs mean that operators require volume commitments to invest, but this can deter freight customers who want to retain flexibility* – rail operators usually require a firm commitment from customers (in terms of volume and term), in order to support the required investment in rollingstock capacity. However, where volume is uncertain, such as is the case in agricultural markets or smaller resource projects, customers may be unwilling or unable to provide this commitment, resulting in a preference for road.
- *Suitable infrastructure quality is critical* - where major infrastructure deficits have accrued, this imposes massive constraints on the ability of rail operators to run an efficient rail service using contemporary standard rollingstock.
- *Major infrastructure deficits are complex and costly to reverse* – major infrastructure deficits are complex and costly to address, and the need for major reinvestment can trigger the closure of marginal rail routes once rail assets reach 'end of life', such as the Eyre Peninsula or WA's 'Tier 3' grain lines. The Murray Basin, where the Government decided to reinvest to reinvigorate rail, demonstrates the complexity of upgrading degraded infrastructure, where considerable investments have occurred but no discernible improvement in rail service quality has been observed.
- *Major reinvestment in rail to achieve contemporary standards may not be economically viable* - there are several pre-requisite conditions to achieve an efficient bulk freight rail service, which are:
  - moderate to high route volumes, which in turn are more likely to be achieved where:
    - there is high production density in the rail catchment zone, with product volumes transported to a common destination;
    - small volumes are funnelled into larger, consolidation points to allow for efficient train loads;
    - route distances are moderate to long; and/or
    - infrastructure is shared with other commodities (although this is not essential where standalone product volumes are sufficient to support infrastructure maintenance); and
  - a transport task that allows for consistent utilisation of rollingstock, which is more likely to be achieved where rail is used to provide base load volumes with road transport used to transport more variable volumes.

Where market conditions are less conducive to an efficient rail service, commercial revenues are unlikely to sustain ongoing reinvestment in rail infrastructure and rollingstock to maintain contemporary standards (although it may remain viable to continue to operate by 'sweating' the assets for their remaining physical life). In these instances, it is appropriate that governments comprehensively evaluate the economic benefits of reinvesting in rail compared to allowing the full transport task to be carried by trucks and accordingly investing in road upgrades as required.

- *There are opportunities for rail operators to improve rail's mode share for contestable bulk services* – based on the routes examined:
  - innovative approaches to facilitate the consolidation and loading of freight from smaller producers may help to reduce the barriers to accessing rail services. For example, the recent introduction by Aurizon of a scheduled bulk/intermodal train to the Mount Isa line, together with the development of a common user loading facility, may help to promote rail mode share.
  - commercial arrangements may be structured to promote rail utilisation. In WA, CBH's integration into the rail haulage market (as a result of its acquisition of rollingstock for its services) meant that CBH accepted the fixed costs of rollingstock ownership and the marginal cost to CBH of increased rail utilisation was low. This encouraged CBH to maximise its use of rail services.

9.5 Recommendations

The Infrastructure & Planning, Safety & Operations and Policy workstreams will consider range of strategies that impact the service quality and operational efficiency of rail, as well as the broader incentives to use rail freight as influenced by Government policy. However, there are some issues that have been identified in this workstream which directly influence the competitiveness of rail relative to road.

Recommendation 6

That, on an ongoing basis, Rail Operators continue to investigate opportunities for innovative operating and contracting strategies that may promote increased utilisation of rail for bulk products with smaller or more variable volume, eg through greater aggregation of freight from smaller producers.

A. Synergies' methodology for assessing modal share

A.1 Introduction

This section presents further details on our approach to estimating road freight volumes for each of the intermodal corridors.

A.2 Estimating road freight volumes

Two basic sources of data have been used to construct our road freight estimates. One is truck counts and weighbridge data. The other is the ABS studies from 2014, 2001 and 1994. These give a snapshot of road movements within Australia.

To estimate in between these ABS points we have used two methods:

1. we calibrate a model using macro variables and based on the ABS data from the three sample years; and
2. this is supplemented with road count data where available; entirely on east west, and partially from 2014 onwards on the north south and north coast lines.

A.2.1 ABS road surveys

The 2014 ABS road freight survey (9223.0) provides estimates of road freight by origin and destination at the SA4 level, with freight broken down into 22 commodity classifications. However, we have adopted a broader 10 commodity classification in order align with the previous 2001 survey.

For each origin-destination we have constructed a broad classification of the contestable region around each origin and destination city. This broad classification is not fixed for an individual city but depends on the origin-destination pair. For example, a much broader contestable region is included around Sydney for east-west freight to Perth as compared to the contestable area around Sydney for freight to Melbourne.

Commodities are broken down into 3 classifications. Included level 1, Included level 2, and Excluded.

- Included level 1: these are the broadly contestable commodities and are included in our road freight estimates if their origin and destination region are part of the main contestable area of the origin and destination.

- Included level 2: For these categories a broader contestable area is drawn around the origin and destination cities. This broader region is used to offset the large standard error of the ABS data at the commodity/SA4 level, and to take into account that some commodity may be contestable over a broader catchment than others.
- Excluded: These are commodities that have broadly been categorised as non-contestable.

The table below gives a breakdown of the ABS commodities categories.

Table A.1 ABS commodities

Commodity Group	Included/Excluded
Food and live animals	Included lvl 1
Beverages and tobacco	Included lvl 2
Crude materials, inedible, except fuels	Excluded
Mineral fuels, lubricants and related materials	Excluded
Chemicals and related products n.e.s.	Included lvl 1
Manufactured goods classified chiefly by material	Included lvl 1
Machinery and transport equipment	Included lvl 1
Miscellaneous manufactured articles	Included lvl 1
Commodities and Transactions n.e.s. (including Animal and vegetable oils, fats and waxes)	Included lvl 2

Source: Synergies based on ABS road freight movements survey freight classifications

The same method has been applied for the 2001 road freight survey. The only change is that the regional break down differs slightly from 2014, so the contestable regions have been approximated as closely as possible.

The next table shows the estimates of contestable road freight for each origin destination pair, along with the ABS estimates of total state to state road freight.

Table A.2 ABS road freight volume estimates

	Contestable Freight			Total State to State Freight		
	1993/94	2000/01	2013/14	1994/95	2000/01	2013/14
Melbourne - Sydney	1,728	3,188	4,823	3,055	9,669	19,815
Sydney - Brisbane	836	2,570	3,644	1,988	6,088	14,442
Melbourne - Brisbane	628	1,140	1,231	1,064	1,374	1,741
Melbourne - Adelaide	817	1,848	2,373	1,191	3,896	6,173
Melbourne - Perth	167	117	128	175	117	143

	Contestable Freight			Total State to State Freight		
	1993/94	2000/01	2013/14	1994/95	2000/01	2013/14
Sydney - Perth	132	104	61	166	106	61
Sydney - Adelaide	462	779	700	745	1,757	1,723
Brisbane - Perth	22	48	142	33	62	142
Brisbane - Adelaide	168	196	188	205	257	638
Adelaide - Perth	78	235	242	81	455	495
Sydney - Melbourne	1,446	3,398	4,591	3,118	10,077	15,528
Brisbane - Sydney	659	2,181	2,931	1,950	5,902	11,604
Brisbane - Melbourne	337	843	1,002	539	1,122	1,394
Adelaide - Melbourne	617	1,356	2,177	1,577	5,069	7,178
Perth - Melbourne	71	67	105	75	92	105
Perth - Sydney	70	119	37	75	125	51
Adelaide - Sydney	425	652	874	691	1,452	2,284
Perth - Brisbane	23	44	115	29	72	115
Adelaide - Brisbane	149	230	208	225	362	402
Perth - Adelaide	149	207	165	150	424	416

Source: ABS road freight movements surveys

A.2.2 East-West

The analysis of the east-west corridor relies entirely on road count data, weighbridge data, and the ABS road surveys. We do not apply our macro model to estimate road freight on this corridor, as road freight makes up only a relatively small proportion of total freight on these routes. So, even though the whole route may be governed by macro forces, drivers of road freight are likely to be governed by timing and reliability concerns and other micro forces.

Fronthaul

For the east-west corridor we have truck count data for west bound traffic from Eucla on the WA-SA border provided by ARTC. These are available from May 1990 until March 2020.[101] ARTC has also provided weight data for a five-year interval from 1996 until 2001. This weight data has low variability

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[101] The Western Australian government stopped providing this data at this time due to covid.

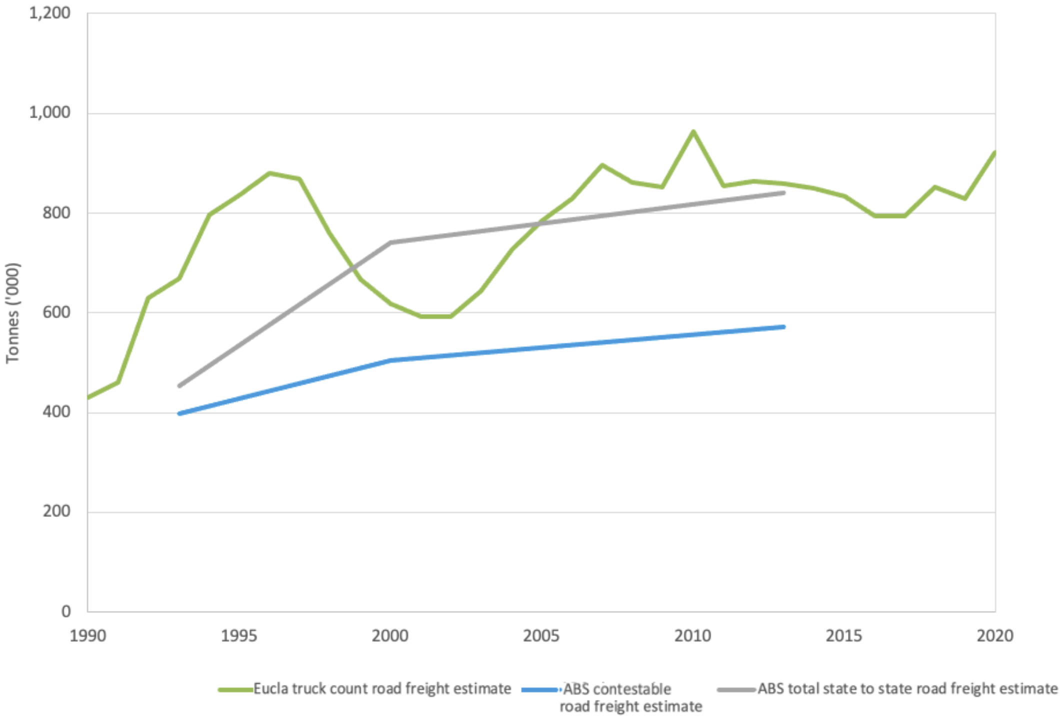
and does not indicate any significant time trend. We use the average weight over this period to estimate the weight for years where weight data is not available.

From March 2020 onwards, Eucla truck count data has been supplemented with truck count data from Mainroads Western Australia from site number 52123 (location: East of Eucla Telegraph station Rd).[102]

This data then gives us an accurate picture of the total east-west road freight volumes in tonnes. However, it does not tell us the origin of the goods, where in WA the goods are going, and what is being transported. For this we supplement the truck count data with data from the 2014 ABS surveys.

Table A.1 shows the total east to west road freight tonnes for the truck counts at Eucla and the estimates based on the ABS road freight surveys. The ABS total state to state series represents the total estimated volume heading from NSW, VIC, QLD and SA to WA. As can be seen in the figure, this estimate of interstate trade aligns closely with the estimated volumes from the Eucla truck counts. Particularly in 2014, indicating that the ABS survey has done a relatively accurate job of estimating these volumes.

Figure A.1 East-West corridor – Fronthaul road freight volume (tonnes)



Source: Synergies

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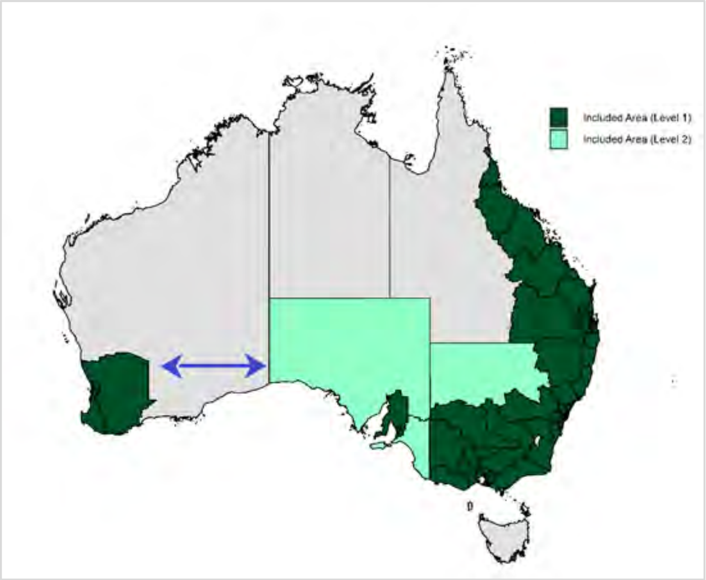
[102] For 2001 counts are provided by vehicle class. For prior years the 2001 vehicle class figures have been used to approximate the breakdown of heavy vehicles into Singles, Road Trains and B-doubles.

The lowest line in Table A.1 represent Synergies estimate of contestable road freight from our key origins, Sydney, Melbourne, Brisbane and Adelaide to Perth. To adjust for the difference between total interstate road freight and contestable road freight, our method is to use 2014 ABS proportions of total interstate trade for each of the four origins to proportion the total freight volume estimates from the Eucla truck counts.[103]

The included level one and the included level two regions are for east-west road freight are shown in Table A.2.

Figure A.2 Map of ABS SA4 Included level 1 and level 2 regions for east-west road freight



Backhaul

Data for the backhaul is more limited, as Eucla truck count data is only for west bound traffic. To account for this we assume the east bound truck counts equal the west bound truck counts, under the assumption that most trucks that travel to Western Australia will make the return journey. This assumption is validated by Mainroads' (site 52123) count data which shows that for 2001 east and west bound truck counts are almost exactly equal.

The bigger data limitation on east bound traffic is the lack of weighbridge data. It is unreasonable to assume that these trucks will be carrying the same load on the backhaul. So, to adjust for this we have used the ABS freight survey to estimate the backhaul volumes. From the ABS the west-east

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[103] This means our proportion estimates for each origin remains static, but creates a consistent estimate of contestable volumes, with changes driven entirely by measure road volumes.

road volume has been approximately 80 percent of East-West. Based on this we have applied the same method as used on the front haul. The proportions from the 2014 ABS road freight survey are used to infer the backhaul weights from the truck count estimates at Eucla. For this reason, our backhaul estimates have a lower degree of certainty than those of the fronthaul.

A.2.3 North ↔ South

For the north/south corridors data is more limited. Long time series of truck count data is unavailable, and weight bridge data is limit. To account for this, estimates of the north/south corridors use a combination of heavy vehicle weights, ABS freight data and a calibrated macroeconomic model.

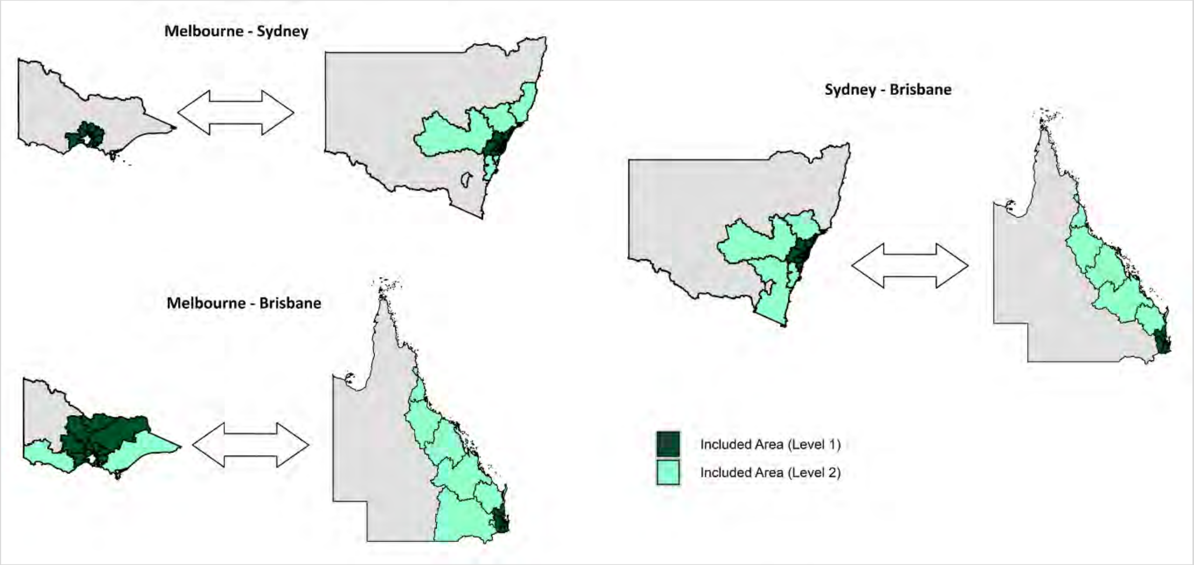
The overall structure of the estimate.

- Calibrate a macro model to bridge the gap between ABS sample years.
- From 2014 we use a weighing of percentage changes in heavy vehicle count along key routes and predicated percentage change based on the macro model to estimate the annual percentage change on each route.

ABS Freight estimates

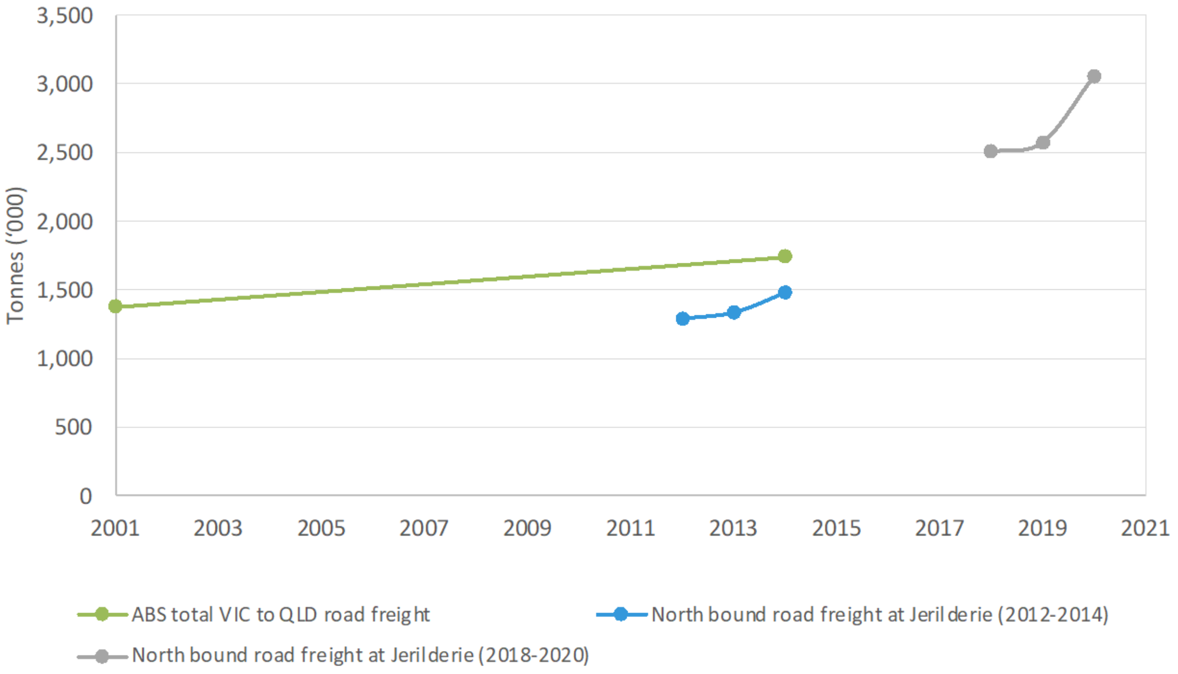
For each of the origin destination pairs we have defined the included level 1 and level 2 regions. These are shown in Figure A.3 .

Figure A.3 Map of ABS SA4 Included level 1 and level 2 regions for north- south corridor



Limited data is available to gauge the accuracy of the ABS road freight estimates on the North-South corridor. However, ARTC has made available road count and weight bridge data that they were provided for the Newell Highway for the period of 2012 to 2013. As the Newell Highway form the main freight route between Melbourne and Brisbane, this provides a good proxy for comparison of the ABS freight data.

Figure A.4 Newell Highway and Melbourne Brisbane



Source: ARTC, ABS, NSW Transport

Figure A.4 shows that ABS estimates of road freight volumes aligns closely with the total volumes of freight passing through Jerilderie.

Macro model

For the north/south corridor a macro model is calibrated using the ABS 2014, 2001, 1994 road freight surveys combined with sea and rail freight tonnages. Using total tonnages for each origin and destination pair, the model is calibrated using the changes from 1994 to 2001, and 2001 and 2014. As explanatory variables are included population, industrial production, GSP per capital and final demand. And the model is calibrated using percentage changes in these variables to predict the percentage changes in total freight movements between the origins and destinations.

Using this calibration, total freight is then projected forward and backwards using each of our three base years. These predictions are then weighted together to produce the overall macroeconomic estimates of total freight movements.[104] Once total freight has been calculated, road freight is then inferred as the residual of total freight, less rail freight and sea freight.

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[104] Weights between the three projections are adjusted over time, with more weight being placed on the projection with the closest based year.

Truck counts

Transport for NSW provides heavy vehicle counts at various location across NSW. The duration of time for which heavy vehicle counts are available depends on the locations. But for most of our key route's data is available from 2014. To estimate road fright from 2014 forward, a weighted average of the percentage change in heavy vehicle counts and the percentage predicted by the macro model are used.

For Sydney ↔ Melbourne, the Hume Highway is used as the key route. Monthly count data is used, and for each date the minimum heavy vehicle count across several key count locations is taken. A weighting of 75 percent truck counts percentage change and 25 percent macro model percentage change is used to estimate road freight on this route.

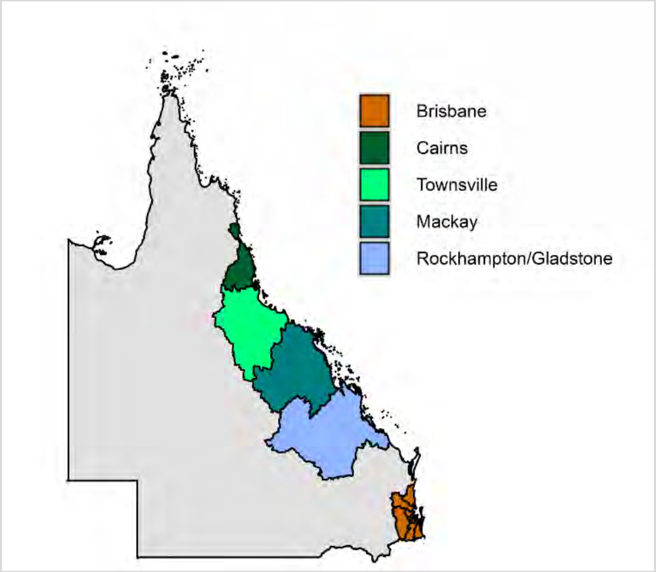
For Melbourne ↔ Brisbane, the Newell Highway is used as the key route. For this route weight bridge data is available for the periods of 2012-2014 and the periods of 2019-2020. This data shows that, although there has only been a small increase in heavy vehicle traffic on this route since 2014, the load weight of trucks has increased over time. Particularly in the North direction. For this reason, truck count changes as been augmented by a linear adjustment to factor in the changes in load weight over time. Again, the percentage change has been taken at the minimum heavy vehicle count along the route, and a weighting of 75 percent truck count change and 25 percent macro model predicted percentage change used to estimate road freight from 2014 onwards.

For Sydney ↔ Brisbane, the New England Highway is used as the key route. Ideally a combination of the Newell Highway and the Pacific Highway would be used, however little count data is available on the Pacific Highway, and what is available is situated close to Newcastle and likely to be heavily affected by local traffic. Given this limitation, for this origin destination pair more weight is placed on the predictions of the macro model. A weighting of 25 percent for road count data and 75 percent on the macro model is used to estimated road freight on this route from 2014 forward.

A.2.4 North Coast Line

For the north coast line the basis of the road freight estimates is the 2014 ABS road freight estimates. In establishing the base 2013-2014 estimates, a relatively small geographic region for Brisbane is used, with no level 2 inclusions. For Cairns, Townsville and Mackay the unique SA4 region for each is used. Rockhampton and Gladstone are both part of the SA 4 region of Fitzroy, so these as grouped as a single O-D.

Figure A.5 Map of ABS SA4 regions for the north coast corridor



As with the north ↔ south corridor, a combination of macroeconomic model estimates, and heavy vehicle counts are used to estimate road freight movements outside of the base year. The same macroeconomic model as used on the north to south corridor is applied to forecast forward and backwards from the 2013-2014 base year. This is supplemented but using heavy vehicle counts, which are available all along the Bruce highway from 2004 to 2020.

The minimum truck count between:

- Cairns and Townsville is used as a proxy for the Brisbane–Cairns;
- Townsville and Mackay is used for Brisbane–Townsville;
- Mackay and Rockhampton is used for Brisbane-Mackay; and
- Gladstone and Brisbane is used for Brisbane-Rockhampton/Gladstone.

With counts only provided at an annual level, it is not possible to differentiate between local, and origin-destination traffic. For this reason, only a weight of 40 percent is applied to truck count data and a weight of 60 percent is applied to the predicted macroeconomic estimates.

B. Heavy vehicle productivity

Heavy vehicle productivity across Australia – has generally improved over time.

The Productivity Commission in its 2020 Inquiry Report into National Transport Regulatory Reform noted that it sees productivity as being the aggregate cost efficiency of all heavy vehicle freight movements. It further noted that vehicle operating costs might be reduced through:

- Larger trucks – allowing larger vehicles on a given road would reduce the number of vehicle movements required;
- Increasing road access – allowing a given truck to travel on a more efficient route would reduce the number of kilometres travelled.[105]

B.1 Larger trucks and increasing road access

Freight vehicles such as B-doubles and road trains account for the majority of the total tonne kilometres of transport in Australia by restricted access vehicles. As such, access decisions for these vehicles have a strong bearing on the overall productivity of the heavy vehicle sector.

The PC's 2020 analysis provides evidence of expanded access across most vehicle types. Key national notices for B-doubles and road trains have been issued in recent years, which have led to some expansions in network access, mainly on local roads, and greater consistency in access conditions across States and Territories.

In the case of New South Wales, collaboration between Transport for New South Wales and the NHVR led to an important segment of the Newell highway — a key link for freight transport between Victoria, Queensland and regional centres in western New South Wales — being gazetted for A-doubles operating at general and concessional mass limits (NSW RMS 2016). After the 2015 national notice, a number of additional routes were added to the road train network, including further segments of the Newell highway (NSW RMS 2019). The final break in the route between Forbes to Parkes has since been upgraded and is now able to support A-Doubles. The figure below shows that road trains have direct pre-approved access to some interstate freight corridors (e.g. east-west), and conditional access along parts of the North South corridors, also as noted, some conditions have been lifted in more recent years.

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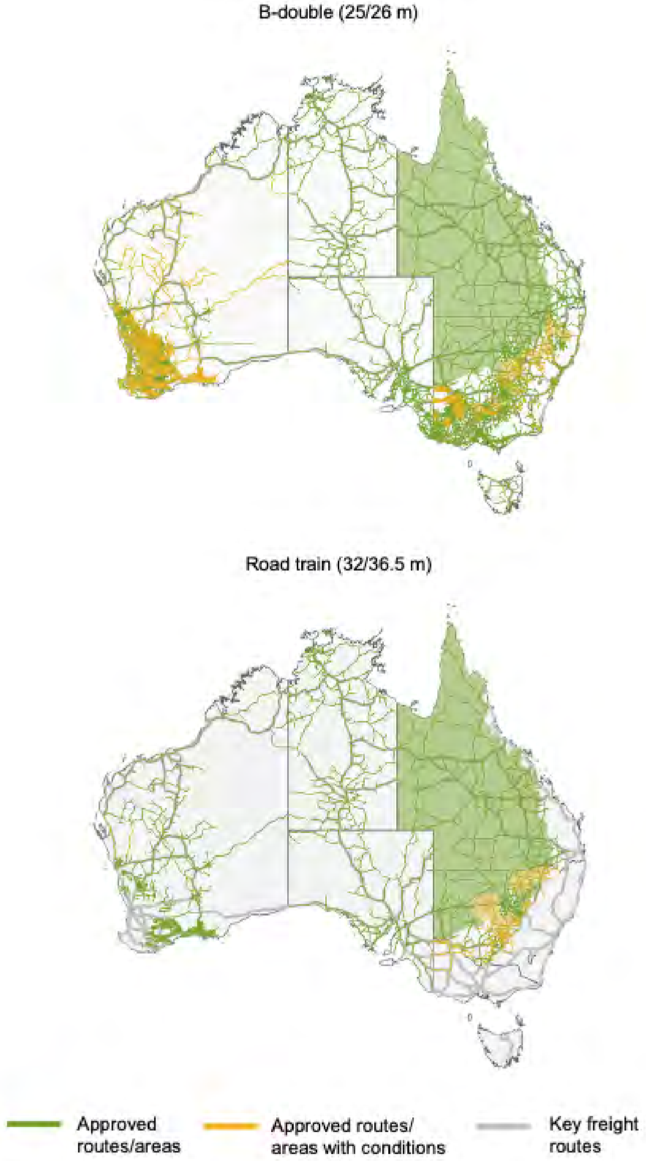
[105] Productivity Commission (2020), Inquiry Report, No. 94, National Transport Regulatory Reform, April 2020.

Figure B.1 B double versus road train access



B-double (25/26 m)

Road train (32/36.5 m)

[a] Access restrictions not shown. Key freight routes include both primary freight routes and secondary cross-border road connections. For updated road access networks, see State and Territory road authority websites.

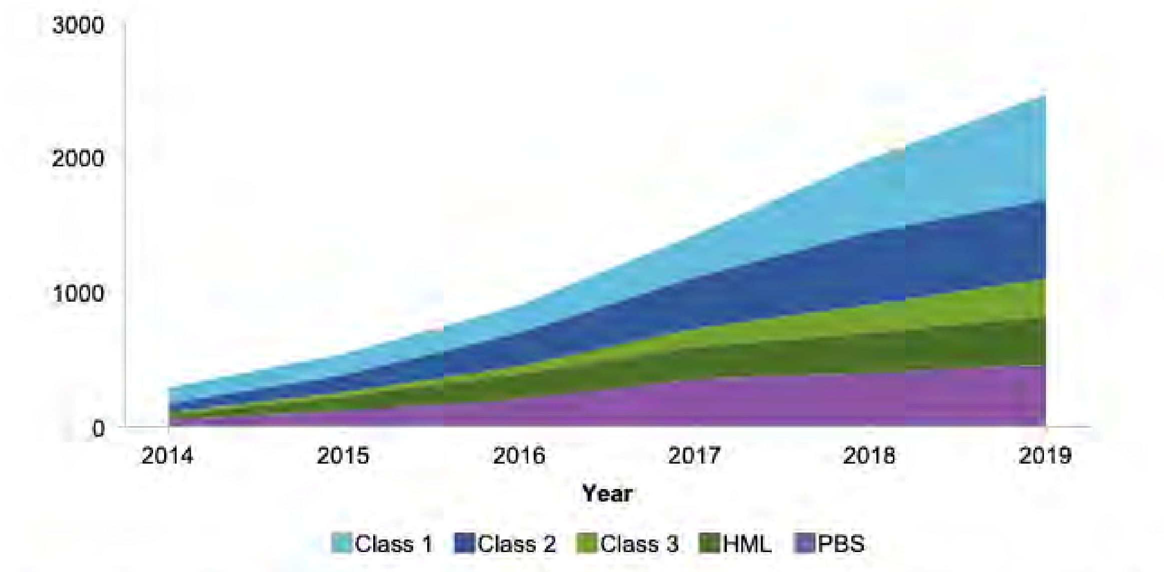
Source: Productivity Commission (2020), Inquiry Report, No. 94, National Transport Regulatory Reform, April 2020, p, 207

B.2 Changes in permit access

Access to roads via permits also appears to be increasing. The introduction of the NHVR Portal in 2016 has helped to streamline the process of applying for permits. The NHVR has also encouraged state and local road managers to voluntarily pre-approve routes, across all vehicle classes. This allows the NHVR to approve access immediately within the limits set by the road manager. In 2019, about

10 per cent of permit decisions were granted via pre-approval, an increase from 8 per cent in 2018 (Commission estimates based on data from NHVR (unpublished)).[106]

Figure B.2 Number of pre-approved routes or areas, by permit class, 2014 to 2019



[a] The number of pre-approved routes or areas in 2019 is at September 2019. [b] Data may include some routes or areas that have since been gazetted.

Source: PC (2020), Inquiry Report, No. 94, National Transport Regulatory Reform, April 2020, p.203
Notes: Class 1 = special purpose heavy vehicles Class 2 = heavy vehicles, including B -doubles, A-doubles AB triples, Class 3 – rigid truck and dog trailer combinations

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[106] Productivity Commission (2020), Inquiry Report, No. 94, National Transport Regulatory Reform, April 2020, p.202

3

Infrastructure and planning

Study into Establishing an Efficient Freight Transport Network

Workstream 2 - Infrastructure and planning requirements

Prepared by Synergies Economic Consulting Pty Ltd

July 2022

Australasian Railway Association

ACRI Australasian Centre for Rail Innovation

Freight on Rail Group

Australian Government
Department of Infrastructure, Transport, Cities and Regional Development
Bureau of Infrastructure, Transport and Regional Economics

Synergies Economic Consulting

Executive Summary

Having regard to the service requirements of various categories of the freight market, together with an assessment of rail's current performance and potential progress towards rail's productivity frontier, following completion of Inland Rail, the components of the studied intermodal freight market which are best suited to transport by rail are:

- Time sensitive and non-time sensitive freight on the following routes:
    - east-west route – Melbourne, Sydney, Brisbane and Adelaide to Perth;
    - north-south route – Melbourne to Brisbane;
    - Queensland north coast line – Brisbane to Townsville, Cairns;
- Non-time sensitive freight on the following routes:
    - North-south – Melbourne to Sydney; Sydney to Brisbane
    - Queensland north coast line – Brisbane to Rockhampton, Mackay.

This confirms rail's structural advantage over road for the transport of non-express[1] intermodal freight over long distances (that is, in excess of ~1,500km) where it is able to operate at or near its productivity frontier. For shorter distances (in excess of ~750km), rail remains well suited to the transport of non-time sensitive freight.

Rail also offers a structural advantage over road for the transport of bulk freight, provided rail is able to operate with contemporary standard rollingstock, and with cycle times that do not incorporate excessive delays (due to either speed restrictions or operational delays).

In order to capitalise on these structural advantages, rail must be able to provide an efficient and productive train operation, targeted towards meeting the customer service requirements that drive mode share.

For the studied intermodal services, the key gaps in rail's current service offering can be summarised as:

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[1] Express freight reflects those goods for which rapid delivery is critical, including pharmaceutical supplies, post and parcel delivery. Non-express freight reflects (a) less time-sensitive where timelines of delivery is still critical to allow goods to consumed frequently (e.g. fast moving consumer goods such as food, grocery products) and (b) non-time sensitive freight which usually has longer delivery times (e.g. beverages, slower moving consumer goods, such as furniture and appliances). See section 2.1 for further discussion.

Table 1 Key service quality gaps - intermodal

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
East-west corridor			
Reliability			
• On-time delivery	High	Moderate	Poor (67% on-time availability)
• Predictable delivery	High	High	Poor (67% on-time availability)
• Certainty of operation	High	Moderate	Moderate (3% services cancelled)
Frequency/Availability	Daily (late pm departure, early am arrival) as required	Multiple services per week as required	Daily (Melbourne, Sydney, Adelaide-Perth) Multiple services per week (Brisbane-Perth) Constraints on increasing service frequency
North-south corridor			
Reliability			
• On-time delivery	High	Moderate	Moderate (85% on-time availability)
• Predictable delivery	High	High	Moderate (85% on-time availability)
Certainty of operation	High	Moderate	Poor (8% services cancelled)
Frequency/Availability	Daily (late pm departure, early am arrival) as required	Multiple services per week as required	Daily (Melbourne-Brisbane) Multiple services per week (short haul services) Constraints on increasing service frequency
Price (door-to-door)	Average 20-40% lower than road	Average 20%-40% lower than road	10-15% lower than road

Source: Synergies

Note: In this report, reliability related to train services which operate. It should be acknowledged this definition may over-estimate reliability where it does not include an allowance for trains which do not run on a corridor due to various reasons, such as network outages, possessions.

In order to identify how the quality of rail infrastructure and planning processes contribute to these service quality gaps, we first assessed the rail infrastructure characteristics that influence the drivers of rail mode share. In making this assessment, we have taken a broad view of rail infrastructure, considering the following aspects:

- Trunk rail network characteristics, including permitted rollingstock configurations; allowable speed; capacity; reliability; resilience; flexibility; and train control and scheduling systems;
- Complementary infrastructure, including the quality of intermodal terminals (location, efficiency of cargo interchange, capacity and accessibility to operators) and the quality of their first/last mile connection to road and rail networks, including port shuttle services;
- Rollingstock, including performance characteristics, reliability and capacity.

We then considered the difference between current rail performance and established best practice (having regard to the best practice currently achieved on Australia's rail networks) and prioritised these gaps having regard to:

- Nature and extent of benefits – in this, we considered the extent to which bridging the gap would address mode share drivers, the likely materiality of the impact and the likely breadth of the impact;
- Extent of constraints – where constraints include complexity (particularly having regard to planning and approval requirements and technological development), strategic alignment amongst the rail industry and with policy makers, and likely project cost.

Based on this analysis, the infrastructure gaps that are considered to be most critical to improving rail's mode share for intermodal freight are summarised as follows:

Table 2 Summary of high priority infrastructure gaps – intermodal

INFRASTRUCTURE	HIGH PRIORITY INFRASTRUCTURE GAPS
Network reliability and resilience	Introduction of network improvements and other asset management strategies, to support improved train service reliability, focusing on improved on-time departure from terminals, improved on-time running and reduced network interruptions together with faster restoration of services following interruptions
Interstate intermodal terminals	New IMT facilities in Melbourne and Brisbane that connect to Inland Rail and are: • Located close to existing or emerging freight centres, incorporating distribution centres, warehouse precincts and manufacturing facilities (including co-location) • Provide for efficient cargo interchange • Provide sufficient capacity to meet long term demand growth • Open access • Efficient first and last mile connections, including rail shuttles to ports Improved IMT facilities will enable reduced time and cost of PUD movements, more efficient loading and unloading of trains, and will contribute to the development of efficient rail based supply chains for major freight customers.
Digital train control system	Introduction of digital train control system, integrated across the intermodal freight network enabling: • More effective use of available network capacity • Improved safety and reliability • Improved transit times • Essential pre-curser to increased train automation
Optimised network planning and scheduling	Introduction of automated train scheduling systems, integrated across the intermodal freight network enabling: • Optimised scheduling of train services from origin to destination (regardless of RIM boundaries) • Optimised real time rescheduling of train services in out of course running in order to reduce excessive delays, including at network boundaries • Real time prediction of train arrival time, both at network boundaries and at ultimate destination • More effective use of available network capacity
Rollingstock fleet capacity	Introduction of additional rollingstock both to enable replacement of near life expired rollingstock as well as to provide for the operation of additional intermodal freight services, where that rollingstock reflects current best practice technology including, where possible, ability to adapt to future technological change.

INFRASTRUCTURE	HIGH PRIORITY INFRASTRUCTURE GAPS
Long term corridor protection and preservation	While network capacity is not a high priority in the immediate term, the very long timeframes associated with the planning and development of new corridors means that there is a high priority associated with the identification, preservation and preliminary planning for freight corridors where long term capacity constraints are anticipated. It is also essential from a planning perspective to ensure that existing capacity for freight services on critical corridors is not eroded by other developments, including urban encroachment and increased utilisation by passenger services.

Source: Synergies

A similar process was also undertaken at a high level for mode contestable bulk freight. The infrastructure gaps for mode contestable bulk freight can have implications not only for the bulk freight services themselves, but where those bulk freight services operate on mainline corridors, to the extent that those infrastructure gaps also constrain the way that the bulk trains operate on the mainline corridors, they can have important implications for other train services also operating on those mainline corridors. Therefore, based on the corridors examined, high priority infrastructure gaps are summarised below.

Table 3 Summary of high priority infrastructure gaps – contestable bulk freight

INFRASTRUCTURE	HIGH PRIORITY INFRASTRUCTURE GAPS
Cycle times	**Murray Basin** • Cycle times for grain services in the Murray Basin are excessive due to a combination of very low allowable train speeds and excessive delays due both to safeworking requirements and crossing dela • The resulting poor rollingstock and crew utilisation provides a strong disincentive for rail operators to invest in rollingstock for these services, or to deploy existing rollingstock in the Murray Basin where there are options for alternate deployment (eg for grain services in NSW) **NSW regional networks** • While not as excessive as the Murray Basin, operators report significant delays due to inability to optimise train paths over multiple networks, inflexibility in crossing locations and operational delays at network boundaries particularly where scheduled path connections are not met. Constraints in traversing Hunter Valley coal network and peak curfews on the Sydney Trains network significantly increase the effective cycle times for bulk freight.
Allowable train configuration	**Murray Basin:** • A number of the Murray Basin routes remain broad gauge, requiring the use of uniquely specified broad gauge rollingstock. The broad gauge rollingstock fleet is nearing end of life. There are significant disincentives for rail operators to invest in new broad gauge freight rollingstock as its unique specification is likely to incur a cost premium, and the limited networks over which it can be used means that there is low flexibility to change rollingstock deployment in response to variability in demand. • This can be addressed by a continuation of the current program of converting grainlines to standard gauge, however this program will be constrained by the high cost of this conversion. **NSW regional networks:** • There are limited parts of the NSW regional network that cannot operate mainline rollingstock under speed or wagon loading restrictions **Queensland regional networks:** • The entirety of the Queensland rail network is narrow gauge, but much of the regional network (including the south west Queensland network servicing bulk coal and grain) operates to highly constrained axle loads of 15.75tal, requiring the use of uniquely specified regional freight rollingstock. A significant portion of the light locomotive fleet is nearing its end of life, and as with the Murray Basin, there are significant disincentives for rail operators to invest in new light locomotives.

INFRASTRUCTURE	HIGH PRIORITY INFRASTRUCTURE GAPS
	• Following completion of Inland Rail, in the absence of upgrade to the Queensland regional network, there will be significant volumes of bulk freight (coal and grain) operating in small lightweight trains over the Queensland portion of the interstate route, and continuing on to the port with capacity implications both for the mainline corridor, and the rail link to the port, particularly following completion of Cross River Rail.

Source: Synergies

A broad range of projects have been identified by various rail participants as potentially beneficial in improving rail mode share as a result of improvements in rail service quality or reductions in rail operating costs. These projects are at varying stages of maturity.

Having regard to the status of these projects recommended actions to address the identified priority infrastructure are as follows.

Table 4 Recommended actions to address high priority infrastructure gaps

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS	RECOMMENDED ACTIONS
Intermodal			
Network reliability and resilience	Introduction of network improvements and other asset management strategies, to support improved train service reliability, focusing on improved on-time departure from terminals, improved on-time running and reduced network interruptions together with faster restoration of services following interruptions	Network reliability and resilience is considered by each RIM as part of their asset management strategies, but there is no specific program or industry consensus on what is required to promote enhanced reliability and resilience.	1. Reliability: – To better understand and monitor the reasons for late running of trains, RIMs and rail operators, in conjunction with BITRE and ACRI, should develop standard reporting metrics. – RIMs to establish regular forums involving operators and other stakeholders to identify, assess and prioritise opportunities to improve reliability and resilience 2. Resilience - ARA/ACRI to liaise with RIM's and rail operators to maintain on an ongoing National Resilience Plan including a prioritised pipeline of minor infrastructure enhancements (beyond standard RIM asset management strategies).
Interstate intermodal terminals	New IMT facilities in Melbourne and Brisbane that are: • Located close to existing and/or emerging distribution centres, warehouse precincts and manufacturing facilities (including co-location) • Provide for efficient cargo interchange • Provide sufficient capacity to meet long term demand growth • Open access • Efficient first and last mile connections, including rail shuttles to ports Improved IMT facilities will enable reduced time and cost of PUD movements, and more efficient loading and unloading of trains.	Melbourne: • Location identified for two new IMTs (Beveridge and Truganina) • Commonwealth funding allocated for Beveridge and planning for Truganina • Port shuttle connections being progressed via Victorian Government as part of the Port Rail Transformation Project at the Port of Melbourne Brisbane • Preferred IMT location not yet confirmed • Preferred route for port shuttle services not yet identified	3. Progress Melbourne IMT development as a priority including: – planning and approvals for Truganina IMT – development of Beveridge IMT 4. Progress Brisbane IMT development as a priority including: – Identification of preferred IMT location, together with planning and approvals – Identification of preferred port shuttle route, together with planning and approvals
Digital train control systems	Introduction of digital train control system across the intermodal freight network enabling: • More effective use of available network capacity • Improved reliability, including due to improved safety • Improved transit times	ARTC: • ATMS currently being rolled out across interstate network, with initial priority on east-west route Sydney Trains:	5. Extension of ATMS to provide seamless operation across other intermodal networks – Priority development of a technical solution for interface between ATMS and ETCS for application on Sydney, Melbourne and Brisbane metropolitan networks – Extension to Arc Network Kalgoorlie-Perth route in line with scheduled ATMS rollout – Ultimately, ATMS (or seamless interface to other digital train control system) should be extended to other intermodal and regional freight routes and for critical port links

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS	RECOMMENDED ACTIONS
		• ETCS currently being rolled out throughout Sydney Trains network	(noting any extension of ATMS to branch lines/country networks may not have ATMS's full functionality given low volumes lines)
Optimised network planning and scheduling	Introduction of automated train scheduling systems across the intermodal freight network enabling: • Automation of train handover at network borders • Optimised and consistent pathing of train services across networks • Optimised real time rescheduling of train services in out of course running • Real time prediction of arrival time • More effective use of available network capacity	ARTC: • Currently investigating the introduction of automated train scheduling system (similar to Hunter Valley ANCO) across full ARTC network	6. RIM commitment to development of integrated automated scheduling system across the entire intermodal network, as full benefits will only be achieved if it operates across the full origin-destination routes – Will require development of technical solution to interface between individual RIM automated scheduling systems – Ultimately regional networks significantly interacting with the interstate network may also be incorporated into the system
Rollingstock fleet capacity	Introduction of additional rollingstock to replace near life expired rollingstock and to provide for the operation of additional intermodal freight services, where that rollingstock reflects current best practice technology including, where possible, ability to adapt to future technological change.	Rail operators are investing in new rollingstock capacity, however there are long lead times on investment and limited local capability to meet demand. Further, it is unclear to what extent this will: • fully address additional demand, having regard to the extent of near life expired rollingstock • incorporate current best practice technology and adaptability to future technological change	7. The market should respond to additional demand with new investment by existing operators and/or new entry. Barriers to entry and investment in new technology are considered in the Safety & Operations workstream.
Long term corridor protection and preservation	Ensure corridors are preserved to address long term network capacity requirements (including freight only corridors in urban areas). Ensure planning for additional passenger services (including long distance passenger services) does not erode capacity and transit times/cycle times for freight services.	Planning and corridor protection is the responsibility of all levels of government. A 2017 Infrastructure Australia Study ('Corridor Protection') identified that a national framework for corridor protection was required to guide coordinated and	8. Consistent with the 2019 National Action Plan, Governments should coordinate assessment of long term network capacity requirements, and the extent to which this may require additional rail corridors (including freight only corridors in urban areas) beyond those for which corridor preservation is complete or underway.

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS	RECOMMENDED ACTIONS
		meaningful action by all levels of government.[2] The 2019 National Action Plan of the National Freight and Supply Chain Strategy committed to identifying and protecting key freight corridors and precincts from encroachment.[3]	
Bulk			
Productivity (incl. cycle times)	For bulk freight networks with excessive delays (eg Murray Basin), to introduce initiatives including track quality, safeworking systems, capacity and scheduling to reduce the occurrence of excessive delays	Varies by regional network	1. Progress planned investment in the Murray Basin rail network program for standardisation and infrastructure quality improvements 2. For other bulk routes with inefficient, uniquely specified rollingstock or excessive cycle times, RIMs, in conjunction with railway operators and Government, should evaluate the economic benefit associated with infrastructure investment to address these issues.
Allowable train configurations	Progressively upgrade regional bulk freight networks (where viable) to allow operation of mainline rollingstock (potentially under speed restriction, provided not excessive in relation to overall cycle time)	Varies by regional network	

Source: Synergies

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[2] Infrastructure Australia (2017), Corridor Protection, Planning and investing for the long term, July 2017, p.32. In the report, Infrastructure Australia recommended action to secure seven corridors for projects including the Outer Sydney Orbital, Outer Melbourne Ring, Western Sydney Airport Rail Line, Western Sydney Freight Line, Hunter Valley Freight Line, and the Port of Brisbane Freight Line. The highest priority identified by Infrastructure Australia at the time was preservation of the corridor for the proposed High Speed Rail line between Brisbane and Melbourne via Sydney and Canberra.

[3] Transport and Infrastructure Council (2019), National Action Plan, National Freight and Supply Chain Strategy, August 2019, p.17

Contents

1 Introduction

1.1 Infrastructure & Planning Workstream

The Infrastructure & Planning workstream is designed to identify the infrastructure characteristics required for successful rail performance, the critical infrastructure gaps (following completion of Inland Rail), the constraints to addressing these gaps, their impact and prioritisation framework. Other factors impacting rail's mode share performance, including operational constraints and policy settings, will be considered in other workstreams.

This report is designed to identify, at a high level, the infrastructure characteristics required for successful rail performance, taking the following approach:

- identifying requirements for successful rail performance (by route);
- identifying trunk infrastructure characteristics (by route);
- identifying complementary infrastructure characteristics (by route);
- identifying remaining gaps following completion of Inland Rail and current status of investment problems to address gaps;
- identifying current constraints to address gaps; and
- assessing likely impact of gaps and consider prioritisation framework.

The assessment focusses on the studied rail corridors, including:

- detailed consideration of the east-west and north-south interstate corridors (and a high level consideration of the Queensland north coast line) for intermodal freight;
- high level consideration of mode contestable bulk corridors based on findings from the Mount Isa corridor, the Murray Basin and the Eyre Peninsula rail networks.

1.2 Report structure

This report is set out as follows:

- Section 2 establishes the service requirements for successful rail performance for both intermodal freight and mode contestable bulk freight;
- Section 3 identifies the priority infrastructure gaps that contribute to lower rail mode share for intermodal freight;

- Section 4 identifies the priority infrastructure gaps that contribute to lower rail mode share for bulk freight;
- Section 5 provides an overview of projects that may contribute to addressing priority infrastructure gaps; and
- Section 6 presents conclusions and recommendations.

2 Service requirements for successful rail performance – intermodal freight

As established in the modal share workstream, different freight markets have different service requirements, and this translates to different rail service characteristics being required for successful performance on different routes. The characteristics required for rail to successfully compete against other modes will reflect the key drivers of mode share, being transit time, reliability, frequency/availability and price.

2.1 Freight market service requirements

For the purpose of assessing what is required for successful freight performance, we have divided the freight market into three broad categories, with general service requirements summarised below:

Table 5 Service requirements for freight categories

	EXPRESS FREIGHT	TIME-SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT
Type of freight			
Type of freight	Goods for which rapid delivery is critical, including pharmaceutical supplies, post and parcel delivery.	Fast moving consumer goods, including products that are highly in-demand, affordable, consumed quickly and purchased frequently, such as food, toiletries, stationery, over-the-counter medicines, cleaning and laundry products, plastic goods, personal care products, but excluding beverages. Stock is replenished on a regular (daily) basis, with timeliness of delivery critical.	Includes: • Beverages • Slow moving consumer goods, being consumer goods which have a longer shelf life and are purchased over time, including items like furniture and appliances; • Industrial and construction products, which are required for business, rather than consumer, input. Usually has longer delivery timeframes.
Proportion of market	Estimated up to 10% of long distance inter-city freight market	Estimated around 50% of long distance inter-city freight market	Estimated around 40% of long distance inter-city freight market
Service requirements			
Transit time requirement	Overnight or as quickly as practicable	Door to door transit time needs to be competitive with standard road	Door to door transit time can moderately to significantly exceed standard road, depending on extent to which price reduction exceeds

	EXPRESS FREIGHT	TIME-SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT
			additional warehousing and inventory cost.
Reliability requirement	Very high (eg 98%)	High requirement to meet delivery timeframes and to manage local logistics arrangements	Medium to low requirement to meet delivery timeframes, but requires reliability to manage local logistics arrangements
Frequency/ availability	Daily or on demand	Daily, with preference for late evening departures and early morning arrivals	Multiple services per week
Price sensitivity	Not price sensitive	Price sensitive, provided that delivery timeframes can be met	Price sensitive, provided that price reduction exceeds additional warehousing and inventory cost, can be very price sensitive for products transported in large volumes
Transport mode			
Opportunity for rail	Usually transported by road or air, due to critical time sensitivity	Can be transported by road or rail, provided rail is able to achieve delivery timeframes	Can be transported by road, rail or shipping

Source: Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; February 2022, p.86, 109.

For the purpose of this study, we have focussed on infrastructure requirements for time sensitive and non-time sensitive freight only, as these constitute the vast majority of the long distance inter-city freight market (greater than 90%) and rail is less likely to be suitable for express freight movements.

2.2 Rail's productivity frontier

The characteristics of intermodal trains currently operating on Australia's key intermodal routes for non-time sensitive freight are summarised below:

Table 6 Train characteristics by route

	MELBOURNE-PERTH	SYDNEY-PERTH	MELBOURNE-SYDNEY	SYDNEY-BRISBANE	MELBOURNE-BRISBANE	TARCOOLA-DARWIN	QUEENSLAND NCL
Train length	1,800m	1,800m	1,800m	1,500m	1,500m	1,800m	650m
Axle load	25tal	25tal	25tal	25tal	25tal	25tal	20tal
Double stacking	Yes (west of Adelaide)	Yes (west of Parkes)	No	No	No	Yes	No
Maximum speed	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	110km/hr (21tal) 80km/hr (25tal)	100km/hr
Average speed	71km/hr	68km/hr	61km/hr	52km/hr	55km/hr	71km/hr	50km/hr

Source: Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; February 2022, p.83.

From this, the currently most productive train types can be seen on the Melbourne/Sydney-Perth and Tarcoola-Darwin corridors, where trains can operate at 1,800m with double stacking, and with an average speed of 70km/hr. The Inland Rail project is intended to permit these same characteristics to be achieved between Melbourne and Brisbane (with future proofing for 30tal). These characteristics have been driven by the objective of spreading the fixed cost of train operations over a larger cargo volume and represent the current 'productivity frontier' for intermodal trains, which has remained substantially unchanged for the last 25 years.

However, rail's future productivity frontier will be influenced by technological trends and the ability and incentives of supply chain participants to incorporate such changes into freight operations and supply chain management. Advances in technology will have wide-ranging and unknown impacts. But we can reasonably expect some major advances in how railways operate, in terms of: potential driverless trains, real-time monitoring, improved optimisation of scheduling, predictive maintenance planning and seamless journeys integrating with other networks and other modes of transport. To move forward with innovation, flexibility in investment planning will be critical to ensure decisions are made, not solely based on past and current experience, but also on future possibilities and preferred outcomes.

The pace of technological change in transport makes it difficult to forecast the future with accuracy, however, trends point to intelligent, more integrated systems for moving freight.

The rail sector in Australia is starting to see the introduction of digital train control systems, which replace traditional trackside signalling with 'in cab' train control technology. Digital train control systems are being introduced and these systems are expected to significantly upgrade the capabilities of the rail industry and improve:

- Rail network capacity, by enabling trains to operate closer together;
- Operational flexibility;
- Train service availability;
- Transit times; and
- Rail safety and system reliability.

Also being introduced into Australian rail networks is automated train scheduling solutions (such as ARTC's ANCO project in the Hunter Valley coal network or Aurizon Network's Advanced Planning and Scheduling project in central Queensland), which enable real time traffic planning and optimisation to enable trains to move more efficiently, enabling reduced dwell times in train schedules, as well as improved on-time performance and management of out-of-course running.

A further major advancement in rail technology is autonomous mobility, which allows for trains to operate driverless and make autonomous decisions while travelling. Computer technology can keep track of speed limits, other trains on the tracks, and obstructions ahead to ensure the safety of the driverless vehicle. Without drivers, the trains can minimise stops for shift changes and travel more efficiently. Demonstrating the opportunities associated with automation, Rio Tinto's AutoHaul is the world's first fully autonomous, long distance, heavy-haul rail network. It travels 280 kilometres and can complete 1 million kilometres of autonomous travel every eight weeks by minimising stopping time.[4] AutoHaul is resulting in improved transit times due to more consistent train speeds and elimination of the need for crew changes, as well as reduced labour and fuel operating costs.

Autonomous mobility is also being engineered by US start-up Parallel.[5] Their autonomous battery-electric rail vehicles can hold single or double stacked loads and can self-assemble and detach on route. Flexibility in the size of cargo and vehicles is unseen in the traditional freight rail space and substitutes the appeal of trucking in a more cost-effective and environmentally conscious way. The implementation of this technology could result in a shift in rail configuration from long trains and heavy cargo loads to smaller vehicles with flexibility in size and destination.

On top of the issue of train configuration, global initiatives are targeting the inefficiencies within the trains themselves. European rail companies have been using smart devices over a wireless network to communicate geolocation, arrival notifications, transport conditions, loading and unloading assistance, and maintenance in their trial of the Digital Freight Train.[6] In the US, the RailEdge Movement Planner gathers information on train schedules, traffic control systems, and the movement of trains to optimise travel plans for the train.[7]

Innovation in fuel technologies is also being developed. Numerous rail companies are investigating the option of hydrogen powered trains, which produce electric power for traction. In addition to providing zero emissions at the point of use, hydrogen technology is fuel efficient offering longer range operation prior to refuelling, which can reduce train dwells for refuelling. Fortescue Metals is in the process of developing its proposed Infinity Train, intended to be the world's first battery-electric rail system, utilising the energy generated on downhill tracks to recharge its battery. The train will not need to stop for charging or refuelling and would no longer rely on diesel to run, lowering both the travel time and carbon emissions.[8]

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[4] Global Railway Review, Rail Freight Innovation in Australia. A copy of the article is available at https://www.globalrailwayreview.com/article/82947/freight-innovation-in-australia/. See also https://www.riotinto.com/en/news/stories/how-did-worlds-biggest-robot [accessed 12 April 2022]

[5] See https://moveparallel.com/product/

[6] Railway Technology (2019), Changing Tracks: the freight rail wagons of the future, 9 July, 2019. A copy of the article is available at https://www.railway-technology.com/analysis/freight-innovations/ [accessed 12 April 2022]

[7] The Wall Street Journal, Railroad Technologies. A copy of the article is available at https://www.wsj.com/ad/article/sustainability-innovation [accessed 12 April 2022]

[8] Australian Mining (2022), Fortescue battery-electric train next stop: Infinity and beyond, 2 March 2022. A copy of the article is available at https://www.australianmining.com.au/news/fortescue-battery-electric-train-next-stop-infinity-and-beyond/ [accessed 12 April 2022]

Reflecting these trends, we consider that while the most productive existing train types highlighted in Table 6 constitute ‘current best practice’, but that rail’s ‘productivity frontier’ will increasingly reflect the introduction of technological change in rail operations, rather than investment in the physical rail infrastructure to enable increases in train cargo carrying capacity and maximum train speeds beyond this current performance. This will, however, be dependent upon the infrastructure being able to support the full realisation of these technological benefits.

2.3 Target service requirement - east-west corridor

2.3.1 Rail opportunity by freight category

Rail is currently able to offer a comparable transit time as standard road from Melbourne, Sydney and Adelaide to Perth, and is currently able to meet the delivery time requirement for both time sensitive and non-time sensitive freight. From Brisbane to Perth, rail is currently significantly slower than standard road (98 hours compared to 82 hours), which may not be acceptable for some time-sensitive freight. However, upon completion of Inland Rail, services from Brisbane will be able to operate directly to Parkes at an average speed of around 70km/hr, using 1,800m double stacked trains, consistent with performance standard west of Parkes. We estimate that this will enable operators to generate up to 10 hours in time savings (compared to routing via Sydney) as well as significant operational efficiencies. This is likely to be sufficient to allow rail to meet the delivery time requirement for most time sensitive freight from Brisbane to Perth.

2.3.2 Target service requirement

Based on the service requirements by freight category, together with the assessed opportunity for rail to effectively compete in each freight category, an indicative target service requirement can be summarised as follows:

Table 7 Indicative target service requirement on east-west corridor

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Transit time (door-to-door)			
• Melbourne – Perth	~63 hours	~84 hours + PUD	63 hours (61 hours + PUD)
• Sydney – Perth	~80 hours	~97 hours + PUD	80 hours (78 hours + PUD)
• Brisbane – Perth[a]	~88 hours	~104 hours + PUD	98 hours (96 hours + PUD) [~88 hours with Inland Rail]
• Adelaide – Perth	~52 hours	~74 hours + PUD	50 hours (48 hours + PUD)
Reliability			
• On-time delivery	High	Moderate	Poor (67% on-time availability)
• Predictable delivery	High	High	Poor (67% on-time availability)
• Certainty of operation	High	Moderate	Moderate (3% services cancelled)

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Frequency/Availability	Daily (late pm departure, early am arrival) as required	Multiple services per week as required	Daily (Melbourne, Sydney, Adelaide-Perth) Multiple services per week (Brisbane-Perth) Constraints on increasing service frequency
Price (door-to-door)	Average 20%-40% lower than road	Average 20%-40% lower than road	30-40% lower than road

a: there are no direct Brisbane-Perth services, rather the freight needs to change service in either Sydney or Melbourne, Following completion of Inland Rail, freight will have an opportunity to change service at rail terminals at Parkes.

Source: Synergies

Explanation of the rationale behind these indicative target service requirements is set out below.

Transit time (door-to-door)

For time sensitive freight, the door to door transit time achievable on rail needs to be comparable to standard road. While current door-to-door transit times from Sydney to Perth are around 7% longer than road, the success of rail in attracting time sensitive freight on this route demonstrates that this margin above standard road transit times is acceptable, and the same margin has been applied to assess the target transit time for time sensitive freight from Brisbane-Perth.

For non-time sensitive freight, transit times can be moderately to significantly extended beyond that required for time sensitive freight. The indicative target transit times shown are around 24 hours longer than those currently achieved by standard road, and are within the times currently achieved by rail. Some non-time sensitive freight will be willing to accept transit times longer than this indicative target.

Reliability

In order to allow a richer consideration of reliability, the reliability service requirement has been broken into three components – reliability of on-time delivery and certainty of service operation (important in and of themselves for time sensitive freight), and predictability of freight arrival (important for all freight categories in order to facilitate efficient local pickup and delivery arrangements).

Current rail performance is judged based off the highest performing corridor examined (Queensland north coast line) which achieved 3 year average freight availability reliability of >95%.

Price (door-to-door)

The target price discount to road has been judged based on the Queensland north coast line, where rail competes successfully against road (with mode share of more than 50%) and the average door-to-door cost of rail freight is estimated to be 20-30% less than road. A greater price discount compared to road, is likely to allow rail to be more successful in attracting freight from road (with the exception of the express freight category). However, once the price discount is sufficient that the vast majority of time sensitive freight is carried by rail, as is the case from Sydney/Melbourne to Perth, further price reductions are likely to have a limited effect in attracting additional freight from road. Therefore, we have taken the view that a price discount to road in excess of 40% will not attract materially greater volumes of freight from road.

2.4 Target service requirement – north-south corridor

2.4.1 Rail opportunity by freight category

Transit times for rail freight on the north-south corridor are significantly longer than for road freight. For Melbourne-Brisbane, rail does not currently provide an early morning 2nd day arrival, as preferred by time-sensitive freight, although this will be able to be achieved upon completion of Inland Rail, at which time trains on the Melbourne-Brisbane corridor are planned to operate at rail's productivity frontier.

For Sydney-Brisbane and Melbourne-Sydney, rail does not provide the overnight delivery required for time-sensitive freight. These routes currently operate below rail's current maximum performance in terms of allowable average speed, and also operate with longer freight cut-off and availability allowances than the Melbourne-Brisbane route (which has one of the tightest allowances of any of the origin-destination routes examined).

There is potential time savings on these routes by:

- operating at the current rail productivity frontier (in terms of maximum average speed), reducing rail linehaul transit times;
- operating at the terminal productivity frontier (in terms of shortest terminal allowances) and with high reliability, enabling reduced freight cut-off and freight availability allowances;
- IMT location close to manufacturing and distribution centres, or co-location, enabling reduced PUD times.

The potential time saving associated with operating at the current productivity frontier (in terms of maximum average speed) is shown below:

Table 8 Potential for transit time savings on north-south corridor (hours)

	MELBOURNE – SYDNEY			SYDNEY – BRISBANE		
	Road	Rail (current)	Rail (potential)	Road	Rail (current)	Rail (potential)
Linehaul	12	14	12.5[a]	14	18	13.5[a]
Freight cut-off and availability allowance		8[b]	5[c]		6[b]	5[c]
PUD allowance		2	0-2		2	0-2
	12	24	17.5-19.5	14	26	18.5-20.5

a: calculated assuming average speed of 70km/hr
b: to note that this includes a buffer to allow for poor reliability
c: assumes equivalent time as Melbourne-Brisbane.
Source: Synergies analysis

If rail services on these corridors were operating at the current productivity frontier (in terms of maximum average speed shortest freight cut-off and availability allowances and minimal PUD allowance due to co-location of warehousing and IMTs), this would allow a faster transit time, however, this still remains substantially longer than road and is unlikely to be sufficient to allow for rail to compete strongly for time sensitive freight. There is potential for future technological developments to permit improved scheduling and operation of train services that may enable more significant reductions in transit time. However, until such options emerge, rail's opportunity on the shorter haul services is effectively limited to the non-time sensitive component of the freight market.

2.4.2 Target service requirement

Based on the service requirements by freight category, together with the assessed opportunity of rail to effectively compete by freight category, an indicative target service requirement can be summarised as follows:

Table 9 Indicative target service requirement on north-south corridor

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Transit time (door-to-door)			
• Melbourne-Brisbane	~32 hours	~40 hours + PUD	38 hours (36 hours + PUD) [~31 hours with Inland Rail]
• Melbourne-Sydney	n/a	~24 hours + PUD	24 hours (22 hours + PUD)
• Sydney-Brisbane	n/a	~24 hours + PUD	26 hours (24 hours + PUD)
Reliability			
• On-time delivery	High	Moderate	Moderate (85% on-time availability)
• Predictable delivery	High	High	Moderate (85% on-time availability)
• Certainty of operation	High	Moderate	Poor (8% services cancelled)

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Frequency/Availability	Daily (late pm departure, early am arrival) as required	Multiple services per week as required	Daily (Melbourne-Brisbane) Multiple services per week (short haul services) Constraints on increasing service frequency
Price (door-to-door)	Average 20-40% lower than road	Average 20%-40% lower than road	10-15% lower than road

Source: Synergies

Explanation of the rationale behind these indicative target service requirements is set out below.

Transit time (door-to-door)

For time sensitive freight (applicable to Melbourne-Brisbane only), the door to door transit time achievable on rail needs to be comparable to standard road (which currently achieves transit times of around 32 hours). Inland Rail is designed to achieve rail linehaul transit times of 24 hours (equivalent to express road transit times). When this is combined with current freight cut-off and availability allowance and PUD times, this will provide an estimated door-to-door freight transit time of 31 hours.

For non-time sensitive freight, transit times can be moderately to significantly extended beyond that required for time sensitive freight. The indicative target transit times shown are 24 hours + PUD (or otherwise around 12 hours longer than the those currently achieved by standard road), and are consistent with the times currently achieved by rail. Some non-time sensitive freight will be willing to accept transit times longer than this indicative target.

2.5 Target service requirement – Queensland north coast line

2.5.1 Rail opportunity by freight category

Transit times for rail freight on the Queensland north coast line are significantly longer than for road freight. For Brisbane to Townsville and Cairns, rail is able to provide an early morning 2nd day freight arrival, as required by much of the time-sensitive freight, (although slower, multi-stop services are also provided).

For the shorter haul services from Brisbane to Rockhampton, rail does not provide the overnight delivery required for time-sensitive freight. This route currently operates below rail's productivity frontier in terms of allowable average speed, although the freight cut-off and availability allowances are amongst the tightest of any of the origin-destination routes examined. IMT location close to, or co-located with, warehousing and distribution centres in Brisbane could also provide for savings in PUD times. The potential time saving associated with operating at the current productivity frontier (in terms of maximum average speed) is shown below:

Table 10 Potential for transit time savings on Queensland north coast line (hours)

	BRISBANE-ROCKHAMPTON			BRISBANE-MACKAY		
	Road	Rail (current)	Rail (potential)	Road	Rail (current)	Rail (potential)
Linehaul	8	18	9a	13	21	13.5a
Freight cut-off and availability allowance		5	5		4	4
PUD allowance		2	1-2		2	1-2
	8	25	15-16	13	27	18.5-19.5

a: calculated assuming average speed of 70km/hr
Source: Synergies analysis

If rail services on these corridors were operating at the current productivity frontier (in terms of maximum average speed), this would allow a faster transit time, however, this still remains substantially longer than road and is unlikely to be sufficient to allow for rail to strongly compete for time sensitive freight. There is potential for future technological developments to permit improved scheduling and operation of train services, that may enable more significant reductions in transit time. However, until such options emerge, rail's opportunity on these shorter haul services is effectively limited to the non-time sensitive component of the freight market.

2.6 Target service requirement

Based on the service requirements by freight category, together with the assessed opportunity of rail to effectively compete by freight category, an indicative target service requirement can be summarised as follows:

Table 11 Indicative target service requirement on Queensland north coast line

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Transit time (door-to-door)			
• Brisbane – Rockhampton	n/a	~24 hours + PUD	25 hours (23 hours + PUD)
• Brisbane – Mackay	n/a	~24 hours + PUD	27 hours (25 hours + PUD)
• Brisbane – Townsville	~34 hours	~40 hours + PUD	39 hours (37 hours + PUD)
• Brisbane – Cairns	~40 hours	~44 hours + PUD	41 hours (39 hours +PUD)
Reliability			
• On-time delivery	High	Moderate	High (>95% on-time availability)
• Predictable delivery	High	High	High (>95% on-time availability)
• Certainty of operation	High	Moderate	n/a
Frequency/Availability	Daily (late pm departure, early am arrival) as required	Multiple services per week as required	Daily

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Price (door-to-door)	Average 20-40% lower than road	Average 20-40% lower than road	20-30% lower than road

Source: Synergies

Explanation of the rationale behind these indicative target service requirements is set out below.

2.6.1 Transit time (door-to-door)

For time sensitive freight (applicable to Brisbane to Townsville and Cairns only), the door to door transit time achievable on rail needs to deliver an overnight plus one day delivery, with an evening departure and early morning arrival. The target transit timeframes, while 20-25% higher than road, achieve this outcome.

The current average performance of rail services to Townsville exceeds the target for time sensitive freight, however it is noted that where services operate non-stop to Townsville (and then onwards to Cairns), they are able to meet the target transit time for time-sensitive freight, with non-time sensitive freight able to be transported on multi-stop services.

For non-time sensitive freight, transit times can be moderately to significantly extended beyond that required for time sensitive freight. The indicative target transit times shown are a minimum of 24 hours + PUD or otherwise around 12 hours longer than the those currently achieved by standard road, and are generally consistent with the times currently achieved by rail. Some non-time sensitive freight will be willing to accept transit times longer than this indicative target.

3 Identifying infrastructure gaps – intermodal freight

3.1 Rail infrastructure characteristics influencing mode share

The rail infrastructure characteristics that have potential to significantly influence mode share are summarised below:

Table 12 Infrastructure groupings

INFRASTRUCTURE CATEGORY	INFRASTRUCTURE CHARACTERISTICS	INFLUENCE ON TARGET SERVICE REQUIREMENT
Trunk rail network (intermodal and bulk services)	• Maximum permitted rollingstock configuration (axle load, train length, double stacking capability, trailing load/loco)	• Influences rail service operating efficiency, contributes to average rail freight **price**
	• Maximum and average train speed (for maximum train configuration)	• Influences rail service transit time, contributing to rail's door-to-door **transit time** • Influences rail service transit time, rollingstock cycle time and capital efficiency, contributes to average rail freight **price**
	• Network capacity	• Influences whether rail services can run at times to meet demand, contributing to **frequency/availability** and **reliability**
	• Network resilience - average infrastructure related train service delays	• Influences rail service reliability, contributing to rail's freight availability **reliability (on-time and predictable arrival)** and, over time, door-to-door **transit time**
	• Network resilience - average infrastructure related train service cancellations	• Influences rail service reliability, contributing to rail's freight availability **reliability (certainty of operation)**
	• Train control system	• Influences the ability to maximise the use of available rail capacity • Influences rail service safety and reliability, contributing to rail's freight availability **reliability (on-time and predictable arrival)** and, over time, door-to-door **transit time** • Influences ability of rail services to operate at maximum allowable speeds, contributing to door-to-door transit time • Influences the ability of rail operators to introduce automated train technologies over time, which will contribute to average rail freight **price** as well as rail's freight availability **reliability (on-time and predictable arrival)** and door-to-door **transit time**
	• Network planning and scheduling	• Influences the ability to maximise the use of available rail capacity, contributing to **frequency/availability** and **reliability**

INFRASTRUCTURE CATEGORY	INFRASTRUCTURE CHARACTERISTICS	INFLUENCE ON TARGET SERVICE REQUIREMENT
		Provides ability to predict arrival times, influences rail service reliability, contributing to rail's freight availability **reliability (on-time and predictable arrival)** and, over time, door-to-door **transit time**
	Information systems' capability of tracking train location, and predicting arrival time (for network changeover points and IMT arrival)	Influences rail service reliability, contributing to rail's freight availability reliability **(on-time and predictable arrival)** and, over time, door-to-door **transit time**
	Network flexibility (train crossings)	Influences **transit time** by reducing crossing delays Influences rail service reliability by allowing services to optimally recover from 'out of course running', contributing to rail's freight availability **reliability (predictable arrival)** and, over time, to door-to-door **transit time**
Complementary infrastructure (intermodal)	Proximity of IMTs to distribution centres, warehouse precincts and manufacturing facilities (including co-location)	Influences the time and cost associated with the PUD movement at either end of journey, contributing to rail freight's door-to-door **price** and **transit time**
	Efficient cargo interchange at IMT eg sufficient number and length of loading/unloading tracks, proximity to mainline, high capacity loading/unloading equipment, empty container storage, freight management system to optimise loading/unloading	Influences the time and cost associated with the loading and unloading of trains, contributing to rail freight's door-to-door **price** and **transit time** and **reliability (on time and predictable arrival)**
	IMT capacity	Influences whether rail services can run at times to meet demand, contributing to **frequency/availability**
	IMT open access	Influences whether rail services can run at times to meet demand, including the ability for those services to be provided by new entrants to the market (noting that securing access to efficient terminal capacity is a barrier to new entry), contributing to **frequency/availability** and by reducing barriers to entry can contribute to increased incentives for reduced rail freight **price** and/or enhanced service levels
	Efficient first/last mile freight connections (eg road links to highway networks, road links to key distribution locations, rail port shuttle services)	Influences the time and cost associated with the PUD movement at either end of journey, contributing to rail freight's door-to-door **price** and **transit time**
Rollingstock	Locomotive performance characteristics and technology	Influences rail service operating efficiency, contributes to average rail freight **price**
	Locomotive reliability	Influences rail service reliability, contributing to rail's freight availability **reliability (on-time and predictable arrival, certainty of operation)** and, over time, door-to-door **transit time**
	Wagon characteristics, including capacity to maximise loading capability of train and compatibility with efficient loading and unloading practices	Influences rail service operating efficiency, contributes to average rail freight **price** Subject to IMT capability, influences loading and unloading time and variability, contributing to rail freight's door-to-door **transit time** and **reliability (on time and predictable arrival)**
	Rollingstock fleet capacity	Influences whether rail services can run at times to meet demand, contributing to **frequency/availability**

3.2 Prioritisation framework

A conceptual prioritisation framework has been developed to analyse identified infrastructure gaps. The factors that we consider to be relevant considerations are set out below. They can be grouped into factors that are considered to be 'benefiting factors' (upside factors) and those that act as 'limiting factors' on addressing the constraint (downside factors).

Table 13 Factors to consider in a prioritisation framework

FACTOR	EXPLANATION
Benefiting factors	
1. Mode share driver impact	1. How many mode share drivers does the constraint affect? 2. Does the constraint affect the high impact mode share drivers of price and reliability?
2. Materiality of impact	3. Does the constraint have a direct, regular impact on train operating costs? 4. Does the constraint affect the availability and utilisation of rollingstock? 5. Does the constraint have a material impact on business management/overhead costs?
3. Breadth of impact	6. How many intermodal train services does the constraint affect? 7. Does the constraint have a broad impact on rail services (beyond intermodal)? 8. Does the constraint have any spill-over effects to other parts of the freight task?
Limiting factors	
4. Complexity/time horizon	9. Are there significant issues with urban encroachment and planning that need to be addressed? 10. Are there significant environmental planning and approval issues that need to be addressed? 11. Are there significant technological issues that need to be resolved? 12. Is the constraint an 'easy fix' or does it require a long term commitment over a sustained period of time?
5. Strategic alignment	13. Is there alignment between rail businesses on the strategic rationale for the project? 14. Are there public statements by government acknowledging this problem and that action must be taken? 15. Are there any existing policies that are targeted at this constraint? 16. Is the constraint the subject of deep research already and is well known?
6. Financing	17. Will the constraint require significant funding to address (either by government or by private parties or both)? 18. Is the project likely to be commercially viable? 19. Is the project likely to be economically viable?

Source: Synergies

Where we identify gaps between current infrastructure capability and best practice capability, we have ranked the benefits and constraints as high, medium or low, having regard to these issues.

3.3 Infrastructure gaps – east-west corridor

3.3.1 Key service quality gaps

Based on the target service requirements established above, the key service quality gaps (post completion of Inland Rail) for the east-west corridor are in the area of reliability (and, in particular, on-time and predictable delivery) and capacity to increase service levels, as summarised in the table below.

Table 14 Key service quality gaps on east-west corridor

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Reliability			
• On-time delivery	High	Moderate	Poor (67% on-time availability)
• Predictable delivery	High	High	Poor (67% on-time availability)
• Certainty of operation	High	Moderate	Moderate (3% services cancelled)
Frequency/Availability	Daily (late pm departure, early am arrival) as required	Multiple services per week as required	Daily (Melbourne, Sydney, Adelaide-Perth) Multiple services per week (Brisbane-Perth) Constraints on increasing service frequency

Source: Synergies

Reliability

From the assessment of reliability data on the east-west corridor,[9] it can be seen that:

- a large proportion of train delays occur prior to trains leaving the originating IMT, with only 50% of services departing the IMT on schedule in 2020-21 (57% over the three year average);
- train on-time performance deteriorates through the journey, with a further 15% suffering further delays such that they arrive late at their destination. The factors contributing to these delays are unclear, noting that the % of services exiting the ARTC network on time slightly exceeds the % of services entering the ARTC network on time. This indicates that there may be additional delays being incurred on connecting networks (such as Arc Infrastructure's network from Kalgoorlie to Perth or the Sydney Trains network for those trains that are routed through Lithgow);
- while ARTC infrastructure issues do contribute to on-time outcomes, they represent a relatively small share of total train delays;

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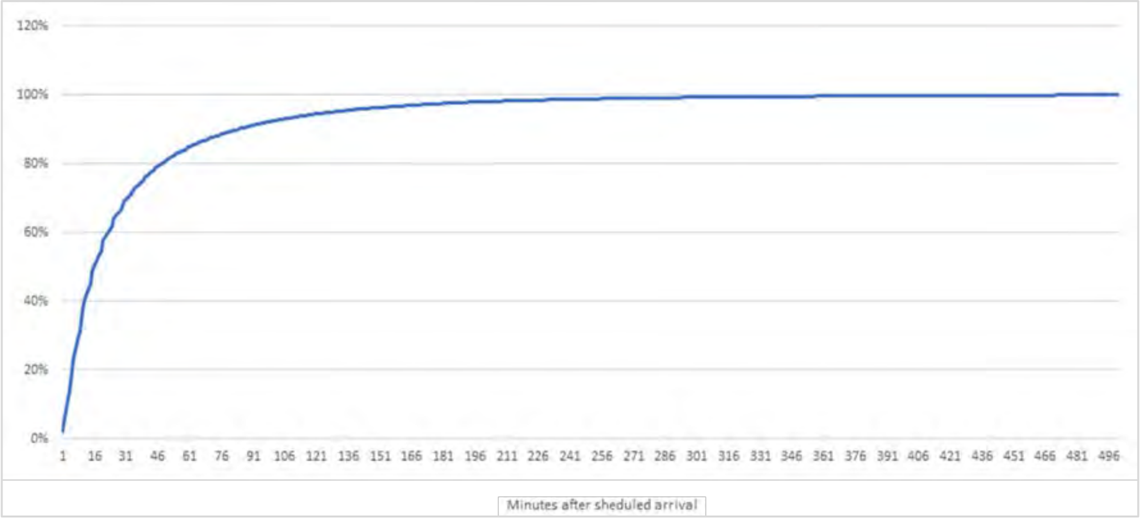
[9] Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; February 2022, p.72

- however, there is no data reported on the causes of train cancellations, and there is potential for infrastructure issues to be a material contributor to train cancellations, where the rail network is unavailable due to infrastructure outages or track possessions.

The published data presents information on the proportion of services that do not reach their destination on time, but does not show the extent of these delays. ARTC has undertaken analysis of the distribution of delays on the east-west corridor, as shown below. These charts show the typical extent of delays by plotting the percentage of train services that have arrived in Perth against the delay time (expressed in minutes after scheduled arrival).

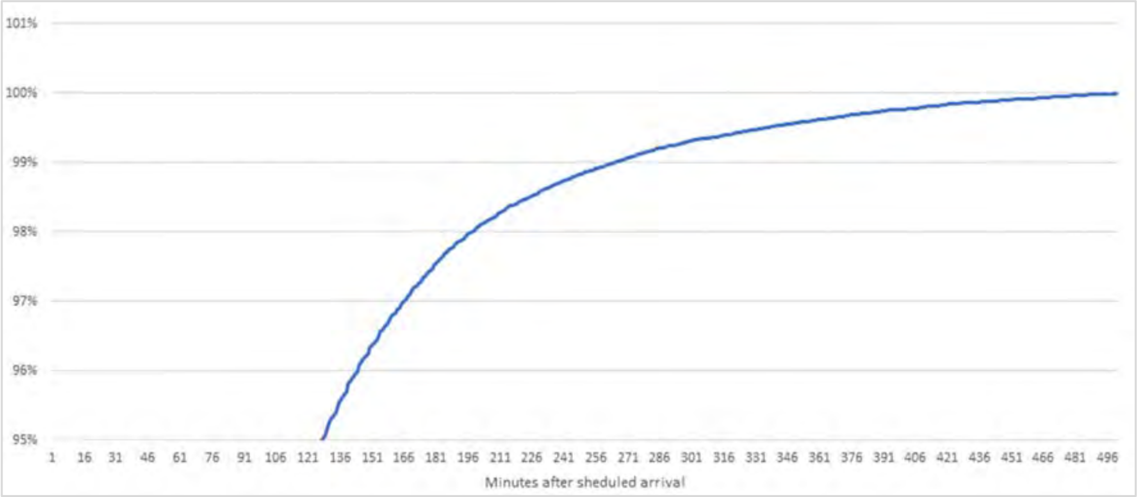
Figure 1 Cumulative percentage of arrivals into Perth after scheduled arrival



Source: ARTC

In order to provide better granularity of results, the following graph focuses on the 95-100% arrival window:

Figure 2 Cumulative percentage of arrivals into Perth after scheduled arrival (95-100% window)



Source: ARTC

This data shows that there is a long 'tail' on the distribution of delays. In order to achieve 98% reliability on the east-west corridor, it would be necessary to provide a buffer of around three hours between the scheduled arrival time and assumed train placement into the terminal. However, the data also shows that there are a small number of train services with delays significantly longer than three hours. Further, this data does not include service cancellations, including due to unrecoverable delays.

In order to better understand service reliability and the impact of extended delays on freight customers and supply chains, ARTC has been recording incidents leading to a track outage of greater than 24 hours since January 2020. ARTC has adopted the >24 hour threshold, as it considers that this represents a tipping point in the impact of a disruption event, where it is no longer a recoverable delay for freight customers, but a loss of a full cycle of paths / deliveries with rollingstock then out of sync with the train plan, causing further delays during post event recovery.

Rail services can be subject to highly extended delays. While these delays are usually infrequent, the length of delay can cause major disruption not only to rail operators, but to end customers and their supply chains. The major source of these extended delays is flooding, which has had a major impact on the east-west corridor over the 2022 summer period. However, the extent of time taken to recover from derailments is also a substantial contributor to extended delays.

Post Inland Rail (which will extend rail's ability to effectively compete with road for time-sensitive freight to include Brisbane to Perth), the greatest opportunity to promote increases in rail mode share will be delivered by strategies that:

- improve the on-time performance of freight (both rail service and freight availability). Based on the reliability performance for the east-west corridor, on-time performance will most effectively be promoted by:

  - improving on time departure from terminals;
  - promoting network resilience in order to reduce the extent and/or impact of extended delays that occur as a result of weather events and derailments (and hence reducing both the distribution of delays and the likelihood of service cancellation); and
- improve the predictability of performance (both rail service and freight availability) including through the provision of real time information on train location (and the ability to track freight location) and up to date predictions of freight arrival times.

Capacity

Rail operators advise that there are persistent rail freight capacity constraints on the east-west corridor. In the short term, these constraints primarily relate to the availability of additional rollingstock and trained crews to allow the operation of additional services.[10] In this regard, Pacific National and SCT are both investing in additional rollingstock fleet, with a significant increase in service numbers likely to occur over the next 2-3 years.

Noting that train service numbers on the east-west corridor have declined from around 25 trains per week in 2017 to approximately 20 trains per week following Aurizon's exit from the intermodal market[11], there is capacity for service numbers to increase to previous levels while maintaining broadly suitable departure and arrival times. However, beyond this, rail infrastructure constraints may emerge in some locations at peak operating times.

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[10] Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; February 2022, p.75

[11] Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; February 2022, p.75

3.3.2 Priority infrastructure gaps

In order to address the key service quality gaps, and having regard to the rail infrastructure characteristics influencing mode share, the priority infrastructure gaps are summarised in the following table.

Table 15 Target infrastructure capability – east-west corridor

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
Trunk rail network							
Maximum permitted rollingstock configuration	21TAL/110km, 25TAL/80km (with future proofing to 30TAL), 1,800m trains with double stacking capability	No double stacking capability east of Adelaide/Parkes, affecting Melbourne-Perth and Sydney-Perth services respectively Services from Brisbane-Perth require connecting service Brisbane-Sydney or Brisbane-Melbourne using north-south route (which has greater train configuration constraints). However, these will be addressed by Inland Rail project.	Low	Primarily influences rail service operating efficiency and, hence average price. Average price not identified as a key service quality gap.	Medium	Requires terminal facilities in Melbourne with double stacking capability Project costs likely to be significant The line between Adelaide and Melbourne also needs double clearances (not just the terminal)	Low
Maximum and average train speed	110km/h max, 70km/hr average	Nil	N/A		N/A		N/A
Network capacity	Sufficient network capacity to meet current demand plus allowance for growth over next 10-15 years (given likely time required for network expansions)	Rail infrastructure constraints may emerge over time in some locations at peak times. Peak hour constraints apply on Sydney Trains Sydney-Lithgow section but can be avoided if using ARTC route.	Medium	Addressing emerging capacity constraints will be necessary in order to enable rail to capitalise on opportunities for freight growth.	Low-high	The nature of the constraints will depend on the specific capacity constraint, and proposals to address. Constraints around additional passing loops likely to be low. Constraints around dedicated freight corridors north or west of Sydney will be high.	Medium
	Corridor identification and preservation and project	No obvious gaps identified					

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
	planning for longer term emerging demand						
Network resilience – delays and cancellations	Low network related delays and cancellations (including due to climate/weather issues) to contribute to 98% on-time performance	Around 95% of healthy services exit ARTC network on time, however additional delays and cancellations due to operator and force majeure events, which can apply for extended periods.	High	Reliability is the primary non-price driver of mode choice, and given rail's large mode share, there is significant risk resulting from extended outages.	Low-medium	Lack of alignment on what actions are required to improve network resilience. Likely to involve a significant number of relatively low cost actions.	High
Train control system	Digital train control system, able to optimise network capacity and support enhanced train operations technology, operates seamlessly across network boundaries.	Not available • Reflects planned capability with ATMS being rolled out over ARTC east-west corridor, however interfaces with other networks (metropolitan networks in Sydney, Melbourne, Brisbane; Arc Infrastructure) not yet resolved	High	Influences mode choice drivers in multiple ways, including reliability, transit time and improved use of existing capacity Is an essential pre-curser to the longer term introduction of train automation technologies	Low-medium	High alignment within industry re need for ATMS, and ARTC project is fully funded, however required to apply across full route to achieve full benefits. Speed of rollout constrained by rollingstock fitout. Technical interface with ETCS in metropolitan networks (Sydney, Melbourne, Brisbane) not yet resolved Application of ATMS to Arc Network to align with rollout is supported (but not yet committed).	High
Network planning and scheduling	Automated train scheduling system, able to transparently optimise train schedules including revisions in the event of delay, operates seamlessly across network boundaries	No automated train scheduling systems • ARTC is investigating introduction of automated train scheduling across ARTC interstate network, however, this would not cover full interstate service journey from origin to destination.	High	Influences mode choice drivers in multiple ways, including reliability, transit time and improved use of existing capacity	Medium	Greatest benefits will be achieved if applied across networks for full O-D movements, but will require increased stakeholder alignment. Technical complexity to apply across networks.	High
Information systems	Ability to track train location, and provide real time predictions of arrival time for network changeover points and IMT arrival	Tracking of train location available by individual operators, real time predictions of arrival time not available given lack of automated/optimised systems train scheduling systems (including for out-of-course running)	High	Ability to provide real time information on train location and predicted arrival time influences rail service reliability, contributing to rail's freight availability reliability (on-time and predictable	Low-medium	Will be enabled as a result of introduction of digital train control system (with GPS tracking of train movements) and automated train scheduling systems (which enable up to date arrival time predictions	High

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
				arrival) and, over time, door-to-door transit time			
Network flexibility	Train crossing flexibility to avoid extended scheduled crossing delays and allow optimal recovery from out of course running	Around 90% of unhealthy trains do not deteriorate further. Transit times competitive with road, but crossing constraints may emerge as train volumes increase.	Medium	Primarily influences transit time, which has not been identified as a key service quality gap, and reliability, which is a high priority service quality gap.	Low-medium	The nature of the constraints will depend on the specific capacity constraint, and proposals to address. Constraints around additional passing loops likely to be low.	Medium
Complementary infrastructure							
Proximity of IMTs to key freight warehousing, distribution and manufacturing locations	IMTs located in close proximity to established and/or emerging zones containing distribution centres, warehouse precincts and manufacturing facilities, and with capability for co-location of warehousing/ distribution facilities	IMTs not necessarily well located in relation to established freight zones. Dynon terminal in Melbourne planned to be phased out over next decade. • New terminal developments by National Intermodal have been announced for Melbourne (Beveridge and Truganina) • New terminal development by National Intermodal being investigated for Brisbane but preferred location has not been finalised Terminal facilities in Perth and Adelaide well located, and Sydney (Moorebank) currently under development.	Medium	New IMT location near key freight locations will enable a lower average PUD time and cost, however transit time and price are not key service quality gaps on east-west corridor. Better located IMTs could assist cargo aggregation and improve reliability of terminal departure.	High	High costs and complexity associated with developing rail connectivity at long term preferred Melbourne IMT location in Truganina. Initial terminal location at Beveridge less proximate to key freight locations. Preferred terminal location in Brisbane not yet confirmed.	Medium
IMT cargo interchange capability	Infrastructure capability for efficient cargo interchange at IMT eg sufficient number and length of loading/unloading tracks, proximity to mainline, high capacity loading/unloading equipment, empty container storage	Many of the older terminals have infrastructure constraints requiring additional time and complexity in loading/unloading.	Medium	New IMT facilities with capability for efficient cargo interchange will enable a lower operating cost and, hence, average price. Improved IMT capability could assist reliability of terminal departure.	High	See above	Medium

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
IMT capacity	Sufficient IMT capacity to meet current demand plus allowance for growth over 15-20 years (given extended time required for new IMT planning and development)	There is sufficient terminal capacity for current freight demand, however capacity constraints will emerge over the planning horizon.	Medium	New IMT facilities will provide sufficient capacity for expected demand growth	High	See above	Medium
IMT open access	One open access IMT in each capital city	While some existing terminals are open access, open access terminals do not exist in all capital cities.	High	Gaining access to a network of efficient IMTs is a barrier to entry to new rail operators and reducing barriers to entry can contribute to increased incentives for reduced rail freight price and/or enhanced service levels	Low	New terminals being (or to be) developed at Government supported intermodal freight precincts in Sydney, Melbourne and Brisbane will be open access There is available terminal facility at Perth (Forrestfield) that could potentially be used by a new entrant	High
First/last mile freight connections	Efficient road links to highway networks Efficient road links to key distribution locations		Medium	Efficient linkages to highway networks and key distribution locations will enable a lower average PUD time and cost, however transit time and price are not key service quality gaps on east-west corridor	High	See above	Medium
	Links to rail port shuttle services	Links to port shuttle services are currently established for IMTs in Sydney, Melbourne and Perth, however, usage is well below targets in Sydney and Melbourne, with enhancements to these links underway in Sydney and Melbourne. The port rail link in Brisbane uses shared track with metro services, and there are no port shuttle services currently operating.	Medium	Efficient linkages between warehousing/distribution, IMEX port shuttle services and interstate intermodal services will increase the efficiency of rail based supply chains for major customers, and will promote the use of rail on connecting long and short distance routes.	High	In Melbourne, IMT development (including at preferred long term terminal location at Truganina) will require major investment in connecting rail capacity including links to Port of Melbourne. In Brisbane, capacity constraints, including following the completion of cross river rail, will require the development of a dedicated freight connection. Preferred route has not been finalised.	Medium

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
Rollingstock							
Locomotive performance characteristics	Locomotive design reflects current best practice technology and, where possible, ability to adapt to further innovation.	A substantial portion of the rollingstock fleet has been operating for over 25 years and is nearing end of life. New locomotives largely reflect design characteristics from mid 2000s. Failure to use new loco technology is a significant industry risk given these are 30+ year assets.	Medium	Given the long lifespan of rollingstock, a lag in the takeup of new technologies will provide a long term disadvantage for rail.	Medium	Constraints on rollingstock approvals for some RIMs inhibit incentive to invest in new technology across broader networks	Medium
Locomotive reliability	Low rate of locomotive failures	Nil	n/a		n/a		
Wagon characteristics	Wagon design reflects current best practice technology	A substantial portion of the rollingstock fleet has been operating for over 25 years and is nearing end of life. New wagons largely reflect design characteristics from mid 2000s	Medium	Given the long lifespan of rollingstock, a lag in the takeup of new technologies will provide a long term disadvantage for rail	Medium	Constraints on rollingstock approvals for some RIMs inhibit incentive to invest in new technology across broader networks	Medium
	Compatibility with efficient loading and unloading practices	No evidence to suggest that there are significant efficiency constraints for mainline wagons					
Rollingstock fleet capacity	Sufficient rollingstock fleet capacity to meet current demand plus allowance for growth over next 5 years	A substantial portion of the rollingstock fleet has been operating for over 25 years and is nearing end of life. Operators also report that the rollingstock fleet is currently capacity constrained and the limited local manufacturing capability does not have the capacity to scale up production to meet demand.	High	New locomotives will provide operating cost savings in terms of fuel utilisation and locomotive maintenance. Additional rollingstock fleet capacity will be critical in order to enable rail to capitalise on opportunities for freight growth, thus enhancing mode share	Low-medium	Both PN and SCT are currently increasing rollingstock fleet capacity. However beyond this, incentives to invest in rollingstock capacity and new market entry will be influenced by operator's confidence in sufficiency of demand.	High

3.4 Infrastructure gaps - north-south corridor

3.4.1 Key service quality gaps

Based on the target service requirements established above the key service quality gaps (post completion of Inland Rail) for the north-south corridor are in the area of reliability (including all three aspects of on-time delivery, predictable delivery and certainty of operation), price and capacity to operate increased service levels.

Table 16 Service quality gaps on north-south corridor

	TIME SENSITIVE FREIGHT	NON-TIME SENSITIVE FREIGHT	CURRENT RAIL PERFORMANCE
Reliability			
• On-time delivery	High	Moderate	Moderate (85% on-time availability)
• Predictable delivery	High	High	Moderate (85% on-time availability)
• Certainty of operation	High	Moderate	Poor (8% services cancelled)
Frequency/Availability	Daily (late pm departure, early am arrival) as required	Multiple services per week as required	Daily (Melbourne-Brisbane) Multiple services per week (short haul services) Constraints on increasing service frequency
Price (door-to-door)	Average 20-40% lower than road	Average 20%-40% lower than road	10-15% lower than road

Note: In this report, reliability relates to train services which operate. It should be acknowledged this definition may over-estimate reliability where it does not include an allowance for trains which do not run on a corridor due to various reasons, such as network outages, possessions.

Source: Synergies

Reliability

Analysis of reliability data on the north-south corridor shows that reliability performance varies significantly by origin-destination route:[12]

- the longer haul Melbourne-Brisbane route has poorer reliability of on-time departure than the shorter haul routes, although still higher than the east-west services (with 60% of Melbourne-Brisbane trains entering the ARTC network on time, compared to around 80-90% for the shorter haul services). The poorer on-time departures for the longer haul

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[12] Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; February 2022, p.100

services may be due to these services competing for time-sensitive freight – with greater risk of delays to freight being received at the terminal resulting in delays to the loading and departure of trains. The shorter haul services, which are not able to meet the required delivery times for time-sensitive freight, appear less likely to be subject to delays in loading and departure;

- there appears to be a greater propensity for delays en-route for north-south services than for east-west services, where around 30% more trains are late on arrival than were late on departure. Unlike the east-west route, a substantial proportion of these delays occur while on the ARTC network, with the proportion of services exiting the ARTC network on time being up to 20% less than the proportion of services entering the ARTC network on time;
- whereas 95% of healthy east-west services exit the ARTC network on time, on the north-south corridor, this declines to 90% for the short haul services, and 81% for the long haul Melbourne-Brisbane services. While this is influenced by factors other than infrastructure performance (eg delays due to third parties, or weather impacts), it indicates that infrastructure performance on the north-south corridor may be poorer than on the east-west corridor.
  - Issues about reliability on the north-south corridor are often related to the running of trains through the Sydney Trains network, due to the impact of passenger services on the NSW Southern Highlands and delays to outer services from running through Sydney (which then has a flow on impact).
- The density of traffic on the Sydney to Melbourne route (as well as the long single line from Maitland to Brisbane) impacts on network reliability, making it more susceptible to consequential delays. Trains that are late can then being delayed in forming the next service, where there is insufficient available terminal time to recover the delay and allow the next service to depart on time.
- Again, there is no data reported on the causes of train cancellations, and there is potential for infrastructure issues to be a material contributor to train cancellations, where the rail network is unavailable due to infrastructure outages or track possessions. Possessions have the potential to be a significant contributor to cancellations on this corridor, where possessions through the metropolitan areas are designed to minimise impacts on passenger services, but can have a material effect on freight services.

As is the case with other corridors, rail is more likely to be affected by major route outages caused by extreme weather events and derailments, with rail services typically taking longer to restore than road.

Post Inland Rail (which will extend rail's ability to effectively compete with road for time-sensitive freight to include Melbourne to Brisbane), the greatest opportunity to promote increase in rail mode share will be delivered by strategies that:

- improve the on-time performance of freight (both rail service and freight availability), including:
  - improving on-time departure from terminals (particularly on the Melbourne-Brisbane route);
  - promoting network reliability to reduce network related delays en-route; and
  - promoting network resilience to reduce the extent of extended delays (and hence reducing both the distribution of delays and the likelihood of service cancellation); and
- improve the predictability of performance (both rail service and freight availability) including through the provision of real time information on train location, and the ability to track freight location.

While Inland Rail will make a difference for Melbourne to Brisbane traffic, Sydney will remain a key destination given its population.

Price

Increasing the effective discount that door-to-door provides compared to road has been identified as critical to improving rail's mode share on the north-south corridor. In order to better understand the opportunities to reduce cost (and hence to ultimately reduce average price), the following chart identifies an average cost buildup for a typical door-to-door rail journey for each of the key routes on the north-south corridor. [13]

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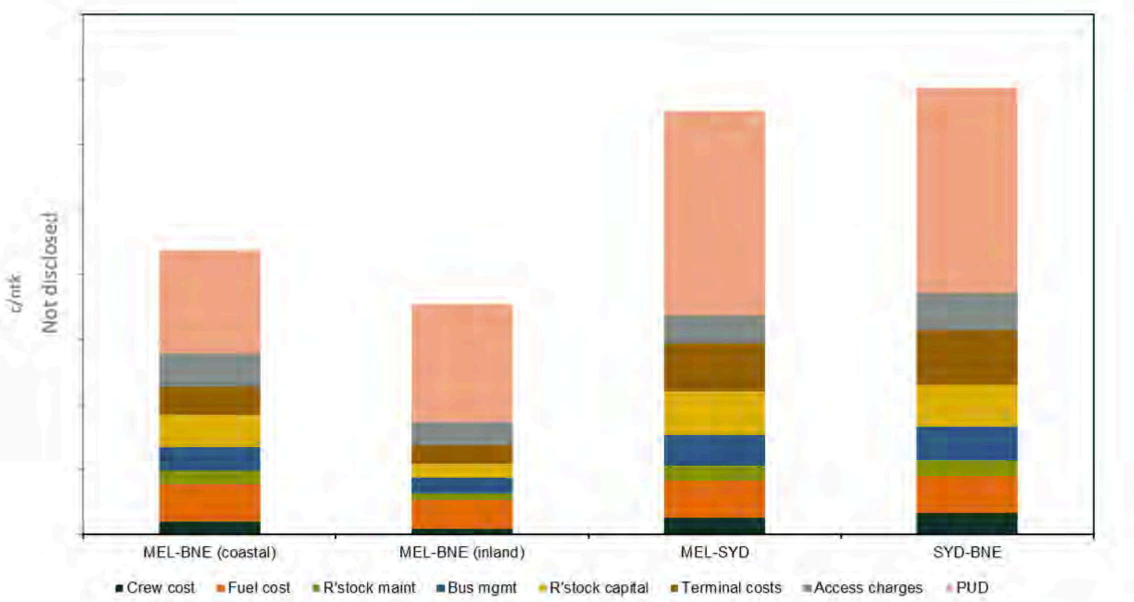
[13] Note, the average cost buildup reflects a full usage based allocation of costs for a return service with assumed loading in the headhaul and backhaul directions, and will not align with prices charged, which differ for headhaul and backhaul services, and which vary according to weight per TEU.

Figure 3 Rail service cost components – north-south



Note: for the inland rail route, inland rail access charges and terminal charges for planned new IMTs have not yet been determined. For the purpose of assessing the indicative cost structure for this route, we have assumed a continuation of the current average $/km access charge for Melbourne-Brisbane and we have assumed a continuation of the same terminal cost/TEU. Differences on a c/ntk basis are the result of assumed differences in train loading.

Source: Synergies

The chart shows that rail service direct operating costs (including crew, fuel and maintenance costs) are a relatively modest portion of the total cost of rail freight, with fuel the most significant of these direct operating cost categories. Fuel costs have increased significantly in the current environment, with Government decision to temporarily halve the fuel excise not moderating the increase in fuel costs for rail freight (as fuel excise does not apply for rail usage) in the same way that it has for road freight.

The chart also demonstrates the very high significance of the average PUD cost to the total door-to-door rail cost, particularly for the shorter haul services, as these costs are largely unrelated to haul distance. The greatest opportunity to reduce the total cost of rail freight lies with the location of planned new terminals close to the established freight markets and, where possible, co-located with major freight users, or in areas where there is a natural future logistics hub. Reducing (or potentially in the case of co-location, eliminating) PUD costs will be the most important factor in allowing rail to offer a significantly increased discount to road on door-to-door freight costs.

Terminal costs also form a large component of the total door-to-door rail cost, particularly for the short haul services, as these costs are again fixed regardless of haul distance.

Capacity

Rail operators advise that there are persistent rail freight capacity constraints on the north-south corridor. In the short term, these constraints primarily relate to the availability of additional rollingstock and trained crews to allow the operation of additional services.[14] All rollingstock fleets are currently fully deployed and current lead times for new locomotives and wagons is generally over 12 months. There is limited capability within the local market to meet increased demand for locomotives and wagons. This problem is exacerbated further during large harvests when there is increased demand for trains and also when there are periods of increased container movements at the export port.

Pacific National and SCT are both investing in additional rollingstock fleet, with a significant increase in service numbers likely to occur over the next 2-3 years.

There are constraints in infrastructure capacity at peak times, substantially relating to the need to operate over Sydney Trains metropolitan network between Strathfield and Newcastle, where peak period curfews apply. Following completion of inland rail, infrastructure capacity constraints may ease (as Melbourne-Brisbane trains are diverted away from Sydney). While peak period curfews will continue to operate from Strathfield to Newcastle, potentially limiting the ability of freight trains to operate at times necessary to satisfy customer demand, this is likely to be less critical to the non-time sensitive freight that is most likely to be carried between Sydney and Brisbane (noting rail will remain unable to provide the overnight delivery times required to compete strongly for time sensitive freight).

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[14] Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; February 2022, p.75

3.4.2 Priority infrastructure gaps

In order to address the key service quality gaps, and having regard to the rail infrastructure characteristics influencing mode share, the priority infrastructure gaps are summarised in the following table.

Table 17 Target infrastructure capability – north south corridor

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP	BENEFITS	CONSTRAINTS	PRIORITY
Trunk rail network					
Maximum permitted rollingstock configuration	21TAL/110km, 25TAL/80km (with future proofing to 30TAL, 1,800m trains with double stacking capability	High Melbourne-Sydney has no double stacking capability. Sydney-Brisbane has train length limit of 1,500m and no double stacking capability, limiting train lengths for both Sydney-Brisbane and Melbourne-Brisbane. These constraints will be addressed for Melbourne-Brisbane by Inland Rail project. However the current performance gap will persist for the shorter haul Melbourne-Sydney and Sydney-Brisbane routes.	High Excluding the costs of the required infrastructure enhancements, increased maximum permitted rollingstock configurations would enable high reductions of approximately 20% in door to door rail freight costs.	The cost of the required infrastructure enhancements is high, and unlikely to be justified by the operating cost savings, particularly given lower train numbers following completion of Inland Rail	Low
Maximum and average train speed	110km/h max, 70km/hr average	Low Melbourne-Sydney: 110km/hr max, 60km/hr avg Sydney-Brisbane: 110km/hr max, 50km/hr avg These constraints will be addressed for Melbourne-Brisbane by Inland Rail project. However the current performance gap will persist for the shorter haul Melbourne-Sydney and Sydney-Brisbane routes.	High Improved transit times and reliability can reduce the need for train crew depots and overtime payments for crews. Enhanced speeds unlikely to be sufficient to allow rail to compete for additional time sensitive freight, but excluding the costs of the required infrastructure enhancements would enable low reductions of approximately 5% in door to door rail freight costs.	The cost of the required infrastructure enhancements is high, and unlikely to be justified by the operating cost savings, particularly given lower train numbers following completion of Inland Rail	Low

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
Network capacity	Sufficient network capacity to meet current demand plus allowance for growth over next 10-15 years (given time required for network expansion)	Rail infrastructure constraints may emerge over time in some locations at peak times. • There are, for example, performance gaps due to train densities on the Sydney to Melbourne corridor, especially with grain traffic and the Southern Highlands commuter services. NSW north coast is 800km of single line so bottlenecks can emerge. • ARTC currently installing passing locations using bi-directional signalling to address Southern Highlands capacity constraints during morning peak • Additional constraints may emerge between Melbourne-Cootamundra following completion of Inland Rail as traffic volumes increase Peak hour constraints apply on Sydney Trains Strathfield-Newcastle however interstate train volumes on this section will decline following completion of Inland Rail. Current delays on the north-south corridor are also affected by the number of passing loops on the north coast which can impose additional transit time to a journey. Additional trains being added to the network could contribute to congestion, in the absence of better pathing and scheduling systems.	Medium	Addressing emerging capacity constraints will be necessary in order to enable rail to capitalise on opportunities for freight growth	Low-high	The nature of the constraints will depend on the specific capacity constraint, and proposals to address. Constraints around additional passing loops likely to be low. Constraints around dedicated freight corridors north or west of Sydney will be high.	Medium

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
	Corridor identification and preservation and project planning for longer term emerging demand	A dedicated freight corridor linking to Port of Brisbane should be progressed. No other gaps have been identified.					
Network resilience – delays and cancellations	Requires a whole-of-network (not just ARTC) perspective. Low network related delays and cancellations (including due to climate/weather issues) to contribute to 98% on-time performance	Less than 90% of healthy services exit ARTC network on time, however additional delays and cancellations due to operator, force majeure events and periodically scheduled track possessions. It is possible that some force majeure and other events could be managed through proactive maintenance and investment in network resilience (i.e. vegetation management, flow monitors on creeks, culvert upgrades, investment in wayside rolling stock monitors etc)	High	Reliability is the primary non-price driver of mode choice, and improving reliability (on-time performance) may significantly improve attractiveness of rail.	Medium-High	Lack of alignment on what actions are required to improve network resilience. Likely to involve a significant number of relatively low cost actions.	High
Train control system	Digital train control system, able to optimise network capacity and support enhanced train operations technology, operates seamlessly across network boundaries.	Reflects planned capability with ATMS being planned to be rolled out over north-south corridor, however: • Interface between ATMS and ETCS (for metropolitan networks in Sydney, Melbourne, Brisbane) not yet resolved)	High	Influences mode choice drivers in multiple ways, including reliability, transit time and improved use of existing capacity Is an essential pre-curser to the longer term introduction of train automation technologies	Low-medium	High alignment within industry re need for ATMS, and ARTC project is fully funded, however required to apply across full route to achieve full benefits. Speed of rollout constrained by rollingstock fitout. Technical interface with ETCS not yet resolved.	High
Network planning and scheduling	Automated train scheduling system, able to optimise train schedules including revisions in the event of delay, operates seamlessly across network boundaries	No automated train scheduling systems • ARTC is investigating introduction of automated train scheduling across full ARTC interstate network, however, this would not cover full interstate service journey from origin to destination for all services.	High	Influences mode choice drivers in multiple ways, including reliability, transit time and improved use of existing capacity	Medium	Greatest benefits will be achieved if applied across networks for full O-D movements, but will require increased stakeholder alignment. Technical complexity to apply across networks.	High

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
Information systems	Ability to track train location, and provide real time predictions of arrival time for network changeover points and IMT arrival	Not available • Will be enabled as a result of introduction of digital train control system (with GPS tracking of train movements) and automated train scheduling systems (which enable up to date arrival time predictions)	High	Ability to provide real time information on train location and predicted arrival time influences rail service reliability, contributing to rail's freight availability reliability (on-time and predictable arrival) and, over time, door-to-door transit time	Low-medium	Will be enabled as a result of introduction of digital train control system (with GPS tracking of train movements) and automated train scheduling systems (which enable up to date arrival time predictions	High
Complementary infrastructure							
Proximity of IMTs to key freight warehousing, distribution and manufacturing locations	IMTs located in close proximity to established and/or emerging zones containing distribution centres, warehouse precincts and manufacturing facilities, and with capability for co-location of warehousing/ distribution facilities	IMTs not necessarily well located in relation to established freight zones. Dynon terminal in Melbourne planned to be phased out over next decade. • New terminal developments by National Intermodal have been announced for Melbourne (Beveridge and Truganina) • New terminal development by National Intermodal being investigated for Brisbane but preferred location has not been finalised	High	New IMT location near key freight locations will enable a lower average PUD time and cost This is particularly critical for the shorter haul Melbourne-Sydney and Sydney-Brisbane services, where an average PUD cost reflects around 50% of the total cost of rail freight, and reducing the cost of rail freight will be the most effective strategy to increase mode share.	High	Preferred locations of Melbourne terminals identified. High costs and complexity associated with long term preferred Melbourne IMT location in Truganina. Initial terminal location at Beveridge less proximate to key freight locations. Preferred terminal location in Brisbane not yet confirmed.	High
IMT cargo interchange capability	Infrastructure capability for efficient cargo interchange at IMT eg sufficient number and length of loading/unloading tracks, proximity to mainline, high capacity loading/unloading equipment, empty container storage	Many of the older terminals have infrastructure constraints requiring additional time and complexity in loading/unloading.	High	New IMT facilities with capability for efficient cargo interchange will enable lower terminal time and operating cost and, hence, average price. This will be particularly critical for the shorter haul Melbourne-Sydney and Sydney-Brisbane services, where terminal costs reflect over 10% of the total door to door cost of rail freight, and reducing the cost of rail freight will be the most effective strategy to increase mode share.	High	See above	Medium

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
IMT capacity	Sufficient IMT capacity (with planned developments delivered) to meet current demand plus allowance for growth over next 15-20 years (given extended time required for new IMT planning and development)	There is sufficient terminal capacity for current freight demand, however capacity constraints will emerge over the planning horizon.	High	New IMT facilities will provide sufficient capacity for expected demand growth The Western Freight Line and IMT will be needed within the next 10-15 years.	High	See above	High
IMT open access	One open access IMT in each capital city	While some existing terminals are open access, open access terminals do not exist in all capital cities.	High	Gaining access to a network of efficient IMTs is a barrier to entry to new rail operators and reducing barriers to entry can contribute to increased incentives for reduced rail freight price and/or enhanced service levels	Low	New terminals being (or to be) developed at Government supported intermodal freight precincts in Sydney, Melbourne and Brisbane will be open access	High
First/last mile freight connections	Efficient road links to highway networks Efficient road links to key distribution locations		High	Efficient linkages to highway networks and key distribution locations will enable a lower average PUD time and cost.	High	See above	High
	Links to rail port shuttle services	Links to port shuttle services are currently established for IMTs in Sydney and Melbourne, however, usage is well below targets, with enhancements to these links underway. The port rail link in Brisbane uses shared track with metro services, and there are no port shuttle services currently operating.	High	Efficient linkages between warehousing/distribution, IMEX port shuttle services and interstate intermodal services will increase the efficiency of rail based supply chains for major customers, and will promote the use of rail on connecting long and short distance routes.	High	Addressing Brisbane capacity constraints, including following the completion of cross river rail, will require the development of a dedicated freight connection. Preferred route has not been finalised.	High

	BEST PRACTICE CAPABILITY	CURRENT PERFORMANCE GAP		BENEFITS		CONSTRAINTS	PRIORITY
Rollingstock							
Locomotive performance characteristics	Locomotive design reflects current best practice technology and, where possible, ability to adapt to further innovation.	A substantial portion of the rollingstock fleet has been operating for over 25 years and is nearing end of life. New locomotives largely reflect design characteristics from mid 2000s. Failure to use new loco technology is a significant industry risk given these are 30+ year assets.	Medium-High	Given the long lifespan of rollingstock, a lag in the takeup of new technologies will provide a long term disadvantage for rail.	Medium	Constraints on rollingstock approvals for some RIMs inhibit incentive to invest in new technology across broader networks	Medium
Locomotive reliability	Low rate of locomotive failures	Nil	n/a		n/a		
Wagon characteristics	Wagon design reflects current best practice technology	A substantial portion of the rollingstock fleet has been operating for over 25 years and is nearing end of life. New wagons largely reflect design characteristics from mid 2000s	Medium	Given the long lifespan of rollingstock, a lag in the takeup of new technologies will provide a long term disadvantage for rail	Medium	Constraints on rollingstock approvals for some RIMs inhibit incentive to invest in new technology across broader networks	Medium
	Compatibility with efficient loading and unloading practices	No evidence to indicate that there are significant efficiency constraints for mainline wagons					
Rollingstock fleet capacity	Sufficient rollingstock fleet capacity to meet current demand plus allowance for growth over medium term	A substantial portion of the rollingstock fleet has been operating for over 25 years and is nearing end of life. Operators also report that the rollingstock fleet is currently capacity constrained and the limited local manufacturing capability does not have the capacity to scale up production to meet demand.	High	New locomotives will provide operating cost savings in terms of fuel utilisation and locomotive maintenance. Additional rollingstock fleet capacity will be critical in order to enable rail to capitalise on opportunities for freight growth, thus enhancing mode share	Low-medium	Both PN and SCT are currently increasing rollingstock fleet capacity. However beyond this, incentives to invest in rollingstock capacity will be influenced by operator's confidence in sufficiency of demand.	High

3.5 Infrastructure gaps – Queensland north coast line

Based on the target service requirements established above, we have not identified any critical service quality gaps that are currently inhibiting the ability of rail services to compete with road on the Queensland north coast line. In terms of transit time, service frequency and door-to-door price, rail is competitive with road. There is only limited data available on service reliability. While this indicates that on-time delivery is generally high (with in excess of 95% of freight being available at the advertised freight availability time, it is likely that rail will suffer from a number of the same reliability concerns as for the other intermodal corridors. As such, there will be opportunity to promote increase in rail mode share will be delivered by strategies that:

- improve the on-time performance of freight (both rail service and freight availability), including reducing the extent of extended delays (and hence reducing both the distribution of delays and the likelihood of service cancellation); and
- improve the predictability of performance (both rail service and freight availability) including through the provision of real time information on train location, and the ability to track freight location.

While the average door-to-door cost of rail is currently sufficient to allow rail to effectively compete with road, we note that the road productivity performance on the Bruce Highway lags the other major interstate routes examined, and significant investment is planned for Bruce Highway upgrades. As a result, strategies that allow ongoing reductions in the average door-to-door cost of rail (and hence the price for rail freight) will be critical to enable rail to maintain its mode share position in Queensland.

3.6 Conclusions

While there are significant differences between the main intermodal corridors, there is significant commonality in terms of the priority infrastructure gaps to be addressed in order to best promote rail mode share.

Table 18 Summary of high priority infrastructure gaps - intermodal

INFRASTRUCTURE	HIGH PRIORITY INFRASTRUCTURE GAPS
Network reliability and resilience	Introduction of network improvements and other strategies, to support improved train service reliability, focusing on improved on-time departure from terminals, improved on-time running and improved resilience resulting in fewer network interruptions and faster restoration of services
Interstate intermodal terminals	New IMT facilities in Melbourne and Brisbane that connect to Inland Rail and are: • Located close to existing or emerging freight centres, incorporating distribution centres, warehouse precincts and manufacturing facilities (including co-location) • Provide for efficient cargo interchange • Provide sufficient capacity to meet long term demand growth

INFRASTRUCTURE	HIGH PRIORITY INFRASTRUCTURE GAPS
	• Open access • Efficient first and last mile connections, including rail shuttles to ports Improved IMT facilities will enable reduced time and cost of PUD movements, more efficient loading and unloading of trains, and will contribute to the development of efficient rail based supply chains for major freight customers.
Digital train control system	Introduction of digital train control system integrated across the intermodal freight network enabling: • More effective use of available network capacity • Improved safety and reliability • Improved transit times • Essential pre-curser to increased train automation
Optimised network planning and scheduling	Introduction of automated train scheduling systems integrated across the intermodal freight network enabling: • Optimised scheduling of train services from origin to destination (regardless of RIM boundaries) • Optimised real time rescheduling of train services in out of course running in order to reduce excessive delays, including at network boundaries • Real time prediction of train arrival time, both at network boundaries and at ultimate destination • More effective use of available network capacity
Rollingstock fleet capacity	Introduction of additional rollingstock both to enable replacement of near life expired rollingstock as well as to provide for the operation of additional intermodal freight services, where that rollingstock reflects current best practice technology including, where possible, ability to adapt to future technological change.
Long term corridor protection and preservation	While network capacity is not a high priority in the immediate term, the very long timeframes associated with the planning and development of new corridors means that there is a high priority associated with the identification, preservation and preliminary planning for freight corridors where long term capacity constraints are anticipated. It is also essential from a planning perspective to ensure that existing capacity for freight services on critical corridors is not eroded by other developments, including urban encroachment and increased utilisation by passenger services.

4 Identifying infrastructure gaps - mode contestable bulk freight

4.1 Priority infrastructure gaps

Price, together with the ability to deliver bulk shipments in a timely manner, are the overwhelming determinants of mode choice for bulk freight, and rail is the preferred mode for bulk haulage provided that the infrastructure supports an efficient train service.[15] For major bulk operations, such as the WA iron ore railways and east coast coal haulage railways, rail is overwhelmingly the preferred mode. For smaller bulk operations, where road offers a competitive alternate, the key general service requirements are summarised in Table 19, along with identification of priority infrastructure gaps.

Table 19 Indicative target service requirement for bulk freight corridors

TARGET REQUIREMENT			CURRENT RAIL PERFORMANCE		BENEFIT		CONSTRAINT	PRIORITY
Allowable train configuration	'Mainline' rollingstock standards, eg TAL and train length limits	Mixed	Where bulk cargoes originate on regional networks, the regional networks were typically originally built to lower infrastructure standards, and many have not been upgraded to contemporary design standards. • low infrastructure standards not only reduces efficiency of train operation, but may require uniquely specified rollingstock, which limits operators' ability to use new rollingstock and limits flexibility to transfer rollingstock between routes to efficiently meet varying demand • regional network specifications constrain the train configuration able to be used for entire	Medium - High	High benefit of ability to use consistent rollingstock fleet across regional and mainline routes, particularly where lower standard rollingstock is reaching end of life. Medium benefit of consistent TAL loading limits, where mainline capacity is constrained Medium benefit of consistent train lengths (noting trains can be	Medium - High	Cost to upgrade regional networks to mainline standards is high, and unlikely to be warranted where utilisation is low. Cost to upgrade to allow use of mainline rollingstock (at lower speeds and shorter train lengths) may be lower.	High

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[15] Synergies; Study into Establishing an Efficient Freight Transport Network; Workstream 1 – Understanding conditions influencing mode share; March 2022, p.150

TARGET REQUIREMENT			CURRENT RAIL PERFORMANCE		BENEFIT		CONSTRAINT	PRIORITY
			route, including (where applicable) mainline and metropolitan networks. Mixed rail gauges used on some regional networks limits the ability to transfer rollingstock between routes to efficiently meet varying demand		consolidated on entry to mainline network)			
Cycle times	Cycle times that provide for moderate to high utilisation of rollingstock	Mixed	• Low quality regional networks can contribute to extended cycle times as a result of • very low average speeds (eg Murray Basin) • extended operational delays due to safeworking system requirements and crossing delays (eg Murray Basin) Constrained capacity on mainline/metropolitan networks (and in particular peak curfews on metropolitan shared networks) can result in significant delays if scheduled path is not met	High	Addressing very low train speeds and excessive delays allows improved rollingstock and crew utilisation, with high operating cost benefit.	Low - high	Costs will depend on the specific capacity constraint, and proposals to address. Constraints around additional passing loops likely to be low. Constraints around dedicated freight corridors north or west of Sydney will be high.	High
Reliability	Predictability of arrival times at key locations	Mixed	The highest risk of unpredictable operations occurs where bulk freight services are required to cross multiple networks in order to complete their train cycle, with delays often occurring at network boundaries A better understanding of, and monitoring of, causes of train delays is required – improved access to data and the implementation of standard metrics will assist.	Medium	Improved predictability would allow for more efficient train service and logistics operations, with the impact related to the length of delays typically incurred.	Low-high	Costs will depend on the specific factors to be addressed, which may overlap significantly with cycle time related projects	Medium
Loading/ unloading facilities	Loading/ unloading facilities that enable: • Efficient loading/ unloading operation • Where applicable, effective consolidation of bulk cargoes from smaller producers	Mixed	Rail sidings and loading facilities on regional networks may not be constructed in a way that supports efficient train sizes or efficient loading of bulk products	Medium	Addressing loading/ unloading constraints can increase the speed of loading/ unloading (reducing cycle times) or making rail services accessible to additional customers.	Low – medium	Cost will depend on the specific loading/unloading constraint.	Medium

Source: Synergies

4.2 Conclusions

The infrastructure gaps for contestable bulk freight can have implications not only for the bulk freight services themselves, but where those bulk freight services operate on mainline corridors, to the extent that those infrastructure gaps also constrain the way that the bulk trains operate on the mainline corridors, they can have important implications for other train services also operating on those mainline corridors. Therefore, having regard to the corridors that we have examined in this study, we have identified a number of high priority infrastructure gaps, summarised below.

Table 20 Summary of high priority infrastructure gaps – contestable bulk freight

INFRASTRUCTURE	HIGH PRIORITY INFRASTRUCTURE GAPS
Cycle times	**Murray Basin** • Cycle times for grain services in the Murray Basin are excessive due to a combination of very low allowable train speeds and excessive delays due both to safeworking requirements and crossing delays • The resulting poor rollingstock and crew utilisation provides a strong disincentive for rail operators to invest in rollingstock for these services, or to deploy existing rollingstock in the Murray Basin where there are options for alternate deployment (eg for grain services in NSW) **NSW regional networks** • While not as excessive as the Murray Basin, operators report significant delays due to inability to optimise train paths over multiple networks, inflexibility in crossing locations and operational delays at network boundaries particularly where scheduled path connections are not met. Constraints in traversing Hunter Valley coal network and peak curfews on the Sydney Trains network significantly increase the effective cycle times for bulk freight.
Allowable train configuration	**Murray Basin:** • A number of the Murray Basin routes remain broad gauge, requiring the use of uniquely specified broad gauge rollingstock. The broad gauge rollingstock fleet is nearing end of life. There are significant disincentives for rail operators to invest in new broad gauge freight rollingstock as its unique specification is likely to incur a cost premium, and the limited networks over which it can be used means that there is low flexibility to change rollingstock deployment in response to variability in demand. • This can be addressed by a continuation of the current program of converting grainlines to standard gauge, however this program will be constrained by the high cost of this conversion. **NSW regional networks:** • There are limited parts of the NSW regional network that cannot operate mainline rollingstock under speed and wagon loading restrictions. **Queensland regional networks:** • The entirety of the Queensland rail network is narrow gauge, but substantial portions of the regional network (including the south west Queensland network servicing bulk coal and grain) operates to highly constrained axle loads of 15.75tal, requiring the use of uniquely specified regional freight rollingstock. A significant portion of the light locomotive fleet is nearing its end of life, and as with the Murray Basin, there are significant disincentives for rail operators to invest in new light locomotives. • Following completion of Inland Rail, in the absence of upgrade to the Queensland regional network, there will be significant volumes of bulk freight (coal and grain) operating in small lightweight trains over the Queensland portion of the interstate route and continuing on to the port, with capacity implications both for the mainline corridor, and the rail link to the port, particularly following completion of Cross River Rail.

5 Infrastructure projects to address priority gaps

5.1 Potential infrastructure projects

A range of projects have been identified by various rail participants as potentially beneficial in improving rail mode share as a result of improvements in rail service quality or reductions in rail operating costs. A summary of identified projects is provided in Table 21.

These projects are at varying stages of maturity. While it is possible to identify the infrastructure quality gap that they are designed to address, and to identify the priority that should be placed on addressing that infrastructure gap, in many cases the specific nature of the project and the extent that it will assist in bridging the infrastructure gap has not yet been determined. In addition, some of these projects are likely to represent alternate ways of bridging the same infrastructure quality gap. As such, it is not possible to comprehensively prioritise these projects at this time.

Table 21 Identification of potential projects

PROJECT	INFRASTRUCTURE OWNER	PROJECT OVERVIEW	INFRASTRUCTURE GAP PRIORITY		STATUS
Melbourne IMT – Beveridge	National Intermodal	Development of new open-access IMT, incorporating best practice characteristics	High	Interstate IMT capability (IM)	**Mar 22** Federal Govt announced budget funding commitment in 2022-23 Budget of $1.62b for BIFT and $280m for road connection upgrades
Melbourne IMT – Truganina (WIFT)	National Intermodal	Development of new open-access IMT incorporating best practice characteristics	High	Interstate IMT capability (IM)	**Mar 22** Federal Govt announced budget funding commitment in 2022-23 Budget of $740m for WIFT and $920m for Outer Metropolitan Ring (OMR) South Rail Connection
WIFT mainline rail connections	Tba	Development of northern and western connections from WIFT to mainline rail corridors			This is expected to be addressed in the $920m project announced above
Brisbane IMT	National Intermodal	Development of new open-access IMT incorporating best practice characteristics	High	Interstate IMT capability (IM)	**May 22** Federal Govt and Qld Govt jointly undertaking business case. Due to be completed mid 2022
Dedicated freight track Brisbane-Acacia Ridge	Unknown – new track	Development of a last mile dedicated freight connection from Acacia Ridge to the Port of Brisbane	High	Interstate IMT capability	Has been an issue raised publicly. No action has been taken. Was not part of Inland Rail original Business Case
Western Sydney Freight Line	Tba	A proposed dedicated freight rail line connection between the Western Parkland City and Port Botany. Project need identified in NSW Freight and Port Plan (2018-2023)	High	Corridor preservation (IM)	Stage 1 (corridor now protected) – connects from Outer Sydney Orbital near Luddenham and runs to Horsley Park at the M7 Motorway Stage 2 (under investigation) – to provide a freight link from Stage 1 near the M7 Motorway to the SSFL near Leightonfield **May 22** – Strategic Business Case is being developed for the rail line – expected to be completed in late 2023.
ATMS on interstate corridor	ARTC	Developed of a digital train control solution, with real time monitoring of trains with GPS and mobile technology. ATMS connected the driver in the cab to ARTC Network Control, integrating four key components into one operating system: Network control system • Communications system • Trackside	High	Digital train control (IM)	**May 22** – System is certified and now in operation between Port Augusta and Whyalla. The next section for ATMS deployment will be Port August to Kalgoorlie

PROJECT	INFRASTRUCTURE OWNER	PROJECT OVERVIEW	INFRASTRUCTURE GAP PRIORITY		STATUS
		• Trainborne The initial $70 million investment for investment and deployment of ATMS was jointly funded by the Federal Govt committing $50m and ARTC committing the remaining $20m			
ATMS integration on interstate corridor	Sydney Trains/ Arc Infrastructure	ATMS is currently planned to be rolled out on the ARTC network. Short of extending the roll-out of ATMS to other networks, more of the benefits of ATMS on the intermodal corridor could be realised if it was integrated with systems that operate on other parts of the corridor network (Arc), and to the NSW track (Sydney Trains) where interstate trains interface with the passenger network. Inter-operability is a significant issue whether other track owners are investing in different platforms to support their own network technologies (i.e. ETCS)	High	Digital train control (IM)	**Nov 2020** – Transport for NSW selected a vendor to deliver the ECTS technology to the Sydney Trains network. A key focus is to develop a solution to enable freight trains with ATMS to traverse the Sydney metropolitan network and communicate with the TfNSW's digital system **Jun 20** – Industry led working group ('ATMS Oversight Implementation Group') was established to develop a business case to fast track ATMS implementation **Nov 19** – Transport and Infrastructure Council agreed to deliver a National Rail Action Plan. Interoperability identified as key issue.
ANCO on interstate corridor	ARTC	The ARTC Network Control Optimisation (ANCO) is currently implemented in the Hunter Valley network and is designed to enhance dynamic capability to manage variations and streamline network wide train control It also enables longer trains to run along the network. ARTC manages the movements of around 250 trains per day on the Hunter Valley network, with around half of these being coal trains. The other half comprise passenger services, grain, general intermodal and other bulk freight trains. In the future, the full benefits of digital pathing could be realised if ANCO was extended beyond the boundary of the Hunter Valley network. This could help optimise (non-coal) trains before they enter the network and also continue the optimisation as trains leave the network.	High	Optimised network planning and scheduling (IM)	Not currently being considered in any public forum.
ANCO integration on interstate corridor	Sydney Trains/ Arc Infrastructure	ANCO currently only applies to Hunter Valley network. Short of extending the implementation of ANCO to other corridors, one option is to integrate it with other systems that operate on other parts of the corridor network (Arc), and to the NSW track (Sydney Trains) where interstate trains interface with the passenger network.	High	Optimised network planning and scheduling (IM)	Not currently being considered in any public forum.

PROJECT	INFRASTRUCTURE OWNER	PROJECT OVERVIEW	INFRASTRUCTURE GAP PRIORITY		STATUS
ANCO integration to connecting regional corridors	CRN/ V/Line	An option to integrate ANCO with other connecting systems so that the benefits of digital pathing and train control can be fully captured and extended to those networks before they enter and after they leave the Hunter Valley network	High	Cycle time (bulk)	Not currently being considered in any public forum.
Melbourne-Adelaide double stacking	ARTC	Double stacking containers between Melbourne and Adelaide is not currently possible due to 1,020 structures that impact on clearance. These include 229 significant obstructions, 218 signals and 573 minor obstructions. Double stacking could reduce above-rail operating costs and increase capacity.	Low	Operating cost savings (IM)	**Feb 21** – Infrastructure Australia identified it as an early stage proposal. ARTC was to identify and analyse potential investment options (under Stage 2 of the IA's Assessment Framework)
Sydney – Illabo (north of Junee) double stacking	ARTC	Development of Inland Rail will clear the line between at least Melbourne and Illabo for double stacking Previous high level estimates have identified a cost in the order of $250m to clear the line for double stacking between Moorebank and Illabo. The appropriate timing would be for such a project to follow on from the IR project, to leverage the investment in double stack clearances between Melbourne and Parkes	Low	Operating cost savings (IM)	**Oct 2016** – identified by FORG as an investment priority in Submission to Infrastructure Victoria on its [then] 30 year infrastructure strategy
Wayside rolling stock performance monitoring equipment	ARTC	Wayside rolling stock performance monitoring on the interstate network to address wagon defects and incidents (with reliability and outage impacts	High	Reliability (IM, bulk)	Not currently being considered in any public forum
Temporary intermodal loading/unloading facilities	Tba	Development of temporary intermodal loading/unloading facilities that can be rapidly established in the event of extended network outages (eg floods) to allow continuation of rail services with road bypass of outage	High	Reliability (IM)	Noted by Arc Infrastructure in workstream consultations
Sydney-Albury crossing loops	ARTC	**ARTC IR Business Case Briefing Paper No 3 (Aug 2020)** - In total, there will be 54 crossing loops between Melbourne and Brisbane under the Inland Rail Project. The sections from Seymour to Albury and from Junee to Illabo will have no crossing loops as the sections have double track and these sections accounts for 13% of the 1700k route.	High Medium	Reliability (IM, bulk) Cycle time (bulk) Capacity (IM)	Not currently being considered in any public forum.
Albury-Somerton infrastructure quality	ARTC	The line is over 150 years old and there have been large amounts of remedial spending undertaken previously and there can be frequent cancellation of services (passenger, freight). Work should continue to reduce speed restrictions.	High	Reliability (IM)	Not currently being considered in any public forum.

PROJECT	INFRASTRUCTURE OWNER	PROJECT OVERVIEW	INFRASTRUCTURE GAP PRIORITY		STATUS
Sydney-Newcastle crossing loops	Sydney Trains	The NSW Government has previously committed to working with rail freight operators to optimise freight train cycle times and trial higher productivity trains for bulk freight movements to Port Kembla and Newcastle (NSW Government, Implementation Plan for the NSW Freight and Ports Plan 2018-2023)	High	Reliability (IM & bulk) Cycle times (bulk)	Not currently being considered in any public forum.
			Medium	Capacity (IM)	
Newcastle- Brisbane crossing loops	ARTC	No public information identifying this issue To note however that NSW Government has an initiative for the delivery of the Northern Sydney Freight Corridor stage 2 in its plans.	High	Reliability (IM)	Not currently being considered in any public forum.
			Medium	Capacity (IM)	
Cootamundra – Parkes crossing loops (including loop Cootamundra-Stockinbingal)	ARTC	Parkes to Cootamundra capacity, grain loading impacting main lines are key issues.	High	Reliability (IM, bulk) Cycle times (bulk)	
			Medium	Capacity (IM)	
Sydney-Lithgow (Blue Mountains) crossing loops	Sydney Trains	No public information identifying this issue	High	Reliability (IM & bulk) Cycle times (bulk)	Not currently being considered in any public forum.
Midland Railway Line – Perth to Geraldton	Arc Infrastructure	Improvement of the railway to increase axle loading and the track speed standard to enable freight volumes to be converted from road to rail.	High	Capacity and productivity	**May 22** Federal and WA State Government funding package of $60m for axle load upgrades from 16 tonne axle loading to 19 tonne axle loading between Carnamah and Mingenew
Greenbushes Line Reinstatement in South West WA	Arc Infrastructure and potentially operators of loading facilities	Reactivation of the rail line between Picton and Greenbushes, with rail loading facilities at Greenbushes and unloading facilities at the Port of Bunbury and at Kwinana. This would allow the line to be used for lithium, agricultural products and other bulk freight.		Provide for the use of rail where it is not currently available.	The reinstatement project has been identified by the Western Australian Government as a priority for the WA Department of Transport. There is $3.8m available for further study works.
McLevie to Wubin Reinstatement and IMT	Arc Infrastructure	Wubin is a major road train assembly hub for freight traffic to WA's north. With an intermodal terminal in Wubin freight may be delivered by rail and despatched by 53.5m road train to the north, rather than by less efficient (and more numerous) B-Double or C-Train trucks. The rail corridor between McLevie and Wubin has been disused for many years.	Medium	Provide for the use of rail.	Not currently identified in any public forum.

PROJECT	INFRASTRUCTURE OWNER	PROJECT OVERVIEW	INFRASTRUCTURE GAP PRIORITY		STATUS
25 TAL East-West rail network	Arc Infrastructure	Continued Government support for investment in the East West rail network to achieve the DIRN standards	Medium	Capacity Productivity	
Broken Hill – Parkes crossing loops and automated points	ARTC	No public information identifying this issue There are issues of traffic congestion and limitations from Broken Hill to Parkes and more cross loops could assist improve headways	Medium	Capacity (IM)	Not currently being considered in any public forum.
Adelaide Hills Bypass to support double stacking and reduced congestion	ARTC / Aurizon	As an alternative to upgrading the existing rail corridor from Adelaide to Melbourne for double stacking which has numerous structures. Proposed use of two existing rail corridors and three new greenfield connections to facilitate a double stacked rail corridor bypass of Adelaide, and to reduce congestion on the standard gauge lines into and within Adelaide freeing up capacity for more freight on rail. Two existing corridors: 1. Gawler to Penrice 2. Apamurra to Monarto South New corridors required: 1. Two Wells (ARTC mainline) to Gawler 2. Lyndoch to Apamurra 3. Preamimma to Rabila (to bypass Murray Bridge) This would provide grade benefits by reducing from 1:45 to 1:80 and also remove interfaces with the Adelaide metropolitan commuter network and potentially reduce transit times by up to an hour.	High	Productivity	Melbourne to Adelaide freight rail improvement is an early stage proposal on the Infrastructure Australia priority list
Increase the Width Maximum across Double Stack capable network	ARTC	The ARTC maximum width from Parkeston to Adelaide Freight terminal is 1500mm from centre line (mm) with a loading diagram of A2.6. From Crystal Brook to Broken Hill and Broken Hill to Goobang Junction; the maximum width is 1250mm with a loading diagram of A2.5. This proposed project would remove restrictions to facilitate the common standard of A2.5 from Parkeston to Goobang Junction and on the new Inland Rail route to enable efficient double stack well wagons to operate across the Australian double stacked rail network to improve supply chain consistency and productivity.	High	Improved infrastructure consistency and productivity.	
Increased crossing loop capacity on ARTC mainlines	ARTC	Increased number of crossing loops on ARTC mainline between Goobang Junction and Parkeston, Adelaide to Spencer Junction and Melbourne to Adelaide to increase capacity to provide additional rail services for customers	High	Enable increased capacity	

PROJECT	INFRASTRUCTURE OWNER	PROJECT OVERVIEW	INFRASTRUCTURE GAP PRIORITY		STATUS
Increased track capability for 23tal wagons at 100km/hr: Spencer Junction to Tarcoola and Tarcoola to Parkeston	ARTC	Increase track capability for 23 tonne axle load for wagons at maximum speed of 100km/hr – initial focus on Spencer Junction to Tarcoola to increase maximum speed from 80km/hr for 23tal wagons to 100km/hr and then Tarcoola to Parkeston. To improve service capacity and lower transport costs for freight customers.	Medium	Enable increased capacity and productivity improvements	
Murrayville to Pinnaroo Standard Gauge	VicTrack / Aurizon	Project to provide Sunraysia region freight customers optionality to rail volumes to Victorian ports and to South Australian ports by reinstating ~25km of track with standard gauge rail infrastructure to connect Murrayville to Pinnaroo rail infrastructure.	Medium		
Eyre Peninsula rail reinstatement	Aurizon / Viterra	Project to invest in the Eyre Peninsula rail network to service grain and other bulk commodities based on a mainline to key aggregation points and feeding road (trucking) services – other bulk commodities include iron ore, kaolin clay etc.	Medium	Rail freight capacity improvement and freight efficiency	Infrastructure Australia's Eyre Infrastructure project relates to a greenfield railway for Iron Road Limited,
Regional NSW Maryvale to Gulgong rail connection	ARTC / TfNSW	Project to efficiently connect the heavy haul Hunter Valley network to the proposed Inland Rail route by connecting the ~70km railway between Maryvale and Gulgong. This would avoid the requirement to turn trains around at Merrygoen and materially improve cycle times and in turn lower rail costs for primary producers (freight customers) in Western NSW	Medium	Reduce cycle times and improve productivity	
Southern Sydney Freight Line capacity	ARTC	The SSFL is already operating close to capacity, limiting its ability to adequately service future demands for rail freight transport. Additional demand has the potential to impact on reliability and restrict the movement of freight across the network. The productivity of the SSFL, especially when the Moorebank Intermodal Terminal is fully operational, will be vital. Other potential capacity constraints could exist with the proposed future development of the Western Sydney Freight Terminal. The project includes a passing loop between Cabramatta and Warwick Farm	Medium	Capacity (IM)	**Current**: Cabramatta passing loop is under construction
Murray Basin broad gauge network	V/Line	The broad gauge lines in the Murray Basin were to be converted to standard gauge under the $440m Murray Basin Rail project, but work stalled in 2019 with the upgrade half complete.	High	Cycle times (bulk)	**Current:** revised Murray Basin rail project is being implemented (without standardisation) **Dec 2021:** Federal Govt provided $5m to plan for future standardisation and asked Victoria to

PROJECT	INFRASTRUCTURE OWNER	PROJECT OVERVIEW	INFRASTRUCTURE GAP PRIORITY		STATUS
		A revised business case was released in late 2020 which outlined plans to rectify some of the deficiencies during the initial rollout, but standardisation of gauge is no longer being pursued. Standard gauge trains on the Mildura line can only access Geelong and Melbourne via Ararat (which is a longer, less direct route). Broad gauge lines are not being utilised because of the need for freight operators to own and maintain two sets of rollingstock, meaning more freight is shifting from rail to road.			match the commitment. (no such Vic commitment was mad4e)
Grain sidings Benalla-Oaklands	ARTC	Freight only railway line in NE Victoria. PN and SSR use the line for grain trains. During good harvests, the line can receive two trains per day and additional sidings for grain storage could support volumes. Upgraded sidings with lighting to allow 24/7 operation could provide benefits. The line condition is deteriorating and numerous emergency repairs carried out in 2021. The line has a speed of 30 kph speed limit from Benalla to Yarrawonga, and a 20kph limit from Yarrawonga to Oaklands. As at Nov 2021, trains are banned from using the line between the hours of 1200 and 2000 if temperatures rise above 32 degrees.	Medium	Loading (bulk)	Unknown - Not currently being considered in any public forum.
Capacity issues Unanderra to Mossvale	ARTC	Extend passing loops at Calwalla Robertson and Summit Tank	Medium	Capacity (bulk), resilience and reliability	Unknown - Not currently being considered in any public forum.
Install automatic signalling	V/Line	Maroona to Portland – replace manual safe-working with remote signalling	Medium	Cycle times (bulk)	Unknown - Not currently being considered in any public forum

Source: Synergies

5.2 Project screening criteria

In order to proceed with any of these projects, a positive business case will be required, demonstrating the project need, project solution and the positive commercial or economic benefit of the project.

A preliminary screening of project concepts should be applied in order to identify which projects have merit in progressing to business case development. This will ensure that the resources required for developing a business case are targeted towards those projects that have the greatest chance of success.

Table 22 Project screening criteria to progress to business case development

	SCREENING CRITERIA	DESCRIPTION
Project Maturity		
Project Need	Pass/Fail	• Has the project need been identified? • Does the project need align to a priority infrastructure gap?
Project Solution	Pass/Fail	• Has the project solution been scoped?
Project Assessment		
Cost estimation	Level of development	• Has the scope of project works been developed? • Is there an indicative cost estimate • What is the level of cost confidence
Benefit assessment	Level of development	• What is the nature of the project benefit – capacity, operating cost saving, reliability, etc? • What is the breadth of the project benefit – does it have network wide impacts or is it limited to a RIM’s infrastructure? • Who are the project beneficiaries? • Is there an indicative benefit estimate? • Is there potential for the project to have a positive economic BCR?
Risk assessment	Level of development	• Extent of technical development required? • Does the project involve multiple RIMs in order to achieve full benefits? • What is the likelihood of project uptake? • What is the delivery risk in terms of timeframe and ease of delivery?

6 Recommendations

Having regard to the status of projects as summarised in section 5, recommended actions to address the identified priority infrastructure are as follows.

Table 23 Recommended actions to address high priority infrastructure gaps

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS	RECOMMENDED ACTIONS
Intermodal			
Network reliability and resilience	Introduction of strategies, including but not limited to network improvements, to support improved train service reliability, focusing on improved on-time departure from terminals, improved on-time running and reduced network interruptions together with faster restoration of services following interruptions	Network reliability and resilience is considered by each RIM as part of their asset management strategies, but there is no specific program or industry consensus on what is required to promote enhanced reliability and resilience.	1. Reliability: – To better understand and monitor the reasons for late running of trains, RIMs and rail operators, in conjunction with BITRE and ACRI, should develop standard reporting metrics. – RIMs to establish regular forums involving operators and other stakeholders to identify, assess and prioritise opportunities to improve reliability and resilience 2. Resilience –ARA/ACRI to liaise with RIM's and rail operators to maintain on an ongoing basis a National Resilience Plan including a prioritised pipeline of beneficial infrastructure enhancements (beyond standard RIM asset management strategies).
Interstate intermodal terminals	New IMT facilities in Melbourne and Brisbane that are: • Located close to distribution centres, warehouse precincts and manufacturing facilities (including co-location) • Provide for efficient cargo interchange • Provide sufficient capacity to meet long term demand growth • Open access • Efficient first and last mile connections, including rail shuttles to ports	Melbourne: • Location identified for two new IMTs (Beveridge and Truganina) • Commonwealth funding allocated for Beveridge and planning for Truganina • Port shuttle connections being progressed via Victorian Government as part of the Port Rail Transformation Project at the Port of Melbourne Brisbane • Preferred IMT location not yet confirmed	3. Progress Melbourne IMT development as a priority including: – planning and approvals for Truganina IMT – development of Beveridge IMT 4. Progress Brisbane IMT development as a priority including: – Confirmation of preferred IMT location, together with planning and approvals – Identification of preferred port shuttle route, together with planning and approvals

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS	RECOMMENDED ACTIONS
	Improved IMT facilities will enable reduced time and cost of PUD movements, and more efficient loading and unloading of trains.	• Preferred route for port shuttle services not yet identified	
Digital train control systems	Introduction of digital train control system across the intermodal freight network enabling: • More effective use of available network capacity • Improved reliability, including due to improved safety • Improved transit times	ARTC: • ATMS currently being rolled out across interstate network, with initial priority on east-west route Sydney Trains: • ETCS currently being rolled out throughout Sydney Trains network	5. Extension of ATMS to other intermodal networks – Priority development of a technical solution for interface between ATMS and ETCS (for application on Sydney, Melbourne and Brisbane metropolitan networks) – Extension to Arc Network Kalgoorlie-Perth route in line with scheduled ATMS rollout. Ultimately, ATMS (or seamless interface to other digital train control system) should be extended to other intermodal and regional freight routes and for critical port links (noting any extension of ATMS to branch lines/country networks may not have ATMS's full functionality given low volumes lines)
Optimised network planning and scheduling	Introduction of automated train scheduling systems across the intermodal freight network enabling: • Automation of train handover at network borders • Optimised and consistent pathing of train services across networks • Optimised real time rescheduling of train services in out of course running • Real time prediction of arrival time • More effective use of available network capacity	ARTC: • Currently investigating the introduction of automated train scheduling system (similar to Hunter Valley ANCO) across full ARTC network	6. RIM commitment to development of integrated automated scheduling system across the entire intermodal network, as full benefits will only be achieved if it operates across the full origin-destination routes – Will require development of technical solution to interface between individual RIM automated scheduling systems – Ultimately regional networks significantly interacting with the interstate network may also be incorporated into the system
Rollingstock fleet capacity	Introduction of additional rollingstock to replace near life expired rollingstock and to provide for the operation of additional intermodal freight services, where that rollingstock reflects current best practice technology including, where possible, ability to adapt to future technological change.	Rail operators are investing in new rollingstock capacity, however there are long lead times on investment and limited local capability to meet demand. Further, it is unclear to what extent this will • fully address additional demand, having regard to the extent of near life expired rollingstock • incorporate current best practice technology and adaptability to future technological change	7. The market should respond to additional demand with new investment by existing operators and/or new entry. Barriers to entry and investment in new technology are considered in the Safety & Operations workstream.

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS	RECOMMENDED ACTIONS
Long term corridor protection and preservation	Ensure corridors are preserved to address long term network capacity requirements (including freight only corridors in urban areas). Ensure planning for additional passenger services (including long distance passenger services) does not erode capacity and transit times/cycle times for freight services.	Planning and corridor protection is the responsibility of all levels of government. A 2017 Infrastructure Australia Study ('Corridor Protection') identified that a national framework for corridor protection was required to guide coordinated and meaningful action by all levels of government.[16] The 2019 National Action Plan of the National Freight and Supply Chain Strategy committed to identifying and protecting key freight corridors and precincts from encroachment.[17]	8. Consistent with the 2019 National Action Plan, Governments should also coordinate an assessment of long term network capacity requirements, and the extent to which this may require additional rail corridors (including freight only corridors in urban areas) beyond those for which corridor preservation is complete or underway.
Bulk			
Cycle times	For bulk freight networks with excessive delays (eg Murray Basin), to introduce initiatives including track quality, safeworking systems, capacity and scheduling to reduce the occurrence of excessive delays	Varies by regional network	1. Progress planned investment in the Murray Basin rail network program for standardisation and infrastructure quality improvements 2. For other bulk routes with uniquely specified rollingstock or excessive cycle times, RIMs, in conjunction with railway operators and Government, should evaluate the economic benefit associated with infrastructure investment to address these issues.
Allowable train configurations	Progressively upgrade regional bulk freight networks (where viable) to allow operation of mainline rollingstock (potentially under speed restriction, provided not excessive in relation to overall cycle time)	Varies by regional network	

Source: Synergies

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[16] Infrastructure Australia (2017), Corridor Protection, Planning and investing for the long term, July 2017, p.32. In the report, Infrastructure Australia recommended action to secure seven corridors for projects including the Outer Sydney Orbital, Outer Melbourne Ring, Western Sydney Airport Rail Line, Western Sydney Freight Line, Hunter Valley Freight Line, and the Port of Brisbane Freight Line. The highest priority identified by Infrastructure Australia at the time was preservation of the corridor for the proposed High Speed Rail line between Brisbane and Melbourne via Sydney and Canberra.

[17] Transport and Infrastructure Council (2019), National Action Plan, National Freight and Supply Chain Strategy, August 2019, p.17

4

Safety and operations

Study into Establishing an Efficient Freight Transport Network

Workstream 3 - Safety & Operations

Prepared by Synergies Economic Consulting Pty Ltd

Executive Summary

Rail freight efficiency on key intermodal corridors is constrained by a number of factors, many of which are related to inconsistencies that exist between networks and between jurisdictions. There are also other factors that impact intermodal efficiency that are more industry-wide (and some that are economy-wide). All of these factors impact on rail's competitiveness and, in turn, its mode share, by increasing the cost (and ultimately the price) of rail freight services and, in some cases, reducing service standards including service reliability. Importantly, these constraints further impede rail efficiency by stifling future gains from existing investments as well as discouraging future investments in establishing a more competitive rail service.

The key operational constraints identified through this Workstream based on a desktop literature review and direct stakeholder consultations are identified below:

Table 1 Constraints on operational rail efficiency

CONSTRAINT
1. Inconsistent operational standards and rule books
2. Silo based safety management systems
3. Inconsistent physical standards and equipment
4. Co-ordination of pathing, train management and possession arrangements
5. Inconsistent access management and regulation
6. Concentration in the above rail market due to barriers to entry
7. Inconsistent environmental regulation
8. Workplace flexibility
9. Insufficient skilled labour
10. Driver training
11. Fatigue management
12. Passenger priority
13. Lack of access to real time prediction of freight arrival

Source: Synergies. A full explanation of these constraints is presented in section 2.2 of this report.

We have examined how each of these constraints have the potential to influence the key mode share drivers in terms of reliability, transit time, service availability/frequency and price (as identified in the Mode Share Workstream). We have then evaluated the extent to which each constraint represents a major impediment to rail operating efficiency, but if addressed, could potentially offer material benefits in terms of improved mode share.

Firstly, our assessment shows there is 'no low hanging fruit' or 'easy fixes' to improving rail operating efficiency. None of the operational constraints identified above can be considered to have 'low' impediments to address and, for many of these constraints, the rail industry has, over an extended period, been investigating opportunities to eliminate these constraints or reduce their impact. Any 'easy' gains (high benefits coupled with few impediments) are likely to have already been implemented. The issues that remain are those that are difficult and complex to progress, but which have opportunity to release significant benefits.

As a result, rather than seeking to prioritise opportunities by identifying 'easy wins' on an issue by issue basis, we believe that it is instead more important to prioritise factors that are impeding solutions to these issues, and to identify where there are any high impact impediments that, if addressed, could potentially allow further progress to be made on the removal of efficiency constraints on an issue by issue basis. The most important factors that are driving this lack of strategic alignment relate to structural market design issues (i.e. network fragmentation) as well as the absence of institutional and regulatory arrangements to improve industry co-ordination. These are explained as follows:

- Network fragmentation and mixed organisational focus on intermodal freight:
  - RIMs are almost all expected to operate within a commercial framework and are governed by their own commercial drivers. Intermodal freight is not a priority for some RIMs, where it is a minor customer, and the RIM's commercial outcomes are largely driven by its performance in meeting the needs of its major customers (eg passenger services in the metropolitan networks, coal services for the Hunter Valley and Central Queensland coal networks). The problem is exacerbated where Governments, as owner or funder of networks (particularly metropolitan passenger networks), do not specify any clear freight objectives or clearly defined freight performance metrics.
  - This is not a criticism of the RIMs, as they are all responding to their own organisational objectives. Rather, it is a predictable outcome of the incentives created by the governance framework and the market structure. However, given the extent of misalignment of commercial objectives, it is unrealistic to expect that the industry should be able to collaboratively reach a commercial agreement on how to address many inter-operability issues, as there is little benefit to the RIMs from doing so, particularly in isolation, and potentially material costs involved.
- Regulatory frameworks that do not promote harmonisation:
  - While there are long term policy agendas to promote harmonisation, the focus has been on harmonisation between RIMs through industry collaboration. This approach also runs into difficulties where the stakeholders are subject to differing jurisdictional regulatory requirements and/or are governed by different jurisdictional regulators who may have different priorities and interpretations of requirements.
  - Even in rail safety, where there is a single regulatory framework and a single national safety regulator, harmonisation concerns still apply as the co-regulatory framework, which

provides for each RIM to develop its own safety systems to address the risks on its network has significant benefits in permitting flexibility within a network, but it does not promote harmonised approaches to managing risks *across* networks

– This approach to regulation of rail networks differs materially from the regulation of other cross jurisdictional infrastructure networks, such as electricity, gas and telecommunications, as well as the road network. In these cases, the intrinsic characteristics of the service provided (where there is no equivalent complexity to the wheel:rail interface present in rail) support regulatory frameworks that are designed to promote consistency in standards and approaches in order to maximise inter-operability and reduce barriers to entry.

These factors mean that collaborative approaches to addressing efficiency constraints, will have only limited efficacy. As identified previously by the ARA and the Interoperability Working Group as part of their role in delivering the National Rail Action Plan, there is limited ability for the industry to meaningfully impact interoperability challenges constraining productivity within the current structure of authority shared by jurisdictions without achieving a step change in commitment to coordinated decision making in the national interest or major Commonwealth intervention.

Development of alternate options for industry co-ordination that are able to more effectively address these issues will be critical in enabling the development of strategies to address the constraints arising from network and jurisdictional regulatory fragmentation and will assist in reducing barriers to entry. While alternate industry co-ordination options will not, by themselves, resolve these issues, more effective industry co-ordination mechanisms are an essential pre-requisite to the development of long term solutions to these matters.

Industry co-ordination options

There are several options available for more effective industry co-ordination, with each option reflecting a different profile of operational and regulatory centralisation. The four broad approaches explored in this paper are identified in the following table.

Table 2 Options to address rail market co-ordination failures

FACTOR	OPTION A – INDUSTRY LED, CONSULTATIVE, VOLUNTARY	OPTION B – CENTRALISED GUIDANCE, VOLUNTARY MEASURES	OPTION C – CENTRALISED GUIDANCE, OPTION TO MANDATE CHANGE	OPTION D – PRESCRIPTIVE REGULATION
Degree of change	• Status quo	• Incremental	• Moderate	• Significant
Coordinating mechanism	• Voluntary, collaborative, industry led approach	• Central Co-ordinating Body, but with implementation to remain voluntary	• Central Co-ordinating Body, but with mechanisms to mandate changes	• Creation of a prescriptive national regulatory framework

FACTOR	OPTION A – INDUSTRY LED, CONSULTATIVE, VOLUNTARY	OPTION B – CENTRALISED GUIDANCE, VOLUNTARY MEASURES	OPTION C – CENTRALISED GUIDANCE, OPTION TO MANDATE CHANGE	OPTION D – PRESCRIPTIVE REGULATION
Potential institutional arrangements	• Status quo	• RISSB to take a more independent role in best practice guidance, including in relation to safety, operational and scheduling practices • Independent national body to take on additional role to advise on guidance on national best practice access regulation • Independent national body (eg proposed new National EPA) could take on a co-ordination in environmental regulation	• RISSB to take a more independent role in best practice guidance and development of a suite of mandatory standards • ONRSR's objectives to be enhanced to include a productivity focus, including through enhanced harmonisation and with the ability to impose standards on the industry where they are unable to be agreed • Independent national body to provide guidance on national best practice access regulation, with jurisdictional regimes requiring accreditation with national guidance • Independent national body (eg proposed new National EPA) could take on a co-ordination in environmental regulation	• Development of a new national rail regulator with regulation encompassing; – Safety regulation and assurance – Operational standards including promoting harmonisation – Scheduling co-ordination – Environmental regulation – Access regulation

Source: Synergies. A more detailed explanation of these approaches is presented in section 4 of this report.

Each option offers potential solutions, but each involves a trade-off between the autonomy of rail stakeholders and the prescription of operating requirements. We have undertaken a structured evaluation of each option to assess the most appropriate broad option to pursue. This is shown below.

Table 3 Assessment of market co-ordination options

CRITERIA	OPTION A – INDUSTRY LED, CONSULTATIVE, VOLUNTARY	OPTION B – CENTRALISED GUIDANCE, VOLUNTARY	OPTION C – CENTRALISED GUIDANCE, OPTION TO MANDATE CHANGE	OPTION D – PRESCRIPTIVE REGULATION
Effectiveness	🔴 Unlikely to be effective as does not address underlying misalignment of incentives under current market and legislative structures	🔴 Unlikely to be effective as does not address underlying misalignment of incentives under current market and legislative structures	🟢 Potential to address underlying misalignment of incentives will depend upon the extent and specificity of the centralised guidance	🟢 Mandatory nature of regulatory regime likely to provide effective means of addressing operational constraints
Autonomy	🟢	🟢	🟡	🔴

	High degree of autonomy	High degree of autonomy	Some loss of autonomy, but retains ability to tailor arrangements to individual circumstances and to depart from centralised guidance on an exception basis	Limited autonomy, which may undermine ability of RIMs and Governments to pursue other legitimate objectives
Flexibility	🟢 High degree of flexibility	🟢 High degree of flexibility	🟢 Use of centralised guidance and ability to depart on exceptions basis provides significant flexibility	🟡 National regime can retain elements of flexibility, but likely to be more restrictive than centralised guidance
Time and cost	🟢 Largely reflects current models and approaches	🟢 Provides some additional transparency and specification of best practice approaches, but remains largely consistent with current models and approaches	🟡 Can be implemented with reliance on existing institutional structures, which will result in moderate time and cost to implement	🔴 Requirement for new institutional structures and regulatory frameworks will likely lead to extended implementation timeframes
Ease of implementation	🟢 Largely reflects current models and approaches	🟢 Provides some additional transparency and specification of best practice approaches, but remains largely consistent with current models and approaches	🟢 Reliance on existing institutional structures will limit barriers to implementation	🟡 Requirement for new institutional structures and regulatory frameworks likely to create significant implementation barriers
Overall Assessment	🔴 This is the option of least resistance, but is unlikely to be effective in alleviating operational constraints	🔴 This is a minimal change option, but again is unlikely to be effective in alleviating operational constraints	🟢 Provides the most balanced assessment against criteria	🟡 While likely to be the most effective in addressing operational constraints, provides less flexibility and likely implementation difficulties

Source: Synergies

This evaluation demonstrates that Option C is likely to provide the most balanced approach to addressing operational constraints while recognising legitimate requirements for flexibility and autonomy and addressing likely implementation risks.

The options discussed above provide opportunity for improved operational and regulatory co-ordination amongst RIMs and regulators. The remaining area where further co-ordination would generate significant gains is in the policy approaches and investment decisions of the various Governments (both State and Commonwealth). In particular, there are opportunities for Governments to more clearly identify the objectives for the facilitation of freight trains through shared networks (including via the specification of service obligations in its funding agreements with passenger operators) and to ensure that the decisions on investment in improved passenger service levels do not undermine objectives for freight services and mode share. In this regard, it is a welcome development that Infrastructure and Transport Ministers have agreed earlier this year to develop a Memorandum of Understanding on Interoperability which will consider a mechanism to implement interoperability impact assessments for future rail investments.[1] Some Commonwealth intervention may be required (possibly via COAG, Infrastructure Australia), involving the use of both 'carrots and sticks', to promote alignment amongst jurisdictions and/or RIMs.

Recommendations

Recommended actions to address the priority constraints are as follows:

Recommendation 1

Promote a step change to rail industry co-ordination that is able to effectively address incentive issues arising from network and jurisdictional regulatory fragmentation, and which, in turn, can effectively promote productivity enhancing harmonisation measures and reduce barriers to entry.

Recommendation 2

Endorse the use of a centralised guidance approach with option for mandated change ('Option C') and **investigate** specific policy and institutional options to implement this as part of the Policy Workstream.

Recommendation 3

Prioritise the introduction of centralised guidance according to the potential benefits, such that:

- the industry should place immediate priority on measures that promote safety and productivity gains through operational harmonisation;
- the industry should actively progress harmonisation of environmental regulation and access regulation, recognising that these are likely to present greater challenges (especially environmental harmonisation) but can also be expected to deliver long term benefits to the industry.

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[1] ARA (Rail Freight Executive Committee (2022) Agenda and Papers, p.14

Recommendation 4

Continue to use existing mechanisms, which will be reinforced by the centralised guidance approach, to identify the specific actions required to address high priority harmonisation related constraints, including actions agreed to under the National Rail Action Plan and other regulatory reviews.

Recommendation 5

Promote Governments providing clear freight objectives and freight measurement metrics in relation to shared metropolitan passenger networks (including moderating constraints imposed through passenger priority requirements), including through 'carrot and stick' interventions by the Commonwealth Government. **Consider** specific policy options to achieve this in the Policy workstream.

Contents

Figures and Tables

1 Introduction

1.1 Safety & Operations

The Safety & Operations Workstream is designed to identify the current constraints on the rail sector improving operational efficiency (while maintaining safety outcomes), their impact on mode share and a prioritisation framework for addressing them. Other factors impacting rail's mode share performance, including infrastructure constraints and policy settings, are considered in other workstreams.

1.2 Report structure

This report is set out as follows:

- Section 2 identifies current constraints on rail efficiency, based on an extensive literature review and direct consultations with stakeholders, and sets out how each constraint impacts on the critical rail mode share drivers;
- Section 3 prioritises the constraints according to an analysis of the benefits and impediments to addressing each constraint, and highlights the key impediments to improving efficiency;
- Section 4 provides a preliminary overview of the potential policy approaches that could contribute to addressing priority operational constraints, for further consideration in the Policy workstream;
- Section 5 presents recommendations; and
- Appendix A sets out the detailed assessment supporting our prioritisation of each identified constraint.

2 Current constraints on rail efficiency

Rail freight efficiency on key intermodal corridors is constrained by a series of differences that exist between networks and between jurisdictions.[2] There are also industry wide issues that impact efficiency. Such differences can act as a drain on efficiency where they increase the cost of operating rail freight services, reduce flexibility and stifle future investment and technological innovation.

These constraints directly influence the critical mode share drivers of price (by increasing average rail costs) and reliability (including both on-time and predictable arrival), and in some cases also influence transit time and frequency/availability. Importantly, these constraints materially increase entry complexity and costs, increasing barriers to entry. Lower barriers to entry facilitate a more competitive operating environment, leading to increased incentives for reduced rail freight price and/or enhanced service levels.

2.1 Extent of network and jurisdictional fragmentation

Over the last three decades, there has been significant change to the structure of Australia's rail industry. Privatisation of elements of the rail sector, together with government institutional changes, have resulted in a significantly increased number of independently managed rail networks.

For those constraints that are fundamentally caused by the fragmented management of Australia's rail networks, or by the jurisdictionally based regulatory frameworks, the extent of the impact depends on the extent to which services cross separate train networks and operate within different jurisdictions. Information on the number of train networks and jurisdictions that may be involved in rail journeys is summarised in the following table, highlighting the extent to which network or jurisdictional fragmentation can impact the rail sector.

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[2] An explanation of rail efficiency and its relationship with each of the modal share drivers is set out in Appendix A.

Table 4 Extent of network and jurisdictional fragmentation

CONSTRAINTS - CATEGORY	EAST-WEST	NORTH SOUTH	QUEENSLAND NCL AND BULK FREIGHT
Network fragmentation	• 9 different networks in geographical area from east coast capital cities to Perth – Qld: ARTC (border to Acacia Ridge), QR (Acacia Ridge north including Port) – NSW: Sydney Trains, Country Regional networks, ARTC, TAHE (network owner and contracting party), TfNSW (manager of Sydney Trains timetable) – Vic: VLine, Metro Trains Melb, VicTrack, ARTC – SA: OneRail, ARTC – WA: ARC, ARTC, WA DoT • Multiple access agreements required for operation of individual service, eg for Brisbane to Perth services, four agreements would be required if running via the Blue Mountains route • Multiple RIM transition points during operation of individual service, eg for Brisbane to Perth services, four transition points must be crossed if running via the Blue Mountains route (ARTC-ST-CRN- ARTC-Arc)	• 6 different networks in geographical area from Melbourne to Brisbane – Qld: ARTC (border to Acacia Ridge), QR (Acacia Ridge north including Port) – NSW: Sydney Trains, Country Regional networks, ARTC, TAHE (network owner and contracting party), TfNSW (manager of Sydney Trains timetable) – Vic: VLine, Metro Trains Melb, VicTrack ARTC, • Multiple access agreements required for operation of individual services, eg two agreements required to operate from Melbourne/Sydney to Brisbane • Multiple RIM transition points during operation of individual service	**Qld NCL** • 2 different networks in geographical area from Brisbane to north Queensland – QR – Aurizon Network (central Queensland coal network components of north coast line) – Two access agreements required for journeys through this corridor – Four RIM transition points to be managed **Bulk freight** • Bulk freight typically operates from regional rail networks to ports. The extent of network fragmentation varies by route. • For example, in NSW: – freight operators may need to hold up to four access agreements for operation of a single regional bulk service – Multiple RIM transition points are required for each service, eg: – Six RIM transition points for a train from Coonamble to Port Kembla [CRN-ARTC-CRN-ST-ARTC-ST-NSW Ports] – Three RIM transition points for a train from Narrabri to Port Botany [CRN-ARTC-Hunter-ST-ARTC Interstate] – Three RIM transition points for a train from Riverina to Port Kembla [CRN-ARTC-ST-NSW Ports]
Jurisdictional differences in	**Safety**	**Safety**	**Safety**

CONSTRAINTS - CATEGORY	EAST-WEST	NORTH SOUTH	QUEENSLAND NCL AND BULK FREIGHT

regulatory environments	• The same regulatory framework applies across RIMs, however, co-regulatory framework means that interpretation of regulatory obligations differs by RIM
	Environment
	• Operators have to comply with specific environmental legislation in WA, SA, Qld, Victoria and NSW. The NSW EPA is regarded by some rail stakeholders as having particularly stringent regulations compared to other jurisdictions.
	• A 2018 PwC report noted that there are roughly 150 different environmental regulations that operators must comply with when operating rollingstock between Perth and Brisbane.[3]
	Labour
	• NSW and Queensland both impose additional prescribed elements over and above labour requirements elsewhere in Australia.
	Access regulation
	• Multiple access regimes
	– ARTC interstate network– submits voluntary interstate access undertakings to ACCC under National Access regime
	– Arc Infrastructure – WA rail access regime, regulated by ERA WA
	– Sydney Trains, Country Regional Network – NSW Rail Access Undertaking, regulated by IPART
		• The same regulatory framework applies across RIMs, however, co-regulatory framework means that interpretation of regulatory obligations differs by RIM
		Environment
		• Operators have to comply with specific environmental legislation in Qld, VIC and NSW.
		Labour
		• NSW and Queensland both impose additional prescribed elements over and above labour requirements elsewhere in Australia.
		Access regulation
		• Multiple access regimes
		– ARTC – submits voluntary access undertakings to ACCC under National Access regime, separate access undertakings for Hunter Valley network and Interstate network
		– ARTC – ARTC's sections of Sydney metropolitan rail network remain subject to NSW Rail Access Undertaking regulated by IPART
		– Sydney Trains, Country Regional Network –subject to the NSW Rail Access Undertaking regulated by IPART
			• The same regulatory framework applies across RIMs, however, co-regulatory framework means that interpretation of regulatory obligations differs by RIM
			Environment
			• Qld NCL and regional freight services usually operate within a single state jurisdiction, and therefore a single state environmental legislation applies. However, there are some regional freight services that operate across state borders in Victoria, NSW and SA, which must comply with environmental legislation in each state.
			Labour
			• In relation to those services that operate across state borders, NSW imposes additional prescribed elements over and above labour requirements elsewhere in Australia.
			Access Regulation
			• While these services largely operate within a single state, they are often subject to multiple access regimes:
			– Within Queensland, the Queensland access regime applies to all rail networks, but separate QCA approved access undertakings for QR and Aurizon Network
			– Within NSW,
			    – ARTC interstate and Hunter Valley network subject to separate access undertakings under ACCC
			    – Remainder of the NSW rail network subject to NSW Rail Access Undertaking regulated by IPART

Source: Synergies

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[3] PwC Consulting (2018), Review of rail access regimes, May 2018, p.22

2.2 Identified operational constraints

The following table identifies the key operational constraints impeding rail efficiency and their impact on mode share drivers. This list has been prepared based on a comprehensive desktop literature review as well as direct stakeholder consultations between Synergies and rail industry stakeholders.

The extent to which each constraint impacts on the key drivers of mode share is identified using the following icons:

$	Impacts on average cost, and hence, rail freight price
🛡	Impacts on reliability, including on time and predictable arrival of freight
⏱	Impacts on transit time
📅	Impacts on the potential frequency and availability of rail services

Table 5 Operational constraints on rail service efficiency

CONSTRAINT	CAUSE	DESCRIPTION	IMPACT ON MODE SHARE DRIVERS
a. Inconsistent operational requirements	i. Network fragmentation	• Different RIMs have different operational requirements specified in rule books and procedural standards, driven by factors other than different physical infrastructure characteristics • Increases cost by – requiring duplicated processes, increasing training and certification costs, reducing crew flexibility and increasing maintenance costs • Inconsistency in rules creates additional operational constraints and safety risk • Increases entry complexity and costs, creating barriers to entry	$ 🛡

CONSTRAINT	CAUSE	DESCRIPTION	IMPACT ON MODE SHARE DRIVERS
		• In contrast, for the road sector, NHVR has been highly effective in harmonising operational requirements across jurisdictions	
b. Silo based safety management systems	i. Network fragmentation ii. Co-regulatory model for safety regulation	• Co-regulation has been highly effective in allowing the rail industry to develop flexible, risk based controls to manage safety. • However, despite a single safety law and safety regulator, the co-regulatory framework results in each RIM having a separately developed, and independently managed, safety management system, often applying different controls to address the same risk • Increases cost by – requiring duplicated processes, increased 'dead time' during commissioning of new equipment, imposing of inconsistent safety approvals and requirements, and different controls being implemented to address the same risk – increasing the required specification and cost of rollingstock to meet all network requirements – creating barriers to innovation and investment in new technology • Inconsistency in rules creates additional operational constraints and safety risk • Increases entry complexity and costs, creating barriers to entry • In contrast, for the road sector, NHVR has been highly effective in harmonising operational requirements across jurisdictions	$ 🛡
c. Inconsistent physical standards and equipment	i. Network fragmentation ii. Legacy infrastructure	• Different engineering standards for trains between RIMs (and sometimes within a single RIM's network) are driven by different physical characteristics of infrastructure • Different train control systems and communication systems require the installation of different equipment on rollingstock • Increases cost by: – Increasing the required specification and cost of rollingstock to meet all network requirements – Differing standards drives under-utilisation of rollingstock, • Increases entry complexity and costs, creating barriers to entry • By comparison, for the road sector, different road infrastructure standards have less complex impacts on truck specifications	$

CONSTRAINT	CAUSE	DESCRIPTION	IMPACT ON MODE SHARE DRIVERS
d. Co-ordination of pathing, train management and possession arrangements	i. Network fragmentation ii. Technology	• Different train control systems, operating requirements, on-time thresholds and possession regimes are applied by the different RIMs • Difficulty/complexity in securing contiguous paths across networks increases transit times and reduces the ability to maximise the use of available rollingstock and network capacity • Poor operational co-ordination reduces rail service reliability • Increases cost by: – reducing rollingstock utilisation – reducing incentive to invest in rollingstock to meet freight demand • By comparison, for the road sector, there is no corresponding requirement	$ 🛡 🕒 📅
e. Access management processes	i. Network fragmentation ii. Jurisdictional regulatory fragmentation	• Different negotiation processes and standard terms and conditions for access agreements • Separate and different processes for securing access to paths, with multiple approvals required for cross border routes • Influence cost by: – Increasing business management costs – Increasing the regulatory burden for network providers and government, which are passed onto rail operators • Increases entry complexity and costs, creating barriers to entry • By comparison, for the road sector, there is no requirement for negotiated access to roads	$
f. Concentration in above rail market	i. Barriers to entry	• Barriers to entry exist due to: – access to critical physical facilities – while regulated access to rail networks applies, lack of access to a network of efficient terminal facilities is a barrier to new entrants, particularly in intermodal markets – commercial access to markets – it is necessary to generate large customer volume to support market entry, which can be difficult to achieve in intermodal markets – complexity and cost of entry – which is significantly exacerbated by network and jurisdictional fragmentation. • Reduced barriers to entry/greater competition can create stronger incentives to seek efficiency gains • In contrast, road has many operators of all sizes and there is strong competition within that mode. This, combined with a productivity focus by regulators and policymakers, means that road freight is continually striving for greater efficiencies	$ 🛡 🕒 📅
g. Environment	i. Jurisdictional regulatory fragmentation	• Different jurisdictional environmental regulatory frameworks, which can result in different environmental obligations, forcing operators to persist with outdated technology in order to be able to operate • Environmental regulators consider rail environmental performance in isolation (instead of relative to the alternate transport mode), which could lead to worse environmental outcomes if rail cannot meet desired standards • Increases cost by:	$ 🛡 📅

CONSTRAINT	CAUSE	DESCRIPTION	IMPACT ON MODE SHARE DRIVERS
		– Increasing the required specification and cost of rollingstock – Creating barriers to innovation and investment in new technology – Reducing incentives to invest in rollingstock to meet freight demand • Increases entry complexity and costs, creating barriers to entry	
h. Workplace flexibility	i. Workplace agreements	• Rail characterised by a small number of large players with highly unionised workforce. High levels of role demarcation and rigidity in employment arrangements reduces workplace flexibility, with consequences of increased cost and reduced reliability • Road by contrast is fragmented with a diverse array of small operators and sub-contractors.	$ 🛡
i. Insufficient skilled workers	i. Workforce characteristics	• Workforce characteristics, with ageing retiring population; low retention rates = under supply of skilled labour • Increases costs due to requirement for additional recruitment processes, incentives and training • Increases operational constraints and, in the event of insufficient skilled workers to replace a retiring population, may impose limits on the ability to increase service levels to meet demand • The road sector has similar challenges with its workforce characteristics, although there is a greater supply of drivers for road	$ 🛡 📅
j. Driver training	i. Network fragmentation ii. Technology	• Driver competency requirements for rail are high and include demonstrated expertise on specific routes. However, driver training is not tailored to requirements, with different route accreditation requirements by different RIMs, and does not take full advantage of technological opportunities • Increases training costs • Increases crewing constraints due to limitations on driver route accreditation • Extended training timeframes can limit the ability to increase service levels to meet demand • Driver training requirements for rail are far more extensive than for road	$ 🛡
k. Fatigue management	i. Other Government policies	• Some differences in fatigue management requirements, – The Rail Safety National Law and regulations create a consistent framework for fatigue risk management, but Queensland and NSW mandate outer limits of service for train drivers; • Increases cost by reducing crew flexibility • Reduces reliability by removing the ability for freight operators to deal with these unforeseen events with any degree of agility	$ 🛡

CONSTRAINT	CAUSE	DESCRIPTION	IMPACT ON MODE SHARE DRIVERS
l. Passenger priority and peak period curfews	i. Other Government policies	• Inflexible application of passenger priority and peak curfew requirements is challenging and excessively restrictive – Passenger priority and peak period curfews apply in Sydney, Melbourne and Brisbane • Increases cost by reducing rollingstock utilisation and ability to maximise use of rail network capacity • Reduces reliability by creating additional delays for freight trains	$ 🛡 🕒 📅
m. lack of access to real time information on likely arrival times	i. Technology ii. Network fragmentation	• Excessive operational delays and lack of access to real time information on train location and likely arrival times– within and across networks - means that planning and scheduling are not able to automatically adjust to delays or incidents as they occur (nor are they used for better planning) • Inability to accurately predict arrival times can increase PUD costs, by limiting ability to align logistics arrangements • By comparison, there is a much greater ability for road transport operators to use technology solutions to provide real time information on location and predict arrival times • Note: This is being addressed under the Infrastructure and Planning Workstream	$ 🛡

Source: Synergies

From this table, it can be seen that there are some key common causes of inefficient constraints on the rail network, the most significant of these being:

(a) market structure - network fragmentation, which contributes to operational, safety, physical, network pathing and access management related constraints;

(b) jurisdictional differences in regulatory environments, which contributes to environmental and access management related constraints;

(c) technology, being the extent to which the industry has accepted the use of, and invested in, leading edge technology to promote efficiency, which contributes to driver training and real time information on train arrival times;

(d) industrial relations flexibility; and

(e) other Government policies, which contributes to fatigue management constraints and passenger priority related constraints.

3 Prioritisation of issues

3.1 Prioritisation framework

A prioritisation framework has been developed to prioritise addressing the identified constraints. The factors that we consider are a relevant consideration are set out below. They can be grouped into factors that are considered to be benefits (upside factors) and those that act as impediments to addressing the constraint (downside factors).

Table 6 Factors to consider in a prioritisation framework

FACTOR	EXPLANATION
Benefits	
1. Mode share driver impact	• How many mode share drivers does the constraint affect? • Does the constraint affect the high impact mode share drivers of price and reliability?
2. Materiality of impact	• Does the constraint have a direct, regular impact on train operating costs? • Does the constraint affect the availability and utilisation of rollingstock? • Does the constraint impose higher rollingstock acquisition costs? • Does the constraint have a material impact on business management/overhead costs? • Does the constraint impose an excessive regulatory burden that adds to costs or causes businesses to adopt inefficient solutions? • Does the impact relate to a short or long term problem?
3. Breadth of impact	• How many intermodal train services does the constraint affect? • Does the constraint have a broad impact on rail services (beyond intermodal)? • Does the constraint have any spill-over effects to other parts of the freight task? • Does the impact relate to a short or long term problem?
Impediments	
4. Complexity/time horizon	• Is the nature of the constraint structural to rail (or to the whole economy), operational or commercial? • Is the root cause of the constraint embedded in the existing governance structure or in legislation? • Is the constraint an 'easy fix' or does it require a long term commitment over a sustained period of time?
5. Strategic alignment	• Is there alignment between rail businesses on the strategic and commercial rationale for addressing the constraint? • Are there public statements by government acknowledging this problem and that action must be taken? • Are there any existing policies that are targeted at this constraint? • Is the constraint the subject of deep research already and is well known?
6. Financing	• Will the constraint require significant funding to address (either by government or by private parties or both)? • Is it likely to be commercially viable for a solution to be implemented?

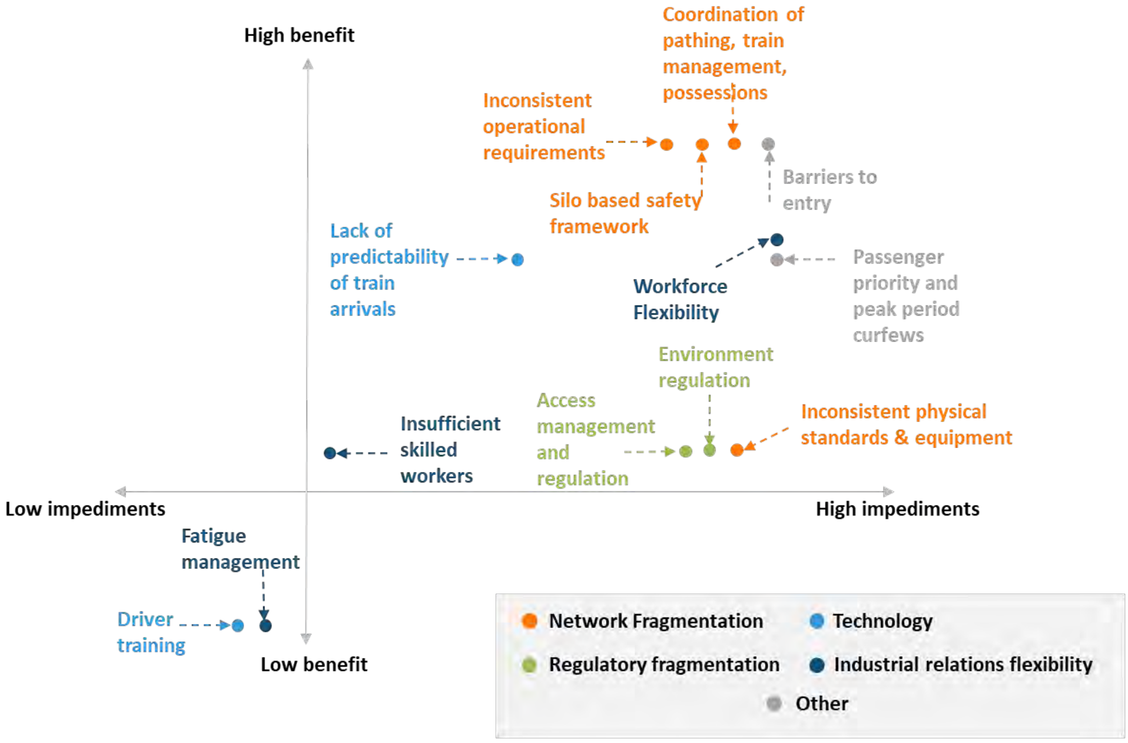
Source: Synergies

3.2 Issues assessment

This section applies the framework set out in Section 3.1 to prioritise the identified issues and assess 'high value levers' to remove constraints on rail efficiency.

Appendix A sets out the detailed results of our assessment of each constraint against this prioritisation framework, in each case ranking the benefits and impediments as high, medium or low. This analysis is summarised in the figure and table below and, based on this analysis, we have presented our overall assessment of the benefits and impediments. Noting the large number of constraints that are caused by network and jurisdictional fragmentation, we have also identified whether there is potential for these constraints to be alleviated through revised governance arrangements.

Figure 1 Summary of benefits and impediments of operational constraints



Source: Synergies

Table 7 Analysis of assessment of benefits and impediments

CONSTRAINT	BENEFITS	IMPEDIMENTS	CURRENT STATUS OF ACTIONS TO ADDRESS CONSTRAINT	OVERALL ASSESSMENT
a. Inconsistent operational requirements	**High** • Has a material impact on the most significant modal choice drivers (price, reliability); complexity creates barrier to entry • Is a common issue for rail operators using multiple rail networks	**High** • Issues are complex and driven by multiple factors, and implications for safety • While there is a policy agenda to promote harmonisation, incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical issues	**Issues identified** • **National Rail Action Plan** (NRAP) (2020) – managed by the NTC, is an agreed set of actions to be undertaken by the Commonwealth, state and territory governments and key members of the rail industry; has two main focuses incl 'to improve efficiency and safety of Australia's rail system by continuing to align or harmonise operating rules, infrastructure and operational standards and systems across the nation's rail network' (p.3) – **ARA** is leading the Interoperability & Regulation Working group to work towards establishing industry-level policy and advocacy priorities on interoperability & regulation – **RISSB** has program to develop/review voluntary standards, currently reviewing standard for Type Approvals process	• Significant inter-relationship between operational standards, rule books and safety management systems • **High benefits** to achieving more consistent arrangements across networks • Difficult to achieve given network fragmentation and institutional framework • **Can be improved with revised governance arrangements** provided that these create the necessary incentives and/or mandatory requirements to achieve more consistent operating standards and rules across networks
b. Silo based safety management systems	**High** • Has a material impact on the most significant modal choice drivers (price, reliability); complexity creates barrier to entry • Is a common issue for rail operators using multiple rail networks	**High** • Issues are complex and driven by multiple factors, and implications for safety • While there is a policy agenda to promote harmonisation, incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical issues		
c. Inconsistent physical standards and equipment	**Medium** • Has a material impact on the most significant modal choice drivers (price, reliability); particularly reduces rollingstock utilisation and influences incentives to invest in new technology rollingstock	**High** • Driven by differences in legacy infrastructure and systems for different RIMs, as well as different risk tolerances • Significant investment may be required to address differences	**Issues identified** • **National Rail Action Plan** (NRAP) (2020) – Concerns with variations in infrastructure standards have been highlighted. • **RISSB** is conducting an audit of existing infrastructure standards and to identify opportunities for standardisation	• **Moderate benefits** to achieving more consistent physical standards and equipment • **Difficult** to achieve given costs to improve alignment, exacerbated by network fragmentation • **Potential to be improved with revised governance arrangements** provided that these create the necessary incentives and/or mandatory requirements to achieve more consistent assessment of risk

CONSTRAINT	BENEFITS	IMPEDIMENTS	CURRENT STATUS OF ACTIONS TO ADDRESS CONSTRAINT	OVERALL ASSESSMENT
	• Significant constraints are more likely to apply for bulk services operating over both regional and mainline networks, but also apply to intermodal services (eg inability to use double stacking directly out of Sydney and Melbourne • Equipment inconsistencies (eg radios and communications) lower impact and reflect legacy RIM systems	• While there is a policy agenda to promote harmonisation, incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical risk tolerance issues and required investment	• **RISSB** is working with governments to establish increased standardisation / harmonisation of rollingstock components	• **Funding support likely to be required** where significant investment would be necessary to improve standardisation • Refer to Infrastructure & Planning workstream
d. Coordination of pathing, train management and possession arrangements	**High** • Has a material impact on the most significant modal choice drivers (price, reliability); particularly influences rollingstock utilisation • Also has a material impact on transit time and capacity utilisation (hence frequency/availability) • Is a common issue for rail operators using multiple rail networks	**High** • Issues are complex and driven by RIMs having different commercial incentives due to primary customer requirements (eg passenger, local bulk) and hampered by absence of suitable technology to aid optimal decisions on co-ordination of pathing and train management	• Industry portal maintained to facilitate response to applications for train paths across networks, but does not actively co-ordinate and optimise arrangements across networks • No known actions to date to address this constraint in intermodal / regional freight sectors	• **High benefits** to achieving coordinated pathing, train management, possessions and managing passenger curfews (for bulk & regional freight) • **Difficult** to achieve given network fragmentation and institutional framework • **Potential to be improved with revised governance arrangements** to create the necessary incentives to achieve coordinated solutions • **Funding support may be required** where imposition of different pathing priorities would increase costs incurred by RIM (eg through less productive maintenance possessions)
e. Access management and regulation	**Medium** • Has a material impact on one of the most significant mode choice drivers (price); complexity creates barrier to entry • Is a common issue for rail operators using multiple rail	**High** • Driven by different jurisdictional regulatory obligations as well as differences in organisational precedent and commercial preferences	• **ARA (2022)** – Interoperability WG (under the NRAP) has previously identified that interoperability cannot be achieved without resolution of access issues. • **BITRE (2006)** – has previously identified that regulatory inconsistencies as one factor that has impeded the flow of rail traffic	• **Moderate benefits** to achieving more consistent access management processes • **Difficult** to achieve given network fragmentation and institutional framework • **Can be improved with revised governance arrangements** to create the necessary incentives to achieve coordinated solutions

CONSTRAINT	BENEFITS	IMPEDIMENTS	CURRENT STATUS OF ACTIONS TO ADDRESS CONSTRAINT	OVERALL ASSESSMENT
	networks, given seven different regulatory frameworks overseen by six different regulators; differences also apply for individual RIM's under a given framework • While regulation is based on consistent principles there are significant differences in operation	• There is no current national policy agenda to improve alignment of access regulation, and as a result no incentive for jurisdictions to cede autonomy		
f. Concentration in above rail market	**High** • Has a material impact on all mode share drivers, as direct threat of direct rail competition creates incentives for reduced cost, reduced price and enhanced service levels • High degree of concentration in intermodal markets (1-2 operators on any route), but greater competitive pressure in bulk markets, where tenders provide competition 'for the market'	**High** • Multiple issues contributing to barriers to entry including • access to critical physical facilities (primarily an issue for terminals given regulation of access to rail networks) • commercial access to markets (primarily an issue for intermodal, where long term volume contracts are not used) • complexity of entry requirements (significantly driven by the harmonisation issues addressed in this assessment)	**Issues identified and action underway on some issues** • Government policy is to establish new intermodal terminals on an open access basis • Government policy to improve physical and operational harmonisation will reduce barriers to entry, provided strategies can be successfully identified and implemented	• **High benefits** available to reducing barriers to entry in above rail market • **Can be improved with revised governance arrangements** to improve the harmonisation issues addressed in this assessment, which will reduce complexity of entry
g. Environmental regulation	**Medium** • Has a material impact on the most significant modal choice drivers (price); particularly reduces rollingstock utilisation and influences	**High** • Primarily driven differing perspectives of environmental regulators on how to promote best outcomes	**Issue identified** • **ARA - (under the NRAP)** - is leading the Interoperability & Regulation Working group, and notes that: • Environmental regulation as it relates to rail freight is inconsistent between jurisdictions, is not adequately informed by	• **Moderate benefits** to reducing jurisdictional differences in environmental regulation • **Difficult** to achieve given current statutory and institutional design • **Can be improved with revised governance arrangements** to create the necessary incentives to achieve greater alignment of

CONSTRAINT	BENEFITS	IMPEDIMENTS	CURRENT STATUS OF ACTIONS TO ADDRESS CONSTRAINT	OVERALL ASSESSMENT
	incentives to invest in new technology rollingstock • Is a common issue for rail operators using multiple networks, given six jurisdictional regulatory regimes apply	• In the absence of agreed national policy agenda, no incentive for jurisdictions to cede autonomy	expert knowledge of the rail freight industry and does not sensibly consider the negative externalities of regulatory responses to poor performance.	environmental standards (and accompanying accreditation processes) across jurisdictions
h. Workplace flexibility	**Medium** • Significant impact on modal choice drivers (price) • Is a common issue across rail operations	**High** • Entrenched/legacy issues, with structural impediments to effective negotiation of enterprise agreements	• An economy wide issue	• **Moderate benefits** to increased flexibility in industrial arrangements • **Difficult** to achieve as an economy wide issue • **Unlikely to be improved by revised governance arrangements**
i. Insufficient skilled workers	**Medium** • Impact on significant modal choice drivers (price and reliability) • Is a common issue across rail operations	**Medium** • Issues relating to aging population are well known, ARA is actively pursuing recruitment campaigns; issue will take years to see significant changes to workforce profile	**Issue identified and action underway** • **National Rail Action Plan (NRAP) (2020)** – work program to identify critical skills and meet those needs • **COAG** has established a new COAG Skills Council to drive skills reform (were due to provide a reform roadmap to COAG) • **Governments and industry** have partnered on a range of programs to develop critical rail skills	• **Moderate benefits** to achieving a long term, sustainable workforce • **Current initiatives** should continue

CONSTRAINT	BENEFITS	IMPEDIMENTS	CURRENT STATUS OF ACTIONS TO ADDRESS CONSTRAINT	OVERALL ASSESSMENT
j. Driver training	**Medium** • Impact on significant modal choice drivers (price and reliability) • Is a common issue across rail operations	**Low - Medium** • Driver training for freight trains likely to be unavoidably more complex (and more time consuming) than for trucks • However, investment in more technology driven training may create more efficient and better aligned driver training requirements	**Issue identified** • **ARA (under the NRAP)** - is leading the Interoperability & Regulation Working group and has identified this as one area which could most readily be resolved with a direct and rapid productivity and efficiency dividend for industry, without comprising safety.	• **Moderate benefits** to addressing opportunities for more efficient driver training processes, and addressing jurisdictional differences in driver training requirements • **Potential to be improved** even in the absence of revised governance arrangements to increase incentives for harmonisation
k. Fatigue management	**Low – Medium** • Key issue relates to fatigue management • Has an impact on the most significant modal choice drivers (price, reliability) • Additional requirements only in NSW & Qld (have additional schedules for outer work hour limits for train drivers in both NSW and QLD)	**Medium** • Issues are well defined and not complex, however harmonisation to a risk based approach is not supported by NSW and Qld	**Issue identified** • **Federal Government's response** to 2020 PC inquiry report into national transport regulatory reform: . – Ministers agreed to further review of fatigue arrangements as a step towards achieving a consistent approach, to commence no later than 2022 • As the recommendation to set outer limits on driving hours applied to both the RSNL and HVNL, consideration is being given to both regulators working together on this issue	• **Low to moderate benefits** to reducing ongoing jurisdictional differences in labour regulation • **Difficult** to achieve in those jurisdictions where differences remain given current statutory design • **Unlikely to be improved by revised governance arrangements** • Combined effort by ONRSR and HVNL may create stronger momentum for change
l. Passenger priority and peak period curfews	**Medium – High** • Influences high impact mode share driver of price; particularly influences rollingstock and capacity utilisation (more significant impact for bulk and port shuttle services) • Significant impact on any services that need to use	**High** • Issues are well known, but there remain strong policy interests in ensuring maximum reliability of commuter services, and low risk tolerance	**No known actions to address constraint**	• **Moderate benefits** to better managing freight and passenger priorities – While passenger priority would be expected to remain, there may be opportunity liberate some capacity for freight services through a more nuanced application • **Difficult** to achieve given low risk tolerance around urban passenger demands and high cost to develop separated networks

CONSTRAINT	BENEFITS	IMPEDIMENTS	CURRENT STATUS OF ACTIONS TO ADDRESS CONSTRAINT	OVERALL ASSESSMENT
	metropolitan areas with peak curfews, particularly Sydney			
m. Lack of access to real time information on likely arrival times	**Medium – High** • Influences reliability (both on-time arrival and predictability) and PUD costs • Limitation applies to all rail networks	**Medium – High** • There are known technology systems that will address issue, however, there is cost and complexity in implementing these systems including addressing interoperability, and RIMs may not have a commercial incentive for investment	**Issue identified** • **National Rail Action Plan (NRAP) (2020).** – Under NRAP, an industry working group of was tasked with completing a report on network business cases for the implementation of interoperable systems and the recommended role of government to deliver those benefits.	• **Moderate to high benefits** of improving access to real time information • **Refer to Infrastructure & Planning workstream** in relation to digital train control and automated train scheduling systems

Source: Synergies

3.3 Critical impediments

The assessment in section 3.2 firstly shows there is ‘no low hanging fruit’ or ‘easy fixes’ to improving rail operating efficiency. None of the operational constraints assessed can be considered to have ‘low’ impediments to address and, for many of these constraints, the rail industry has, over an extended period, been investigating opportunities to reduce their impact. Through these forums, any ‘easy’ gains (high benefits coupled with few impediments) are likely to have already been implemented. The issues that remain tend to be ones that are difficult and complex to progress, but which have opportunity to release significant benefits.

As a result, rather than seeking to prioritise opportunities by identifying ‘easy wins’ on an issue by issue basis, we believe that it is instead more important to prioritise factors that are impeding solutions to these issues, and to identify where there are any high impact impediments that, if addressed, could potentially allow further progress to be made on the removal of efficiency constraints on an issue by issue basis.

Reviewing the assessment of issues, it is clear that a lack of strategic alignment is a high ranking impediment for many of the issues, and that the most important factors that are driving this lack of strategic alignment relate to structural market design issues (i.e. network fragmentation) as well as the absence of institutional and regulatory arrangements to improve market co-ordination. These are explained as follows:

- Network fragmentation and mixed organisational focus on intermodal freight:
  - RIMs are almost all expected to operate within a commercial framework and are governed by their own commercial drivers. For some RIMs, intermodal freight (or even mode contestable bulk freight) is not their major customer, and the commercial outcomes for the RIM will be largely driven by its performance in meeting the needs of its major customers (eg passenger services in the metropolitan networks, coal services for the Hunter Valley and Central Queensland coal networks). Mode contestable freight (intermodal and mode contestable bulk) can have limited commercial leverage for these networks. The problem is exacerbated where Governments, as owner or funder of networks (particularly metropolitan passenger networks), do not specify any clear freight objectives or clearly defined freight performance metrics.
  - Even where intermodal or regional freight is the major customer, meeting their needs may not provide the strongest commercial driver for the RIM. For networks that are directly supported by Government funding (eg NSW CRN, Queensland regional network), the RIM may be more strongly driven by the incentive to reduce costs within the terms of its contract with Government than to bear any cost to promote rail utilisation – we are not aware of remuneration mechanisms for RIMs in these cases.

  - As a result, there is significant misalignment of incentives between RIMs in how they manage inter-network train services. This is not a criticism of the RIMs, as they are all responding to their own organisational objectives. Rather, it is a predictable outcome of what we understand to be the incentive framework. Given the extent of misalignment of commercial objectives, it is unrealistic to expect that the industry should be able to collaboratively reach a commercial agreement on how to address many inter-operability issues, as there is little benefit to the RIMs from doing so and potentially material costs involved. Ongoing reform of incentive arrangements between RIMs and relevant Government owners provides the most effective means of addressing this issue.

- Regulatory frameworks that do not promote harmonisation:
  - While there are long term policy agendas to promote harmonisation, the focus of this has been on harmonisation between RIMs through industry collaboration. As discussed above, this approach runs into difficulties where the stakeholders have incompatible commercial objectives. But this approach also runs into difficulties where the stakeholders are subject to differing jurisdictional regulatory requirements and/or are governed by different jurisdictional regulators who may have different priorities and interpretations of requirements.
  - Even in rail safety, where there is a single regulatory framework and a single national safety regulator, harmonisation concerns still apply. The co-regulatory framework, which provides for each RIM to develop its own safety systems to address the risks on its network, is designed to address the varying characteristics and safety risks of differing networks. This approach does not promote harmonised approaches to managing risks across networks (although it does not prevent harmonised approaches being applied if proposed by the rail operator).
  - There is no national policy agenda to review regulatory frameworks in order to promote harmonisation. Rather, the frameworks rely on individual RIMs and regulators to implement more consistent obligations and approaches to increase harmonisation.
  - This approach to regulation of rail networks differs materially from the regulation of other cross jurisdictional infrastructure networks, such as electricity, gas and telecommunications, as well as the road network. In these cases, the intrinsic characteristics of the underlying product together with regulatory frameworks are designed to promote consistency in standards and approaches.

These factors mean that collaborative approaches to addressing efficiency constraints, will have only limited efficacy. As identified previously by the ARA and the Interoperability Working Group as part of their role in delivering the National Rail Action Plan, there is limited ability for the industry to meaningfully impact interoperability challenges constraining productivity within the current structure of authority shared by jurisdictions without achieving a step change in commitment to coordinated decision making in the national interest or major Commonwealth intervention.

Development of alternative options for industry co-ordination that are able to more effectively address these issues will be critical in enabling the development of strategies to address issues arising from network and jurisdictional regulatory fragmentation and will assist in reducing barriers to entry. While alternative industry co-ordination options will not, by themselves, resolve these issues, we consider that more effective industry co-ordination is an essential pre-requisite to the development of long term solutions to these matters.

4 Industry co-ordination options

Without some form of independent intervention, the constraints which are intrinsically embedded in the existing market structure will most likely continue to limit rail's competitiveness. It would not be correct to regard this as a failing of the existing market participants per se, but more reflective of a simple reality that industry incentives and existing institutional structures are not designed to deliver harmonised or coordinated solutions that effectively deal with incompatibilities that lead to inefficiencies that extend beyond structural or jurisdictional boundaries.

4.1 Option identification

To address the constraints identified above, some form of effective, coordinated industry guidance or prescriptive change is required. This is likely to ultimately involve institutional change, however the institutional implications will be driven by the nature of co-ordination mechanism adopted. There are several industry co-ordination options available, with each option reflecting a different profile of operational and regulatory centralisation. These profiles are not the only possible scenarios that may be considered, but understanding the key approaches available may help in the design of specific policy and institutional options (as will be considered under the Policy Workstream). The four broad approaches are:

Option A – industry led, consultative approach

- reflects a continuation of the current approach
- greater harmonisation, and regulatory reform is encouraged through collaborative forums, with the onus for change remaining with different RIMs, jurisdictional regulators and governments
- delivery is likely to be less costly to the government than interventions
- however, as has been demonstrated to date, given the conflicting commercial objectives of RIMs, there are significant limitations on the issues that can be resolved through this process.

Option B – centralised guidance on rail operations and regulations, implemented through voluntary measures

- Presents incremental change to the current operational and regulatory environment

- Stronger mechanisms would be developed that provide central guidance to state regulators and RIMs based on a ‘best practice’ approach to each issue, with adherence to remain on a voluntary basis, involving consultation and development with interested parties

- Guidance could be developed through already established national bodies (eg RISSB, ONRSR, ACCC), however this may require some amendment to their current scope of responsibilities and/or governance arrangements in order to allow them to present an independent view on best practice approaches.

Option C– centralised guidance on rail operations and regulation – with an option to mandate change

- presents moderate change to the current operational and regulatory environment

- guidance would be developed and provided based on an assessment of a ‘best practice’ approach to each issue, as with Option B

- however, this option would provide for mandated changes to standards or processes where the centralised guidance is not voluntarily adopted although there could be an opportunity for derogations to reflect local circumstances

- this option would therefore provide mandated changes and increased direction to RIMs and state based regulators, with legislative change limited wherever possible

- implementation of recommended regulatory mechanisms could be the responsibility of existing regulators. For example, ONRSR’s current safety mandate could be expanded to include a productivity objective, including through improved harmonisation, recognising ONRSR’s existing capability and the significant overlap between the two roles.

Option D – prescriptive regulation

- This option presents significant change to the current institutional, regulatory and operational environment through the introduction of prescriptive, nationally consistent, regulation.

- This would include
  - almost certainly, a new body with Australian states ceding jurisdiction to that new body
  - national safety and assurance accreditation, with greater level of prescription and mandated harmonisation than the current co-regulatory framework

- national rail operational regulation, to provide a consistent and co-ordinated approach to non-safety operational issues, such as capacity and path allocation and train scheduling
- national environmental regulation
- national regulation of rail access and economic regulation

The following table outlines the four broad options of market co-ordination arrangements and how they could be applied in tackling the high value operational constraints associated with network and jurisdictional regulatory fragmentation identified in this paper.

The purpose of this table is to identify the co-ordination options available to the industry. While some of these options will require a change in existing institutional structures, the purpose of this table is not to try to comprehensively identify the specific institutional structure that would accompany each option. However, where there is an existing national body that could logically take responsibility for an issue, this is identified.

Table 8 Broad approaches to governance arrangements to address network and jurisdictional regulatory fragmentation

CATEGORY	OPTION A – INDUSTRY LED, CONSULTATIVE, VOLUNTARY	OPTION B – CENTRALISED GUIDANCE, VOLUNTARY	OPTION C – CENTRALISED GUIDANCE, OPTION FOR MANDATED CHANGE	OPTION D – PRESCRIPTIVE REGULATION
a. Promotion of operational harmonisation	• RISSB develops and manage a suite of voluntary standards via a collaborative approach • Industry identifies areas of inconsistency between systems, processes and technologies and encourages RIMs to move towards more consistent systems and technologies	• RISSB to provide additional guidance to RIMs and rail operators on opportunities to enhance inter-operability, including in relation to standards, systems, processes and technologies • May require change in scope and/or governance for RISSB to ensure that it can take an independent view of best practice guidance • Compliance would remain voluntary.	• RISSB to provide additional guidance to RIMs and rail operators on opportunities to enhance inter-operability, including in relation to standards, systems, processes and technologies, as per Option B • Where harmonised arrangements are not able to be collaboratively agreed (but where there is a net benefit in a harmonised approach) ONRSR to specify mandatory inter-operability standards, which would require agreement of Transport Ministers to be imposed • ONRSR's objectives to be enhanced to include a productivity role, and to have power to direct RIMs to vary standards, systems, processes and technologies to improve alignment • Prescribed harmonisation may need to be accompanied by funding arrangements in some circumstances	• National regulator (either ONRSR or a broader national regulator incorporating the roles of ONRSR) to specify a suite of mandatory inter-operability standards • National regulator to prescribe approach to managing rail operations, with defined variation given different rail network characteristics
b. Co-ordinated scheduling	• Industry wide portal providing information on path availability, including • Interconnected and consolidated route guides, train operating conditions • Up to date maintenance possession schedules • Train path schedules	• Industry wide portal as per Option A • A Co-ordinating Body to take a collaborative approach to developing centralised guidance for transparency around rules based processes for train scheduling and possession planning	• A Co-ordinating Body to require the adoption of transparent rules based processes for train scheduling and possessing planning (this may be addressed through either, or a combination of, access regulation or operational harmonisation co-ordinating bodies) • A Co-ordinating Body to specify framework for development of an integrated/harmonised platform providing a scheduling service based on rules based procedures (this may be via the operational harmonisation co-ordination body) • Co-ordinating Body could potentially have power to direct RIM in relation to the rules to be applied in certain circumstances in order to improve alignment and/or productivity	• National regulator to develop and manage integrated platform and provide a scheduling service based on rules based procedures.

CATEGORY	OPTION A – INDUSTRY LED, CONSULTATIVE, VOLUNTARY	OPTION B – CENTRALISED GUIDANCE, VOLUNTARY	OPTION C – CENTRALISED GUIDANCE, OPTION FOR MANDATED CHANGE	OPTION D – PRESCRIPTIVE REGULATION
c. Safety management systems	• RISSB continues to develop and/or review a suite of voluntary standards based on a collaborative approach. • Compliance with those standards is voluntary.	• RISSB continues its role in development of voluntary standards as per Option A • RISSB could also identify the similarities and differences between safety standards and assurance protocols across networks. The core requirements and exceptions would be published and recommendations put to RIMs and regulators. • Adoption of consistent standards would remain voluntary	• Where harmonised arrangements are not able to be collaboratively agreed (but where there is a net benefit in a harmonised approach) ONRSR to specify mandatory core safety requirements (as identified in RISSB review) • Option of either mandatory mutual recognition, or process of becoming accredited with ONRSR for core requirements, with RIMs/rail operators then reliant upon that accreditation for their safety management systems • RIMs would continue to be responsible for ensuring operators comply with the other safety and assurance requirements, including any exceptions to the core requirements • ONRSR to have power to direct RIM in relation to the safety and assurance requirements to be applied in certain circumstances in order to improve alignment and/or productivity	• National regulator/ONRSR to specify comprehensive suite of mandatory standards (based on RISSB standards) with compliance overseen regulator as part of safety accreditation. No RIM-based regulations and licencing requirements.
d. Environment	• RIM's/rail operators could collaborate to transparently identify the similarities and differences between all state-based regulation and licencing. The core requirements and exceptions to be published and recommendations put to RIMs and regulators.	• An independent national body (eg the proposed national EPA) could identify the similarities and differences between all state-based regulation and licencing. The core requirements and exceptions to be published and recommendations put to RIMs and regulators. Implementation remains voluntary	• An independent national body (eg the proposed national EPA) to specify mandatory core environmental requirements (as identified in review) • Option of either mandatory mutual recognition, or process of becoming accredited with the national body for core requirements (as identified in review), with RIMs/rail operators then reliant upon that accreditation • EPAs in each state will be responsible for ensuring operators comply with other environmental requirements by exception	• Creation of national rail environmental regulations and framework, with compliance overseen by a national regulator. No state based regulations and licensing requirements
e. Access	• An industry driven assessment of network characteristics could be conducted in each jurisdiction. A national economic body could be	• An independent national economic body to develop a targeted set of principles specific to rail, providing state-based regimes with direction on the	• Independent national economic body to develop a targeted set of principles specific to rail, providing state-based regimes with direction on the different levels of regulatory control, and template 'best practice' regulatory control mechanisms, suitable	• Creation of a National Rail Access Regime, with compliance overseen by the national regulator, that provides a consistent overarching regulatory

CATEGORY	OPTION A – INDUSTRY LED, CONSULTATIVE, VOLUNTARY	OPTION B – CENTRALISED GUIDANCE, VOLUNTARY	OPTION C – CENTRALISED GUIDANCE, OPTION FOR MANDATED CHANGE	OPTION D – PRESCRIPTIVE REGULATION
	appointed to identify the material similarities and differences between jurisdictional regimes for different demand and supply characteristics of rail networks. The results could be put to RIMs and regulators.	different levels of regulatory control, and template 'best practice' regulatory control mechanisms, suitable for different demand and supply characteristics of rail networks, including a stated objective of increased harmonisation where practicable. • Regimes would not be compelled to comply	for different demand and supply characteristics of rail networks, including a stated objective of increased harmonisation where practicable. • Regimes must comply to be accredited at the national level.	framework, with flexibility in the regulatory control measures to be adopted based on different supply and demand characteristics of each network.

4.2 Option assessment

In order to assess the most appropriate broad option to pursue, we have identified a number of evaluation criteria, as follows:

- Likely effectiveness in alleviating operational constraints (effectiveness)
- Ability for RIMs and rail operators to retain autonomy to address individual objectives (autonomy)
- Flexibility to address individual circumstances and risk levels (flexibility)
- Time and cost required for implementation (time and cost)
- Required degree of institutional and legislative change, requiring aligned support of industry and Government and influencing ability to implement option (ease of implementation)

An assessment of each broad option against these criteria is shown below:

Table 9 Assessment of market co-ordination options

CRITERIA	OPTION A – INDUSTRY LED, CONSULTATIVE, VOLUNTARY	OPTION B – CENTRALISED GUIDANCE, VOLUNTARY	OPTION C – CENTRALISED GUIDANCE, OPTION TO MANDATE CHANGE	OPTION D – PRESCRIPTIVE REGULATION
Effectiveness	🔴 Unlikely to be effective as does not address underlying misalignment of incentives under current market and legislative structures	🔴 Unlikely to be effective as does not address underlying misalignment of incentives under current market and legislative structures	🟢 Potential to address underlying misalignment of incentives will depend upon the extent and specificity of the centralised guidance	🟢 Mandatory nature of regulatory regime likely to provide effective means of addressing operational constraints
Autonomy	🟢 High degree of autonomy	🟢 High degree of autonomy	🟡 Some loss of autonomy, but retains ability to tailor arrangements to individual circumstances and to depart from centralised guidance on an exception basis	🔴 Limited autonomy, which may undermine ability of RIMs and Governments to pursue other legitimate objectives
Flexibility	🟢 High degree of flexibility	🟢 High degree of flexibility	🟢 Use of centralised guidance and ability to depart on exceptions basis provides significant flexibility	🟡 National regime can retain elements of flexibility, but likely to be more restrictive than centralised guidance

Time and cost	🟢 Largely reflects current models and approaches	🟢 Provides some additional transparency and specification of best practice approaches, but remains largely consistent with current models and approaches	🟡 Can be implemented with reliance on existing institutional structures, which will result in moderate time and cost to implement	🔴 Requirement for new institutional structures and regulatory frameworks will likely lead to extended implementation timeframes
Ease of implementation	🟢 Largely reflects current models and approaches	🟢 Provides some additional transparency and specification of best practice approaches, but remains largely consistent with current models and approaches	🟢 Reliance on existing institutional structures will limit barriers to implementation	🟡 Requirement for new institutional structures and regulatory frameworks likely to create significant implementation barriers
Overall Assessment	🔴 This is the option of least resistance, but is unlikely to be effective in alleviating operational constraints	🔴 This is a minimal change option, but again is unlikely to be effective in alleviating operational constraints	🟢 Provides the most balanced assessment against criteria	🟡 While likely to be the most effective in addressing operational constraints, provides less flexibility and likely implementation difficulties

Source: Synergies

Based on this evaluation, Option C provides the best balance of effectively improving harmonisation of arrangements while maintaining flexibility to tailor arrangements to local circumstances using a risk based approach, and offering an approach that can feasibly be implemented at reasonable time and cost.

In order to promote the ease of implementation, this option could be implemented through varying the roles of a range of existing bodies, in order to directly address each issue with minimum required institutional and legislative change. For example:

- Given the high inter-relationship between safety management, operational systems and productivity initiatives, there is benefit in these issues being addressed by a single body. Reflecting this, ONRSR’s role could be expanded to incorporate productivity and harmonisation objectives as well as safety:
  - The architecture behind mandating standards would need consideration, as any mandated standard would have to be delegated legislation. We understand that the machinery largely exists for this to happen by virtue of the applied law arrangements underpinning the existing safety legislative framework (noting this has not yet fully been put in place by WA);

  - A process would need to be developed to trigger the imposition of mandatory standards – this could be triggered either through the NTC or through an operator/RIM referral process;
  - A Ministerial forum would need to approve any mandatory standards;
  - ONRSR could also potentially have a role in assessing disputes over the application of standards, were they to apply.
- There is less overlap between safety/operations/productivity and environmental requirements, meaning a separate co-ordinating body, such as a national EPA, could oversee environmental requirements;
- Either the ACCC or the NCC would be logical bodies to take on a co-ordination role in relation to access regulation.

Alternately, in order to establish a stronger impetus for harmonisation reform, a new rail industry regulatory body could be established, with a broader set of objectives (potentially incorporating safety, productivity, environmental and access issues). The National Heavy Vehicle Regulator provides one template for how such a 'one stop shop' could operate. The Australian Energy Market Commission provides another model for how rules could be developed and applied across the industry. However, if such an institutional approach were to be adopted, it would be necessary to recognise that, unlike road (and hence the NHVR), the rail network is underpinned by a contractual framework that allocates risk and responsibility between RIMs and rail operators, and any regulatory arrangements need to be cognisant of that.

4.3 Remaining issues

The options discussed above provide opportunity for improved operational and regulatory co-ordination amongst RIMs and regulators. The remaining area where further co-ordination would generate significant gains is in the policy approaches and investment decisions of the various Governments (both State and Commonwealth).

A key opportunity in this regard relates to the extent to which freight is facilitated and encouraged on shared passenger networks. While these shared networks are often used for only a small proportion of a freight train's journey, the constraints that they impose reverberate across the network – this is particularly the case for the Sydney Trains network, which is used for a large proportion of interstate freight.

Key issues that impact freight trains operating through shared networks include:

- Capacity availability for freight services, and in particular the extent to which opportunities for freight services are increasingly restricted as passenger services are increased;

- Rollingstock standards, where lower risk tolerances are often required for freight services operating on shared passenger networks;
- Scheduling and operational constraints (including as a result of passenger priority obligations).

Progress on these issues is more than critical that ever before, given the risks to adequate freight rail capacity posed by future passenger fast rail projects, that could potentially significantly extend the extent of the interstate network subject to these constraints.

There are opportunities for Governments to more clearly identify the objectives for the facilitation of freight trains through these shared networks (including via the specification of service obligations in its funding agreements with passenger operators) and to ensure that the decisions on investment in improved passenger service levels do not undermine objectives for freight services and mode share.

It is a welcome development that Infrastructure and Transport Ministers have agreed earlier this year to develop a Memorandum of Understanding on Interoperability which will consider a mechanism to implement interoperability impact assessments for future rail investments.[4] This will ensure that the broader interoperability impacts of investments are known prior to those investments being made. Some Commonwealth intervention may be required (possibly via COAG, Infrastructure Australia), including the use of both ‘carrots and sticks’, to promote alignment amongst jurisdictions.

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[4] ARA (Rail Freight Executive Committee (2022) Agenda and Papers, p.14

5 Recommendations

Having regard to the available co-ordination options set out in Section 4 to deliver a more harmonised, consistent approach to the operation and regulation of the Australian rail networks, recommended actions to address the priority constraints are as follows:

Recommendation 1

Promote a step change to rail industry co-ordination that is able to effectively address incentive issues arising from network and jurisdictional regulatory fragmentation, and which, in turn, can effectively promote productivity enhancing harmonisation measures and reduce barriers to entry.

Recommendation 2

Endorse the use of a centralised guidance approach with option for mandated change (‘Option C’) and **investigate** specific policy and institutional options to implement this as part of the Policy Workstream.

Recommendation 3

Prioritise the introduction of centralised guidance according to the potential benefits, such that:

- the industry should place immediate priority on measures that promote safety and productivity gains through operational harmonisation;
- the industry should actively progress harmonisation of environmental regulation and access regulation, recognising that these are likely to present greater challenges (especially environmental harmonisation) but can also be expected to deliver long term benefits to the industry.

Recommendation 4

Continue to use existing mechanisms, which will be reinforced by the centralised guidance approach, to identify the specific actions required to address high priority harmonisation related constraints, including actions agreed to under the National Rail Action Plan and other regulatory reviews.

Recommendation 5

Promote Governments providing clear freight objectives and freight measurement metrics in relation to shared metropolitan passenger networks (including moderating constraints imposed through passenger priority requirements), including through ‘carrot and stick’ interventions by the Commonwealth Government. **Consider** specific policy options to achieve this in the Policy workstream.

A. Identifying infrastructure gaps - mode contestable bulk freight

This appendix provides a more detailed assessment of the benefits and impediments of the operational constraints on rail efficiency identified in section 3.

A.1 Benefits assessment

Table 10 Benefits assessment

CONSTRAINT	FACTOR # 1 MODE SHARE DRIVER IMPACT	FACTOR #2 MATERIALITY OF IMPACT	FACTOR #3 BREADTH OF IMPACT	OVERALL ASSESSMENT OF BENEFITS AVAILABLE IF CONSTRAINT WAS ADDRESSED
a. Inconsistent operational standards and processes	**High** • Influences high impact driver of price by influencing operating costs and rollingstock investment incentives • Influences high impact driver of reliability	**Medium - High** • Impacts costs in multiple ways including operating cost (eg training, crew flexibility), and rollingstock investment incentive	**High** • 13 different RIMs • Individual services may need up to 4 access agreements and up to 6 RIM transition points	**High**
b. Silo based safety management systems	**High** • Influences high impact driver of price by influencing operating costs and rollingstock investment incentives, cost and utilisation • Influences high impact driver of reliability	**Medium** • Impacts costs in multiple ways including operating cost, rollingstock investment incentive and cost • Low incentive for RIMs to align requirements given their different commercial drivers	**High** • As above	**High**

CONSTRAINT	FACTOR # 1 MODE SHARE DRIVER IMPACT	FACTOR #2 MATERIALITY OF IMPACT	FACTOR #3 BREADTH OF IMPACT	OVERALL ASSESSMENT OF BENEFITS AVAILABLE IF CONSTRAINT WAS ADDRESSED
c. Inconsistent physical standards and equipment	**Medium** • Influences high impact driver of price by influencing operating costs, rollingstock investment incentives, cost and rollingstock and network utilisation • Influences high impact driver of reliability by reducing incentive to invest in newer rollingstock	**High** • Impacts operator costs in multiple ways, including operating cost (eg training, maintenance), rollingstock cost and rollingstock utilisation • Influences network capacity	**Medium** • Most significant impact on bulk services operating over both low quality regional and mainline networks	**Medium**
d. Co-ordination of pathing, train management and possession arrangements, passenger curfew impacts	**High** • Influences high impact driver of reliability • Influences high impact driver of price by influencing operating cost • Influences other drivers of transit time and frequency/ availability	**High** • Service disruptions, delays, restrictions can significantly impact reliability • Impacts operator costs in multiple ways with service disruptions and delays increasing operating costs and reducing rollingstock utilisation	**High** • As above	**High**
e. Access management and regulation	**Medium** • Influences high impact driver of price by influencing business management cost	**Medium** • Different access regimes adds to the regulatory compliance burden of operators running trains services that go across multiple networks • Can be a material cost component for a	**High** • Seven different regulatory frameworks with six different regulators • Based on consistent principles but significant differences in operation • Differences also apply for individual RIM's under a given framework	**Medium**
f. Concentration in above rail market	**High** • Influences high impact drivers of price and reliability, as direct threat of direct rail competition creates incentives for reduced cost, reduced price and enhanced service levels	**High** • Can have a material impact on those freight categories which are contestable	**Medium** • High degree of concentration in intermodal markets with 1-2 operators on any route • Greater competitive pressure in bulk markets, where tenders provide competition 'for the market'	**High**

CONSTRAINT	FACTOR # 1 MODE SHARE DRIVER IMPACT	FACTOR #2 MATERIALITY OF IMPACT	FACTOR #3 BREADTH OF IMPACT	OVERALL ASSESSMENT OF BENEFITS AVAILABLE IF CONSTRAINT WAS ADDRESSED
g. Environmental regulation	**Medium** • Six jurisdictional regulatory regimes, although with similar requirements in most jurisdictions • Influences high impact driver of price, as influences business management and investment costs	**Medium** • Influences investment incentives in more modern, more efficient equipment, reduces rollingstock utilisation • Prevents operation of certain locomotive types from a geographic area (where a locomotive is excluded from the network, it is unlikely to be replaced by a higher performing locomotive, but trucks will be used to move the freight instead)	**Medium** • Six jurisdictional regulatory regimes, although with similar requirements in most jurisdictions • Even where regulatory requirements are consistent, differences may arise in application	**Medium**
h. Workplace flexibility	**Medium** • Influences high impact driver of price as influences labour flexibility and pay rates	**Medium** • Industrial arrangements have a direct impact on crewing arrangements & labour cost structures	**Medium** • This is a significant issue for those rail operators with heavily unionised workforces	**Medium**
i. Insufficient skilled workers	**Medium** • Influences ability to increase service levels to match demand and may influence reliability	**Medium** • Ageing workforce, recruitment rates have a material impact on crewing flexibility and operating cost	**Medium** • This is a significant issue for rail operators with aging workforces	**Medium**
j. Driver training	**Medium** • Influences high impact driver of price as influences training and train operating costs	**Medium** • Skilled labour arrangements affect have a material impact on operating cost, operating flexibility and efficiency	**Medium** • This is a significant issue for those operators with workplace conditions requiring inflexible driver training arrangements	**Medium**
k. Fatigue management	**High** • Influences high impact driver of price as influences train operating cost • May influence reliability	**Low – Medium** • Influences train operating costs and reliability by influencing crewing flexibility.	**Medium** • Some additional requirements only in NSW & Qld	**Low to Medium**

CONSTRAINT	FACTOR # 1 MODE SHARE DRIVER IMPACT	FACTOR #2 MATERIALITY OF IMPACT	FACTOR #3 BREADTH OF IMPACT	OVERALL ASSESSMENT OF BENEFITS AVAILABLE IF CONSTRAINT WAS ADDRESSED
l. Passenger priority and peak period curfews	**Medium – High** • Influences reliability • Influences high impact driver of price as influences rollingstock and capacity utilisation (more significant impact for bulk and port shuttle services)	**Medium – High** • Influences operating cost through influencing rollingstock and capacity utilisation (more significant impact for bulk and port shuttle services) • Where services miss their path before metro peak, delays can be multiple hours	**Medium** • Significant impact on any services that are required to operate through metropolitan areas with peak curfews	**Medium to High**
m. Lack of access to real time information including on train arrival times	**Medium – High** • Influences reliability (both on-time arrival and predictability) • Influences PUD costs	**Medium – High** • Significant impact on operational efficiency of rail services and optimal utilisation of below and above infrastructure	**High** • Limitation applies across all rail networks (although is being partially addressed as ATMS is rolled out)	**Medium to High**

Source: Synergies

A.2 Assessment of impediments

Table 11 Limitations assessment

CONSTRAINT	COMPLEXITY	LACK OF STRATEGIC ALIGNMENT	FINANCING REQUIREMENT	TOTAL
a. Inconsistent operational standards and processes	**Medium – High** • Broad range of factors driving inconsistencies, including safety management systems, organisational precedent, and commercial incentives • Opportunity for selected mandatory inter-operability standards	**High** • Current policy agenda to promote harmonisation being progressed by railway participants • Incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical issues	**Medium – High** • Implementation costs will include process costs at minimum • Additional costs will vary depending upon factor driving each inconsistent requirement	**High**

CONSTRAINT	COMPLEXITY	LACK OF STRATEGIC ALIGNMENT	FINANCING REQUIREMENT	TOTAL
b. Silo based safety management systems	**High** • Broad range of factors driving inconsistencies, including infrastructure/ equipment standards, primary customer requirements, organisational precedent • Opportunity for increased consistency of requirements and 'mutual recognition' of compliance processes	**High** • Current policy agenda to promote harmonisation being progressed by railway participants • Incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical issues	**Medium** • Implementation costs will include process costs at minimum • Additional costs will vary depending upon factor driving each inconsistent requirement (but assumed to not include change to physical infrastructure)	**High**
c. Inconsistent physical standards and equipment	**Medium** • Inconsistencies primarily driven by differences in legacy infrastructure and systems for different RIMs	**High** • Current policy agenda to promote harmonisation being progressed by railway participants • Incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical issues	**High** • Costs will vary depending on factor driving each inconsistent requirement • Will require investment in alternate, consistent train equipment across RIMs and operators, approval costs for new equipment can be significant	**High**
d. Co-ordination of pathing, train management and possession arrangements	**High** • Lack of co-ordination influenced by absence of suitable technology to aid optimal decisions on co-ordination of pathing and train management • Lack of co-ordination also driven by RIM's having different primary customer requirements (eg passenger, local bulk), and resulting different commercial incentives	**High** • Current policy agenda to promote harmonisation being progressed by railway participants • Incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical issues	**Medium – High** • Implementation costs will include process costs at minimum • May require changed infrastructure maintenance arrangements • May require investment in consistent automated scheduling technology • May require investment in consistent train management technology	**High**
e. Access management and regulation	**Medium** • Range of factors driving inconsistencies including primary customer requirements, organisational precedent and commercial preferences	**High** • Incompatible commercial drivers mean that it is unlikely that RIM's will achieve harmonisation on critical issues • No current national policy agenda to improve alignment of access regulation • In the absence of agreed national policy agenda, no incentive for jurisdictions to harmonise where this requires them to cede autonomy	**Low** • Implementation costs are primarily process related • May cause some change in commercial opportunity/ exposure	**High**

CONSTRAINT	COMPLEXITY	LACK OF STRATEGIC ALIGNMENT	FINANCING REQUIREMENT	TOTAL
f. Concentration in above rail market	**High** • There are a range of issues contributing to barriers to entry including both access to facilities (primarily an issue for terminals), and access to markets (primarily an issue for intermodal, where long term volume contracts are not used) and the complexity of entry requirements	**Medium** • Government's announced National Intermodal will develop a network of open access terminals to complement open access rail infrastructure • Current policy agenda to promote harmonisation being progressed by railway participants	**Medium** • Federal Govt's funding is related to development of intermodal terminals and governance arrangements	**High**
g. Environmental regulation	**High** • Factors driving differences are primarily differing perspectives of environmental regulators on how to promote best outcomes	**High** • No current national policy agenda to improve alignment of environmental regulation • In the absence of agreed national policy agenda, no incentive for jurisdictions to harmonise where this requires them to cede autonomy	**Low – Medium** • Implementation costs will vary depending upon changes pursued, low cost to improve alignment of jurisdictional approaches, higher costs for creation of national environmental regulatory framework	**High**
h. Workplace flexibility	**High** • Entrenched/legacy issues, with structural impediments to effective negotiation of enterprise agreements	**High** • No current policy agenda; economy wide issue	**Medium** • Increased flexibility would require significant funding and workplace agreements (potentially including legislative change)	**High**
i. Insufficient skilled workers	**Medium** • Issues relating to aging population are well known, ARA is actively pursuing recruitment campaigns; issue will take years to see significant changes to workforce profile	**Low** • Reform is largely industry driven • Some targeted initiatives underway as part of the National Rail Action Plan	**Medium** • Requires significant investment over a sustained period (much is industry led)	**Medium**
j. Driver training	**Low** • There could be significant transitional issues associated with implementing more flexible driver training arrangements	**Medium**	**Low** • Investment in more technology driven training may be required, but this may be offset by reduced training costs under current system	**Low to Medium**

CONSTRAINT	COMPLEXITY	LACK OF STRATEGIC ALIGNMENT	FINANCING REQUIREMENT	TOTAL
k. Fatigue management	**Low** • Issues are well known and not complex	**High** • NSW and Queensland have entrenched policy views of retaining mandated maximum hours	**Low** • Low implementation costs to change jurisdictional differences	**Medium**
l. Passenger priority and peak period curfews	**Medium** • Issues associated with passenger priority are well known, and primarily around managing risks of freight trains causing delays to passenger services	**High** • There are strong policy interests in ensuring maximum reliability of commuter services, and low risk tolerance	**Low** • Transitional costs in reviewing train timetables to identify additional opportunities for operating freight trains	**Medium**
m. Lack of access to real time information on train arrival times	**Medium** • There are established technology systems that will provide access to real time information, however, there is complexity in implementing these systems so that they interface effectively across the various network boundaries	**Medium** • Aligns with established Government support for introduction of ATMS • However, RIMs do not all have a commercial incentive to address	**Medium – High** • Technology systems have been developed; however further systems development still underway to address network interface issues • Costs associated with extending technology systems to additional networks/routes	**Medium to High**

Source: Synergies

5

Policy

Study Into Establishing an Efficient Freight Transport Network

Workstream 4 - Policy

Prepared by Synergies Economic Consulting Pty Ltd

AUSTRALASIAN RAILWAY ASSOCIATION

ACRI
Australasian Centre for Rail Innovation

FREIGHT ON RAIL GROUP

Australian Government
Department of Infrastructure, Transport, Cities and Regional Development
Bureau of Infrastructure, Transport and Regional Economics

Synergies
ECONOMIC CONSULTING

Executive Summary

The potential for rail to play more of a role in the nation's growing freight task is significant and urgent. Increasing rail's modal share represents one of the most effective means of achieving the Australian Government's legislated emissions reduction target of 43% by 2030. The COVID-19 pandemic brought with it many economic and social challenges; but also highlighted the importance of rail to our national freight supply chain sovereign capability and resilience. With Australia's freight task expected to grow, increasing rail's contribution is not just desirable, it is critical to ensuring our transport infrastructure is able to meet Australia's freight needs within an acceptable carbon emissions footprint. Road cannot fulfil the freight task alone. Yet, current operational, regulatory and policy settings are not consistent with objectives of promoting a more efficient rail freight task. This Study has so far presented evidence that shows:

- rail faces significant challenges to capture mode share on key interstate freight routes, particularly along key corridors between Melbourne – Sydney - Brisbane (Mode Share workstream). While Inland Rail and the development of connecting intermodal freight precincts will result in a significant improvement in the quality of service that rail is able to offer, this investment alone will not guarantee the desired modal shift to rail. Other investments to address infrastructure gaps are critical to ensuring rail maximises its full potential, including to achieve greater network resilience to recover from natural disasters and to improve the reliability of the rail network (Infrastructure and Planning workstream);

- a re-alignment of incentives to promote seamless rail freight supply chains when traversing multiple networks and jurisdictions is fundamental to improving rail freight efficiency and maximising rail's ability to compete with alternate modes. This requires improved harmonisation of operational standards and processes with a focus on improving both safety and productivity, as well as improved harmonisation of environmental and access regulation and management. The rail industry, by itself, cannot achieve the necessary change; government facilitation is required in order to provide a regulatory and governance framework for developing guidance on the best practice approaches to each of these issues, as well as to resolve issues where agreement cannot be reached through collaboration alone. This is likely to require some mandating of harmonised principles, standards and processes where the benefits outweigh the costs (Safety and Operations workstream);

- increased transparency of freight data and more accurate cost benefit analysis (CBA) frameworks is required to support more informed decision making that can in turn optimise private and public investments infrastructure (Mode Share workstream and Policy workstream).

This report has been prepared by key stakeholders of the Australian rail freight industry. It is intended to provide a common platform from which the industry can effectively engage with relevant policymakers and the Australian community on the policy challenges and solutions for improving freight rail productivity. BITRE, as a member of the Policy workstream working group, has provided input to this paper, however this paper does not and is not intended to reflect a government view.

Recognising rail's strengths in the national freight task

Australia's National Freight and Supply Chain Strategy identifies the importance of developing an integrated transport network to meet Australia's growing freight needs, relying on all transport modes playing their part, including rail. The key point is that rail can and should play a greater role in the performance of the growing national freight task and achieving such an outcome is dependent on a policy environment enabling the most efficient transport solution for a particular task to prevail.

This study has shown that rail has the ability to capture significant mode share, but only in circumstances where the conditions exist to allow rail to exploit its natural competitive advantages. The challenge for policymakers is to create the right conditions to allow rail to flourish in order to reach its full potential in the performance of the growing national freight task, by providing freight owners with the appropriate signals when making modal choice decisions, and equally, providing the appropriate structure to encourage coordination and efficient investment decisions.

Policy settings can significantly influence these mode share drivers, and therefore the choices that freight customers make. However, current policy settings do not necessarily support these decisions being made in a way that best reflects the national interest. Strategies that seek to optimise rail's inherent strengths and advantages are essential in order to pursue long term improvements in rail's modal share. Increasing rail's contribution to the national freight task is not just desirable, it is critical to ensuring our transport infrastructure is able to meet Australia's freight needs within an acceptable carbon emissions footprint. Road cannot fulfil the freight task alone.

There are now, more than ever before, great opportunities for governments and industry to think more strategically about the role of rail and how increased utilisation and productivity can help to achieve broader government policy objectives in terms of reductions in overall transport emissions and de-carbonisation strategies, especially with the Australian Government's plan to reduce emissions by 43% by 2030.

Understanding the consequences of an inefficient modal distribution of freight

In order to fully appreciate the value of initiatives identified in this paper to deliver improved rail mode share, a comprehensive understanding of the economic, social and environmental consequences of a change in the distribution of freight between rail and road is essential.

There is a commonly held concern within the rail industry that not all of the external benefits of rail are properly taken into account in evaluating rail/road investment decisions and other policies impacting mode share. Our examination of the conventional Cost Benefit Analysis (CBA) frameworks applied to road and rail infrastructure proposals reveals scope for improvements to the way in which standard CBAs have been applied to assess the costs and benefits with different transport modes (and hence the consequences of modal shift). Key issues are:

- There are standard parameter values assigned to a number of external costs and benefits associated with the movement of freight by alternate modes, which significantly influences CBA outcomes with mode share consequences. However, there are legitimate questions as to whether the values attributed to some parameters fully reflect the relevant costs. For example:
  - given the growing national emphasis on addressing climate change and decarbonisation measures, it is not clear whether the current parameter values for emissions properly reflect the cost of emissions (and the associated value of carbon credits), potentially understating the benefits of investments and policies that promote a more environmentally sustainable transport mode;
  - there are questions as to whether the current road cost parameter values fully reflect the additional costs associated with constructing and maintaining roads to the standard necessary for high utilisation by heavy vehicles, and whether they properly reflect the different cost imposed by different truck types (eg whether the costs attributed to lighter trucks are overstated and the costs attributed to the largest truck combinations are understated);
  - there is no standard approach for valuing the security, reliability and resilience of Australia’s supply chains, an issue that has been particularly exposed in recent times due to both the impact of the COVID-19 international supply chain disruptions, as well as due to major natural disasters that have significantly impacted key supply chains;
- The high discount rate applied in CBAs relating to social infrastructure results in limited consideration of the long term benefits that can be created through investment – given the capital intensive nature of rail transport, this creates a structural disadvantage in the assessment of rail investment projects with longer term payoffs and greater long term option values.

- While the ATAP guidelines endorsed by all Infrastructure and Transport Ministers explicitly provide that CBAs for rail projects should consider the impact of the project on modal shift, the ATAP guidelines include no such requirement for road projects. Noting that the external costs imposed by road freight is significantly higher than for rail, this creates a high risk that the additional costs resulting from road projects attracting freight away from rail are not being considered in these evaluations, and no measures to address this risk are contemplated; and
- There are also concerns that, in practice, business case assessments do not always fully scope road projects (say, for example, where one road project is dependent on another proceeding in order for all of the benefits to be fully realised, only the initial project is costed) therefore understating the costs as well as overstating the benefits of the project, and, potentially, double counting those benefits as attributable to multiple projects.

The ARA's Value of Rail report published in 2020[1] examined some of the key benefits of a mode shift from road to rail. The report identified that a 1% mode shift away from road to rail between major capital cities in Australia will reduce the social costs created through emissions, crashes and accidents and health costs from emissions (even using current parameter value estimates) with total estimated benefits of around $71.9 million (2019 prices) per year.

This provide further evidence that operational, regulatory and policy settings that target improved rail mode share are expected to provide significant economic and social value.

Policy objectives and strategies to improve rail mode share

As noted earlier, the overarching policy objective should be to create an environment that enables transport modes to operate efficiently and incentivises the use of the most economically efficient mode of transport for each freight task, having regard to not only the direct costs, but also the indirect (or external) costs of each mode. Recognising the findings of the mode share analysis prepared for this review, the policy objective should provide for policy changes that enable the increased utilisation of rail freight where there are efficiency gains and economic, environmental and community benefits that would be realised from the increased use of rail. Importantly, road and rail are complementary in particular supply chain tasks as well as being competitive in many specific tasks and on particular freight corridors, and efficient transport outcomes require an optimal combination of the modes.

In this context, we have identified a range of strategies that will aid in promoting rail mode share, so that it can perform a role in the national transport task according to the natural advantages of the

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[1] ARA (2020) Value of Rail 2020, The rail industry's contribution to a strong economy and vibrant communities, November 2020, prepared by Deloitte Access Economics

mode and we have reviewed a range of policy options designed to address these strategies. This has confirmed that there is no single strategy or pathway that will 'solve' the issues of improving rail's productivity, competitiveness and mode share. Rather, a broad suite of policies, applied in a co-ordinated way, will be required. Each of the identified strategies has an important role to play in the long term pursuit of improved rail productivity. However, there will inevitably be a need to prioritise initial actions to initiate and build momentum for reform.

Therefore, in developing recommendations of the actions that will best promote rail productivity, competitiveness and mode share, we have first considered the broad policy framework that should be pursued (with strategies listed in no particular order).

From this, we have identified a series of priority actions that should be promoted, reflecting the policies that that are most critical to pursue in the short term, having regard to their potential benefit and the extent of constraints.

Recommended policy framework

Strategy 1 – Specify an overall freight objective

Government specification of an overall freight transport objective may help to align policy development and application of regulation to a common long term goal. Key features of this objective could include:

- promoting efficient investment in transport infrastructure and operation of freight transport services, including having regard to the implications outside individual rail networks or jurisdictions;
- promoting the most efficient mode of transport for each freight task, having regard to not only the direct costs, but also the indirect (or external) costs of each mode;
- maximising the long term benefit to consumers of freight services with respect to price, quality, safety and supply chain reliability.

Strategy 2 – Ensure economic assessments support efficient modal outcomes

This should be facilitated by:

(a) A comprehensive review of the standard methodologies for CBAs for transport projects/policies should be undertaken in order to ensure that existing parameter values and approaches effectively ensure that economic, social and environmental benefits of a project are fully reflected and taken into account in the evaluation of rail/road investment decisions.

(b) As part of the Clean Energy Regulator's current review of the Transport Method under the ERF and the Government's parallel review of the Safeguard Mechanism, amendments should be made to make it easier for rail operators to participate in the ERF, including through enabling mode shift projects to generate ACCUs. This is an important step in enabling rail to play its role in the decarbonisation of the Australian economy.

Strategy 3 – Promote investment in efficient rail freight infrastructure

The rail industry and Governments should continue to promote investment in infrastructure that enables the operation of efficient rail services, where this can be supported commercially or by a broader cost benefit analysis. This should be facilitated by:

(a) targeting infrastructure project development and investment to priority rail infrastructure requirements. Priority investment requirements were identified in the Infrastructure & Planning Workstream. Beyond the high priority projects already being progressed, the focus should be:

  (i) a pipeline of network resilience and reliability initiatives (an initial list of project investments were identified in the Infrastructure & Planning workstream);

  (ii) automated train scheduling systems, seamlessly integrated across networks (eg ANCO);

  (iii) long term preservation of rail corridors

(b) Governments directing that rail infrastructure proposals specifically consider interoperability impacts; and

(c) the Commonwealth Government should leverage its funding of rail infrastructure projects to encourage State Government support of the remaining recommendations.

Strategy 4 – Promote operational harmonisation through a focus on both safety and productivity

The rail industry and Governments should:

(a) promote harmonisation of operational standards, systems, processes and technologies, through central co-ordination and, in the event that harmonisation measures cannot be collaboratively agreed, with a process for mandated changes to obligations, rules, standards and processes to enforce consistency;

(b) in doing so, a productivity focus, in combination with a safety focus, should be brought to bear on rail freight performance;

(c) options to create a rail industry regulator to drive both productivity and safety performance generally fall within two broad categories: leveraging off existing institutions and institutional architecture, in which case the most efficacious solution would be to expand ONRSRS's scope and operation to incorporate a productivity role and empowering it to develop mandatory standards; or creating a new rail industry regulatory body with a broader set of objectives. Ultimately, the preferred option will need to be determined in consultation with the State and Commonwealth Governments.

Strategy 5 – Promote a harmonised, consistent approach to regulation

(a) Governments should promote harmonisation of environmental regulations by identifying a national co-ordinating body (eg national EPA) to investigate opportunities for enhanced harmonisation of environmental requirements, recommending specific harmonisation opportunities by way of common standards and provides a mechanism for the common core national environmental standards to be mandated, by agreement of the relevant Commonwealth and State Ministers.

(b) The rail industry and Governments should promote harmonisation of access regimes by: identifying an independent national co-ordinating body to assess opportunities for improved harmonisation; tasking that body with the role of investigating opportunities for enhanced harmonisation of access regulation and management requirements, and recommending specific harmonisation opportunities by way of common principles and procedures; providing a process for individual RIMs and jurisdictional regulators to seek agreement on incorporating those principles and procedures into existing regulatory instruments; and providing a mechanism for the principles and procedures to be mandated for application within the existing regulatory instruments, through agreement of the relevant Commonwealth and State Ministers.

Strategy 6 – Promote opportunities to expand the above rail market and to maximise rail's competitive service offering

There are instances where improved access to infrastructure can improve contestability and, hence improve opportunities for the above rail market to grow. In this regard, the rail industry and Governments should continue to support action already in progress to address barriers to entry, including by ensuring the availability of open access to intermodal terminals in new publicly funded intermodal freight precincts and new rail paths created through the development of Inland Rail.

Strategy 7 – Encourage efficient modal choice

(a) Recognising that prices for road infrastructure do not encourage the use of the most efficient mode for the right task:

  (i) The heavy vehicle road charging framework requires review

    - the use of diesel/petrol excise as a means of road funding lacks transparency and creates confusion in relation to policies aimed for the uptake of electric vehicles to improve the environmental sustainability of Australia's transport task. Clear user based charging for heavy vehicles, delinked to diesel utilisation, will assist Australian governments achieve both their environmental and transport objectives; and

- PAYGO pricing methodologies should be independently reviewed to ensure there is no cross subsidisation between vehicle types. In order to do this, responsibility for administering heavy vehicle road user charges could be transferred from the NTC to another body, such as the ACCC (which would be the most appropriate body under existing institutional arrangements).

(ii) Policymakers should re-consider the benefits of Mass Distance Charging in relation to setting road user prices on a basis that are more able to reflect full cost recovery, including sunk capital and externalities. However, in the meantime:

- Increased HPV permits (either increased volume or geographical scope) should only be granted where this has been subject to a cost benefit assessment including considering the likely consequence on mode share;
- Government incentive schemes to promote efficient mode utilisation may be appropriate in local instances to encourage a mode shift and/or to address a discrete policy objective, and are most effective when used as a transitional measure until the full benefits of longer term strategies to promote rail productivity are realised;

(b) There is opportunity for the rail industry (operators and RIMs) to continue to evolve their pricing structures to improve the alignment of rail haulage prices with competitive alternatives, including across different cargo densities and different train sizes;

(c) Legislative amendments should be considered to incorporate a framework that compels foreign flagged vessels to provide evidence of their compliance with Australian shipping regulations. This will provide confidence that Australian regulations are being upheld. Beyond this, while coastal shipping has provided a low cost means of transport, the sudden loss of shipping capacity availability reported during the recent pandemic highlighted the economic sovereignty concerns with this mode. This is an issue worthy of further policy consideration.

Strategy 8 – Improving freight access in metropolitan areas

Governments should facilitate improved access for freight services through metropolitan networks by:

(a) incorporating organisational incentives into the funding arrangements for metropolitan RIMs to facilitate freight through urban areas, while continuing to recognise passenger priority; and

(b) defining a more flexible application of passenger priority.

Strategy 9 – Promote rail provider alignment with customer requirements

Rail providers should continue to pursue opportunities to improve alignment of their services with freight customer requirements, including rail operators continuing to evolve their operating and contracting strategies to include innovative approaches to addressing barriers to the use of rail, and RIMs seeking more direct input from freight customers into business and network strategies, with options including customer engagement forums or through Board representation.

Strategy 10 – Information disclosure

Governments should continue to promote:

(a) accurate, timely and comprehensive public reporting of the modal freight task in order to facilitate more informed decision making;

(b) accurate, timely and consistent public reporting of train service reliability performance.

Recommended Priority Actions

Having the potential benefit gain and the materiality of constraints for each recommended strategy, as well as the current status of existing programs that are progressing action on a range of these strategies, we have developed a recommended short term priority focus on the following issues, which we consider will provide the greatest opportunity for progress and real value in terms of promoting rail mode shift.

The other strategies incorporated into the recommended policy framework should be progressed as longer term objectives, but with industry prepared to act quickly as opportunities present.

Priority 1 – Building greater network resilience and reliability

Ongoing investment in efficient rail freight infrastructure should continue, with a focus on building greater network resilience and rail reliability. It is critical that the sovereign capability and resilience of our national network of rail freight supply chains is preserved such that rail infrastructure is able to withstand significant events that appear to be happening more regularly and that industry and the public have confidence in these measures. In that regard, the upcoming findings of the current Review of Road and Rail Supply Chain Resilience have important ramifications for rail's future security and productivity.

However, in order to support ongoing improvements in network resilience and reliability, the rail industry should collaborate on an ongoing basis in the preparation and maintenance of an agreed priority resilience and reliability investment pipeline (with the list of projects identified in the Investment & Planning workstream providing a longlist starting point for this). This will require co-ordination by a central body.

This reflects Strategy 1 and Strategy 3(a)(i).

Priority 2 – Promote operational harmonisation through the use of centralised guidance (including mandatory standards) with a productivity focus, overseen by a regulator responsible for achieving both enhanced productivity and safety outcomes

Federal and state governments, in conjunction with the rail industry, should promote harmonisation of operational standards, systems, processes and technologies, including through the use of mandatory standards where harmonisation is supported by a cost benefit analysis but not agreed through collaborative/consultative processes. A centralised guidance approach that enables a dual focus on safety and productivity matters is recognised as a sensible way forward to improve overall rail freight supply chain productivity.

Options to achieve this include:

- leveraging off existing institutional architecture, most efficiently achieved by redefining ONRSR's role to incorporate a productivity focus and empowering it to develop mandatory standards. This would require the acquisition of additional skills and resources to enable an effective assessment of productivity issues and advocacy for mandatory standards where required, and should be accompanied by a change in name; or
- developing a new rail industry regulator with a broader responsibility for enhanced productivity and safety outcomes.

The preferred option should be determined by the rail industry in consultation with Commonwealth and State Governments.

This reflects Strategy 4.

Priority 3 – Review economic assessment frameworks that influence transport mode

In order to promote the most efficient transport solution for Australia, is critical that Government policies and investment decisions facilitate modal shift where this promotes a more efficient outcome.

In the immediate term, the Clean Energy Regulator's review of the Transport Method and the Government's parallel review of the Safeguard Mechanism, should make it easier for rail operators to participate in the ERF, including through enabling mode shift projects to generate ACCUs. Reducing rigidities between modes, and reducing the costs associated with rail operators increasing the share of freight transported by rail, is an important step in enabling rail to play its role in the decarbonisation of the Australian economy.

Beyond this, CBAs are an effective tool that can support decisions to identify the most cost effective infrastructure solution. However, the results generated through these evaluations are only as good as their inputs. Governments should review existing parameter values and approaches to ensuring economic, social and environmental benefits of a project are fully reflected and taken into account before evaluating rail/road investment decisions. This is particularly important as Australian governments seek to achieve broader social policy targets.

This reflects Strategy 2.

Priority 4 - Seamless pathing for freight trains across networks

The extent of network fragmentation means that many long distance freight services operate over multiple RIM networks, however there can be significant constraints on gaining seamless paths across these networks, both in terms of capacity allocation and on the day of operation. The introduction of open access terminals may further complicate the allocation of pathing, with paths for intermodal trains needing to align with terminal access slots. Key strategies that are required to achieve this include:

- developing technological solutions for automated scheduling across the full origin-destination route, and potentially extending to terminal scheduling, allowing optimisation of schedules both in capacity planning, and also in the day of operation environment based on real time information on train location and expected arrival time. This will provide the best opportunity to reduce friction and delays at network changeover points and improve customer information on freight status;
- a key aspect of creating seamless paths through the application of technological solutions is the development of a fully specified rules based approach to scheduling and management of out of course running. While the rules need not be fully consistent across all RIMs, this is likely to require a core set of commonly applied definitions and rules between RIMs – a technological solution will only be effective to the extent that it gives effect to these rules; and
- creating incentives for metropolitan RIMs to facilitate freight through urban networks and defining a more flexible approach to applying passenger priority, which is critical not only to improving reliability, capacity utilisation and efficiency of freight services, but also to improving the freight customer experience with rail so that rail can play its natural role in meeting the national transport task.

Provided that a ‘cross-network’ rules based technological solution is developed and implemented, management of train operations can still successfully rest with individual RIMs. However, there may need to be a mechanism for resolving the core rules to be commonly applied across RIMs. Adjudicating on this issue could ultimately form part of the productivity remit assigned to ONRSR.

Note, this incorporates Strategy (3)(a)(ii), 4 and 8.

Priority 5 – Information collection and disclosure

Prioritisation of improved information collection and disclosure is essential in order to improve the quality of decision making and policy development. The key areas to focus on include:

- Road freight – enhanced collection of road freight data to continue to be facilitated by BITRE through:
  - encouraging State Governments to review and, where applicable, upgrade their traffic census programs in order to collect data consistent with that published by Transport for NSW in relation to truck numbers, categorisation and weights on key national highways;
  - to the extent that the additional data becomes available from State Governments, aggregating and regularly publishing the relevant data in the National Freight Data Hub and, provided that the required information becomes available, publishing regular analysis interpreting the data in order to present an assessment of the national road freight task, including on key origin-destination routes.
- Rail freight task – Rail Infrastructure Managers should commit to regularly provide BITRE with rail freight datasets, including freight volumes, freight types (to the extent ascertainable) and origin-destination (with the recent MoU between BITRE and ARTC providing a template for this data collection). Rail operators should commit to providing RIMs permission for this data to be disclosed to BITRE on an aggregated and de-identified basis, and published in the National Freight Data Hub. If this is unsuccessful in ensuring the efficient and regular collection of rail freight data, a compulsory data collection arrangement may ultimately be required.
- Train service reliability – Rail Infrastructure Managers and Rail Operators should commit to working with BITRE to confirm a preferred suite of reliability KPIs to be collected by Rail Infrastructure Managers and Rail Operators and agree to the inclusion of these reliability KPIs in the aggregated information to be provided by RIMs to BITRE, and published in the National Freight Data Hub.

This incorporates Strategy 10.

Contents

Figures and Tables

1 Introduction

1.1 Policy workstream

The policy workstream is designed to build upon the outcomes of the prior project workstreams, and to identify the policy options that are available to improve rail freight mode share and allow the full potential of rail to be realised. This workstream has four key deliverables:

1. To understand consequences of an inefficient rail system (including impact on externalities);
2. To assess policy options to ensure a 'level playing field' between transport modes;
3. To assess institutional structures to ensure rail infrastructure providers respond to customer needs; and
4. To consider a prioritisation framework for progressing policy and institutional reform.

1.2 Report structure

The report is set out as follows:

- Section 2 recognises rail's strengths in the national freight task;
- Section 3 sets out the consequences of inefficient rail networks (including externalities) and identifies the extent to which there are gaps in traditional frameworks for assessing economic benefits and costs of infrastructure projects;
- Section 4 identifies and evaluates the policy options that are available for promoting rail mode share and ensuring a more level playing field between transport modes; and
- Section 5 presents recommended priority actions for achieving improved rail mode share.

2 Recognising rail's strengths

Australia's National Freight and Supply Chain Strategy identifies the importance of developing an integrated transport network to meet Australia's growing freight needs, relying on all transport modes playing their part, including rail. The key point is that rail can and should play a greater role in the performance of the growing national freight task and achieving such an outcome is dependent on a policy environment enabling the most efficient transport solution for a particular task to prevail.

This study has shown that rail has the ability to capture significant mode share, but only in circumstances where the conditions exist to allow rail to exploit its natural competitive advantages. The challenge for policymakers is to create the right conditions to allow rail to flourish in order to reach its full potential in the performance of the growing national freight task, by providing freight owners with the appropriate signals when making modal choice decisions, and equally, providing the appropriate structure to encourage coordination and efficient investment decisions. Each transport mode has areas of strong natural advantage. For example:

- road freight provides high flexibility and speed, and is strongly preferred for express freight and the transport of dispersed freight in small volumes;
- rail is strongly suited to the transport of large freight volumes, and long distance freight movements or movements of relatively dense freight.

However, there is a large volume of 'mode contestable freight' for which modal choice is influenced by both the nature of the transport task and characteristics of the transport service, with the key factors being:

- *Reliability* – which encompasses on-time performance, confidence that the service will run as planned and risk of damage to freight;
- *Frequency/availability* – whether the service is available at times and frequency, and with sufficient capacity, to meet the customer's requirements;
- *Transit time* – end to end transit time is the critical consideration, including, where applicable, the time required for pick up and delivery to the freight terminal;
- *Price* – again, price for the end to end freight movement is the critical consideration, including where applicable, pick up and delivery to the freight terminal;
- Other factors, that influence mode choice decisions include:

  - *Sustainability* – numerous companies have corporate policies in favour of reducing their ‘carbon footprint’, which may influence their preferred option, while rail currently has a sustainability advantage over road, this may diminish over time with movement towards alternative fuel sources for trucks;
  - *Complexity* – rail, and shipping, reflect a more complex transport solution which may require greater management effort, with anecdotal reports that rail freight charges need to be around 10% lower than road to compensate for this “hassle factor”;
  - *Risk/diversification* – customers may prefer to maintain some diversification in their freight channels, in order to reduce the risks associated with reliance on a single mode.

Policy settings can significantly influence these mode share drivers, and therefore the choices that freight customers make. Current policy settings do not necessarily support these decisions being made in a way that best reflects the national interest. For example:

- trends towards approvals for increasingly higher productivity vehicles (both on interstate routes such as the Newell Highway and in urban areas, such as truck movements to Port Botany) can support a more efficient road freight movement, however the consequences and costs of the resulting mode shift to road, including the increased congestion and safety risks, as well as carbon emissions from road transport, need to also be considered; and

- where domestic coastal shipping movements are provided by international carriers as an incremental add-on to the international freight movement, they are able to offer very low rates reflecting only the marginal cost of the movement. This provides shippers with a low cost means of transporting non-time sensitive freight. However, these supply chains are highly vulnerable to the vagaries of the international shipping markets – as clearly demonstrated through the COVID-19 pandemic where the international carriers largely withdrew from the domestic market in order to focus on the more lucrative international opportunities. Policy settings that facilitate a high reliance on coastal shipping via international carriers can undermine the sovereign capability and resilience of Australia’s supply chains.

Strategies that seek to optimise rail’s inherent strengths and advantages are essential in order to pursue long term improvements in rail’s modal share. Increasing rail’s contribution to the national freight task is not just desirable, it is critical to ensuring our transport infrastructure is able to meet Australia’s freight needs. Road cannot fulfil the freight task alone.

There are now, more than ever before, great opportunities for governments and industry to think more strategically about the role of rail and how increased utilisation and productivity can help to achieve broader government policy objectives in terms of reductions in overall transport emissions and de-carbonisation strategies, especially with the Australian Government’s plan to reduce emissions by 43% by 2030. Since early 2022, the Federal Government (through the Clean Energy Regulator) has been consulting with the transport sector around a revised Transport Method under the Emissions Reduction Fund (ERF).[2] This work has continued since the election and has been complemented by a review of the Safeguard Mechanism. These processes are important given the potential cost realignment that could result from this outcome through the issuing of carbon credits to the industry. A sound approach to optimising freight rail productivity across the national freight transport system can help to achieve this broader policy objective.

Significant policy developments are already underway to secure and maximise rail's potential contribution to the national freight task, including:

- The establishment of the Inland Rail Project and the associated Interface Improvement Project to build more efficient freight connections between Melbourne and Brisbane and transform regions, communities and our economy now and well into the future;
- The Commonwealth Government's commitment to invest in the development of intermodal freight precincts incorporating new open access intermodal terminals in Melbourne and Brisbane, together with substantial private investment in intermodal terminal development;
- Investments in digital train control, with ATMS currently being trialled on key sections of the interstate East West corridor, to provide a platform for improved rail productivity and safety;
- The National Rail Action Plan, led by the National Transport Commission, in collaboration with industry, to:
  - improve interoperability and deliver a more efficient rail network; and
  - address the critical skills shortages within the rail industry;
- The current review chaired by Mr John Fullerton, into the resilience of Australian road and rail supply chains, which is due to be completed later this year; and
- The establishment of the National Freight Data Hub as a key resource for industry, government and others to improve the efficiency, safety, productivity and resilience of the freight sector.

Understanding the consequences of an inefficient freight task where rail cannot optimise its role in the national freight task should provide the necessary impetus for such strategies to be developed.

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[2] See https://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-industry/transport-methods/Transport-Land-and-Sea

3 Understanding the consequences of an inefficient modal distribution of freight

In order to fully appreciate the value of initiatives identified in this paper, a comprehensive understanding of the economic, social and environmental consequences of a change in the distribution of freight between rail and road is essential.

In this section, we first set out to identify a comprehensive list of the consequences of an inefficient modal distribution, and then quantify the benefits foregone in the absence of a modal shift from road to rail using a standard cost benefit analysis (CBA) framework. We further consider if there are any benefits associated with a modal shift from road to rail that are not already recognised in standard CBA assessments. Being able to capture all of the benefits associated with a modal shift to rail is critical to evaluating the available policy options to incentivise the use of rail freight, as well as reducing any unintended policy bias towards incentivising road freight at the expense of a rail solution.

3.1 Cost benefit analysis

CBA is a widely used tool for economic evaluation. It is a process that is used to estimate the costs and benefits of decisions in order to find the most cost-effective option. An effective CBA evaluates the following types of costs and benefits:

- Costs[3] – direct and indirect costs, intangible costs, opportunity costs and costs of potential risks of a potential action; and
- Benefits – direct and indirect/wider economic benefits and can include consideration of avoided capital and operating costs (which might be incurred in the base case scenario) plus initial estimates of direct user benefits and other benefits that can be readily valued.

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[3] Costs that are already incurred and are irrevocable, ie sunk costs, are ignored in CBA assessment. This is consistent with the Australian Transport Assessment and Planning Guidelines (ATAP) regarding cost estimation. For clarity, costs that have already been incurred but are recoverable (either in full or partially) are not sunk costs and should be included in CBA evaluation. For example, if the project being appraised uses a length of track built in the past, the initial costs cost of the track is sunk and therefore irrelevant to the CBA. In the base case, the steel rails could be sold for scrap. This would be an offset to the investment costs. See Infrastructure and Transport Ministers (2021), Australian Transport Assessment and Planning Guidelines, M3 Freight Rail, August 2021, p.22

CBAs are different to commercial financial assessments. Commercial financial assessments are much narrower in scope and their purpose is to establish whether a proposed investments will be commercially viable by considering whether, over a reasonable investment horizon, it is expected to earn sufficient revenue to cover its costs and yield an acceptable financial rate of return. In contrast, a CBA is used to assess the broader economic and social efficiency of the project.

Governments in Australia generally agree that a broader focus on the economic and social benefits of a project (as is evaluated in a CBA) is appropriate in evaluating policy initiatives and assessing investment proposals where government funding is being proposed.

There is a commonly held concern within the rail industry that not all of the external benefits of rail are properly taken into account in evaluating rail/road investment decisions. We examine this perception in the following section. In order to evaluate the prevalence of any such 'gaps', we have examined the cost benefit frameworks that are typically used when evaluating transport infrastructure investment proposals.

3.2 Applying a CBA framework to rail

3.2.1 Applying a CBA framework to understanding the consequences of an inefficient rail system

The economic consequences of having inefficient rail systems are largely those associated with an increased reliance on trucks for the transportation of freight.

There are both direct consequences and indirect consequences (ie. externalities) of a loss of rail freight to road, as outlined in Table 1. The consequences identified in this table are consistent with those that are typically considered in transport infrastructure CBAs.[4]

Table 1 Direct and indirect consequences of inefficient rail networks

	FACTOR	WHY THIS FACTOR ARISES
Direct impacts		
Economic/financial	Increased maintenance costs of existing roads	Increased road usage by heavy freight vehicles adds to the 'wear and tear' on on road infrastructure, with the rate of road damage increasing with increasing truck size and weight.
	Increased capital costs for new road construction	Increased reliance on trucks can result in higher demand for additional road capacity, either on existing or new routes. The need to construct roads to a standard that supports high volumes

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[4] See Infrastructure and Transport Ministers (2021), Australian Transport Assessment and Planning Guidelines, M3 Freight Rail, August 2021

	FACTOR	WHY THIS FACTOR ARISES
		of heavy freight vehicles increases the cost of road construction.
	Higher accident costs	Increased presence of trucks on roads and higher volumes of traffic increases the risk and consequence of traffic accidents. Costs can be assessed using a variety of approaches i.e. human capital (human costs, vehicle costs, genral costs) vs willingness to pay (injury severity)
	Higher average operating costs (road)	Increased demand for road freight creates further demand for trucks to carry freight, and requires larger fleets, increased operating costs in terms of fuel, types repairs & maintenance and depreciation.
	Higher average operating costs (rail)	Train operating costs are largely fixed regardless of volume of freight on a train, with little opportunity to reduce costs in the absence of a decision to cease the train service. Therefore, average train operating costs are higher when train operators have lower capacity utilisation. Rail operating costs are valued in terms of train operating costs, infrastructure operating costs or maintenance costs.
	Impact on freight reliability/availability, transit time (value of time savings) and final price	Rail typically provides for lower freight reliability/availability and slower transit times – the costs associated with this reduced service quality should be offset against the benefits resulting from additional rail freight usage.
	Security, reliability and resilience of national supply chains	Significant disruptions to supply chains, as has occurred over the last 12 months due to major flooding events, can have major consequences for the local communities and broader economic performance.
Indirect impacts		
Social	Increased traffic congestion from increased reliance on trucks	Social costs arise where high traffic volumes cause congestion. Congestion causes additional travel time and reduced reliability for all road users, and can be measured based on the value of time for different categories of road users. Trucks removed from congested roads generate a positive externality where it results in fewer delays for other vehicls on the same roads.
	Reduced road user amenity due to presence of high truck volumes on roads	Road users typically have a preference against high truck volumes on roads. While in part this is due to the environmental, congestion and safety consequences of trucks, there is also a social cost associated with the loss of road user amenity that is not captured by these values.
	Reduced urban amenity due to high truck volumes in urban areas	Increased demand for roads (new roads or upgrades of existing road to carry more traffic and/or support heavier trucks) reduces available space for other urban amenities (e.g parks, sporting venues, business/housing construction) to support local communities.
Environmental	Increased gas emissions, noise, air pollution from increased reliance on trucks	Road transport generally has higher environmental consequences than rail

FACTOR	WHY THIS FACTOR ARISES
	transport, with increased greenhouse gas emissions, air pollution and noise pollution. Environmental consequences are generally greatest in urban areas, particularly for noise polution.
Impact on nature and landscape	This reflects the infrastructure's 'footprint'. For example, habitat loss, loss of natural vegetation or reduce in visual emenity occurs as infrastructure is constructed.

Source: Synergies

3.2.2 Evaluation of existing approaches to assessing rail freight inefficiency

Mode-specific parameter values for many of the common benefits and costs identified in the table above are published in a range of public sector guidelines, the key ones being guidelines published by Transport for NSW (2022)[5] and the Australian Transport Assessment and Planning (ATAP).[6]

We have therefore examined these respective approaches, both in terms of coverage of impacts and the nature of parameters constructed, and whether there have been concerns raised by industry or academic stakeholders as to the robustness of the value (see the table below).

Table 2 Factors to consider in conducting cost benefit assessments of rail

FACTOR	TFNSW GUIDELINES	ATAP GUIDELINES
Economic/financial		
Increased maintenance costs of existing roads	✓ Standard parameter values for road damage costs are published to calculate the benefits of reducing road traffic as a result of project or initiative.	✓ No standard parameter values specified but recognised as a cost to be considered in appraisals.
Increased maintenance costs of existing rail infrastructure	✓ Standard parameter values for maintenance costs (above and below rail) are published. Given the wide variability in freight rail operations and costs, a range of parameter values are available).	✓ Standard parameter values are published.

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[5] See Transport for NSW (2022), Transport for NSW Economic Parameter Values for all TfNSW agencies, 22 August 2022 at:

https://www.transport.nsw.gov.au/projects/project-delivery-requirements/evaluation-and-assurance/technical-guidance

[6] See ATAP Guidelines for parameter values for road transport (PV2) and freight rail (PV3) at https://www.atap.gov.au/parameter-values/index. See also ATAP's mode specific methodology guidelines for road transport and freight rail at https://www.atap.gov.au/mode-specific-guidance/index

The Commonwealth Department of Infrastructure, Transport, Regional Development, Communications and the Arts also publishes technical cost estimation guidance that outlines the principles that are expected to be followed by proponents in preparing cost estimates accompanying Project Proposal Reports, for projects seeking Australian Government funding. See https://investment.infrastructure.gov.au/about/funding_and_finance/cost_estimation_guidance.aspx

FACTOR	TFNSW GUIDELINES	ATAP GUIDELINES
Higher road accident costs	✓ Standard parameter values are published. TfNSW recommends that road safety benefits be estimated based on the Inclusive Willingness to Pay (WTP) values which represents the individuals WTP to avoid death or injury as well as the cost to society due to the crash such as emergency costs. The Inclusive WTP approach is recommended by the Australian Government Department of Infrastructure, Transport, Cities and Regional Development (DITCRD) and has been adopted by ATAP.	✓ Standard parameter values are published.
Higher average operating costs (road)	✓ Standard parameter values for estimating vehicle operating costs are published, and distinguish between urban CBA projects and rural CBA projects.	✓ Standard parameter values are published.
Higher average operating costs (rail)	✓ Standard parameter values are published. Given the wide variability in freight rail operations and costs, a range of parameter values are available).	✓ Standard parameter values are published.
Increased capital costs for new road construction	⊖ Not clear that this is fully reflected. The guidelines provide some estimates of local infrastructure benchmark costs for delivering certain infrastructure items (i.e new sub-arterial road, road widening, intersections, street lighting, road bridges).	⊖ Not clear that this is reflected.
Impact on freight reliability/availability, transit time (value of time savings) and final price	✗ The guidelines do not provide standard parameter estimates in relation to freight. Value of time savings provided for cars and public transport CBAs.	✓ No standard parameter values specified but impact of mode on service quality recognised as a factor to be considered in appraisals.
Security, reliability and resilience of national supply chains	✗ Not specifically considered	✗ Not specifically considered
Social		
Increased traffic congestion from increased reliance on trucks	✓ Standard parameter values are published by vehicle type / by urban and rural areas and terrain type.	✓ No standard parameter values specified but congestion impacts recognised as a factor to be considered in appraisals.
Reduced road user amenity	⊖	⊖

FACTOR	TFNSW GUIDELINES	ATAP GUIDELINES
	Not clear the extent to which this is fully reflected. Standard parameter values are published for urban separation externaillity (only in urban areas). Relates to factors such as visual intrusion.	Not clear the extent to which this is reflected.
Reduced urban amenity	✓ Standard parameter values are published for impact of freight vehicles on nature and landscape.	⊖ Not clear the extent to which this is reflected.
Environmental		
Increased gas emissions, noise, air pollution from increased reliance on trucks	✓ Standard parameter values for freight vehicles are published by externality type.	✓ No standard parameter values specified but environmental externalities recognised as a factor to be considered in appraisals.
Impact on nature and landscape	✓ Standard parameter values for freight vehicles are published by externality type.	✓ No standard parameter values specified but environmental externalities recognised as a factor to be considered in appraisals.

Source: Synergies

Notes: ✓ included in standard ⊖ Partially included in standard CBAs ✗ Not included in standard CBAs

Our examination of the conventional CBA framework applied to road and rail infrastructure proposals reveals scope for improvements to the way in which standard CBAs have been applied to assess the costs and benefits with different transport modes (and hence the consequences of modal shift). The identified issues are discussed below.

Gaps in costs considered

The conventional CBA framework is applied through the methodology specified in published guidance, with standard values published for a range of parameters. Based on our desktop review, the key gap that we have identified in the standard cost benefit assessments for transport infrastructure relates to the valuation of security, reliability and resilience in Australia's supply chains. This issue has been particularly exposed in recent times due to both the impact of the COVID-19 international supply chain disruptions, as well as due to major natural disasters that have significantly impacted key supply chains. Apart from this, standard CBA methodologies comprehensively incorporate the types of costs and benefits that will arise from modal shift.

Robustness of standard parameter values and assessment methods

In terms of the published standard parameter values used in standard CBAs, TfNSW nominates standard values for a wider range of parameters than does ATAP. While some parameters are substantially influenced by local conditions eg congestion costs, the inclusion of standardised parameter values can be particularly useful in guiding preparation of initial options assessments of infrastructure proposals. Bespoke analysis can then be developed for detailed CBA assessments, particularly for large scale infrastructure proposals. However, there are legitimate questions as to whether the values attributed to some parameters fully reflect the relevant costs. For example:

- given the growing national emphasis on addressing climate change and decarbonisation measures, it is not clear whether the current parameter values for emissions properly reflect the cost of emissions (and the associated value of carbon credits), potentially understating the benefits of investments and policies that promote a more environmentally sustainable transport mode;
- there are questions as to whether the current road cost parameter values fully reflect the additional costs associated with constructing and maintaining roads to the standard necessary for high utilisation by heavy vehicles, and whether they properly reflect the different cost imposed by different truck types (eg whether the costs attributed to lighter trucks are overstated and the costs attributed to the largest truck combinations are understated);

In addition, the high discount rate applied in CBAs relating to social infrastructure results in limited consideration of the long term benefits that can be created through investment – given the capital intensive nature of rail transport, this creates a structural disadvantage in the assessment of rail investment projects with longer term payoffs and greater long term option values.

There are also concerns that, in practice, business case assessments do not always fully scope road projects (say, for example, where one road project is dependent on another proceeding in order for all of the benefits to be fully realised, only the initial project is costed) therefore understating the costs as well as overstating the benefits of the project, and, potentially, double counting those benefits as attributable to multiple projects.

CBA guidance by mode

Beyond the parameter values and methodology, we note that the ATAP framework provides additional, specific guidance for freight rail infrastructure funding requirements in relation to three key areas: (1) defining goals, objectives and targets (2) including allowance for post completion review and (3) benefits management.[7] The ATAP advice gives rail freight specific guidance for including KPI metrics into freight rail infrastructure proposals, and note the following should be included:

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[7] See Infrastructure and Transport Ministers (2021), Australian Transport Assessment and Planning Guidelines, M3 Freight Rail, August 2021

- entire logistics chain efficiency and coordination
- competition from other modes or above rail operators
- regulatory compliance – OH&S, enterprise agreements, other legislation

The Guideline also provides advice on KPIs/performance metrics which it says can be analysed in terms of the quality of service provided and operating efficiency, which the ATAP says can be assessed in terms of labour and capital productivity.

This is, by itself, uncontroversial and represents a sensible approach to presenting rail infrastructure proposals. However, we note that ATAP guidelines do not appear to provide the same degree of guidance in relation to road infrastructure proposals. Noting that the external costs imposed by road freight is significantly higher than for rail, this creates a high risk that the additional costs resulting from road projects attracting freight away from rail are not being considered in these evaluations, and no measures to address this risk are contemplated.

3.2.3 Recent assessments of the benefits of modal shift

The ARA's Value of Rail report published in 2020[8] examined some of the key benefits of a 1% mode shift from road to rail. The report presents modelling analysis conducted by Deloitte Access Economics that evaluated the extent of benefits of transporting freight using rail compared to road by estimating:

- the environmental benefits from reduced carbon emissions
- the safety benefits from reduced crash costs and
- the health benefits from reduced air pollution.

The report identified that a mode shift away from road to rail between major capital cities in Australia will reduce the social costs created through emissions, crashes and accidents and health costs from emissions (even using the current parameter value estimates) will result in total estimated benefits of around $71.9 million (2019 prices) per year. A breakdown of the anticipated cost savings is presented below.

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[8] ARA (2020) Value of Rail 2020, The rail industry's contribution to a strong economy and vibrant communities, November 2020, prepared by Deloitte Access Economics

Table 3 Summary of estimated benefits from a 1% mode shift from road to rail ($ per TKM 2019 prices)

COSTS SAVED	SYDNEY	MELBOURNE	BRISBANE
Reduced accidents costs			
Melbourne	$12.16		
Brisbane	$12.63	$24.87	
Perth	$54.13	$45.38	$66.74
Reduced emissions costs			
Melbourne	$9.42		
Brisbane	$9.78	$19.28	
Perth	$41.95	$35.16	$51.72
Avoided health costs			
Melbourne	$8.63		
Brisbane	$8.96	$17.65	
Perth	$38.42	$32.20	$47.37
Total costs saved			
Melbourne	**$30.20**		
Brisbane	**$31.37**	**$61.80**	
Perth	**$134.49**	**$112.74**	**$165.83**

Source: ARA (2020) Value of Rail 2020, The rail industry's contribution to a strong economy and vibrant communities, November 2020, prepared by Deloitte Access Economics, p.55

The ARA report notes that the benefits identified above are not the only costs that derive from a shift from road to rail, as there are other benefits such as reduced degradation of roads.[9]

This provides further evidence that operational, regulatory and policy settings that target improved rail mode share are expected to provide significant economic and social value.

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[9] ARA (2020) Value of Rail 2020, The rail industry's contribution to a strong economy and vibrant communities, November 2020, prepared by Deloitte Access Economics, p.55

4 Policy objectives and strategies to improve rail mode share

Without some form of policy intervention, the constraints on rail's ongoing competitiveness, particularly relative to road, will most likely continue to limit rail's mode share. As demonstrated in section 3, the consequences on inaction and missed opportunities for improved rail mode share are expected to be significant and extend well beyond the rail industry, to the broader economy and the Australian community.

This section identifies and evaluates the potential strategies to improve rail's mode share.

4.1 Ensuring a 'level playing field' between transport modes

The benefit assessment in section 3.2.3 identifies the scale of benefits available from improved rail mode share on key freight routes. Strategies to achieve this desirable outcome are discussed below.

The rail sector has long argued for a policy objective of achieving competitive neutrality, or a 'level playing field' between transport modes. However, before we proceed, we consider that it is important to reconsider and clarify what we mean by a 'level playing field'. This issue has been around for decades in Australian public policy debates about the relative efficiency between road and rail. However, the term 'level playing field' has often been used as part of a debate about the extent of subsidy provided to different modes and different vehicle types – a debate that is complicated by the service models, pricing structures and Government funding arrangements varying significantly between road and rail infrastructure.

However this debate obscures the key question; the overarching policy objective should be to create an environment that enables transport modes to operate efficiently and incentivises the use of the most economically efficient mode of transport for each freight task, having regard to not only the direct costs, but also the indirect (or external) costs of each mode. Importantly, road and rail are complementary as well as competitive, and efficient transport outcomes require an optimal combination of the modes.

Promoting the most economically efficient mode of transport for each freight task will logically result in different levels of Government funding for each mode, however this is what will create a level playing field from an economic efficiency perspective.

4.2 Strategies to improve rail mode share

In this context, we have identified a range of strategies that will aid in promoting rail mode share, so that it can perform a role in the national transport task according to the natural advantages of the mode and we have reviewed a range of policy options designed to address these strategies. This has confirmed that there is no single strategy or pathway that will 'solve' the issues of improving rail's productivity, competitiveness and mode share. Rather, a broad suite of policies, applied in a co-ordinated way, will be required. Each of the identified strategies has an important role to play in the long term pursuit of improved rail productivity. However, there will inevitably be a need to prioritise initial actions to initiate and build momentum for reform.

Therefore, in developing recommendations of the actions that will best promote rail productivity, competitiveness and mode share, we have first considered the broad policy framework that should be pursued (with strategies listed in no particular order).

Policy options to promote rail mode share can be logically grouped under the following strategies:

1. specifying an overall freight objective to guide and focus policy development;
2. ensuring cost benefit assessments support efficient outcomes;
3. promoting efficient investment in rail infrastructure;
4. promoting operation harmonisation through a focus on both safety and productivity;
5. promoting regulatory harmonisation;
6. promoting opportunities to expand the above rail market and to maximise rail's competitive service offering;
7. encouraging efficient modal choice;
8. improving freight access in metropolitan areas;
9. promoting rail provider alignment with customer requirements;
10. promoting information disclosure to allow accurate, timely and comprehensive reporting of the modal freight task to facilitate more informed decision making.

The potential solutions within each of these strategies are discussed in turn below.

4.2.1 Strategy 1 – Specify an overall freight objective

Problem identification

Within a range of industry sectors, an overall objective is specified that then serves to guide the development of further policies, and the implementation of regulation. A clear example of this is in the electricity sector, where a National Electricity Objective is established: "to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to: price, quality, safety and reliability and security of supply of electricity."[10]

Within transport, the National Freight and Supply Chain Strategy encompasses a range of actions across four critical areas:

- smarter and targeted infrastructure investment
- enable improved supply chain efficiency
- better planning, coordination and regulation
- better freight location and performance data

There are a range of action plans and strategies for progressing these critical areas, and the recommendations within this review of rail productivity performance all fall within these broad strategies.

Within the rail sector, there are a broad range of institutions with a variety of policy and regulatory functions. In each case, these institutions operate according to their own objectives. In some cases, these objectives are conflicting, and there are some institutions with internally conflicting objectives as a result of their different functions. For example, some Government agencies retain responsibilities for policy, regulatory and commercial aspects. Alternately, an agency's objectives for passenger transport outcomes may conflict with its objectives for freight outcomes.

More broadly, there can be misalignment of federal and state policy regarding transport infrastructure. An example of this is the NSW Government's Special Activation Precinct work around Parkes, where specific proposals from the NSW Government for the transport precinct had the potential to act as a barrier to operating the long trains that are central to achieving the expected productivity gains associated with Inland Rail.

However, within this framework, the overall freight transport objective is implicit, rather than explicit.

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[10] See https://www.aemc.gov.au/regulation/neo

Policy options

Government specification of an overall freight transport objective may help to align policy development and application of regulation to a common long term goal. Key features of this objective could include:

- promoting efficient investment in transport infrastructure and operation of freight transport services;
- promoting the most efficient mode of transport for each freight task, having regard to both the direct costs (which will in turn be influenced by the strategies recommended in this report), but also the indirect (or external) costs of each mode;
- maximising the long term benefit to consumers of freight services with respect to price, quality, safety and supply chain reliability;
- strengthening resilience of the national freight supply chains to ensure their ability to withstand and recover quickly from disruptive events to provide effective, reliable services.

4.2.2 Strategy 2 – Ensure economic assessments support efficient modal outcomes

Problem identification

1. Cost benefit assessments

As described in section 3 above, we have examined the conventional CBA frameworks applied to infrastructure proposals and policies influencing mode share, and consider that there is scope for some improvement to the way in which standard CBAs assess the costs and benefits with different transport modes (and hence the consequences of modal shift).

Policy options

A comprehensive review of the standard methodologies for CBAs for transport projects/policies should be undertaken in order to ensure that existing parameter values and approaches effectively ensure that economic, social and environmental benefits of a project are fully reflected and taken into account in the evaluation of rail/road investment decisions.

Such a review should include consideration of whether:

- methodologies consistently consider and assess modal implications
- standard parameters reflect a robust assessment of external costs of each mode, and

- standard parameters reflect changing community priorities particularly in relation to emission reduction.

There are several options for which body should be responsible for undertaking such a review, including by the Federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts, the National Transport Commission (NTC), BITRE or Infrastructure Australia.

Problem identification

2. Carbon reduction methods

The ERF[11] offers landholders, community and business the opportunity to run projects in Australia that avoid the release of greenhouse gas emissions or remove and sequester carbon from the atmosphere. A number of activities are eligible under the scheme and participants can earn Australian carbon credit units (ACCUs). ACCUs can be sold to generate income, either to the Australian Government through a carbon abatement contract, or to companies and other private buyers in the secondary market. Alternately, large emitters (such as rail transport operators) can hand ACCUs into the Government in order to ensure that they comply with the Safeguard Mechanism, which requires their net emissions (the emissions that they directly produce ('Scope 1 emissions') less ACCUs) be maintained at below a nominated level.

Under the ERF, the rules for eligible activities are set out in methodology determinations (methods), developed by the Clean Energy Regulator. The Transport Method, covering land and sea transport, was first established in 2015, and sets out the rules for projects that reduce emissions by improving fuel efficiency and changing energy sources to generate ACCUs.

In the context of the current Transport Method, a mode shift project is only possible where a proponent conducts operations across both modes, and directly replaces a vehicle in one mode with a vehicle in another mode (using the same duty cycle).[12] Any abatement created is not based on the difference in emissions intensity between categories of vehicles. Rather, abatement is created by improvements in emissions intensity within the categories of vehicles involved in the project.

Under the current method, a project that reduces truck emissions can create an abatement and qualify for ACCUs, however, a project that switched freight to a lower emissions transport mode such as rail, with potentially significantly greater reduction in total emissions, would not qualify for an abatement and could not earn ACCUs. Further, in the absence of being able to generate

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[11] Information about the Emissions Reduction Fund (ERF) has been sourced from Clean Energy Regulator at https://www.cleanenergyregulator.gov.au/ERF/About-the-Emissions-Reduction-Fund

[12] See https://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-industry/transport-methods/Transport-Land-and-Sea

ACCUs through mode shift, rail operators will need to acquire ACCUs on the secondary market in order to cover any increase in their own emissions due to their increased mode share (notwithstanding that this reflects a reduction in carbon intensity for the overall transport task).

Therefore, notwithstanding that a mode shift to rail represents one of the most effective means of reducing overall transport emissions, the current Transport Method creates rigidities between modes, and creates a cost barrier to rail operators in increasing the share of freight transported by rail.

The solution

The Clean Energy Regulator is currently consulting with the transport sector around a revised Transport Method, and this is being complemented by a review of the Safeguard Mechanism. Making it easier for rail operators to participate in the ERF, including through enabling mode shift projects to generate ACCUs, is an important step in enabling rail to play its role in the decarbonisation of the Australian economy.

4.2.3 Strategy 3 – Promote investment in efficient rail freight infrastructure

Problem identification

This study has shown that, for intermodal freight, rail corridors with shorter haulage distances (e.g Melbourne to Sydney, Sydney to Brisbane), face significant challenges to capturing increased mode share. Contributing to this outcome is road's relatively higher productivity performance, where upgrades of major interstate highways have allowed for road productivity to increase by reducing transit times (particularly on the Hume Highway and Pacific Motorway), allowing increased use of larger truck types (particularly on the Newell Highway) and more generally improving the resilience of the road network to withstand major weather events.

Existing rail infrastructure is not necessarily of a standard that enables rail freight operators to provide a service that can effectively compete with road in terms of the key drivers of mode choice – transit time, reliability, frequency/availability and price.

The planned upgrade in rail infrastructure with Inland Rail between Melbourne and Brisbane will provide an important improvement in trunk rail infrastructure, but it is not sufficient to guarantee mode shift to rail. An efficient end to end rail service offering requires other complementary investments in rail infrastructure to occur. As noted earlier, ongoing government commitment for the initiatives delivered by the Interface Improvement Program (IIP) is also an important element of increasing the amount on freight on the IRP.

Areas to address

As identified in the Infrastructure and Planning workstream, the infrastructure gaps that are considered to be most critical to improving rail mode share for intermodal and contestable bulk freight are as follows:

Table 4 Recommended actions to address high priority infrastructure gaps

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS
Intermodal		
Network reliability and resilience	Introduction of network improvements and other asset management strategies, to support improved train service reliability, focusing on improved on-time departure from terminals, improved on-time running and fewer network interruptions together with faster restoration of services following interruptions	Network reliability and resilience is considered by each RIM as part of their asset management strategies, but there is no specific program or industry consensus on what is required to promote enhanced reliability and resilience. BITRE and its portfolio Department are jointly progressing an investigation into Network Resilience risks and mitigation options as part of their Road and Rail Supply Chain Resilience Review.
Interstate intermodal terminals	New IMT facilities in Melbourne and Brisbane, that are: • Located within publicly funded intermodal freight precincts (enabling co-location with warehousing and distribution centres) close to existing and/or emerging major industrial areas • Provide for efficient arrivals, departures and cargo interchange • Provide sufficient capacity to meet long term demand growth • Non-discriminatory open access • Efficient first and last mile connections, including rail shuttles to ports Improved IMT facilities will enable reduced time and cost of PUD movements, and more efficient loading and unloading of trains.	Melbourne: • Location identified for two new IMTs (Beveridge and Truganina) • Commonwealth funding allocated for Beveridge and planning for Truganina • Port shuttle connections being progressed via Victorian Government as part of the Port Rail Transformation Project at the Port of Melbourne Brisbane: • Preferred IMT location not yet identified • Preferred route for port shuttle services not yet identified
Digital train control systems	Introduction of digital train control systems across the intermodal freight network involving: • Digital train control being progressed by all RIM's involved in the interstate network • RIM's to ensure that there is a seamless interface between digital control systems on adjoining networks	ARTC currently rolling out ATMS across interstate network, with initial priority on east-west route. Sydney Trains, Queensland Rail and MTM currently rolling out ETCS in metro networks. • Interface between ATMS and ETCS not yet resolved.
Optimised network planning and scheduling	Introduction of automated train scheduling systems across the intermodal freight network enabling: • automation of train handover at network borders, optimised and consistent pathing of train services across networks, optimised real time rescheduling of train services in	ARTC currently investigating the introduction of automated train scheduling system (similar to Hunter Valley ANCO) across ARTC interstate network. No current plans to develop automated train scheduling systems for other RIMs responsible for components of interstate network.

INFRASTRUCTURE ELEMENT	PRIORITY REQUIREMENTS	CURRENT STATUS
	out of course running, and real time prediction of arrival time. • automated train scheduling to be progressed by all RIM's involved in the interstate network RIM's to ensure that scheduling systems on adjoining networks are seamlessly linked requires common rules/definitions to be agreed between RIMs up front (i.e. on-time train arrivals) so that technological solutions can effectively implement those rules	
Rollingstock fleet capacity	Introduction of additional rollingstock to replace near life expired rollingstock and to provide for the operation of additional intermodal freight services, where that rollingstock reflects current best practice technology including, where possible, ability to adapt to future technological change.	Rail operators are investing in new rollingstock capacity, however there are long lead times on investment and limited local capability to meet demand. Further, it is unclear to what extent this will: • fully address additional demand, having regard to the extent of near life expired rollingstock • incorporate current best practice technology and adaptability to future technological change
Long term corridor protection and preservation	Ensure corridors are preserved to address long term network capacity requirements (including freight only corridors in urban areas). Ensure planning for additional passenger services (including long distance passenger services) does not erode capacity and transit times/cycle times for freight services.	Planning and corridor protection is the responsibility of all levels of government. A 2017 Infrastructure Australia Study ('Corridor Protection') identified that a national framework for corridor protection was required to guide coordinated and meaningful action by all levels of government.[13] The 2019 National Action Plan of the National Freight and Supply Chain Strategy committed to identifying and protecting key freight corridors and precincts from encroachment.[14]
Bulk		
Productivity (incl. cycle times)	For bulk freight networks with excessive delays (eg Murray Basin), to introduce initiatives including track quality, safeworking systems, capacity and scheduling to reduce the occurrence of excessive delays	Varies by regional network
Allowable train configurations	Progressively upgrade regional bulk freight networks (where viable) to allow operation of mainline rollingstock (potentially under speed restriction, provided not excessive in relation to overall cycle time)	Varies by regional network

Source: Synergies

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[13] Infrastructure Australia (2017), Corridor Protection, Planning and investing for the long term, July 2017, p.32. In the report, Infrastructure Australia recommended action to secure seven corridors for projects including the Outer Sydney Orbital, Outer Melbourne Ring, Western Sydney Airport Rail Line, Western Sydney Freight Line, Hunter Valley Freight Line, and the Port of Brisbane Freight Line. The highest priority identified by Infrastructure Australia at the time was preservation of the corridor for the proposed High Speed Rail line between Brisbane and Melbourne via Sydney and Canberra.

[14] Transport and Infrastructure Council (2019), National Action Plan, National Freight and Supply Chain Strategy, August 2019, p.17

Efficient investment to address these infrastructure gaps is required. While some of these investments may be commercially viable, in a number of cases, the key benefits of the investments are the external benefits generated from shifting freight onto rail. Governments are best placed and well able to provide the appropriate incentives to encourage investment in, and access to, efficient rail infrastructure.

Policy options

The rail industry and Governments should continue to promote investments in infrastructure, some of which are already underway, that enables the operation of efficient rail services, where this can be supported commercially or by a broader cost benefit analysis.

Governments, both Commonwealth and State, have demonstrated a willingness to fund rail infrastructure projects where the economic benefits outweigh the costs (as demonstrated by a full CBA). This proposed solution simply involves focusing investment programs on those rail infrastructure requirements that have been identified as providing the greatest opportunity to promote rail mode share.

We note that some of the highest priority infrastructure requirements, being intermodal terminal developments within integrated freight precincts, and digital train control on the interstate network (including integration with ETCS), are currently being progressed, supported by Government funding commitments. However, if rail is to play the role that it could in an efficient national freight system, it is essential to look beyond these existing pipeline projects to the next priority infrastructure requirements. The projects required to address the remaining priority infrastructure requirements are less well defined, but should be targeted towards a pipeline of reliability/resilience initiatives as well as development of integrated automated train scheduling systems. For these, rail participants will need to co-operatively progress the definition of the specific projects required to address the priority infrastructure requirements and to develop options analysis to establish the project need, specific project options and provide a preliminary assessment of financial and economic benefits.

This should be facilitated by:

(a) targeting infrastructure project development and investment to priority rail infrastructure requirements. Priority investment requirements were identified in the Infrastructure & Planning Workstream. Beyond the high priority projects already being progressed, the focus should be:

  (i) a pipeline of network resilience and reliability initiatives (an initial list of potential project investments is identified in the Infrastructure & Planning workstream - this should be used as a starting point to assess the reliability and resilience project pipeline);

(ii) automated train scheduling systems, seamlessly integrated across networks (eg ANCO);

(iii) long term preservation of rail corridors.

(b) Governments directing that rail infrastructure proposals specifically consider interoperability impacts.

This reflects that legacy infrastructure, with inconsistent requirements for rollingstock standards, is a major contributor to the nation's interoperability constraints. However, there is a risk that such incompatibilities will be further perpetuated where RIMs invest in future infrastructure without considering the ramifications for users beyond their network, including interoperability and capacity bottlenecks. It is critical that incremental investments are made on a compatible basis so that overall value and benefits can be extracted rather than investments being made on a 'piecemeal' basis which either shifts the problem to elsewhere along the rail network or makes overall rail operations worse.

It is therefore a welcome development that Infrastructure and Transport Ministers have agreed earlier this year to develop a Memorandum of Understanding on Interoperability which will consider a mechanism to implement interoperability impact assessments for future rail investments.[15] Ensuring that these issues are considered in the scoping of projects, will enable rail stakeholders and Governments to assess whether there is a benefit in additional expenditure to avoid interoperability and capacity problems being created.

(c) the Commonwealth Government should leverage its funding of rail infrastructure projects to encourage State Government support of other recommendations where states have the greatest influence.

In many cases, rail infrastructure projects, including those that are designed to promote rail's mode share, are funded at least in part with Commonwealth Government assistance. As is discussed below, a range of rail efficiency constraints are within the control of the State Governments to address, for example, constraints relating to jurisdictional regulatory fragmentation and freight access to metropolitan rail networks. However, there may not be sufficient incentive for State Governments to address these issues where the benefits are distributed more broadly across the Australian community. For example, limits on freight access through metropolitan rail networks will impact the quality and availability of freight paths across the national network and may discourage long distance freight from using rail. There is opportunity for the Commonwealth Government to leverage its investment in state based rail projects to gain State Government commitment to other strategies that will promote broader rail mode share objectives.

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[15] ARA (Rail Freight Executive Committee (2022) Agenda and Papers, p.14

4.2.4 Strategy 4 – Promote operational harmonisation through a focus on both safety and productivity

Problem identification

1. Inconsistent operational arrangements across RIMs (safety standards, operating rules, process and regulation) adversely affects industry productivity

Rail freight efficiency on key intermodal corridors is constrained by a series of differences that exist between networks and between jurisdictions. These constraints act as a drain on efficiency where they increase the cost of operating rail services, reduce flexibility and stifle future investment and technological innovation.

Poor harmonisation of standards, operating rules, processes and regulation contribute to a broad range of operating constraints that impede the efficiency of the rail sector. The Safety & Operations workstream identified that the most significant causes of inefficient constraints on the rail network, relate to:

(a) increasing network fragmentation, accompanied by differences in standards, operating rules and processes amongst RIMs, which contributes to operational, safety, physical, network pathing and access management related constraints;

(b) jurisdictional differences in regulatory environments, which contributes to environmental and access management related constraints;

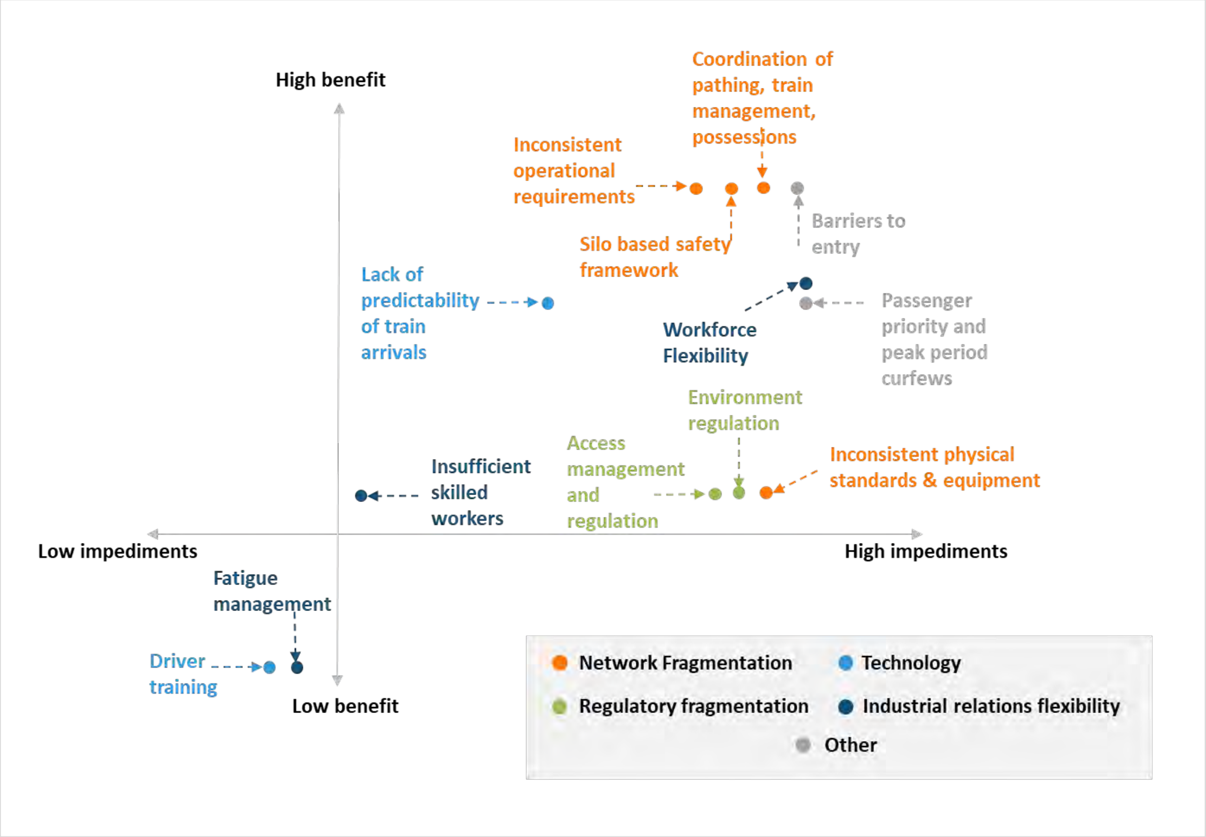
(c) technology, being the extent to which the industry has consistently invested in leading edge technology to promote efficiency;

(d) industrial relations flexibility; and

(e) other Government policies, which contributes to fatigue management constraints and passenger priority related constraints.

Analysis completed in the Safety & Operations Workstream identified the operational constraints and assessed the 'high value levers' to remove constraints on rail efficiency (see Figure 1).

Figure 1 Summary of benefits and impediments of operational constraints



Source: Synergies

A lack of strategic alignment was considered a high ranking impediment for many of the issues driving rail's inefficiency, and the most important factors that are driving this lack of strategic alignment relate to structural market design issues (i.e. network fragmentation) as well as the absence of institutional and regulatory arrangements to improve market co-ordination. These are explained as follows:

- Network fragmentation and mixed organisational focus on intermodal freight:
  - RIMs are largely expected to operate within a commercial framework and are governed by their own commercial drivers. The commercial outcomes for a RIM will be largely driven by its performance in meeting the needs of its major customers (eg passenger services in the metropolitan networks, coal services for the Hunter Valley and Central Queensland coal networks). Mode contestable freight (intermodal and mode contestable bulk) can have limited commercial leverage for these networks. The problem is exacerbated where Governments, as owner or funder of networks (particularly metropolitan passenger networks), do not specify any clear objectives or clearly defined performance metrics for freight, including long distance freight that crosses multiple network boundaries.

  - Even where intermodal or regional freight is the major customer, meeting their needs may not provide the strongest commercial driver for the RIM. For networks that are directly supported by Government funding (eg NSW CRN, Queensland regional network), the RIM may be more strongly driven by the incentive to reduce costs within the terms of its contract with Government than to bear any cost to promote rail utilisation – we are not aware of remuneration mechanisms for RIMs in these cases.
  - As a result, there is significant misalignment of incentives between RIMs in how they manage inter-network train services. This is not a criticism of the RIMs, as they are all responding to their own organisational objectives. Rather, it is a predictable outcome of their incentive frameworks. Given the extent of misalignment of commercial objectives, it is unrealistic to expect that the industry should be able to collaboratively reach a commercial agreement on how to address many interoperability issues, as there may be little benefit to some RIMs from doing so and potentially material costs involved.
- Regulatory frameworks that do not promote harmonisation:
  - While there are long term policy agendas to promote harmonisation, the focus of this has been on harmonisation between RIMs through industry collaboration. As discussed above, this approach runs into difficulties where the stakeholders have incompatible commercial objectives. But this approach also runs into difficulties where the stakeholders are subject to differing jurisdictional regulatory requirements and/or are governed by different jurisdictional regulators who may have different priorities and interpretations of requirements.
  - Even in rail safety, where there is a single regulatory framework and a single national safety regulator, harmonisation concerns still apply. The co-regulatory framework, which provides for each RIM to develop its own safety systems to address the risks on its network, is designed to address the varying characteristics and safety risks of differing networks. This approach does not promote harmonised approaches to managing risks across networks (although it does not prevent harmonised approaches being applied if proposed by the rail operator).
  - There is no national policy agenda to review regulatory frameworks in order to promote harmonisation. Rather, the frameworks rely on individual RIMs and regulators to implement more consistent obligations and approaches to increase harmonisation.
  - This approach to regulation of rail networks differs materially from the regulation of other cross jurisdictional infrastructure networks, such as electricity, gas and telecommunications, as well as the road network. In these cases, the intrinsic characteristics of the underlying product together with regulatory frameworks are designed to promote consistency in standards and approaches.

This approach to regulation of rail networks differs materially from the regulation of other cross jurisdictional infrastructure networks, such as electricity, gas and telecommunications, as well as the road network. In these cases, the intrinsic characteristics of the underlying product together with regulatory frameworks are designed to promote a greater degree of consistency in standards and approaches.

Policy options

The rail industry and Governments should promote harmonisation of operational standards, systems, processes and technologies.

A range of options were considered as part of the Safety & Operations Workstream, which ultimately recommended pursuing a regulatory and governance model that promotes centralised guidance on rail operations and regulation and empowers mandatory imposition of consistent standards where there is a net benefit from doing so, while still, where applicable, enabling regulation to be undertaken at a jurisdictional level.

The preferred model developed within the Safety & Operations Workstream provides for:

- a centrally co-ordinated review of the key differences between the specific obligations, rules, standards and processes across networks, identifying specific opportunities for improved consistency and enhanced harmonisation and providing guidance as to 'best practice' options;
- rail industry participants have the opportunity to consider these specific opportunities, and where possible, agree on a consistent approach to be applied across RIMs;
- to the extent that agreement cannot be reached, but where there is net benefit in applying a harmonised approach, a process for mandated changes to obligations, rules, standards and processes to be made to enforce consistency;
- on an ongoing basis, a process for issues around standards and processes that cannot be collaboratively resolved to be referred to an independent body for resolution via such mandated changes.

Problem identification

2. The need for a productivity focus on safety standards, operating rules, processes and regulation to improve freight rail performance

Many of the operational standards and processes adopted within the rail industry have both safety and productivity consequences, and changes can be designed with a focus on improving safety, improving productivity or improving both. The Safety and Operations Workstream noted that safety and productivity were often positively correlated – in the sense that greater consistency promoted both safety and productivity. Therefore, there is significant overlap in assessment of safety and productivity related to standards and processes.

However, there is no existing body responsible for promoting rail productivity in Australia. This is different to the regulatory framework for road where the National Heavy Vehicle Regulator (NHVR) has responsibility for increasing both safety and productivity of heavy vehicles on the road networks available to them (see Appendix A for further information).

Policy options

A productivity focus, in combination with a safety focus, should be brought to bear on rail freight performance.

Problem identification

3. The need for an institutional vehicle to drive improved operational harmonisation with a productivity focus

Accepting that increased operational harmonisation and an increased emphasis on rail freight productivity are sensible pathways to improving rail's mode share, the next challenge is determining the vehicle that is most appropriately placed to deliver this mandate.

Under the current institutional arrangements:

- ONRSR's statutory role is regulatory oversight of the National Rail Safety Law which involves improving rail safety, decreasing the regulatory burden on the rail industry, providing seamless national safety regulation and enforcing regulatory compliance[16].
- RISSB is responsible for developing and managing a suite of voluntary standards via a collaborative approach amongst RIMs, providing RIMs with significant discretion to implement their own processes and standards.
- the National Transport Commission (NTC) is an independent advisory body leading major strategic national land transport reform in support of all Australian Governments.

Policy options

Within this preferred model for new centralised guidance, there are a number of possible options to develop a rail industry regulator to drive both productivity and safety performance. Options generally fall within two broad categories:

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[16] ONRSR Statement of Intent 2021 – 2024, p.3

(a) One option is to leverage off existing institutions and institutional architecture, with the most efficacious mechanism involving redefining ONRSR's role so that it becomes a regulator with a productivity as well as safety focus, and empowering it to develop mandatory standards where harmonisation can be expected to yield net benefit but is not agreed or fails to be implemented through collaborative processes. This would involve a major change in ONRSR's role and approach, moving from a safety compliance focus to pro-actively promoting opportunities to enhance productivity while maintaining safety. It would require the acquisition of additional skills and resources to enable an effective assessment of productivity issues and advocacy for mandatory standards where required and a cultural change within the organisation. Significant organisational change, including a change in name, would be required to reflect this change in focus. This change would also have implications for the role of other national bodies, such as RISSB and the NTC.

This option, reflecting a modification of existing governance arrangements for rail, could be implemented with modest legislative reform. However, there is a risk that attaching a productivity agenda to an existing safety regulator will not create sufficient impetus for productivity reform.

(b) The other broad option is the creation of a new rail industry regulatory body, with a broader set of objectives, potentially even extending beyond safety and productivity, to include matters such as environmental and/or access regulation. The National Heavy Vehicle Regulator provides a template for how such a 'one stop shop' could operate. The Australian Energy Market Commission provides another model for how rules could be developed and applied across the industry. However, if such an institutional approach were to be adopted, it would be necessary to recognise that, unlike road (and hence the NHVR), the rail network is underpinned by a contractual framework that allocates risk and responsibility between RIMs and rail operators, and any regulatory arrangements need to be cognisant of that.

This option may provide a stronger impetus for productivity related reforms, however, the need to develop a new institutional architecture means that this is likely to involve extended implementation timeframes and costs.

Ultimately, the preferred option will need to be determined in consultation with Governments.

In either case, significant Government and industry commitment will be required to refocus the industry to achieve the productivity gains necessary for rail to achieve its potential in efficiently meeting the national freight task. Reforms extend beyond harmonisation of standards to encompass productivity inhibiting operational and capacity management practices across the industry. Further, recognising that any mandatory standards and requirements ultimately need to be endorsed by all jurisdictional Infrastructure and Transport Ministers, it would be appropriate for the ARA and FORG to have an enhanced role in advocating to the Infrastructure and Transport Ministers Meeting (ITMM) in relation to the rationale and need for identified reforms.

4.2.5 Strategy 5 – Promote regulatory harmonisation

Problem identification

4. There is a need for greater harmonisation of environmental regulation

In Australia, the regulation of environmental requirements is primarily the responsibilities of the state and territories. The state or territory's environmental regulator is responsible for the administration of these controls and ensuring the relevant environmental protection legislation in enforced. Different jurisdictional environmental regulatory frameworks can result in different environmental obligations, forcing operators to persist with outdated technology in order to be able to operate.

Environmental regulators consider rail environmental performance in isolation (instead of relative to the alternate transport mode), which could lead to worse environmental outcomes if rail cannot meet desired standards.

These jurisdictional differences lead to increased rail operating costs by:

- increasing the required specification and cost of rollingstock;
- creating barriers for rail operators to innovate and invest in new technology; and
- reducing incentives to invest in rollingstock to meet freight demand.

Policy options

Governments should promote harmonisation of environmental regulation by identifying a national co-ordinating body (eg the national EPA planned to be established by the Commonwealth Government) to investigate opportunities for enhanced harmonisation of environmental requirements, recommending specific harmonisation opportunities by way of common standards and providing a mechanism for the common core national environmental standards to be mandated, by agreement of the relevant Commonwealth and State Ministers.

Problem identification

5. There is a need for greater harmonisation of rail access regulation

There are multiple access regimes in Australia, each administered by different regulators. While each of these regulatory frameworks is based on a consistent set of high level principles, there are significant differences in application and operation. While some of these differences are appropriate, for example, while heavy handed price regulation can be justified in some circumstances (eg coal networks in NSW and Queensland), for general freight networks there is limited value in cost based regulation of access charges.[17] However, in many cases, the differences are unrelated to the economic case for regulation, with a range of different processes applied to achieve the same broad objective. Further, a number of the frameworks, most notably ARTC's interstate and Hunter Valley access undertakings, remain voluntary.

It is a common issue for rail operators using multiple rail networks to have to deal with seven different regulatory frameworks overseen by six different regulators; differences also apply for individual RIMs under a given framework.

The application of economic regulation to rail networks is driven by a combination of the overarching regulatory frameworks, the design of regulatory instruments proposed by RIMs, and the requirements of regulators in approving those instruments. The level of interaction between RIMs and regulators has some similarity with the co-regulatory framework applied for safety regulation.

Policy options

The rail industry and Governments should promote harmonisation of access regimes by:

- identifying an independent national co-ordinating body to assess opportunities for improved harmonisation, with the rail industry involved in the assessment. It is possible that the rail industry may be in a position to present a unified position to such a body on a detailed harmonised framework;
- tasking that body with the role of investigating opportunities for enhanced harmonisation of access regulation and management requirements, and recommending specific harmonisation opportunities by way of common principles and procedures;
- providing a process for individual RIMs and jurisdictional regulators to seek agreement on incorporating those principles and procedures into existing regulatory instruments; and
- providing a mechanism for the principles and procedures to be mandated for application within the existing regulatory instruments, through agreement of the relevant Commonwealth and State Ministers.

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[17] ACCC (2022), Guidance Paper: ARTC's Interstate network access undertaking 2023, p.14

4.2.6 Strategy 6 - Promote opportunities to expand the above rail market and to maximise rail's competitive service offering

Problem identification

Rail faces intense competition from road in the provision of intermodal freight. However, in terms of rail on rail competition, on each of long distance/interstate corridors other than Adelaide to Darwin, there are currently two intermodal rail freight operators across Australia. A third operator (Aurizon) exited the intermodal freight market in 2017.

There are various structural reasons to explain the limited number of players in the above rail market to date. These include a combination of rail specific as well as generic challenges confronting any industry entrant:

- the presence of high economies of scale in rail line haul, with the volume of freight required to support the viable operation of a new rail operator large in the context of the size of the market and proportion amenable to rail;
- incumbent customer relationships and contracts, which limit the opportunity for new entrants to attract the necessary freight volumes;
- access to a network of efficient, well located intermodal terminals that support new entrants' ability to offer an attractive freight service;
- access to attractive paths (where applicable integrated with terminal slots);
- access to rollingstock, recognising the cost and time associated with acquiring new rollingstock.

Even in sectors where structural conditions can reasonably only support a small number of participants, increasing contestability through reducing barriers to entry is a well recognised means of encouraging increased productivity. For the rail sector, increased productivity driven by increased market contestability can be expected to enhance rail's ability to attract freight from road.

Policy options

Many of the factors that limit new entry to the rail market are not unique to rail. The difficulty of attracting sufficient customers from incumbents to support new entry in an environment of high upfront capital costs and high economies of scale is common to many markets. There is ample evidence that these factors can be overcome where there is sufficient opportunity within the market.

However, there are instances where improved access to infrastructure can improve contestability and, hence improve opportunities for the above rail market to grow. In this regard, the rail industry and Governments should continue to support action already in progress to address barriers to entry, including by:

(a) *Access to new publicly supported intermodal terminals* – continue to support decisions around the land use planning, design, strategic management and operation of intermodal terminals in new publicly funded intermodal freight precincts that facilitates non-discriminatory access by third parties;

(b) *Access to rail paths* – the establishment of Inland Rail, together with the development of new intermodal terminals in the east coast capitals, provides an opportunity on the north-south route for the definition of new train paths (linked to terminal slots). Access to these paths will need to be negotiated and granted in accordance with the provisions set out in ARTC's access undertaking, approved by the ACCC.

4.2.7 Strategy 7 – Encourage efficient modal choice

Price is a critical consideration for influencing modal choice for end to end freight movements. Rather than setting prices so that freight customers are 'agnostic' to mode, prices for each mode should be set in such a way that they provide an appropriate signal to encourage the use of the best, most efficient mode for each freight task.

As discussed in the mode share workstream report, in order to attract freight volumes, rail needs to 'price off road'. However, current pricing structures for road freight do not necessarily result in this encouraging the best, most efficient mode for each freight task. Of particular concern is whether road prices are appropriately set to cover the costs imposed by trucks (including the different costs imposed by different types of trucks), which influences the rail freight prices that can be applied.

Beyond the issue of road pricing, there is an issue of whether rail prices (access charges and freight charges) are appropriately set to attract freight volumes from road across the spectrum of freight types, including freight of different densities and haul distances.

In relation to coastal shipping where domestic coastal shipping movements are provided by international carriers as an incremental add-on to the international freight movement, they are able to offer very low rates reflecting only the marginal cost of the movement. In some cases, this marginal cost is able to be further lowered if the international carriers can avoid compliance with Australian maritime regulation. However, these supply chains are highly vulnerable to the vagaries of the international shipping markets and a high reliance on coastal shipping via international carriers can undermine the sovereign capability of Australia's supply chains.

Problem identification

1. Prices for road infrastructure do not encourage the use of the most efficient mode for the right task

In relation to road, the disparity in charging arrangements between road and rail is commonly cited as a reason for rail's lack of competitiveness. There are substantial differences in the approaches used for road and rail network pricing. While it is acknowledged that PAYGO charging structures largely cover the full ongoing cost of road provision (including construction and maintenance) that can be allocated to heavy vehicles[18], the approach of recovering all costs as they are incurred (measured over a seven year period) rather than recovering a capital charge based on an established value of the existing road networks leaves open a question of whether the full value of existing major roads is properly reflected in these charges.

There are also significant concerns over whether the allocation of these costs to different types of vehicles properly reflects the different costs that they impose. There is a view that the current PAYGO structures result in small heavy vehicles cross subsidising large heavy vehicles.[19] Given rail primarily competes with large vehicles, this cross-subsidy will depress the price that can be charged by rail in order to attract freight from road and impede decarbonisation of the transport sector. This is a long running, known, systemic deficiency in the current road pricing structure that has been the subject of numerous reviews over many years. A more detailed explanation of the current road infrastructure pricing arrangements is set out in Appendix B.

Policy options

Achieving more cost reflective road pricing

(a) Transfer of responsibility for heavy vehicle road pricing from NTC to ACCC

The NTC has ongoing responsibility for recommending heavy vehicle charges to the Infrastructure and Transport Ministers Meeting (ITMM).

One policy option to consider is for the ACCC (rather than the NTC) to independently determine heavy vehicles charges. It can be expected that concerns around cost subsidisation would more effectively be dealt with by the ACCC given their experience in examining cross subsidisation in pricing across a range of industry sectors (postal services, rail, energy, and telecommunications).

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[18] NTC (2021), Heavy vehicle charges consultation report, January 2021, p.7

[19] This issue was examined by the Productivity Commission in 2006 as part of the Inquiry into Road and Rail Pricing. The PC found that a major problem with PAYGO in practice is created by averaging costs across the network. This blurs price signals and leads to cross-subsidies from operators carrying light loads to those carrying heavy loads, from users of lower-cost roads to users of high-cost roads and, indeed, to those benefiting from roads that may be justifiable on social but not economic grounds. See page xxxiii of the PC inquiry report at https://www.pc.gov.au/inquiries/completed/freight/report/freight.pdf.

This is not a new proposition. It has been previously recommended that the ACCC take on this role. In 2017, the Federal Government undertook public consultations to seek public and industry views on options for independent ACCC regulation of heavy vehicle charges.[20] In November 2017, the Transport and Infrastructure Council asked for a COAG Regulation Impact Statement to be developed in order to inform a decision on whether to implement ACCC price regulation, as part of the COAG Heavy Vehicle Road Reform work. After receiving the final RIS in November 2019, the Transport and Infrastructure Council directed that public consultations take place on package of reform elements, independent ACCC price regulation.[21] No further progress appears to have been made.

There has been some support for this policy option, with the former ACCC chairman Rod Sims publicly commenting in 2019 that:[22]

> “Another element is that heavy vehicle charges are to be set on an independent basis. It has been suggested that the ACCC takes this role. Having an independent agency determine charges can promote confidence in the scheme. Industry will know the charges reflect underlying spending on roads, avoiding the common criticism that the charges reflect a ‘tax grab’.
>
> Also, part of the proposal is to introduce a form of external scrutiny over where road agencies spend their dollars. Any spending on projects judged not to meet national road standards will not be recoverable through heavy vehicle charges.
>
> I hope that these reforms will be adopted.
>
> Granted, they represent small steps on the reform journey, particularly as they only relate to heavy vehicles. Even then, they don’t extend to replacing today’s fuel-consumption-based charges with more sophisticated charging models that vary by a truck’s mass, distance and location.
>
> But change in the right direction is extremely welcome. And these proposals lay the essential foundations for further reform.”

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[20] A copy of the discussion paper published by the Department of Infrastructure and Regional Development in May 2017 regarding independent price regulation of heavy vehicle charges is available at https://www.infrastructure.gov.au/sites/default/files/migrated/roads/heavy/files/IPR-Discussion-Paper.pdf

[21] See https://www.infrastructure.gov.au/infrastructure-transport-vehicles/transport-strategy-policy/heavy-vehicle-road-reform/regulation-impact-statement-independent-price-regulation-heavy-vehicle-charges

[22] ACCC (2019), Speech by Rod Sims Chair to the Australasian Transport Research Forum: ACCC perspectives on transport issues, 30 September 2019. A copy is available at https://www.accc.gov.au/speech/accc-perspectives-on-transport-issues

(b) Direct mass-distance charging model

The use of diesel/petrol excise as a means of road funding lacks transparency and creates confusion in relation to policies aimed for the uptake of electric vehicles to improve the environmental sustainability of Australia's transport task. Over the longer term, a more direct form of road user charging, with charges varying based on a truck's mass, distance and location, is likely to be appropriate. Governments have not yet made a decision on the specific form this more direct user charge should take, although the replacement of the current charges with more direct user charges has already been flagged as the key transition from 'phase three to phase four' of the Heavy Vehicle Road Reform (HVRR) Road Map.[23] Clear user based charging for heavy vehicles, delinked to diesel utilisation, will assist Australian governments achieve both their environmental and transport objectives.

The history of road pricing in Australia suggests that there is no strong appetite by Governments to progress this reform. However, the next major impetus for reform is likely to come in the medium term as energy providers and governments respond to the growing challenges and opportunities in relation the growing take-up of electric vehicles and the need to set appropriate pricing signals to support long term, sustainable growth. There may be little that the rail industry can do to influence the progress and expediency of road reform in the meantime, other than ensuring that its own pricing signals and service offerings are set to reflect the most competitive, attractive terms and conditions to capture more mode share as possible.

(c) Recognising externalities in road costs and charges

Externalities in road pricing relate to incorporating the social cost of factors such as congestion, noise, pollution and accidents into the pricing mechanism. Current road pricing structures do not reflect externality charges, with PAYGO charges only reflecting the direct costs associated with the use of roads i.e. maintenance costs, road damage costs.

Externality costs can vary significantly by location, with the most significant costs occurring in urban areas where there can be high levels of road congestion, and environmental concerns such as air and noise pollution are significant.

In its 2006 review of road user charging, the Productivity Commission concluded that applying a single charge on freight operators to cover the cost imposed by a range of externalities would be inappropriate, and that if externalities are to be reflected in charges, this should be by way of direct charges for specific externalities.

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[23] Department of Infrastructure and Regional Development (2017), Independent price regulation of heavy vehicle charges, May 2017. p.5. There are four pillars to Heavy Vehicle Road Reform agreed to by Infrastructure and Transport Ministers (1) National service standards for roads (2) Independent determination of what expenditure is recoverable through heavy vehicle charges (3) Independent setting of heavy vehicle charges (4) Hypothecation of charges revenue. See https://www.infrastructure.gov.au/sites/default/files/documents/pathway-ahead-heavy-vehicle-road-reform.pdf

In this context, it is likely that externalities can only be effectively incorporated into road user charges where mass-distance, location based charging is implemented.

Use of government incentives to promote mode utilisation and rail efficiency

Direct government incentives can be an effective means of promoting increased rail transport, particularly where road user prices are not set on a basis that reflects full cost recovery (including sunk capital and externalities). This can be achieved either through greater use of existing infrastructure or by encouraging private investment in enhanced infrastructure.

(a) Rail utilisation incentives

Mode utilisation incentives can be used to facilitate increased rail mode share, but governments need to assess the circumstances in which utilisation incentives are likely to be successful. Utilisation incentives may not be effective in promoting a long-term shift to rail if other strategies that fundamentally improve the competitiveness of rail services are not also introduced. This is particularly the case if they are applied on a single network that is used as part of a multi-network rail journey. However, they may still have a place within a broader rail freight policy, including:

- to encourage a switch of freight from road to rail in order to reduce the negative externalities associated with a high number of trucks on inner city roads (e.g. congestion costs) – this is most likely to be relevant in relation to transport and urban planning into major city ports;
- where they are part of a broad package of longer term investments in service quality; or
- in order to trigger users to switch from a road based to a rail based supply chain (noting that there can be costs associated with changing supply chains).

It is also possible to tailor utilisation incentives to address discrete objectives. For example, the NSW Auditor General's Report observes that there could be available train path capacity on weekends, however TfNSW is not clear on how to make these paths more attractive to rail operators.[24] A potential option is to offer an incentive to freight and/or terminal operators for increasing available capacity on weekends in order to effectively use these paths.

(b) Rail efficiency incentives

Train networks operate most efficiently where there is a high degree of uniformity and predictability in train movements. Similarly, rail terminals will operate most efficiently where there is uniformity and predictability in the trains that are presented and the equipment required to load/unload that train.

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[24] Audit Office of NSW (2021), Performance Audit: Rail freight and Greater Sydney, 19 October 2021, p.26

There are opportunities for infrastructure providers to structure their arrangements and agreements with rail operators in order to promote and incentivise on-time running and high levels of path/slot utilisation, to the extent that this is within the control of the rail operator.

There are a range of levers within rail access agreements that can potentially be used to promote increased rail utilisation and on-time performance. For example:

- there could be scope for access agreements to include a financial incentive mechanism for maximising utilisation and on time performance (to the extent that this is within the control of the rail operator). Most access agreements instead apply a penalty regime, where rail operators risk suspension or cancellation of access rights, although these rights are rarely used by RIMs in practice.
- a financial incentive could also potentially be used to encourage earlier release of unused paths by rail operators, enabling a take up of those paths by other operators with greater incentive for utilisation.

(c) Granting HPV permits subject to a cost benefit assessment of its impact on mode share

There are a range of instances where Governments have supported the increased use of high performance vehicles in order to promote road productivity, but where this has been at the expense of objectives for strategically increasing the use of rail transport. These include:

- increasing vehicle permits for A Double trucks to run to/from Port Botany
- approving A Double trucks to/from Port of Melbourne, which is likely to have had similar ramifications as Port Botany
- investments in road upgrades to support HPV movements, especially on first and last mile local roads – this has occurred in multiple jurisdictions (Qld, NSW and Victoria)
- broader investments in road networks to support heavy vehicle access to ports.

Such decisions are taken according to specific policy objectives targeted better utilisation of road infrastructure and improved productivity of road transport. However, to the extent that these decisions result in a shift of freight from rail to road, it is not clear whether this shift reflects an efficient outcome for the community more broadly, having regard to the full cost of road and rail, including externalities.

Given that externalities are not recognised in either road or rail pricing, in the context of ensuring freight owners face the appropriate signals to choose the most efficient mode for the right task, decisions around the granting of increased HPV permits (either increased volume or geographical scope) should be guided by an initial cost benefit assessment, including considering the likely consequence on mode share.

Problem identification

2. Prices for rail freight do not always enable rail to offer a competitive benefit to road

As discussed in the mode share workstream report, in order to attract freight volumes, rail freight charges for intermodal services need to be set that allows above rail operators to compete with road, noting that they may need to 'price off road'.

As a result, the key issues in rail pricing are:

- whether rail access charges are set at a level and structure that allows rail operators to effectively compete with road, while recovering the long run efficient cost of providing and operating the train services; and
- whether rail prices are appropriately set to attract freight volumes from road across the spectrum of freight types, including freight of different densities and haul distances.

Importantly, in considering the issues around rail access pricing, there is a tension between the objective to enable rail operators to effectively compete with road, while also setting a charge that enable sufficient ongoing maintenance and renewal of the rail infrastructure.

Therefore, this does not indicate that there is long term benefit from a move to 'rock bottom' access pricing to facilitate competition with road; such pricing does not support necessary maintenance and investment and will ultimately lead to further service degradation and reduced modal share. And in any case, given the multi-network and multi-jurisdiction nature of many train services, the application of such an approach by any individual network may not work in practice.

Policy options

There is opportunity for the rail industry (operators and RIMs) to continue to evolve their pricing structures to improve the alignment of rail haulage prices with competitive alternatives, including across different cargo densities and different train sizes. This can include for rail operators to:

(a) continue, on an ongoing basis, to evolve their price structures in order to maintain their competitiveness with other modes, including across varying cargo densities; and

(b) work with ARTC (and other RIMs) in order to identify whether alternate rail access charge structures may assist rail operators in more closely aligning rail freight charges with competitive alternatives (eg applying the variable charge by loaded wagon rather than by weight).

Similarly, rail operators can continue, on an ongoing basis, to develop other aspects of their service offering in order to maximise rail's ability to compete with other modes, including:

(c) charges applied for one-way backhaul movement to return empty containers used in coastal shipping;

(d) the extent of differentiated transit time product offerings (eg based on priority of loading/unloading at IMTs) to maximise their competitiveness with road and shipping.

Problem identification

3. Regulation of international shipping companies' carriage of domestic freight

Supply chains that are highly reliant on the carriage of domestic freight by international shipping liners are highly vulnerable to the vagaries of the international shipping markets. These shippers are able to carry domestic freight at marginal cost, as they are an incremental add on to their import/export movements, however, availability of this coastal shipping service is not certain. These rates are insufficient to support investment in rollingstock capacity, and therefore cannot be matched by rail operators who need to invest in dedicated trainsets. Hence, a withdrawal of international shipping capacity may leave a gap unable to be filled by existing domestic freight capacity. As a result, policy settings that facilitate a high reliance on coastal shipping via international carriers can undermine the sovereign capability and resilience of Australia's supply chains.

Further, there are broad concerns that international vessels are not subject to consistent regulation to domestic freight operators, particularly in relation to labour arrangements, providing shipping with a competitive advantage. The Australian Government has introduced a range of regulatory requirements that apply to foreign flagged ships providing domestic freight movements, including that, when in Australian waters, international shipping lines are to pay Australian wages to their foreign crews when carrying domestic freight. However, there is currently no mechanism to assess or enforce compliance with these requirements, with the risk that non-compliance could provide international shipping companies with a further unreasonable competitive advantage over rail (and road) transport.

Policy options

Legislative amendments should be considered to incorporate a framework that compels foreign flagged vessels to provide evidence of their compliance with Australian shipping regulations. This will provide confidence that Australian regulations are being upheld. Beyond this, while coastal shipping has provided a low cost means of transport, the sudden loss of shipping capacity availability reported during the recent pandemic highlighted the economic sovereignty concerns with this mode. This is an issue worthy of further policy consideration.

4.2.8 Strategy 8 – Improving freight access in metropolitan areas

Problem identification

Within many of our major cities, there is a need for freight trains to operate over rail networks shared with the metropolitan passenger system. While freight services are not necessarily a major user of these metropolitan networks, the 'last mile' connections through urban areas is a critical component of the end to end movement of the freight train, and the efficiency and reliability of that 'last mile' access has significant repercussions for the entire freight movement.

While the metropolitan networks are understandably primarily focused on the successful delivery of passenger services, the application of inflexible passenger priority Government policies can materially reduce overall rail transport efficiency (particularly in term of freight reliability, on-time performance, path availability and rollingstock utilisation). Government passenger priority requirements and peak period curfews apply in Sydney, Melbourne and Brisbane, although it is in Sydney where there is most significant impact on the national freight task, given Sydney's central location within the national freight network, and the extent to which freight trains are required to operate over shared passenger networks.

Passenger priority and peak period curfews are often inflexibly applied in order to, wherever possible, eliminate the risk of freight trains causing any disruption or delay to passenger services. However, this inflexibility makes the task of operating rail freight services challenging and excessively restrictive, and can result in substantial delays to freight services and increasing cost by reducing rollingstock utilisation and the ability to maximise use of rail network capacity.

Also problematic for freight services is the practice of scheduling maintenance, with metropolitan RIMs typically applying scheduled full weekend closures of network segments in order to maximise maintenance efficiency and minimise disruption to passenger services outside of these closures. However, where through freight services require access to multiple network segments (and so are unable to operate when any of those segments are closed), this practice results in significant service unavailability. As a consequence, freight is increasingly moved by road.

The importance of urban networks in providing effective public transport, particularly in peak periods, is unquestioned. However, given the prohibitively high cost of developing separated freight and passenger networks, it is appropriate to consider whether a more flexible approach may improve the ability of the shared networks to deliver an overall benefit to the community.

Policy options

Most metropolitan rail commuter networks are operated with substantial State Government funding support. The networks are usually vertically integrated with the rail operator, and run either by Government owned rail operators (eg Sydney, Brisbane) or under Government franchise (eg Melbourne). The funding arrangements for these operators are usually structured either solely or primarily around their performance in passenger service delivery. Freight services have limited commercial leverage on these metropolitan networks.

However, State Governments have the ability to modify the way in which passenger priority arrangements are applied in order to promote the efficiency of rail freight in the context of the transport system as a whole, and therefore promote rail mode share, both for urban and long distance freight services.

While passenger priority would be expected to remain paramount in metropolitan networks, there is opportunity to improve freight service quality and liberate capacity for freight services through a more nuanced application. There are a range of options to achieve this.

(a) Creating an organisational incentive to facilitate freight

An increased organisational incentive for the facilitation of efficient access for cross network freight trains will not directly address any specific constraint. However, specifically introducing incentives for metropolitan RIMs to facilitate freight services will improve the opportunity for a more nuanced application of passenger priority requirements.

There are clear opportunities for State Governments to influence metropolitan RIM organisational objectives and commercial incentives, particularly where:

- Governments have retained ownership of the RIM – in this case, the owner Government can influence the RIM's organisational objectives through its statements of objectives and through the performance measures that it focuses upon; or
- Governments contract with the RIM to operate the services – in this case, the purchaser Government can influence the RIM's commercial incentives through the way in which it specifies the services that are to be provided, and the performance measures that it focuses upon.

The specification of clear objectives and/or service specifications to include the facilitation of freight services is broadly consistent with the NSW Auditor General's 2021 report relating to freight services operating through the Sydney Train network, which concluded that transport agencies do not have clear strategies or targets in place to improve freight efficiency or capacity of the metropolitan shared rail network. It also noted that TfNSW had started work on four freight-specific strategies to improve freight efficiency, a review of the Freight and Ports Plan, a freight rail strategy, a port efficiency and a freight data strategy, however, that none of these would be fully developed before the end of 2022.

Including these requirements as part of the specification of its service purchasing arrangements may be the most transparent way of improving the alignment of metropolitan rail operators towards the facilitation of freight services, and this approach has the advantage of allowing the purchaser Government to specify consequences for the failure to provide these services, in the same way that occurs in relation to the provision of passenger services.

Addressing RIM incentives is arguably the most important issue to address as every other measure will fail to meet its potential for improvement in the absence of incentive alignment.

(b) Defining a more flexible application of passenger priority

The obligation on metropolitan rail operators to provide passenger priority is often defined in a very general way, for example, the obligation on network managers in NSW is simply to 'give reasonable priority to rail passenger services'. State Governments may provide some greater guidance as to how they intend this to be applied. For example:

(i) A general obligation could be specified that decisions on the circumstances in which passenger priority are applied must be assessed under a cost benefit framework, in order to ensure that the broader social benefits are maximised;

(ii) Moderate prescription could be provided by giving practical examples of what would be considered reasonable and unreasonable, for example:

- it is reasonable to prioritise passenger services over freight services where the passenger services are used by large volumes of passengers or where there are significant consequential impacts of delays (eg commuter peak periods);
- it is not reasonable to prioritise passenger services over freight services where the number of passengers and/or consequential impact is small, but where
    - the impact on the freight service (in terms of value of freight and/or consequential impact) is large; or
    - this results in the freight operator having insufficient certainty and/or quality of service to enable it to provide an efficient and commercially attractive freight transportation service.

(iii) Particular rules could be specified that RIMs must adopt, for example:

- In relation to the allocation of capacity in an access negotiation:
    - It is not reasonable for a RIM to refuse to contract available train paths to freight services (or only contract them on short term basis) in case this capacity may be required in future by (currently uncontracted) passenger services
    - In order to provide sufficient certainty to freight operators, a RIM should be willing to contract train paths for up to [5] years

- In relation to the application of peak curfews, freight trains should be permitted to operate in the contra-peak direction
- In relation to the scheduling and management of trains on the network, specify a prioritisation hierarchy that must consistently be applied by all RIMs. This could be based on the ARTC prioritisation hierarchy which allows prioritisation of freight trains in certain circumstances.

(c) Preserving freight paths in metropolitan networks

Paths are committed to freight operators under term based access agreements, with the potential for these paths to become unavailable at the end of the agreement where passenger services are redesigned or additional passenger services added. An inability to secure access to the 'last mile' of the freight journey will prevent the operation of the entire freight service, reducing the utilisation of rollingstock and regional network capacity, and potentially causing freight customers to move their freight task to road.

In order to ensure that a reasonable level of access through urban areas is retained, Governments have the opportunity to specifically preserve paths in metropolitan networks for freight services, requiring that as metropolitan rail operators redesign passenger timetables, access for a defined number of freight paths (within certain time periods) is maintained. This could be applied both during peak and non-peak periods.

4.2.9 Strategy 9 - Promote rail provider alignment with customer needs

Problem identification

The factors that influence mode choice include both price and service quality characteristics, and as a result, understanding customers' needs and ensuring that rail's service offering is closely aligned to best meet those needs are critical for rail to effectively compete with road.

There can be barriers to customers accessing rail services. As is evidenced on the Mount Isa line, particularly for smaller bulk customers, difficulties in gaining access to suitable loading and unloading infrastructure, and the requirement to aggregate volumes to full train loads can lead to customers preferring road, even where this may be a higher cost option. Also, where the demand for transport of bulk products is variable, as is the case for agricultural products such as grain, the typical terms of rail contracts (reflecting rail's high fixed costs) can be a disincentive. There are opportunities for rail providers to identify innovative means of enhancing service delivery, or offering alternate contracting structures, in order to address these barriers to the utilisation of rail.

Another consequence of vertical separation is that rail infrastructure providers can become remote from customers, and may struggle to identify the best opportunities to enhance service delivery to provide an improved outcome for those customers.

Policy options

(a) Rail operator contracting strategies

As was identified in the Mode Share Workstream, rail operators can continue, on an ongoing basis, to investigate opportunities for innovative operating and contracting strategies that may promote increased utilisation of rail, including for bulk products with smaller or more variable volume, eg through greater aggregation of freight from smaller producers.

(b) Rail provider customer input

For vertically separated RIMs (e.g. ARTC) who are more structurally remote from freight customers, there are a range of opportunities to further promote understanding and alignment with freight customers, including:

- the use of customer engagement forums during the development of business and network strategies for freight services on the interstate and regional networks. Such forums are regularly used by ARTC and Aurizon in the heavy haul coal networks, but are less commonly a regular feature on the interstate and regional networks.
- customer alignment may be further promoted through freight customer representation on the RIM's Board of Directors.

4.2.10 Strategy 10 – Information disclosure

Problem identification

1. **There is insufficient available information to understand the national freight task and the role of each mode**

While the overview of the national freight task provides a broad indication of mode share, a robust understanding of mode share needs to be undertaken at a corridor level, and requires quantitative analysis of the volume of freight moved on each route by each key origin-destination (separately identifying freight movements in each direction), both in total and for each transport mode used. Regular reporting of data, in order to allow assessment of time series information, is essential in order to understand trends in mode share and the factors driving changes.

The varying quality of data availability reflects institutional constraints and industry culture as well as inherent challenges in data collection, such as free rider problems, perhaps exacerbated by differing levels of confidence amongst industry participants in the utility of the exercise.

However, there are several critical gaps in freight mode share statistics, as noted in the Mode Share Workstream:

- Road freight task - the quality of published information on current road freight volumes and service quality measures is generally poor. Often, the necessary data needed to accurately estimate road's share on particular freight routes is not currently collected in any systematic or ongoing way.
  - ABS freight data is collected irregularly and freight categorisation provides limited information on intercity freight. State government truck counts and weighbridge data where it is published is useful, but only partial information is publicly available.
- Rail freight task - conversely, rail freight statistics are collected at the origin destination level by both the rail operator and the rail infrastructure provider, but are not typically publicly available or only available to Government agencies on an in-confidence basis.[25] This means that information on rail freight volumes is usually not visible (with the information used for our mode share analysis directly provided by rail industry participants specifically for the purpose of this Study).
  - Some rail data that BITRE previously collected and reported (in aggregate) relied on the cooperation of individual rail companies to supply such information (BITRE has no legislative powers to compel information to be provided). Complete aggregated data has been unavailable since 2017. There may be a number of reasons for this but organisations have little incentive to dedicate resources to provide data. However, in order for industry wide rail freight data to be published, data is required to be collected and aggregated from all parties (not just some).
- Shipping freight task - for coastal shipping, the majority of required data is collected and published.

As part of the National Action Plan connected to the National Freight and Supply Chain Strategy, BITRE has been pursuing improvements to the availability of information, focussing initially on the collation of currently available information into the National Freight Data Hub. However, in order to maximise the effectiveness of the National Freight Data Hub, it is essential that it continue to be developed – with the cooperation of the freight industry - to include

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[25] For example, BITRE does publish rail freight statistics provide by ARTC and Arc Infrastructure on interstate network tonnages, and operator specific volumes already available to the public, such as Aurizon and Tasrail in their annual reports. Further information on rail freight volumes, however, is usually not available or visible.

comprehensive, reliable and timely information on freight movements for all major transport modes – road, rail and sea freight.

Policy options

(a) Enhanced collection and publication of road use data

As a priority, in relation to road data, State Government Transport Departments should be encouraged to review their existing data collection via their traffic census programs and publish more of their datasets.

- The data that is now collected and published by Transport for NSW, including truck numbers, categorisations and weights at key highway points, measured at hourly intervals, provides a wealth of information from which data analysis can be used to gain an understanding of road freight volumes distinguished into local vs long distance truck movements, and can even be used to gain a broad understanding of origin-destination truck movements. Other states should be encouraged to review and, if necessary upgrade, their traffic census programs in order to collect consistent datasets;
- comprehensive State Government traffic census datasets should wherever possible be regularly published in the National Freight Data Hub in order to facilitate greater transparency and understanding of the road freight task.

In the medium term, if this type of information is collected and published by State Governments, this would enable BITRE to prepare regular periodic data analysis reports, interpreting the traffic census data in order to present quarterly information on road freight volumes, including analysis by origin-destination route to the extent that this is able to be ascertained.

(b) Enhanced publication of rail data

Rail Infrastructure Managers should commit to regularly provide BITRE with rail freight datasets, that are relevant to informing transport policy decisions, including freight volumes, freight types (to the extent ascertainable) and origin-destination (with the recent MoU between BITRE and ARTC providing a template for this data collection). Rail operators should commit to providing RIMs permission for this data to be disclosed to BITRE on an aggregated and de-identified basis, and published in the National Freight Data Hub. If this is unsuccessful in ensuring the efficient and regular collection of rail freight data, a compulsory data collection arrangement may ultimately be required.

Problem identification

2. There is insufficient available information to understand rail's service performance

Building supply chain reliability and resilience is a key priority. Reliability of on-time delivery and certainty of service operation (important in and of themselves for time sensitive freight), and predictability of freight arrival (important for all freight categories in order to facilitate efficient local pickup and delivery arrangements) are key aspects of providing an efficient, competitive rail freight services. However, there is no consistent framework or methodology for monitoring the train service reliability, particularly in relation to end to end train movements across different rail networks, including in relation to on-time departures from terminals, improvements in on-time running and restoration of services following interruptions.

Policy options

Accurate, timely and consistent public reporting of train service reliability performance requires RIMs and rail operators to reach a settled, standardised view about the reliability related KPIs to be measured, including the extent to which the cause of delays and cancellations can be attributed (noting that detailed identification of the root cause of delays and cancellations can be complex and time consuming). Therefore Rail Infrastructure Managers and Rail Operators should commit to working with BITRE to:

(a) confirm the preferred suite of reliability KPIs to be collected by Rail Infrastructure Managers and Rail Operators; and

(b) agree to the inclusion of these reliability KPIs in the aggregated information to be provided by RIMs to BITRE, and published in the National Freight Data Hub.

4.3 Evaluation of policy options

This section summarises the benefits and constraints of each policy option, and presents an overall assessment of the likely opportunity that it presents, with rankings described as follows:

🟢	High opportunity to promote improved mode share
🟡	Moderate opportunity to promote improved mode share
🔴	Low opportunity to promote improved mode share

Table 5 Assessment of policy strategies

#	POLICY OPTION	POTENTIAL BENEFITS	POTENTIAL CONSTRAINTS	OVERALL
Policies to achieve Strategy 1 – Specifying an overall freight objective				
1.	a. Specifying an overall freight objective	**Moderate** • Can align policy development and application of regulation to a common long term goal.	**Low-moderate** • There should be limited constraints on Ministers developing an overall freight objective, however it will	🟡

#	POLICY OPTION	POTENTIAL BENEFITS	POTENTIAL CONSTRAINTS	OVERALL
			need to be incorporated in legislation in order to be effective.	
Policies to achieve Strategy 2 – Ensure economic assessments support efficient modal outcomes				
2.	a. Review standard methodologies and parameters and ensuring parameters reflecting changing community priorities	**High** • Will ensure that infrastructure proposals are assessed accurately and results in policies and investment targeted towards those initiatives that provide the greatest opportunity to increase rail mode share.	**Low** • Limited constraints once body is determined to undertake such a review	🟢
	b. Review the Transport Method under the ERF to enable mode shift projects to generate ACCUs	**High** • Recognising that a mode shift to rail represents one of the most effective means of reducing overall transport emissions, would remove rigidities between modes and remove an existing cost barrier to rail operators as rail's mode share increases	**Low** • The Transport Method is currently under review by the Clean Energy Regulator in parallel with a Government review of the Safeguard Mechanism	🟢
Policies to achieve Strategy 3 – Promote investment in efficient rail freight infrastructure				
3.	a. targeting infrastructure spending to priority rail infrastructure requirements, as identified in Infrastructure & Planning Workstream	**High** • Will ensure that infrastructure investment is targeted towards those initiatives that provide the greatest opportunity to increase rail mode share.	**Moderate** • Will be subject to Government funding constraints and other budgetary priorities. Given high current funding and potential future budgetary constraints, future willingness for Government expenditure may be limited.	🟢
4.	b. directing that rail infrastructure proposals specifically consider interoperability impacts	**High** • Will provide a whole of network focus for individual RIM investments, and limit the creation of new interoperability problems. • Upfront investment in better proposal appraisal and planning should lead to more efficient resource allocation.	**Low** • Infrastructure and Transport Ministers have earlier this year agreed to this approach. • Governments may be reluctant to commit to addressing interoperability impacts due to potential for increased project costs.	🟢
5.	c. Commonwealth Government can leverage its funding of rail projects to encourage State Government support for strategies to promote rail freight productivity	**High** • Will promote a consistent, coordinated approach to rail freight productivity across jurisdictions.	**Significant** • Cooperation of all state and territory governments might still not be guaranteed. • Commonwealth may be reluctant to withdraw funding even without commensurate state commitment.	🟡

#	POLICY OPTION	POTENTIAL BENEFITS	POTENTIAL CONSTRAINTS	OVERALL
Policies to achieve Strategy 4 – Promoting operational harmonisation through a focus on both safety and productivity				
6.	Harmonisation to be promoted through centralised guidance, with a process for mandated changes where agreement cannot be reached	**High** • Promoting harmonisation and consistency across networks should ultimately lead to a reduction rail operating costs and improved efficiency. • Incorporation of mandatory standards, where agreement cannot be reached, will potentially address underlying misalignment of incentives.	**Moderate** • RIMs may resist actions that reduce their autonomy • Requires Government commitment to a modified governance structure and regulatory framework. Achieving agreement by all Ministers to make standards mandatory may be problematic, and will require strong advocacy.	🟢
7.	Apply a productivity focus to safety standards, operating rules and processes	**High** • Many operational standards and processes have both safety and productivity consequences, designing harmonised arrangements to promote both safety and productivity can significantly promote productivity	**Moderate** • There is no existing body responsible for promoting rail productivity in Australia • Requires Government commitment to a modified governance structure and regulatory framework.	🟢
8. (a)	Institutional arrangements to drive harmonisation via expansion of ONRSR's role to include productivity focus	**Moderate** • Expansion of ONRSR's role to include productivity focus and opportunity for mandated standards will provide an opportunity for progress to be achieved in the within medium term, although there are questions whether it will create a sufficiently high focus on pro-active productivity reforms	**Moderate** • Leveraging off existing institutional architecture is the most straightforward approach • However, there is not a consensus view amongst rail industry participants that ONRSR presents the best institutional option.	🟡
8. (b)	Institutional arrangements to drive harmonisation via development of a new rail industry regulator with responsibility for productivity and safety	**High** • Creation of a new body, responsible for both productivity and safety outcomes and potentially with a broader set of responsibilities, provides best opportunity for a strong focus on harmonisation issues	**High** • Development of new institutional architecture, requiring agreement between states and legislative amendment, is likely to have significant cost and extended timeframes	🟡
Policies to achieve Strategy 5 – Promote regulatory harmonisation				
9. (a)	Centralised guidance environmental regulation	**Significant** • Increased harmonisation and consistency across networks should reduce jurisdictional differences, particularly with respect to rollingstock standards. • Will overcome issues where even if only one state has restrictive regulations it acts as a limitation nation-wide.	**Significant** • Requires Commonwealth and state government agreement – some state governments / agencies may resist actions that reduce autonomy. • Requires a modified governance structure to be effectively implemented – time consuming to secure across the board agreement.	🟡

#	POLICY OPTION	POTENTIAL BENEFITS	POTENTIAL CONSTRAINTS	OVERALL
9. (b)	Centralised guidance on access and economic regulation	**Moderate** • Increased harmonisation and consistency across networks will reduce inconsistencies and duplicative processes and ultimately lead to a reduction rail business management costs.	**Moderate** • Requires Commonwealth and state government agreement – some state governments / agencies may resist actions that reduce autonomy. • Requires a modified governance structure to be effectively implemented – time consuming to secure across the board agreement.	🟡
Policies to achieve Strategy 6 – Promote opportunities to expand the above rail market and to maximise rail's competitive service offering				
10.	a. Facilitating access to intermodal terminals in new publicly funded intermodal freight precincts	**Moderate** • Effective way of addressing a barrier to entry for new rail operators.	**Low** • Currently being implemented as part of the development of new Commonwealth Government funded intermodal freight precincts	🟡
11.	b. Facilitating access to rail paths created through Inland Rail	**Moderate** • Effective way of addressing a barrier to entry for new rail operators.	**Low** • Will be addressed through ARTC's Interstate Access Undertaking, required to be approved by the ACCC.	🟡
Policies to achieve Strategy 7 – Encourage efficient modal choice				
Achieving more cost reflective road pricing				
12.	a. Transfer of responsibility for heavy vehicle road pricing from NTC to ACCC	**Moderate** • Concerns about cross-subsidisation in road pricing is likely to be more effectively examined and dealt with by ACCC given its has expertise in investigating cross subsidies in pricing across a range of industries. • This may increase the cost applied to heavy vehicles, and improve opportunity of rail to compete.	**Moderate** • May be resistance from road user industry if they consider this is likely to result in increased charges This has been recommended from previous public assessment, so should not be viewed as a radical proposition.	🟡
13.	b. Implementation of a direct mass-distance charging model	**Moderate** • Road user charges will more closely reflect the costs imposed by users. • This may increase the cost applied to heavy vehicles, and improve opportunity of rail to compete. However, there is a risk that this will reduce the costs applicable to very high density routes (and increase the costs for lower density routes), which may reduce the ability of rail to compete.	**High** • This has been a long running potential reform and so far governments have not had strong motivations to implement due to political risks. The impetus for this type of reform is likely to come from the ongoing takeup of electric vehicles. • There is likely to be resistance from road user industry if they consider this is likely to result in increased charges.	🔴

#	POLICY OPTION	POTENTIAL BENEFITS	POTENTIAL CONSTRAINTS	OVERALL
14.	c. Recognising externalities in road costs and charges	**Moderate** • By incorporating the cost of road transport externalities in road prices, this may increase the cost applied to heavy vehicles (particularly in urban areas) and improve opportunity of rail to compete.	**High** • In order to be effective at a local level, this would need to be applied in conjunction with direct mass-distance charging. • There is likely to be resistance from road user industry if they consider this is likely to result in increased charges.	🔴
Use of government incentives to promote mode utilisation and rail efficiency				
15.	a. Rail utilisation incentives	**Moderate** • Short term benefits associated with encouraging a temporary modal shift in localised areas where there are high externalities of road transport (particularly urban port shuttles).	**Significant** • Incentives are more effective in short term and are not measures that can promote a sustained modal shift in the long term. • Does not address underlying problems of modal share. Would require government commitment and significant funding.	🟡
16.	b. Rail efficiency incentives	**Low** • There may be some short term benefits from financial efficiency incentives. However rail operators have a natural commercial incentive to strive for efficiency, and the additional benefit of financial efficiency incentives is uncertain.	**Moderate** Providing financial efficiency incentives may not be consistent with RIM's commercial objectives, and may require government support.	🔴
17.	c. Granting of increased HPV permits only where there has been a CBA to consider consequences on mode share	**Moderate** • Will allow a fuller assessment of actions that potentially bias freight to road. • Could result in government making decisions that benefit the more efficient utilisation of the most efficient mode for the right task.	**Moderate** • Likely to be a high degree of resistance from road transport providers. Dealing with externalities through limitations on use (permitting) is less efficient than through pricing.	🟡
Achieving more competitive rail pricing structures				
18.	a. Review of rail access prices (rail operators, ARTC, other RIMs)	**Moderate** • Prices could be more effectively structured in a way that attracts freight from rail to road across the broad spectrum of cargo densities and train sizes.	**Low** • There may be contractual and relationship based constraints to implementation of major changes to charging structures. • ARTC's non-discrimination obligations may make changes to access charge structure difficult to individually negotiate.	🟡
Regulation of international shipping companies' carriage of domestic freight				
19.	a. Enforce compliance of coastal shipping	**Moderate** • Will ensure foreign flagged ships do not gain an unreasonable	**Moderate** • Requires legislative amendment.	🟡

#	POLICY OPTION	POTENTIAL BENEFITS	POTENTIAL CONSTRAINTS	OVERALL
	law on foreign flagged ships	competitive advantage in domestic freight markets where these ships compete with land transport supply chains		
Policies to achieve Strategy 8 – Improving freight access in metropolitan areas				
20.	a. Creating an organisational incentive to facilitate freight in metropolitan networks	**High** • Will create more flexibility for freight services operating in metropolitan areas. • Improved reliability and efficiency for rail freight services should enable rail to more effectively compete with road.	**Significant** • Governments have very low tolerance for disruptions to passenger services by freight services.	🟢
21.	b. Defining a more flexible application of passenger priority (i) moderate prescription to provide clear guidance (ii) specification of rules	**High** • Allow a more balanced approach to managing freight and passenger demands. • Improved reliability and efficiency for rail freight services should enable rail to more effectively compete with road.	**Significant** • Governments have very low tolerance for disruptions to passenger services by freight services, and may be very reluctant to allow any relaxation of passenger priority policies.	🟢
22.	c. Preserving freight paths in metropolitan networks	**High** • Provide greater certainty of long term access for freight operators through urban areas. • Improved reliability and efficiency for rail freight services should enable rail to more effectively compete with road.	**High** • Preserving freight paths in metropolitan areas will reduce discretion in redesigning passenger services, and may significantly increase the costs associated with increasing passenger service levels.	🟡
Policies to achieve Strategy 9 – Promote rail provider alignment with customer needs				
23.	a. Rail operators to review contracting strategies	**Moderate** • Within rail industry's control to ensure its offering is competitive with alternate modes. • However, it can be expected that rail operators review this on a regular basis and may result in marginal improvements to mode share.	**Moderate** • Some rail operators may have reduced flexibility to vary service offerings if there are long term contracts in place.	🟡
24.	b. Rail provider customer input	**Moderate** • Better alignment of service provider's priorities with customer needs.	**Low** • Where intermodal is not a primary freight cargo, some RIMs may resist such representations when the business does not represent its core revenue base.	🟡
Policies to achieve Strategy 10 – Information disclosure				

#	POLICY OPTION	POTENTIAL BENEFITS	POTENTIAL CONSTRAINTS	OVERALL
25.	a. Actions to address information gaps in relation to road and rail (led by BITRE)	**High** - Improved data collection and reporting leads to a better understanding of the freight task by industry, governments. - More informed decision making leads to better policy and industry outcomes, and ultimately better freight outcomes for customers.	**Moderate** - Reliable, consistent data collection requires the ongoing cooperation of all identified parties. - Information gaps can only be addressed over time as data become available. - Much work is already underway in this regard via BITRE through the National Freight Data Hub.	●
26.	b. Develop consistent public reporting of rail reliability performance	**High (as above)**	**Moderate (as above)**	●

Source: Synergies

5 Recommended actions

There is no single strategy or pathway that will 'solve' the issues of improving rail's productivity, competitiveness and mode share. Rather, a broad suite of policies, applied in a co-ordinated way, will be required. We consider that each of the identified strategies has an important role to play in the long term pursuit of improved rail productivity. However, there will inevitably be a need to prioritise a set of initial actions to kickstart progress.

Therefore, in developing recommendations of the actions that will best promote rail productivity, competitiveness and mode share, we have first considered the broad policy framework that should be pursued.

From this, we have identified a series of priority actions that should be promoted, reflecting the policies that that are most critical to pursue in the short term, having regard to their potential benefit and the extent of constraints.

5.1 Recommended policy framework

5.1.1 Strategy 1 – Specify an overall freight objective

Government specification of an overall freight transport objective may help to align policy development and application of regulation to a common long term goal. Key features of this objective could include:

- promoting efficient investment in transport infrastructure and operation of freight transport services, including having regard to the implications outside individual rail networks or jurisdictions;
- promoting the most efficient mode of transport for each freight task, having regard to not only the direct costs, but also the indirect (or external) costs of each mode;
- maximising the long term benefit to consumers of freight services with respect to price, quality, safety and supply chain reliability.

5.1.2 Strategy 2 – Ensure economic assessments support efficient modal outcomes

This should be facilitated by:

(a) A comprehensive review of the standard methodologies for CBAs for transport projects/policies should be undertaken in order to ensure that existing parameter values and approaches effectively ensure that economic, social and environmental benefits of a project are fully reflected and taken into account in the evaluation of rail/road investment decisions.

(b) As part of the Clean Energy Regulator's current review of the Transport Method under the ERF and the parallel Government review of the Safeguard Mechanism, amendments should be made to make it easier for rail operators to participate in the ERF, including through enabling mode shift projects to generate ACCUs. This is an important step in enabling rail to play its role in the decarbonisation of the Australian economy.

5.1.3 Strategy 3 – Promote investment in efficient rail freight infrastructure

The rail industry and Governments should continue to promote investment in infrastructure that enables the operation of efficient rail services, where this can be supported commercially or by a broader cost benefit analysis. This should be facilitated by:

(a) targeting infrastructure project development and investment to priority rail infrastructure requirements. Priority investment requirements were identified in the Infrastructure & Planning Workstream. Beyond the high priority projects already being progressed, the focus should be:

  (i) a pipeline of network resilience and reliability initiatives (an initial list of project investments were identified in the Infrastructure & Planning workstream);

  (ii) automated train scheduling systems, seamlessly integrated across networks (eg ANCO);

  (iii) long term preservation of rail corridors

(b) Governments directing that rail infrastructure proposals specifically consider interoperability impacts; and

(c) the Commonwealth Government should leverage its funding of rail infrastructure projects to encourage State Government support of the remaining recommendations.

5.1.4 Strategy 4 – Promote operational harmonisation through a focus on both safety and productivity

The rail industry and Governments should:

(a) promote harmonisation of operational standards, systems, processes and technologies, through central co-ordination and, in the event that harmonisation measures cannot be collaboratively agreed, with a process for mandated changes to obligations, rules, standards and processes to enforce consistency;

(b) in doing so, a productivity focus, in combination with a safety focus, should be brought to bear on rail freight performance;

(c) options to create a rail industry regulator to drive both productivity and safety performance generally fall within two broad categories: leveraging off existing institutions and institutional architecture, in which case the most efficacious solution would be to expand ONRSRS's scope and operation to incorporate a productivity role and empowering it to develop mandatory standards; or creating a new rail industry regulatory body with a broader set of objectives. Ultimately, the preferred option will need to be determined in consultation with the State and Commonwealth Governments.

5.1.5 Strategy 5 – Promote a harmonised, consistent approach to regulation

(a) Governments should promote harmonisation of environmental regulations by identifying a national co-ordinating body (eg national EPA) to investigate opportunities for enhanced harmonisation of environmental requirements, recommending specific harmonisation opportunities by way of common standards and provides a mechanism for the common core national environmental standards to be mandated, by agreement of the relevant Commonwealth and State Ministers.

(b) The rail industry and Governments should promote harmonisation of access regimes by: identifying an independent national co-ordinating body to assess opportunities for improved harmonisation; tasking that body with the role of investigating opportunities for enhanced harmonisation of access regulation and management requirements, and recommending specific harmonisation opportunities by way of common principles and procedures; providing a process for individual RIMs and jurisdictional regulators to seek agreement on incorporating those principles and procedures into existing regulatory instruments; and providing a mechanism for the principles and procedures to be mandated for application within the existing regulatory instruments, through agreement of the relevant Commonwealth and State Ministers.

5.1.6 Strategy 6 – Promote opportunities to expand the above rail market and to maximise rail's competitive service offering

There are instances where improved access to infrastructure can improve contestability and, hence improve opportunities for the above rail market to grow. In this regard, the rail industry and Governments should continue to support action already in progress to address barriers to entry, including by ensuring the availability of open access to intermodal terminals in new publicly funded intermodal freight precincts, and new rail paths created through the development of Inland Rail.

5.1.7 Strategy 7 – Encourage efficient modal choice

(a) Recognising that prices for road infrastructure do not encourage the use of the most efficient mode for the right task:

  (i) The heavy vehicle road charging framework requires review

    - the use of diesel/petrol excise as a means of road funding lacks transparency and creates confusion in relation to policies aimed for the uptake of electric vehicles to improve the environmental sustainability of Australia's transport task. Clear user based charging for heavy vehicles, delinked to diesel utilisation, will assist Australian governments achieve both their environmental and transport objectives; and
    - PAYGO pricing methodologies should be independently reviewed to ensure there is no cross subsidisation between vehicle types. In order to do this, responsibility for administering heavy vehicle road user charges could be transferred from the NTC to another body, such as the ACCC (which would be the most appropriate body under existing institutional arrangements).

  (ii) Policymakers should re-consider the benefits of Mass Distance Charging in relation to setting road user prices on a basis that are more able to reflect full cost recovery, including sunk capital and externalities. However, in the meantime:

    - Increased HPV permits (either increased volume or geographical scope) should only be granted where this has been subject to a cost benefit assessment including considering the likely consequence on mode share;
    - Government incentive schemes to promote efficient mode utilisation may be appropriate in local instances to encourage a mode shift and/or to address a discrete policy objective, and are most effective when used as a transitional measure until the full benefits of longer term strategies to promote rail productivity are realised;

(b) There is opportunity for the rail industry (operators and RIMs) to continue to evolve their pricing structures to improve the alignment of rail haulage prices with competitive alternatives, including across different cargo densities and different train sizes;

(c) Legislative amendments should be considered to incorporate a framework that compels foreign flagged vessels to provide evidence of their compliance with Australian shipping regulations. This will provide confidence that Australian regulations are being upheld. Beyond this, while coastal shipping has provided a low cost means of transport, the sudden reported loss of shipping capacity availability during the recent pandemic highlighted the economic sovereignty concerns with this mode. This is an issue worthy of further policy consideration.

5.1.8 Strategy 8 – Improving freight access in metropolitan areas

Governments should facilitate improved access for freight services through metropolitan networks by:

(a) Incorporating organisational incentives into the funding arrangements for metropolitan RIMs to facilitate freight through urban areas, while continuing to recognise passenger priority; and

(b) defining a more flexible application of passenger priority.

5.1.9 Strategy 9 – Promote rail provider alignment with customer requirements

Rail providers should continue to pursue opportunities to improve alignment of their services with freight customer requirements, including rail operators continuing to evolve their operating and contracting strategies to include innovative approaches to addressing barriers to the use of rail, and RIMs seeking more direct input from freight customers into business and network strategies, with options including customer engagement forums or through Board representation.

5.1.10 Strategy 10 – Information disclosure

Governments should continue to promote:

(a) accurate, timely and comprehensive public reporting of the modal freight task in order to facilitate more informed decision making;

(b) accurate, timely and consistent public reporting of train service reliability performance.

These recommendations are linked to each of the workstream recommendations developed during the course of this Study (see Appendix C).

5.2 Recommended Action Plan

Having the potential benefit gain and the materiality of constraints for each recommended strategy, as well as the current status of existing programs that are progressing action on a range of these strategies, we have developed a recommended short term priority focus on the following issues, which we consider will provide the greatest opportunity for progress and real value in terms of promoting rail mode shift.

The other strategies incorporated into the recommended policy framework should be progressed as longer term objectives, but with industry prepared to act quickly as opportunities present.

5.2.1 Priority 1 – Building greater network resilience and reliability

Ongoing investment in efficient rail freight infrastructure should continue, with a focus on building greater network resilience and rail reliability. It is critical that the sovereign capability and resilience of our national network of rail freight supply chains is preserved such that rail infrastructure is able to withstand significant events that appear to be happening more regularly and that industry and the public have confidence in these measures.

However, in order to support ongoing improvements in network resilience and reliability, the rail industry should collaborate on an ongoing basis in the preparation and maintenance of an agreed priority resilience and reliability investment pipeline (with the list of projects identified in the Investment & Planning workstream providing a longlist starting point for this). This will require co-ordination by a central body.

This reflects Strategy 1 and Strategy 3(a)(i).

5.2.2 Priority 2 – Promote operational harmonisation through the use of centralised guidance (including mandatory standards) with a productivity focus, overseen by a regulator responsible for achieving both enhanced productivity and safety outcomes

Federal and state governments, in conjunction with the rail industry, should promote harmonisation of operational standards, systems, processes and technologies, including through the use of mandatory standards where harmonisation is supported by a cost benefit analysis but not agreed through collaborative/consultative processes. A centralised guidance approach that enables a dual focus on safety and productivity matters is recognised as a sensible way forward to improve overall rail freight supply chain productivity.

Options to achieve this include:

- leveraging off existing institutional architecture, most efficiently achieved by redefining ONRSR's role to incorporate a productivity focus and empowering it to develop mandatory standards. This would require the acquisition of additional skills and resources to enable an effective assessment of productivity issues and advocacy for mandatory standards where required, and should be accompanied by a change in name; or
- developing a new rail industry regulator with a broader responsibility for enhanced productivity and safety outcomes.

The preferred option should be determined by the rail industry in consultation with Commonwealth and State Governments.

This reflects Strategy 4.

5.2.3 Priority 3 – Review economic assessment frameworks that influence transport mode

In order to promote the most efficient transport solution for Australia, it is critical that Government policies and investment decisions facilitate modal shift where this promotes a more efficient outcome.

In the immediate term, the Clean Energy Regulator's review of the Transport Method, and the Government's parallel review of the Safeguard Mechanism, should make it easier for rail operators to participate in the ERF, including through enabling mode shift projects to generate ACCUs. Reducing rigidities between modes, and reducing the costs associated with rail operators increasing the share of freight transported by rail, is an important step in enabling rail to play its role in the decarbonisation of the Australian economy.

Beyond this, CBAs are an effective tool that can support decisions to identify the most cost effective infrastructure solution. However, the results generated through these evaluations are only as good as their inputs. Governments should review existing parameter values and approaches to ensuring economic, social and environmental benefits of a project are fully reflected and taken into account before evaluating rail/road investment decisions. This is particularly important as Australian governments seek to achieve broader social policy targets.

This reflects Strategy 2.

5.2.4 Priority 4 - Seamless pathing for freight trains across networks

The extent of network fragmentation means that many long distance freight services operate over multiple RIM networks, however there can be significant constraints on gaining seamless paths across these networks, both in terms of capacity allocation and on the day of operation. The introduction of open access terminals may further complicate the allocation of pathing, with paths for intermodal trains needing to align with terminal access slots. Key strategies that are required to achieve this include:

- developing technological solutions for automated scheduling across the full origin-destination route, and potentially extending to terminal scheduling, allowing optimisation of schedules both in capacity planning, and also in the day of operation environment based on real time information on train location and expected arrival time. This will provide the best opportunity to reduce friction and delays at network changeover points and improve customer information on freight status;
- a key aspect of creating seamless paths through the application of technological solutions is the development of a fully specified rules based approach to scheduling and management of out of course running. While the rules need not be fully consistent across all RIMs, this is likely to require a core set of commonly applied definitions and rules

between RIMs – a technological solution will only be effective to the extent that it gives effect to these rules; and

- creating incentives for metropolitan RIMs to facilitate freight through urban networks and defining a more flexible approach to applying passenger priority, which is critical not only to improving reliability, capacity utilisation and efficiency of freight services, but also to improving the freight customer experience with rail so that rail can play its natural role in meeting the national transport task.

Provided that a 'cross-network' rules based technological solution is developed and implemented, management of train operations can still successfully rest with individual RIMs. However, there may need to be a mechanism for resolving the core rules to be commonly applied across RIMs. Adjudicating on this issue could ultimately form part of the productivity remit assigned to ONRSR.

Note, this incorporates Strategy (3)(a)(ii), 4 and 8.

5.2.5 Priority 5 – Information collection and disclosure

Prioritisation of improved information collection and disclosure is essential in order to improve the quality of decision making and policy development. The key areas to focus on include:

- Road freight – enhanced collection of road freight data to continue to be facilitated by BITRE through:
  - encouraging State Governments to review and, where applicable, upgrade their traffic census programs in order to collect data consistent with that published by Transport for NSW in relation to truck numbers, categorisation and weights on key national highways;
  - to the extent that the additional data becomes available from State Governments, aggregating and regularly publishing the relevant data in the National Freight Data Hub and, provided that the required information becomes available, publishing regular analysis interpreting the data in order to present an assessment of the national road freight task, including on key origin-destination routes.
- Rail freight task – Rail Infrastructure Managers should commit to regularly provide BITRE with rail freight datasets, including freight volumes, freight types (to the extent ascertainable) and origin-destination (with the recent MoU between BITRE and ARTC providing a template for this data collection). Rail operators should commit to providing RIMs permission for this data to be disclosed to BITRE on an aggregated and de-identified basis, and published in the National Freight Data Hub. If this is unsuccessful in ensuring the efficient and regular collection of rail freight data, a compulsory data collection arrangement may ultimately be required.

- Train service reliability – Rail Infrastructure Managers and Rail Operators should commit to working with BITRE to confirm a preferred suite of reliability KPIs to be collected by Rail Infrastructure Managers and Rail Operators and agree to the inclusion of these reliability KPIs in the aggregated information to be provided by RIMs to BITRE, and published in the National Freight Data Hub.

This incorporates Strategy 10.

A. Institutional structures

This appendix identifies the existing institutional structures governing rail freight operations in Australia. As discussed in the safety and operations workstream, a key source of rail freight inefficiency is the fragmented nature of the operational and regulatory framework governing rail systems in Australia whereby the current arrangements do not promote harmonisation or consistency across multiple networks The success of any policy development designed to improve rail freight efficiency will be contingent on having the appropriate institutional structure in place to promote harmonisation and deliver on the broader policy objectives outlined in section 4 of this paper for improving freight rail mode share.

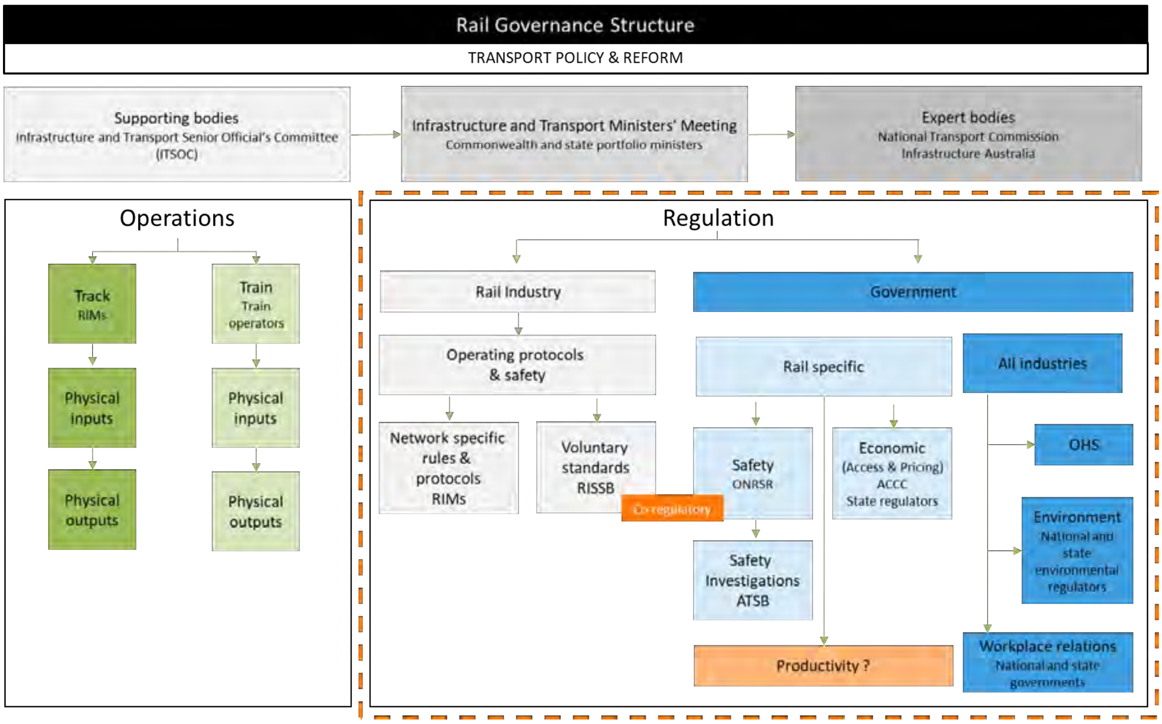
We also discuss the opportunities for institutional improvement, having regard to our analysis in the safety and operations workstream.

A.1 Existing institutional structures

The rail industry has considerable diversity in infrastructure, operating systems and regulatory oversight.

As can be seen by the figure below, the rail operating framework is set by physical inputs and the regulatory environment. The physical inputs are those associated with the track networks and the locomotive fleets while the regulatory framework comprises a mix of voluntary standards and government regulation by multiple bodies.

Figure A.1 Rail operations and regulatory framework



Source: Synergies

A.2 Policy development

A.2.1 Infrastructure and Transport Ministers

The figure above shows that the Infrastructure and Transport Ministers' Meeting (ITMM) is the responsible forum for overall transport policy and reform. The purpose of the ITMM is to:

- Consider and develop responses to emerging issues in transport and infrastructure.
- Support an internationally competitive transport and infrastructure industry.
- Pursue further opportunities for national consistency in regulatory and policy frameworks to improve safety, reduce costs and improve the operation of transport and infrastructure.
- Deliver on responsibilities under legislation and national agreements, national partnerships and other governance arrangements.

Supporting bodies

The Infrastructure and Transport Senior Officials' Committee (ITSOC) supports ITMM in achieving its priorities and provides a forum for senior officials to facilitate reform proposals for Ministerial agreement, negotiate contentious issues before Ministerial consideration, and provide operational advice on the implementation of Ministerial decisions. ITMM delegates issues to ITSOC that do not require Ministerial decisions.

Expert bodies

National advisory/standard setting bodies or organisations are utilised by ITMM where specialist knowledge/expertise is required to support specific discussion.

In relation to rail related matters:

- The National Transport Commission (NTC) supports ITMM as an expert advisor on reform development implementation and evaluation.
  - The NTC is an independent advisory body established under the *National Transport Commission Act 2003*. It leads major strategic national land transport reform in support of all Australian governments to improve safety, productivity and environmental outcomes.
  - The NTC's work includes defining the problems and opportunities, developing policy and drafting law, through to implementation planning and review.
  - The NTC has a legislative requirement to develop, monitor and maintain uniform or nationally consistent regulatory and operational arrangements for road, rail and intermodal transport. It also develops some Codes and Guidelines relating to land transport e.g. The Australian Code for the Transport of Dangerous Goods by Road or Rail.
- Infrastructure Australia (IA)'s primary role is to provide high quality independent advice to governments, industry and the community on the investments and reforms needed to deliver better infrastructure for all Australians. IA has two key functions:
  - evaluate business cases for nationally significant investment proposals for inclusion on the Infrastructure Priority List and assess proposals seeking more than $250 million in Australian Government funding,
  - set the policy agenda on the long-term opportunities for infrastructure reform that will improve living standards and national productivity.
- National Transport Research Organisation – is home to the Australian Road Research Board (ARRB), the Australasian Centre for Rail Innovation (ACRI) and the National Interest Service (NIS).
  - The NTRO is a transport research agency which provides independent advice to its members, including Commonwealth, state and territory and local government bodies responsible for managing the nation's transport systems and networks. It is the national portal for all transport research across the transport modes Road, Rail, Ports

and Airports. The incorporation of ACRI into the NTRO organisation on 1 July 2022 consolidates rail research procurement and delivery.

A.3 Regulatory

The regulatory structure for rail is complex and involves a mix of rail specific regulations as well as national regulations. There are multiple bodies involved each with a specific policy and or legislative role. It also shows that there is no single, overarching governing body responsible for delivering a nationally consistent approach to regulation. It also shows that there is no body responsible at all for providing a productivity focus to rail operations or standards. This is discussed in further detail below.

A.3.1 Economic regulation (pricing and access)

Commonwealth and State regulators

There are multiple access regimes in Australia, each administered by different regulators. Each regime has a material impact on one of the most significant mode choice drivers (price); complexity creates barrier to entry.

It is a common issue for rail operators using multiple rail networks, given seven different regulatory frameworks overseen by six different regulators. Differences in access for operators also apply for individual RIMs under a given framework.

While regulation is based on consistent principles there are significant differences in operation.

- East West
  - ARTC interstate network– submits voluntary interstate access undertakings to ACCC under National Access regime
  - Arc Infrastructure – WA rail access regime, regulated by ERA WA
  - Sydney Trains, Country Regional Network – NSW Rail Access Undertaking, regulated by IPART
- North South
  - ARTC – submits voluntary access undertakings to ACCC under National Access regime, separate access undertakings for Hunter Valley network and Interstate network
  - ARTC – ARTC’s sections of Sydney metropolitan rail network remain subject to NSW Rail Access Undertaking regulated by IPART
  - Sydney Trains, Country Regional Network – subject to the NSW Rail Access Undertaking regulated by IPART

- North Coast Line
  - While these services largely operate within a single state, they are often subject to multiple access regimes:
    - Within Queensland, the Queensland access regime applies to all rail networks, but separate QCA approved access undertakings for QR and Aurizon Network
  - Within NSW,
    - ARTC interstate and Hunter Valley network subject to separate access undertakings under ACCC
    - The remainder of the NSW rail network subject to NSW Rail Access Undertaking regulated by IPART.

A.3.2 Safety

Co-regulation has been highly effective in allowing the rail industry to develop flexible, risk based controls to manage safety. Under the current framework:

- ONRSR is responsible for independently administering the RSNL as passed in each state and territory.
  - ONRSR works on behalf of Australian governments to promote and improve national rail safety and ensure the safety of the community by encouraging and enforcing safe railway operations. In doing so, ONRSR works closely with rail operators, unions, owners, contractors, maintainers, rail safety associations and practitioners.
  - It reports directly to Ministers through the Infrastructure and Transport Ministers' Meeting.
  - ONRSR meets with RISSB, the ARA and ACRI on a regular basis to discuss safety projects and initiatives and encourage national consistency across the rail industry
- RISSB is a not for profit company limited by guarantee. It is an industry body formed by the ARA to improve operational efficiency, safety and interoperability for rail owners, operators and suppliers through the development, publication and maintenance of national standards, codes of practice, rules and guidelines.
  - The standards, codes of practice, rules and guidelines published by RISSB, developed in collaboration with industry, form the Australian Code of Practice (the Code).
  - The Code complements the safety management systems that are recognised by ONRSR.

However, despite a single safety law and safety regulator, the co-regulatory framework results in each RIM having a separately developed, and independently managed, safety management system, often applying different controls to address the same risk.

The existing framework increases the cost of providing rail services by:

- requiring duplicated processes, increased 'dead time' during commissioning of new equipment, imposing of inconsistent safety approvals and requirements, and different controls being implemented to address the same risk
- increasing the required specification and cost of rollingstock to meet all network requirements
- creating barriers to innovation and investment in new technology

This inconsistency in rules creates additional operational constraints and safety risk and increases entry complexity and costs, creating barriers to entry

In contrast, for the road sector, the NHVR has been highly effective in harmonising operational requirements across jurisdictions.

A.3.3 Environmental regulation

There are different jurisdictional environmental regulatory frameworks, which can result in different environmental obligations, forcing operators to persist with outdated technology in order to be able to operate. For example:

- East West
  - Operators have to comply with specific environmental legislation in WA, SA, Qld, Victoria and NSW. The NSW EPA is regarded by some rail stakeholders as having particularly stringent regulations compared to other jurisdictions.
  - A 2018 PwC report noted that there are roughly 150 different environmental regulations that operators must comply with when operating rollingstock between Perth and Brisbane.[26]
- North South
  - Operators have to comply with specific environmental legislation in Qld, VIC and NSW.
- North Coast Line

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[26] PwC Consulting (2018), Review of rail access regimes, May 2018, p.22

  - Qld NCL and regional freight services usually operate within a single state jurisdiction, and therefore a single state environmental legislation applies. However, there are some regional freight services that operate across state borders in Victoria, NSW and SA, which must comply with environmental legislation in each state.

Environmental regulators consider rail environmental performance in isolation (instead of relative to the alternate transport mode), which could lead to worse environmental outcomes if rail cannot meet desired standards.

Inconsistent environmental regulation increases rail operating costs by:

- Increasing the required specification and cost of rollingstock
- Creating barriers to innovation and investment in new technology
- Reducing incentive to invest in rollingstock to meet freight demand
- Increases entry complexity and costs, creating barriers to entry

Prior to the last federal election, the Australian Labor Party pledged to establish an Environmental Protection Agency to ensure increased compliance with environmental laws, improved processes for proponents and centralised data collection and analysis so there is consistent and reliable information on the state of the environment across the country. This pledge was in response to the independent review conducted by Professor Graeme Samuel AC and his panel in the second ten yearly statutory review of the *Environment Protection and Biodiversity Conservation Act 1999* (Clth).[27]

Since the federal election, the newly appointed Labor Government and remained committed to establishing a new national EPA and has indicated that its approach to reform will be available soon.[28]

A.3.4 Productivity

There is no existing body responsible for promoting rail productivity in Australia.

This is different to the regulatory framework for road where the National Heavy Vehicle Regulator (NHVR) has a specific role for increasing the productivity of heavy vehicles on the road networks available to them.

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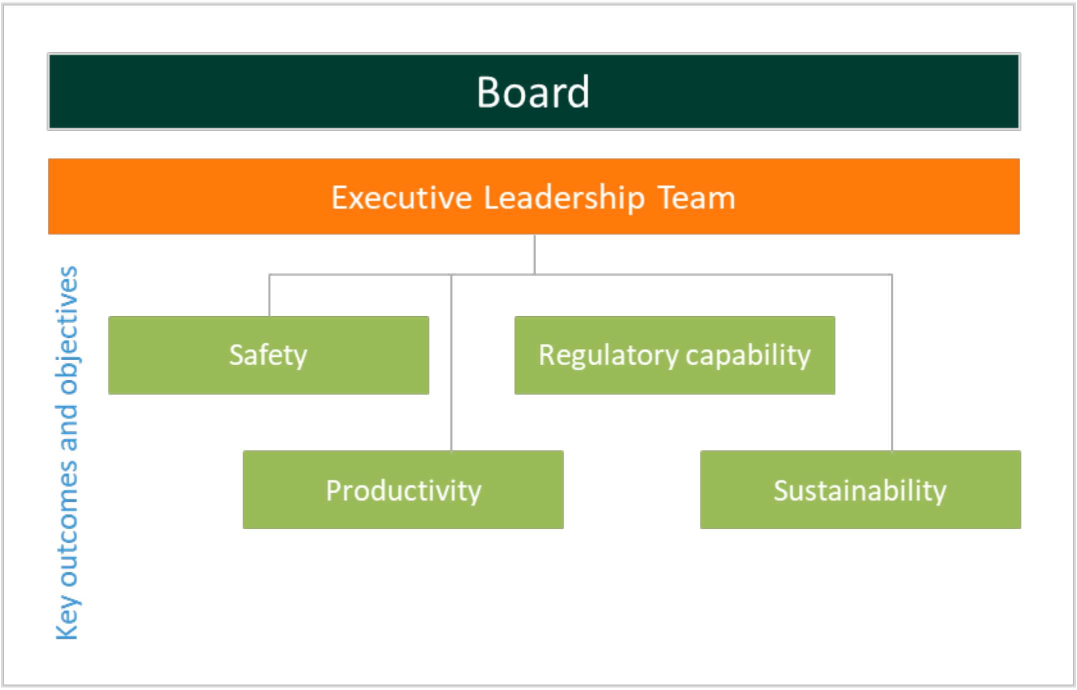
[27] See Australian Labor Party, Environmental Law Reform and a National Environmental Protectional Agency at https://www.alp.org.au/policies/environmental-law-reform-and-a-national-environmental-protection-agency

[28] See https://www.dcceew.gov.au/environment/epbc/epbc-act-reform

Figure A.2 National Heavy Vehicle Regulator



Source: Synergies

A.4 Implications

As identified in the Safety and Operations Workstream, this level of policy fragmentation differs materially from the regulation of other cross jurisdictional infrastructure networks, such as electricity, gas and telecommunications, as well as the road network. In these cases, the intrinsic characteristics of the underlying product together with regulatory frameworks are designed to promote consistency in standards and approaches.

These factors mean that collaborative approaches to addressing efficiency constraints, will have only limited efficacy. As identified previously by the ARA and the Interoperability Working Group as part of their role in delivering the National Rail Action Plan, there is limited ability for the industry to meaningfully impact interoperability challenges constraining productivity within the current structure of authority shared by jurisdictions without achieving a step change in commitment to coordinated decision making in the national interest or major Commonwealth intervention.

B. Pricing issues

This appendix provides a brief overview of the pricing issues associated with road infrastructure pricing. It is not intended to present a 'deep dive' analysis of the existing arrangements, but rather explain those arrangements briefly and highlight the concerns that have been raised in the public domain over many years and desired impetus for change.

In 2006, the Productivity Commission conducted an inquiry into road and rail infrastructure pricing and found that pricing and regulatory arrangements were hampering the efficient provision and productive use of road and rail infrastructure. Despite this, and the numerous reviews and studies that have taken place since, the infrastructure pricing framework continues to apply.

B.1 Road infrastructure pricing

B.1.1 Current arrangements[29]

Uniform national road use charges for heavy vehicles were first introduced in Australia in 1995. Heavy vehicle road use prices are developed by the National Transport Commission (NTC) and decided by the Infrastructure and Transport Ministers Meeting (ITMM). These prices are set to recover the share of road construction and maintenance costs that can be allocated to heavy vehicles. They apply to all vehicles with a Gross Vehicle Mass (GVM) of above 4.5 tonnes.

There are three components to the charges paid by heavy vehicles:

- the diesel fuel charge (also known as the Road User Charge (RUC)[30]) administered by the Commonwealth Government;
- the roads component of the yearly registration charge[31] as applied by state and territory governments, which is intended to reflect the amount of damage that each type of heavy vehicle does to the road; and
- the regulatory component of the yearly registration charge, which is applied to cover the operating cost of the NHVR.

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[29] This section is sourced from NTC (2021), Heavy vehicle charges consultation report, January 2021, pp.7-12

[30] The RUC is implemented under the *Commonwealth Fuel Tax Act 2006*. The RUC is implemented as a fuel tax credit.

[31] Registration charges are implemented through the Heavy Vehicle Charges Model Law. The charges have legislative force once the Model Law is adopted by states and territories.

The diesel fuel charge and registration charge are set using the PAYGO model which calculate the heavy vehicles cost based on historical government road expenditure and road usage data. The amount to cover the cost of the NHVR is designed to reflect the NHVR's budget, which is approved by the ITMM.

Road pricing principles

Heavy vehicle road prices are developed in accordance with several principles that were agreed by the Australian Transport Council (a predecessor of ITMM) and the Council of Australian Governments (COAG) and are binding on the NTC.

The COAG principles are:[32]

> "ATC direct the NTC, in developing its Determination, to apply principles and methods that
>
> 1. ensure the delivery of full cost recovery in aggregate,
> 2. further develop indexation adjustment arrangements to ensure the ongoing delivery of full expenditure recovery in aggregate and
> 3. remove cross-subsidisation across different heavy vehicle classes, recognising that transition to any new arrangement may require a phased approach".

The ATC/SCOTI guiding principles:[33]

> "National heavy vehicle road use prices should promote optimal use of infrastructure, vehicles and transport modes. This is subject to the following:
>
> 1. full recovery of allocated infrastructure costs while minimising both the over and under recovery from any class of vehicle
> 2. cost effectiveness of pricing instruments
> 3. transparency
> 4. the need to balance administrative simplicity, efficiency and equity (e.g. impact on regional and remote communities/access)
> 5. the need to have regard to other pricing applications such as light vehicle charges, tolling and congestion."

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[32] Endorsed at COAG meeting of 13 April 2007. See http://ncp.ncc.gov.au/docs/Council%20of%20Australian%20Governments%20Meeting%20-%2013%20April%202007.pdf

[33] Approved by ATC in August 2004 and reaffirmed in May 2007. Note: SCOTI is the Standing Council on Transport and Infrastructure, a predecessor of ITMM.

The heavy vehicle costing approach

Heavy vehicle prices are designed to recover the share of annual road related expenditures by all levels of government attributable to heavy vehicles. The share of expenditure is intended to reflect the cost to the road system, although this is not a straight forward or exact process. Different measures of road use are used to allocate to different types of expenditure, depending on what drives the need for each type of road work.

PAYGO model

Heavy vehicle charges are assessed on what is known as the PAYGO, or pay-as-you-go, approach to cost recovery. Under the PAYGO approach, all costs including capital, are recovered in the year of expenditure. This is quite different to the approach normally adopted for the cost recovery of infrastructure provision, which separates capital and operating costs, with capital costs recovered over the life of the asset and operating costs recovered in the year of expenditure. To ensure that charges are not affected by abnormal levels of expenditure in the year of the Determination, recommended charges are based on the average expenditure of multiple years.

Each year, jurisdictions provide the NTC with a completed road expenditure template which covers all road construction and maintenance costs (light and heavy vehicles). Data from the Australian Bureau of Statistics Government Financial Statistics Series is used to account for local government expenditure on roads. A cost base is then established with the heavy vehicle portion recovered via heavy vehicle charges.

The cost base is calculated by taking a weighted 7-year average of the historic financial costs of providing roads. These costs, which are measured in a number of expenditure categories, are then allocated between vehicle classes on the basis of:

- a ‘cost allocation matrix’[34]
- usage data including vehicle kilometres travelled, ESA-kilometres travelled, AGM-kilometres travelled, and PCU-kilometres travelled.

Based on the costs allocated to each vehicle class, the NTC then recommends a set of heavy vehicle charges that recovers the heavy vehicle cost base in total while ensuring each vehicle class, on average, pays at least the attributable costs allocated to the vehicle category.

Determinations where all aspects of the model and the resulting heavy vehicle charges are reviewed (taking into account the pricing principles and other directions from government) are

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[34] The NTC has previously stated that the cost allocation matrix has been developed over time with input from industry and experts and has been subject to consultation. The current matrix used by the NTC was first approved as part of the 2007 Heavy Vehicle Charges Determination. See NTC (2021), Heavy vehicle charges consultation report, January 2021, p.11

carried out periodically. In the years between determinations, an annual adjustment formula is used and is included in the Heavy Vehicle Charges Model Law and is intended to automatically adjust heavy vehicle charges without the need for ITMM to approve the change.

Concerns about the current arrangements

(a) Cost allocation methodology with vehicle classes

One of the key criticisms of the PAYGO methodology is created by the averaging of costs across the road network. This blurs price signals and leads to cross subsidies from operators carrying light loads to those carrying heavy loads, and from users of lower cost roads to users of high cost roads.[35] The PC found, as far back as 2006, that B doubles as a class were not covering their attributable network costs, whereas semi trailers and rigid trucks have been more than covering their costs.[36] In general terms, B-doubles tend to operate on major interstate corridors, whereas smaller rigid trucks operate predominately in urban areas and road trains are almost entirely confined to regional rural areas. This has implications for the relative competitiveness of alternate modes, particularly for rail, which faces a cost disadvantage where its main competitor for interstate intermodal freight are these larger vehicle types.

Issues of artificial competitive advantage have been exacerbated by previous government decisions to periodically ‘freeze’ road infrastructure charges. For instance:

- in 2015, Federal and State Transport Ministers agree to freeze road infrastructure charges at 2015-16 levels for two years[37];
- in 2017, Ministers agreed to continue to freeze road infrastructure charges for a further two years[38]
- in 2020, Ministers agreed to temporarily freeze road infrastructure charges for 2020-21 during the COVID-19 pandemic.[39]

B.1.2 Alternative models

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[35] Productivity Commission (2006), Inquiry Report No 41, Road and Rail Freight Infrastructure Pricing, December 2006, p.xxxiii

[36] Productivity Commission (2006), Inquiry Report No 41, Road and Rail Freight Infrastructure Pricing, December 2006, p.xxxiii

[37] Department of Infrastructure, Regional Development (2015), Transport and Infrastructure Council Communique, Adelaide, 6 November 2015.

[38] Department of Infrastructure, Regional Development and Cities (2017), Transport and Infrastructure Council Communique, Hobart, 10 November 2017.

[39] Department of Infrastructure, Transport, Regional Development and Communications (2020), Transport and Infrastructure Council Communique, 6 May 2020.

Over the years, there has been a range of alternative pricing structures proposed, although much of the focus about infrastructure pricing reform relates to mass-distance and locational-based charging structures.

Mass distance charging

Mass distance charging involves measures of the distance travelled by trucks over a defined period. Technologies for monitoring distance include on-board units, such as odometers or toll stations at the entrances and exits of particular roads.

This model more closely approximates to an individual user pricing system whereby the direct user pays for the cost of road wear for each vehicle, in direct proportion to the mass, distance and specific routes used. It is based on ensuring that road transport faces price signals that accurately reflects the costs of road use.

Distance based road user charges would have the potential to remove some levels of averaging currently imposed by the limitations of the current approach as well as allowing greater flexibility in setting registration fees.

Individual user pricing for heavy vehicles in Australia would involve replacing the existing pricing system with a set of mass-distance related charges that users incur based on their actual road use. Implementation would involve measuring and monitoring road use to assess the cost responsibilities of individual vehicles and collecting the revenue and re-distributing it as needed between the various road managers.

The cost of implementing and operating a MDC scheme are not insignificant. However, technological developments have made these charging frameworks feasible and are used in a number of countries overseas, and in some cases, linked to the use of certain roads. Administrative, compliance and enforcement costs would be likely to reduce as pricing technology improve and trucks are fitted with satellite monitoring technologies for logistics purposes.

Locational-based charging structures

Under this model, road user prices would track vehicle use of particular roads. It allows heavy vehicle charges to vary by road type. They can also incorporate time-related, location specific congestion costs as well as varying charges according to actual vehicle mass. Locational charges requires accurate mapping and classification of the road system.

Mass–distance location-based charges would allow variable charges to reflect the short- or long-run marginal costs of using particular roads or road types, with an access fee (such as an annual registration fee or other charges) to make an appropriate contribution to network-wide capital costs. Alternatively, location-based charges could be calculated on a ‘stand-alone’ basis, facilitating commercial road provisions. In addition to more accurate pricing signals, revenues from locational-based charges could flow directly to the relevant road owner, promoting funding certainty and forward looking charges based on economic costs.[40]

B.2 Implications

Road pricing reform is not a new issue. It has been on the political/economic reform agenda for decades. But it remains a thorny issue, with many competing vested interests.

Inefficient pricing on roads impacts on the efficiency of the broader transport infrastructure network. Where road freight has an artificial price advantage, this distorts modal choice decisions and makes it harder for alternative modes (such as rail), to compete. This leads to sub-optimal transport solutions.

The history of road infrastructure pricing reform suggests that here been little appetite for genuine reform. However, this is likely to change however, as energy providers and governments position themselves to respond with appropriate price signals in relation to the growing take up of electric vehicles. Growing future demand will be the inevitable catalyst for future road pricing reform.

Before that eventuality, at the very least, an independent review by the ACCC into cost allocation issues to investigate cross-subsidisation in heavy vehicle charging arrangements is a pragmatic step forward to establish more appropriate price signals for freight owners to ensure that the most efficient mode is used for the right freight task, without seeking fundamental reform of existing arrangements.

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[40] Productivity Commission (2006), Inquiry Report No 41, Road and Rail Freight Infrastructure Pricing, December 2006, p.xiii

C. Link to workstream recommended strategies

A summary table identifying the recommendations of each workstream (Modal Share, Infrastructure and Planning, Safety and Operations) and their respective alignment against the recommended strategies identified in the Policy workstream is presented on the following pages.

Table 6 Workstream recommendations – leading to Policy recommendations

#	RECOMMENDATION	STRATEGIC FOCUS (LONG TERM VS SHORT TERM)	LINK TO OVERALL RECOMMENDED POLICY FRAMEWORK
Modal Share Workstream			
1	a. As a priority, in relation to road data, BITRE continue to work with the National Freight Data Hub and relevant State Government Transport Departments in order to: i. identify and/or confirm a preferred suite of road freight data metrics that should be collected by State Governments through their traffic census programs in order to provide for the collation of consistent information in relation to truck numbers, categorisation and weights on key national highways, and to allow for data analysis to be used to distinguish local and long distance truck movements, and for long distance truck movements to inform an estimate of origin-destination movements.; ii. aggregate and regularly publish in the National Freight Data Hub further detailed road freight data in relation to truck numbers (by truck type) and weighbridge data at critical locations on the national highways, as collected through the State Government traffic census programs; b. In the medium term, based on the collected traffic census information, BITRE prepare periodic (eg annual) data analysis reports, interpreting the traffic census data in order to present quarterly information on road freight volumes, including analysis by origin-destination route to the extent that this is able to be ascertained.	Short term	Strategy 10 – Information disclosure
2	In relation to rail data, Rail Infrastructure Managers and rail operators commit to working with BITRE in order to: i. confirm the preferred suite of rail data metrics to be collected from Rail Infrastructure Managers in order to allow the collation of consistent information on the volume of freight transported (preferably in terms of both weight and volumetric measure) by major origin-destination route; and ii. enter into a voluntary protocol committing to allow the data to be collected directly from RIMs, and published in the National Freight Data Hub on a regular basis. If this is unsuccessful in enabling the efficient and regular collection of data, a compulsory data collection arrangement may ultimately be required.	Short term	Strategy 10 – Information disclosure
3	That Rail Operators: i. continue, on an ongoing basis, to evolve their price structures in order to maintain their competitiveness with other modes, including across varying cargo densities; and	Short term	Strategy 7 – Encourage efficient modal choice

#	RECOMMENDATION	STRATEGIC FOCUS (LONG TERM VS SHORT TERM)	LINK TO OVERALL RECOMMENDED POLICY FRAMEWORK
	ii. work with ARTC in order to identify whether alternate rail access charge structures may assist rail operators in more closely aligning rail freight charges with competitive alternatives (eg applying the variable charge by loaded wagon rather than by weight)		
4	That Rail Operators continue, on an ongoing basis, to develop other aspects of their service offering that may maximise rail's ability to compete with other modes, including: i. charges applied for one-way backhaul movement to return empty containers used in coastal shipping; ii. the extent of differentiated transit time product offerings (eg based on priority of loading/unloading at IMTs) to maximise their competitiveness with road and shipping.	Short term	Strategy 7 - Encourage efficient modal choice
5	Given the limited visibility on the factors contributing to delays, that ACRI consider facilitating, in conjunction with rail operators and RIMs, a research investigation into the specific factors contributing to delays, and impacting on rail freight's reliability performance, on the east-west and north-south corridors.	Short term	Strategy 10 – Information disclosure
6	That Rail Operators continue, on an ongoing basis, to investigate opportunities for innovative operating and contracting strategies that may promote increased utilisation of rail for bulk products with smaller or more variable volume, eg through greater aggregation of freight from smaller producers.	Long term	Strategy 9 – Alignment with customer requirements
Infrastructure & Planning			
Intermodal			
1	Progress Melbourne IMT development as a priority including: • planning and approvals for Truganina IMT • development of Beveridge IMT	Underway Short term	Strategy 3 - Infrastructure investment Strategy 6 – Promote opportunities to expand above rail market
2	Progress Brisbane IMT development as a priority including: • Identification of preferred IMT location, together with planning and approvals • Identification of preferred port shuttle route, together with planning and approvals	Underway Short term	Strategy 3 - Infrastructure investment Strategy 6 – Promote opportunities to expand above rail market
3	Extension of ATMS to provide seamless operation across other intermodal networks	Long term	Strategy 3 - Infrastructure investment

#	RECOMMENDATION	STRATEGIC FOCUS (LONG TERM VS SHORT TERM)	LINK TO OVERALL RECOMMENDED POLICY FRAMEWORK
	• Priority development of a technical solution for interface between ATMS and ETCS for application on Sydney, Melbourne and Brisbane metropolitan networks) Extension to Arc Network Kalgoorlie-Perth route in line with scheduled ATMS rollout Ultimately, ATMS (or seamless interface to other digital train control system) should be extended to other intermodal and regional freight routes and for critical port links (noting any extension of ATMS to branch lines/country networks may not have ATMS's full functionality given low volumes lines)		
4	RIM commitment to development of integrated automated scheduling system across the entire intermodal network, as full benefits will only be achieved if it operates across the full origin-destination routes • Will require development of technical solution to interface between individual RIM automated scheduling systems • Ultimately regional networks significantly interacting with the interstate network may also be incorporated into the system	Long term	Strategy 3 - Infrastructure investment
5	Reliability – • To better understand and monitor the reasons for late running of trains, RIMs and rail operators, in conjunction with BITRE and ACRI, should develop standard reporting metrics. • RIMs to establish regular forums involving operators and other stakeholders to identify, assess and prioritise opportunities to improve reliability and resilience	Short term	Strategy 10 – Information disclosure
6	Resilience – • ARA/ACRI to liaise with RIM's and rail operators to maintain on an ongoing National Resilience Plan including a prioritised pipeline of minor infrastructure enhancements (beyond standard RIM asset management strategies).	Short term	Strategy 1 – National freight objective Strategy 3 - Infrastructure investment
7	The market should respond to additional demand with new investment by existing operators and/or new entry. Barriers to entry and investment in new technology are considered in the Safety & Operations workstream.	Long term	Strategy 6 - Promote opportunities to expand above rail market
8	Consistent with the 2019 National Action Plan, Governments should coordinate assessment of long term network capacity requirements, and the extent to which this may require additional rail corridors (including freight only corridors in urban areas) beyond those for which corridor preservation is complete or underway.	Short term	Strategy 3 - Infrastructure investment

#	RECOMMENDATION	STRATEGIC FOCUS (LONG TERM VS SHORT TERM)	LINK TO OVERALL RECOMMENDED POLICY FRAMEWORK
Bulk			
1	Progress planned investment in the Murray Basin rail network program for standardisation and infrastructure quality improvements	Short – Long term	Strategy 3 - Infrastructure investment
2	For other bulk routes with inefficient, uniquely specified rollingstock or excessive cycle times, RIMs, in conjunction with railway operators and Government, should evaluate the economic benefit associated with infrastructure investment to address these issues	Short term	Strategy 2 - economic assessment methodologies Strategy 3 - Infrastructure investment
Safety & Operations			
1	Promote a step change to rail industry co-ordination that is able to effectively address incentive issues arising from network and jurisdictional regulatory fragmentation, and which, in turn, can effectively promote productivity enhancing harmonisation measures and reduce barriers to entry.	Short term	Strategy 4 – Harmonising & mandating of safety standards with a focus on productivity Strategy 5 – Harmonisation of environmental and rail access regulation
2	Endorse the use of a centralised guidance approach with mandatory powers (‘Option C’) relying where possible on enhancing the role and responsibility of existing national institutions (including through expanding the role of ONRSR to include a productivity focus), and investigate specific policy and institutional options to implement this as part of the Policy Workstream.	Short term	Strategy 4 – Harmonising & mandating of safety standards with a focus on productivity
3	Prioritise the introduction of centralised guidance according to the potential benefits, such that: • the industry should place immediate priority on measures that promote safety and productivity gains through operational harmonisation; • the industry should actively progress harmonisation of environmental regulation and access regulation, recognising that these are likely to present greater challenges (especially environmental harmonisation) but can also be expected to deliver long term benefits to the industry.	Short term	Strategy 4 – Harmonising & mandating of safety standards with a focus on productivity Strategy 5 – Harmonisation of environmental and rail access regulation
4	Continue to use existing mechanisms, which will be reinforced by the centralised guidance approach, to identify the specific actions required to address high priority harmonisation related constraints, including actions agreed to under the National Rail Action Plan and other regulatory reviews.	Short term	Strategy 4 – Harmonising & mandating of safety standards with a focus on productivity

#	RECOMMENDATION	STRATEGIC FOCUS (LONG TERM VS SHORT TERM)	LINK TO OVERALL RECOMMENDED POLICY FRAMEWORK
			Strategy 5 – Harmonisation of environmental and rail access regulation
5	Promote Governments providing clear freight objectives and freight measurement metrics in relation to shared metropolitan passenger networks (including moderating constraints imposed through passenger priority requirements), including through 'carrot and stick' interventions by the Commonwealth Government. Consider specific policy options to achieve this in the Policy workstream.	Short term	Strategy 8 – Improving freight access in metropolitan areas