Who Moves What Where

Freight and Passenger Transport in Australia

Final Report
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NTC AUSTRALIA
National Transport Commission

Report outline

Title Who Moves What Where -
Freight and Passenger Transport in Australia

Type of report Information paper

Purpose For public information

Abstract 'Who Moves What Where' is a NTC initiative designed to better inform future planning and policy development by filling gaps in information on passenger and freight movement in Australia. This report provides a vital quantitative component of the 'Who Moves What Where' project by reviewing existing data sources and reports. It answers specific questions related to the movement of freight and passengers on Australia's road and rail networks, including a high-level analysis of the networks, operators and transport task.

Key words Road Network, Rail Network, Passenger Task, Freight Task

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Context

'Who Moves What Where' is a NTC initiative designed to better inform future planning and policy development by filling gaps in information on passenger and freight movement in Australia.

The Transport and Infrastructure Council recognise that without complete and comparable information about passenger and freight movements on road and rail, government and industry cannot get the best planning and reform outcomes. With this in mind, the Council endorsed the Who moves what where project on 6 November 2015. This report provides a vital quantitative component of the project by reviewing existing data sources and reports. It answers specific questions related to the movement of freight and passengers on Australia's road and rail networks, including a high-level analysis of the networks, operators and transport task.

Operators

Within the rail, air and sea freight forwarding market, industry concentration is low, with the four largest operators in the segment contributing just 10% of industry revenue, with rail freight accounting for 65.8%.

Australia's rail transport industry consists of 25 operators, primarily located in southern states and resource rich areas. The major rail operators and their market share are Aurizon Holding (40%), Asciano (33%) and Specialised Container Transport (23%). The remaining 22 operators make up the balance share (4%).

There are an estimated 42,000 operators in the road freight transport sector, ranging from singletruck operators to large multi-national corporations. The major operators and their share of Australia's road transport market are Toll IPEC (8.3%), Linfox (4%), K&S (1.6%), Border Express (0.3%), Kings Group (0.25%) and Allied Express (0.16%).

Networks

The rail network caters predominantly for the movement of bulk non-time-sensitive commodities (such as coal and iron ore) and accordingly has a heavy export focus. The road network carries bulk and non-bulk freight and time-sensitive commodities such as fresh food, construction materials and fuel.

The main interstate road freight networks in Australia include the Hume Highway (connecting Sydney and Melbourne), the Pacific Highway (connecting Sydney and Brisbane) and the Newell Highway (connecting Melbourne and Brisbane).

In contrast to most of the urban rail systems, the non-urban passenger services are not standalone networks. Typically, the non-urban services share track with urban passenger and freight trains.

Freight task

In 2013–14, the national domestic freight task totalled 726 billion tonne-kilometres, of which rail accounted for half and road one-third. Just over 75% of the tonne-kilometres on Australia's road network and 99.8% on the rail network are associated with intrastate freight, with the balance being longer-distance interstate freight.

The domestic freight task increased 50% in the 10 years to 2016 and is forecast to grow another 26% by 2026.

The global financial crisis caused a one-off drop in Australia's road freight and has slowed economic growth since. This means it is unlikely the BITRE's prediction that road freight would double by 2020 will be achieved until several years later.

Rail freight in Australia is dominated by the transportation of bulk commodities over long distances. While iron ore and coal account for 80% of the rail freight task, rail is also important for transporting other bulk commodities such as grains, sugar, fertilisers and mineral sands, especially to sea ports.

Rail and road compete strongly for long-distance non-bulk freight, but as distances increase, rail competitiveness increases.

Around 8% of Australia's non-bulk rail freight is carried on three main corridors, namely between the eastern states and Perth, between Melbourne and Brisbane, and between Brisbane and northern Queensland.

Road freight in Australia specialises in delivering time-sensitive / perishable commodities such fresh fruit and groceries, consumer goods such as whitegoods and electronics, and construction material such as steel, concrete and timber. Road competes with rail in moving bulk commodities such as cattle, grain and processed metals over longer distances.

Passenger task

In 2013–14, the national domestic passenger transport task totalled 427 billion passengerkilometres, of which road accounted for almost four-fifths and rail just under 4%.

The domestic passenger task increased 8% in the 10 years to 2016 and is forecast to grow 19% by 2026.

The market share for urban public transport in Australia comprises rail (61.7%), bus (33.6%), tram (4.3%) and ferry (0.8%).

Key features of urban passenger transport trends in Australian capital cities include:

- Urban bus passenger-kilometres surpassed rail passenger-kilometres in 1981 due to expansion of the urban bus network, while rail usage has remained relatively unchanged.
- In 2014, Sydney had the highest public transport usage per capita, followed by Melbourne, Brisbane, Perth, Adelaide, Canberra, Hobart and Darwin.
- Of the five major capital cities, passenger-kilometres per capita shows a sharp growth in Melbourne and Perth, with a relatively slower increase for Brisbane (in decline since 2012).
- Car passenger-kilometres per capita peaked in the major capital cities in 2004.
- Car remains the primary method of travel to work (82% either as passenger or driver), followed by public transport (10%), walking (5%) and other modes (3%).

Information gaps

There is sufficient data in the catalogue of sources to address the majority of the questions nominated in the terms of reference either fully, or at least partially. However, the following gaps in the available data were identified:

- number of ancillary versus hire-and-reward vehicles involved in road freight
- number of employees per fleet involved in road freight
- commodities moved on rail freight network
- freight rail network utilisation
- fleet profile for tourist train operators
- tourist rail usage
- passenger rail network utilisation.

The next steps for addressing these information gaps, taking into account the relative importance of the missing data to the NTC and other transport policy agencies, are outlined in Chapter 7.

1 Introduction

Key points

'Who Moves What Where' is a NTC initiative designed to better inform future planning and policy development by filling information gaps on passenger and freight movement in Australia.

This report provides a vital quantitative component of the 'Who moves what where' project by reviewing existing data sources and reports.

It answers specific questions relating to the movement of freight and passengers on Australia's road and rail networks, including a high-level analysis of the networks, operators and transport task.

1.1 Objectives

This study was undertaken to provide quantitative input into the NTC's broader Who moves what where project. The objective of this study was to summarise the movement of freight and passengers on Australian domestic transport networks, including a high-level analysis of the networks, operators and transport task. In doing so, the study aimed to answer a number of specific questions nominated in the terms of reference, such as:

- Who moves passengers and freight in Australia?
- How many operators are currently active?
- Who are the major players?
- What is the profile and composition of the transport fleet?
- What is the passenger and freight task?
- What are the major origins and destinations?
- What commodities are being moved?
- What are the important trends in passenger and freight movement?
- What are major gaps in the available data?

1.2 Who Moves What Where

The transport and logistics industry is a key driver of the Australian economy. Despite this, a holistic overview of passenger and freight movements across road and rail has not been undertaken for several decades. The Who moves what where project is compiling and analysing information about passenger and freight movements on road and rail so that government and industry can get the best planning and reform outcomes. This report forms a vital quantitative component of the project as it summarises the movement of freight and passengers on Australian road and rail networks.

The report describes the industry composition, trends and forecasts related to freight and passenger movement on Australian road and rail networks. It was completed using existing information sourced from state and territory jurisdictions, industry bodies and transport operators. Where it was not possible to obtain the information to answer the nominated research questions, the associated gaps in the available data are identified.

1.3 Study approach

1.3.1 Scope

This report presents the most up-to-date publicly-available data on a range of parameters associated with passenger and freight transport in Australia, with a primary focus on the road and rail networks. Relevant historic trends and future projections are included in the analysis.

1.3.2 Methodology

The NTC provided a catalogue of reports and websites prepared by federal government, state government and transport operators, which formed the basis of this study.

This catalogue was reviewed during the project inception phase and additional relevant data sources were identified and collated. Following the project inception meeting with the NTC, work began on the main phase of the work.

A literature review and data gathering exercise to collate information needed to answer the specific questions nominated in the terms of reference was undertaken. No new data was collected. The specific tasks undertaken during this phase of the work included:

- reviewing information and data sources provided by the NTC
- answering the specific research questions
- determining relevant trends, patterns and projections
- identifying and cataloguing perceived or actual information gaps.

The NTC reviewed the findings of the literature review and data gathering before preparation of this final study report, which included incorporating graphs and tables into subsequent analysis and release materials.

1.3.3 Data sources

This study relied predominantly on a catalogue of over 150 published reports, annual reports and websites obtained from federal government, state government and transport operators. These were augmented by additional data sources identified by the project team via research and stakeholder advice. No new data was collected.

A full reference list is provided in the bibliography.

1.3.4 Report structure

Following a brief overview of the domestic transport task undertaken by the major passenger and freight modes in Australia (Chapter 2), the balance of the report focuses on the road and rail networks.

The scope and scale of Australia's road and rail networks are presented (Chapter 3), followed by a summary of the available information on the major road and rail transport operators currently active in the domestic transport market (Chapter 4).

The report then presents a range of information pertaining to the freight (Chapter 5) and passenger (Chapter 6) transport tasks undertaken by road and rail.

The report concludes by summarising the gaps identified in the information reviewed (Chapter 7).

1.3.5 Next steps

The NTC will work with stakeholders to identify the current and potential decisions that better transport use data could inform, as well as opportunities to standardise and improve information gathering, storage, sharing and analysis. We will determine whether the existing available information is sufficient, or whether we need to fill some of the identified gaps and if so, how. We will do this through producing two outputs:

1. a public discussion paper summarising the findings of phase 1, exploring some opportunities for improved information and discussing some draft recommendations to Ministers with government and industry in early 2017.
2. a report to the Transport and Infrastructure Council in late 2017.

If, while reading this report you formulate ideas or suggestions that you would like to contribute to the next stages of the project, please check the National Transport Commission website for further information.

2 Overview

Key points

In 2013–14, the national domestic transport task totalled 427 billion passenger-kilometres and 726 billion tonne-kilometres.

Road accounted for almost four-fifths of the national domestic passenger task (includes private vehicle usage) and one-third of the freight task.

Rail accounted for half of the national domestic freight task.

Air accounted for just over one-sixth of the national domestic passenger task.

Coastal shipping accounted for just under one-sixth of the national domestic freight task.

The domestic passenger task increased 8% in the 10 years to 2016, having reached a low-point after the global financial crisis, and is forecast to grow 19% by 2026.

The domestic freight task increased 50% in the 10 years to 2016 and is forecast to grow another 26% by 2026.

The economic slowdown following the global financial crisis reduced growth rates in road freight and it is unlikely the BITRE's 2003 prediction that road freight would double by 2020 will be achieved until several years later.

2.1 The national transport task

The latest estimates available indicate that in 2013–14 the Australian domestic transport task totalled 427 billion passenger-kilometres and 726 billion tonne-kilometres (Pekol Traffic and Transport, 2016). The proportion of rail, road, air and sea transport the national passenger and freight tasks are shown in Figure 1 and Figure 2 respectively:

- road accounts for almost four-fifths of the national passenger task and almost one-third of the freight task
- rail accounts for half the national freight task
- air accounts for just over one-sixth of the national passenger task
- coastal shipping accounts for just under one-sixth of the national freight task.

Figure 1: National passenger task (passenger-kilometres) by mode, 2013–14

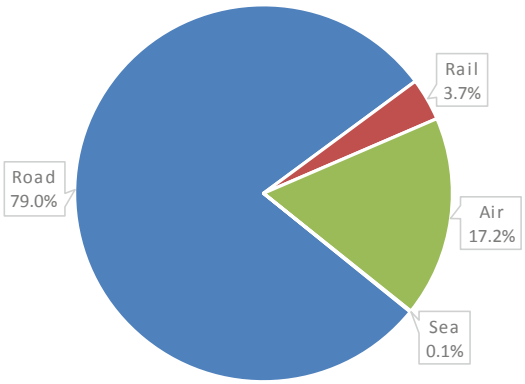
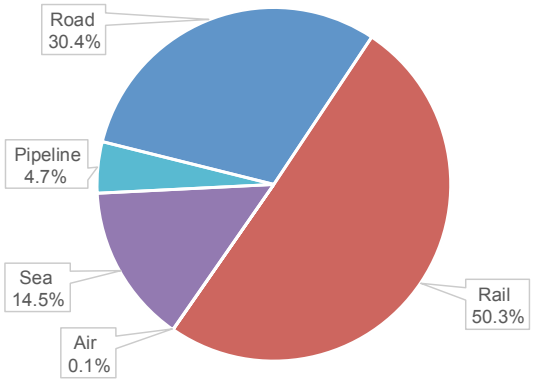


Figure 2: National freight task (tonne-kilometres) by mode, 2013–14



2.2 Growth of the national transport task

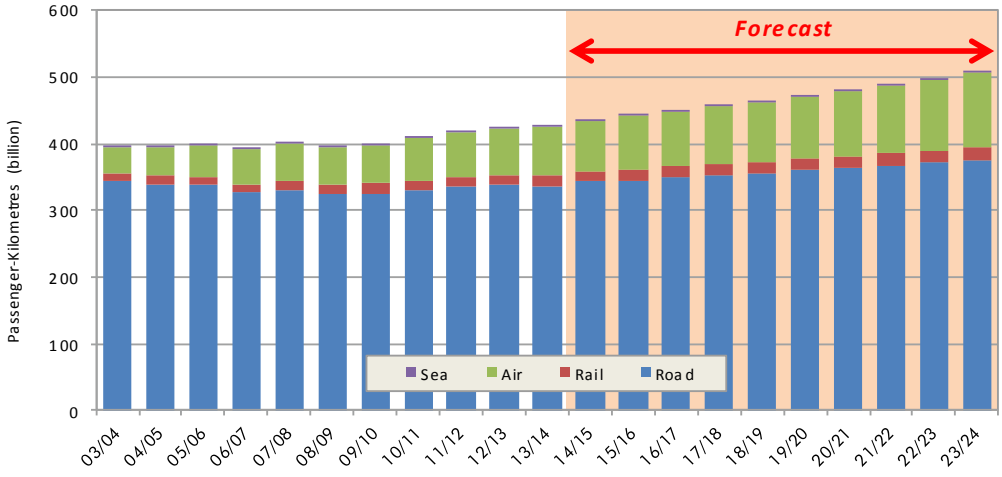
In the 10 years to 2014, Australia's population increased 18% and is forecast to grow another 17% by 2024. At the same time, the national economy grew 32% and is forecast to grow 21% by 2024.

Figure 3 shows how the national domestic passenger task increased 8% in the 10 years to 2016 and is forecast to grow 19% by 2026.

Figure 4 illustrates the much stronger growth of the national domestic freight task, which increased 50% and is forecast to grow 26% by 2026.

The figures highlight the important role of road and rail in meeting Australia's historic and future passenger and freight transport tasks. Accordingly, this report focuses exclusively on these transport modes.

Figure 3: Growth in national passenger task (passenger-kilometres) by mode



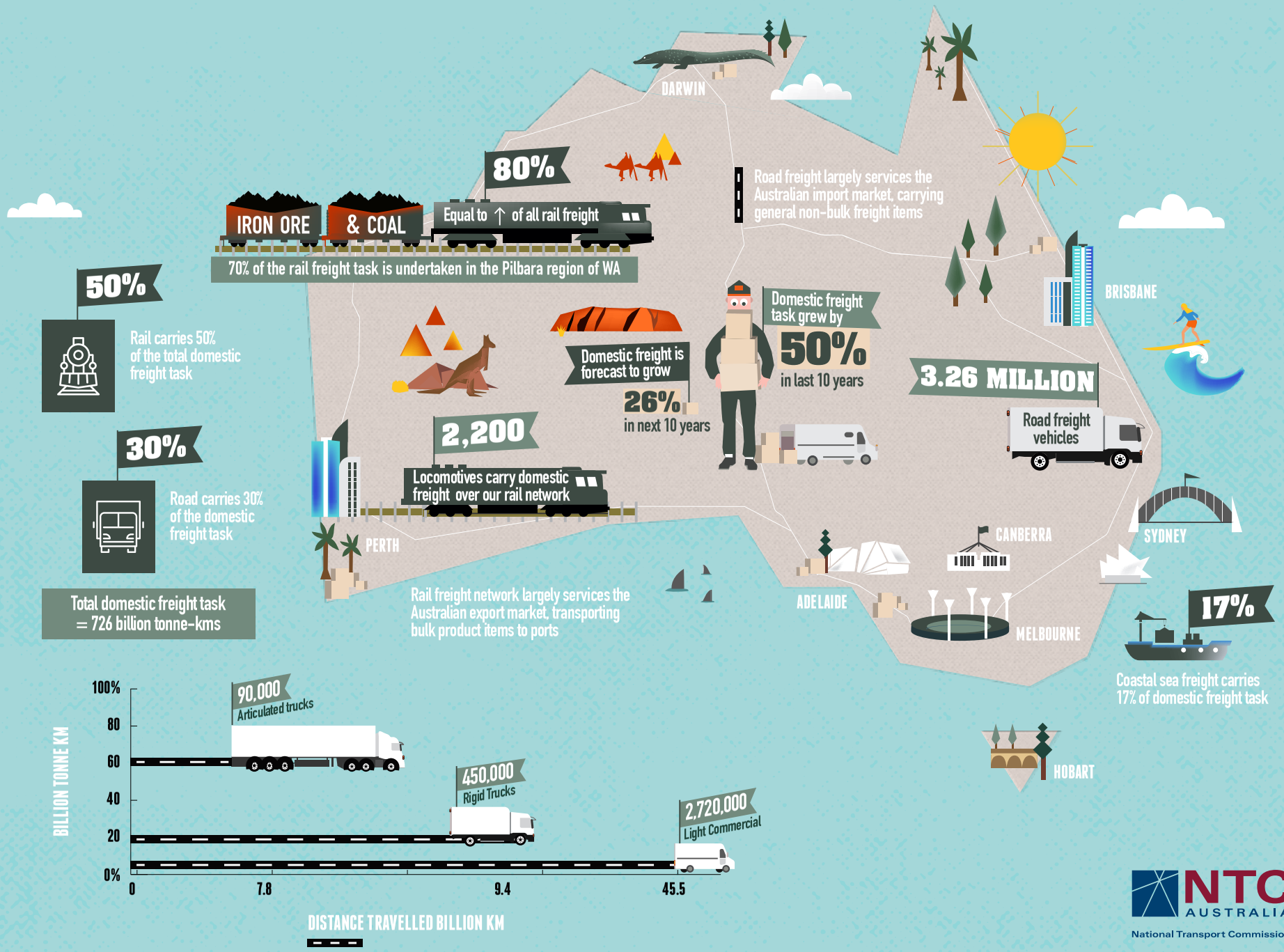


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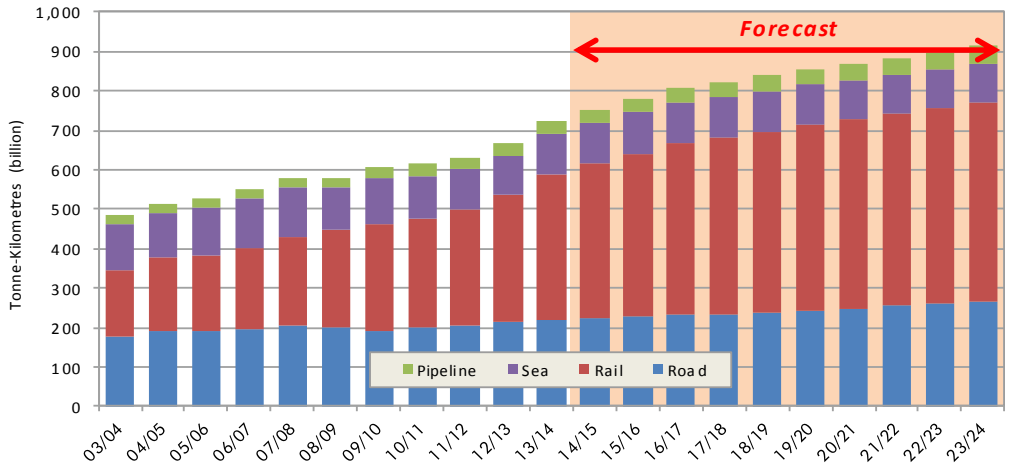
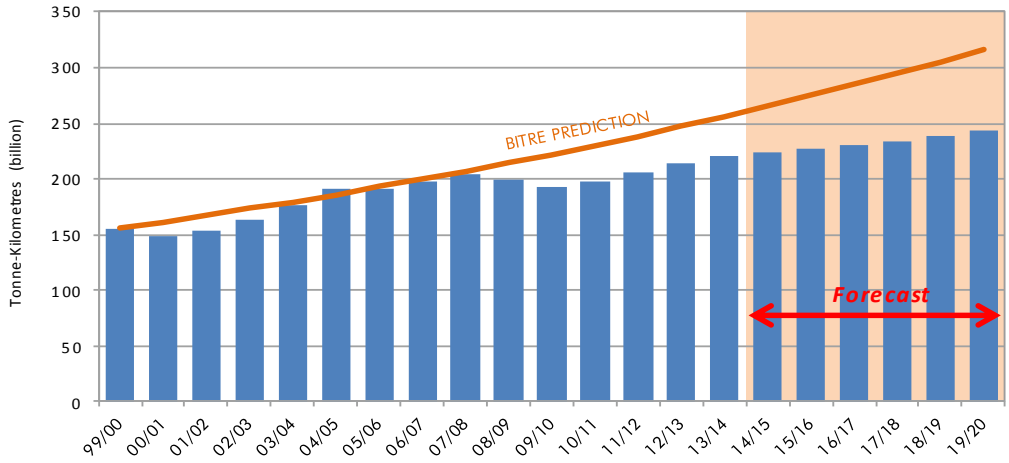
Figure 4: Growth in national freight task (tonne-kilometres) by mode



2.3 Doubling of road freight task

In 2003, the BITRE predicted the national road freight task would effectively double from 2000 to 2020 with 3.6% annual growth based on an average economic growth rate of 2.75% per annum (BITRE, 2003). The latest data on the actual and forecast road freight task for this period is plotted in Figure 5, together with the BITRE prediction line. It shows the BITRE prediction held true up to the 2008 global financial crisis after which the rate of growth in the road freight task has declined dramatically, reflecting the lower economic growth since.

Figure 5: Growth in road freight task (tonne-kilometres)



For example, between 1999–00 and 2007–08, the economy and road freight task grew an average of 3.4% per annum. However, in the six years following the global financial crisis, the economy has grown 2.4% per annum and growth in the road freight task has slowed to 1.3% per annum. This suggests that on current projections, it is unlikely we will reach the doubling milestone until several years later than predicted.

3 Operators

Key points

Freight operators:

Australia's rail transport industry generates $5.4 to $7.3 billion in revenue and comprises 25 operators primarily located in southern states and resource-rich areas (Ferrier Hodgson, 2014).

The road freight industry generated approximately $3.2 billion in revenue in the same year (IBISWorld, 2015).

The major rail operators and their market share are:

- Aurizon Holding, 40%
- Asciano, 33%
- SCT, 23%

The major operators and their share of Australia's road transport market are:

- Toll IPEC, 8.3%
- Linfox, 4%
- K&S, 1.6%

IBISWorld suggests that within the Rail, Air and Sea Freight Forwarding market as a whole, industry concentration is low, with the four largest operators in the segment contributing only 10% of the industry's $8.2 billion revenue in 2011. Rail freight forwarding is estimated to have generated 65.8% of industry revenue while sea and air accounted for 23.3% and 10.9% respectively (IBISWorld, 2015).

The structure of the road freight industry is very diverse with a large number of small firms. In terms of volume, industry sources indicate that approximately 70% of all interstate freight is controlled by the four largest Freight Forwarders and that half of the interstate freight task (including both bulk and intermodal) goes by rail.

It is estimated there are around 42,000 operators in the wider road freight transport sector, ranging from single-truck operators to large corporations. Combined, they generate about $48.3 billion in revenue, which has been estimated as 24% of Australia's transport and logistics industry revenue (Ferrier Hodgson, 2014).

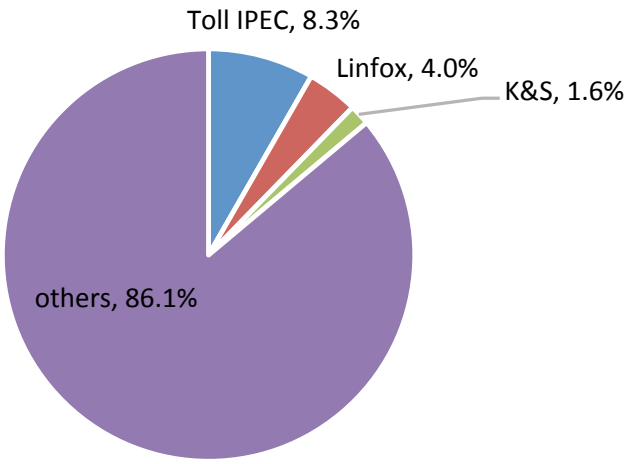
3.1 Road freight operators

According to the BITRE, in 2002 there were around 47,000 businesses operating in the wider road freight transport industry, compared with 33,000 in 1983–84. An estimated 42,000 operators are now active in this sector, ranging from single-truck operators to large corporations and combined they generate about $48.3 billion in revenue (Ferrier Hodgson, 2014).

Figure 6 shows the share of the market occupied by the top three operators:

- Toll IPEC, 8.3%
- Linfox, 4%
- Kain & Shelton (K&S), 1.6%

Figure 6: Market share



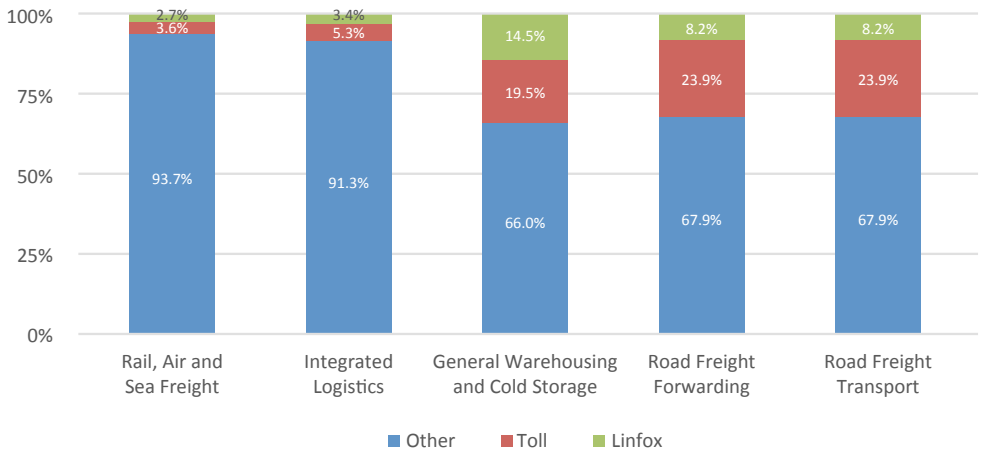
Source: Ferrier Hodgson, 2014

Figure 7 shows that Toll IPEC and Linfox are the largest operators in each industry sub segment (IBISWorld). Within the road freight forwarding segment, the 'Others market share comprises mid- tier Freight Forwarders and End Users direct. Given the fluidity in the market and the lack of transparency within this industry, it is difficult to quantify precisely what share of the market each freight forwarder occupies (Deloitte, 2011).

However, three other road freight transport companies have featured (in addition to Linfox) in the Business Review Weekly Magazine's list of top 500 private companies. Linfox was reported to have $2,500 million revenue for 2012–13, which was more than 12 times greater than:

- Border Express based in NSW, with $195 million revenue
- Kings Group based in VIC, with $157 million revenue and a fleet of over 1500 subcontracted and company-owned vehicles
- Allied Express based in NSW, with $100 million revenue and a fleet of over 1000 vehicles.

Figure 7: Market share of Toll, Linfox and others, 2011 revenue



Source: Deloitte, 2011

Toll

Toll is an integrated transport and logistics operator ranked as the ninth-largest global transport operator by Transport Intelligence in 2012 and listed as a top-50 ASX company. It provides freight transport across all transport modes, warehousing and storage, logistics services, courier and parcel services. Toll's key customers are:

- Australian Defence Force
- Australia Post
- BHP Billiton
- Bluescope Steel
- Cadbury
- Commonwealth Bank
- Formula One Grand Prix
- IKEA
- Johnson and Johnson
- Nike
- Symbion Pharmacy Services

Linfox

Linfox is Australia's largest privately owned logistics company that is rapidly expanding throughout Asia and New Zealand. Linfox Logistics operates 3.2 million square metres of warehousing and 5000 vehicles across 10 countries and employs more than 23,000 people in Australia, New Zealand and Asia. The Australian Linehaul team provides long-distance distribution services across road, rail and coastal shipping to ensure customers benefit from the most effective mode of transport (Linfox, 2015). Linfox is an ASX-listed company which controls about 4.2% of Australia's road transport market. Linfox's fleet include tankers, road trains, prime movers, refrigerated trailers, bulk containers and a range of custom designed trailers (Linfox, 2015).

K&S

K&S corporation has one of the largest fleets in Australia. They provide multi-modal transport of dry and liquid bulk and fuel, hazardous solids, liquids and explosives and warehouses with an emphasis on the resources sector in Western Australia. It is an ASX-listed company with reported operating revenue of $604 million in 2014–15 with an 18.5% increase from the last year. K&S acquired Scotts in 2014 and Northern Territory Freight Services (NTFS) in 2015, one of the largest rail freight forwarders on the Adelaide – Darwin corridor. K&S Freighters is also recognised as a true multi modal provider of transport solutions, maintaining outstanding facilities and resource base and controlling one of the largest company-owned and operated fleets in Australia, over 160,000 sq m of warehousing and a large range of rail and sea containers. Key major national locations include Truganina Vic, Enfield NSW, Coopers Plains Qld, Fisherman Islands Qld, Gillman SA and Kewdale in WA (K&S, 2015).

Key K&S customers are:

- Alcoa
- BlueScope Steel
- Boral
- BP/Castoral
- Caltex
- Chep
- Mount Gibson Iron
- Norske Skog
- Onesteel
- The Laminex Group
- Santos
- Woodside Energy
- BHP Petroleum
- Coca-Cola

The other part of road freight transport operators are forwarders who purchase transport services in bulk, and then sell in smaller quantities to major markets. The four largest players are DHL (Dalsey, Hillblom and Lynn) Global Forwarding (Australia) Pty Limited, TNT (Thomas Nationwide Transport) Australia Pty Ltd, Schenker Australia Pty Limited and Toll Holdings Limited. According to IBISWorld, in 2012–13 there were approximately 547 businesses operating as freight forwarders with a combined estimated revenue of around $2.2 billion and 7770 employees (IBISWorld, 2015).

3.1.1 Fleet profile information

Approximately 70% of all operators only have one truck in their fleet and approximately 24% have two to four trucks. Less than 0.5% of all operators have fleets with 100+ trucks (National Transport Insurance).

Based on the Survey of Motor Vehicle Use ABS (2014b), there were approximately 17.7 million vehicles registered on Australian roads to 31 Oct 2014, with an increase of 1.1 million (6.5%) since the survey in 2012. Freight vehicles accounted for 19.1% (3.38 million) and travelled an estimated 203,295 billion tonne-kilometres each year.

LIGHT COMMERCIAL VEHICLES	RIGID TRUCKS	ARTICULATED TRUCKS
		
Makes up 83.4 % of fleet (2.82 million vehicles)	Makes up 13.8% of fleet (466,545 vehicles)	Makes up 2.8% of fleet (96,226 vehicles)
Makes up 3.8% of freight task (7,676 million) of total tonne-kms	Makes up 17.2% of freight task (35,035 million) of total tonne-kms	Makes up 79% of freight task (160,584 million of total tonne-kms), trucks with over 40 tonnes, accounted for 95.3% (153,109 million) of tonne-kms
Travels an average of 4,900 tonne-kms	Travels an average of 87,700 tonne-kms	Travels an average of 1.8 million tonne-kms
6.35% of total tonne carried (145 million tonnes)	46% of total tonne carried (1,046 million tonnes)	47.65% of total tonne carried (1,084 million tonnes)
72.5% of total kilometres travelled (45,540 million kms)	15% of total kilometres travelled (9,394 million kms)	12.5% of total kilometres travelled (7,820 million kms)
Travelled on average of 16,100 kilometres	Travelled on average of 20,100 kilometres	Travelled on average of 81,300 kilometres
Average load per trip: 0.353 tonne	Average load per trip: 5.653 tonne	Average load per trip: 24.742 tonne

In 2014, freight vehicles registered in Victoria travelled the most tonne-kilometres (53,667 million), followed by Queensland (47,018 million), New South Wales (39,797 billion) and Western Australia (37,866 million).

The largest change in tonne-kilometres travelled by freight vehicles over 12 months ending 31 October 2010 to the 12 months ending 31 October 2014 was for freight vehicles registered in Western Australia with an increase of 7,787 million (25.9%).

From 2010 to 2014, tonne-kilometres travelled by freight vehicles registered in the Northern Territory had the highest percentage increase of 76.7% (1,553 million). This was the largest increase for any state or territory (ABS, 2014b).

The trend toward larger trucks has continued, reducing the growth of heavy vehicles numbers, as previously noted, not only GVM or GCM in each class of heavy vehicles has continued to increase, but also there has been a trend for shifting from rigid trucks to articulated trucks. Articulated trucks offer higher fuel efficiency, a better safety record and savings in labour (BITRE, 2003). Figure 8 to Figure 11 demonstrate various aspects of the fleet.

Figure 8: Fleet profile

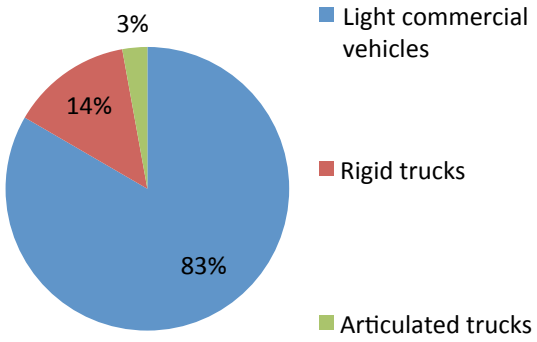
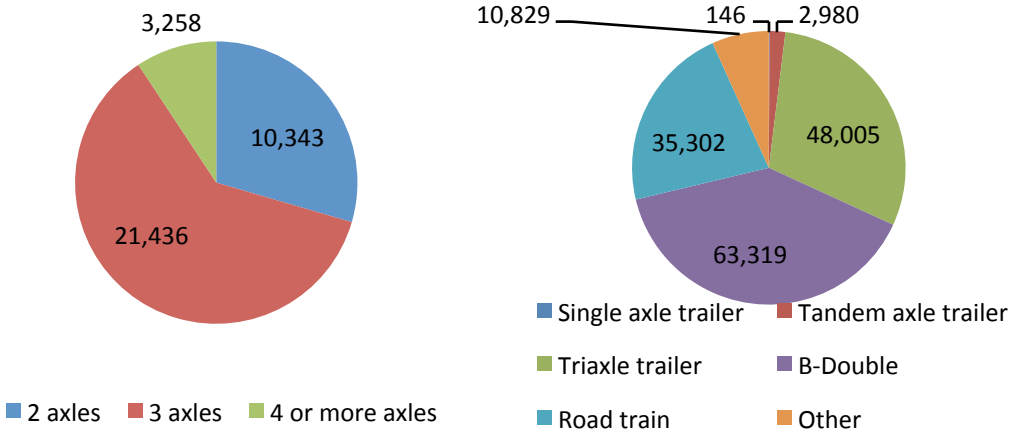
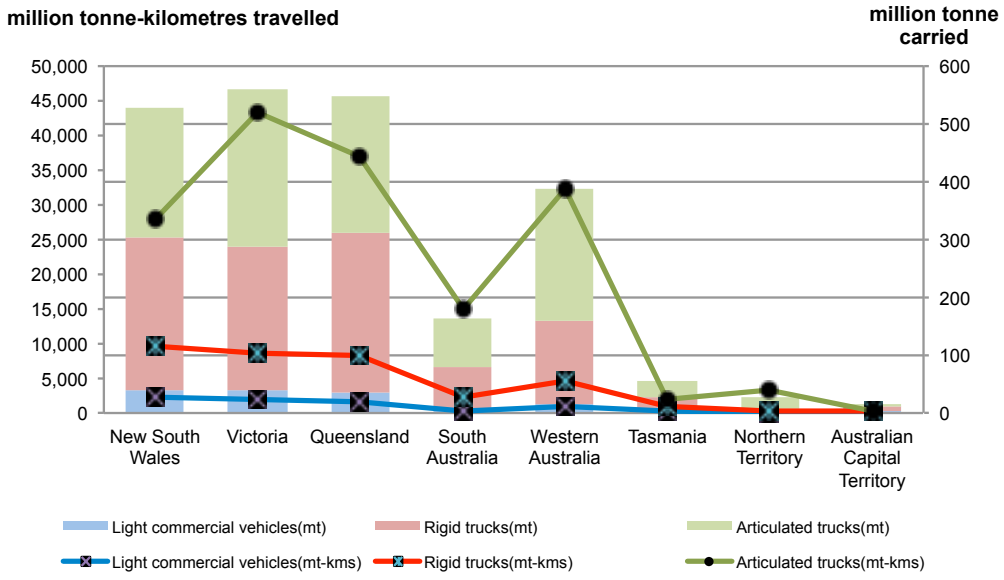


Figure 9: Tonne-kilometres (million) of rigid trucks (left), articulated trucks (right)



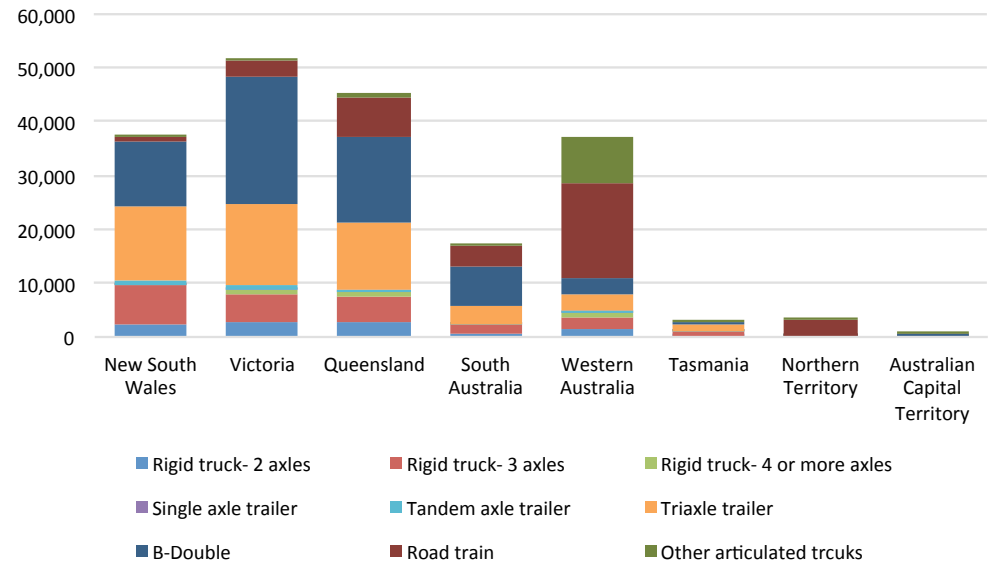
Source: ABS, 2014b

Figure 10: Total tonnes and tonne-kilometres by type of vehicle by states



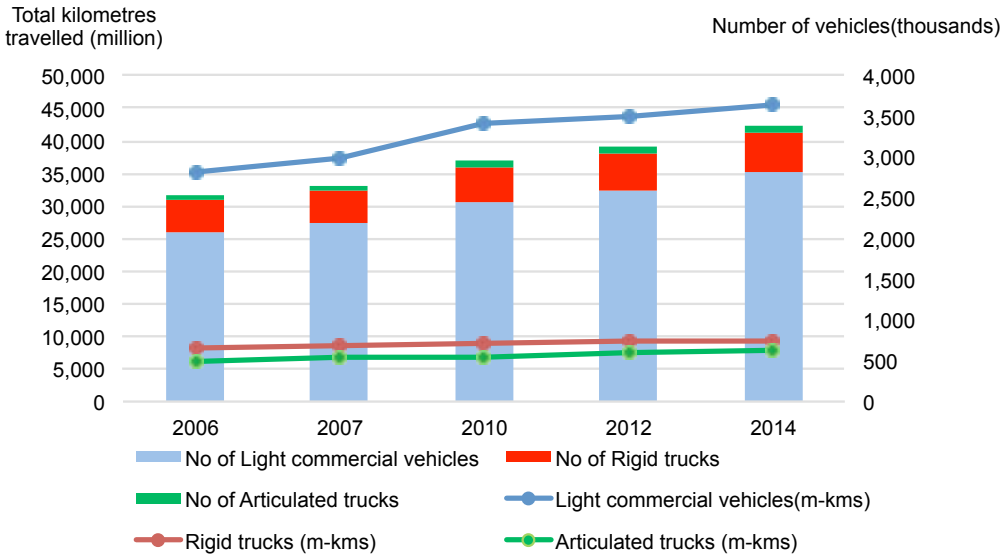
Source: ABS, 2014b

Figure 11: Total tonne-kilometres by type of trucks



Source: ABS, 2014b

Figure 12: Trend from 2006 to 2014



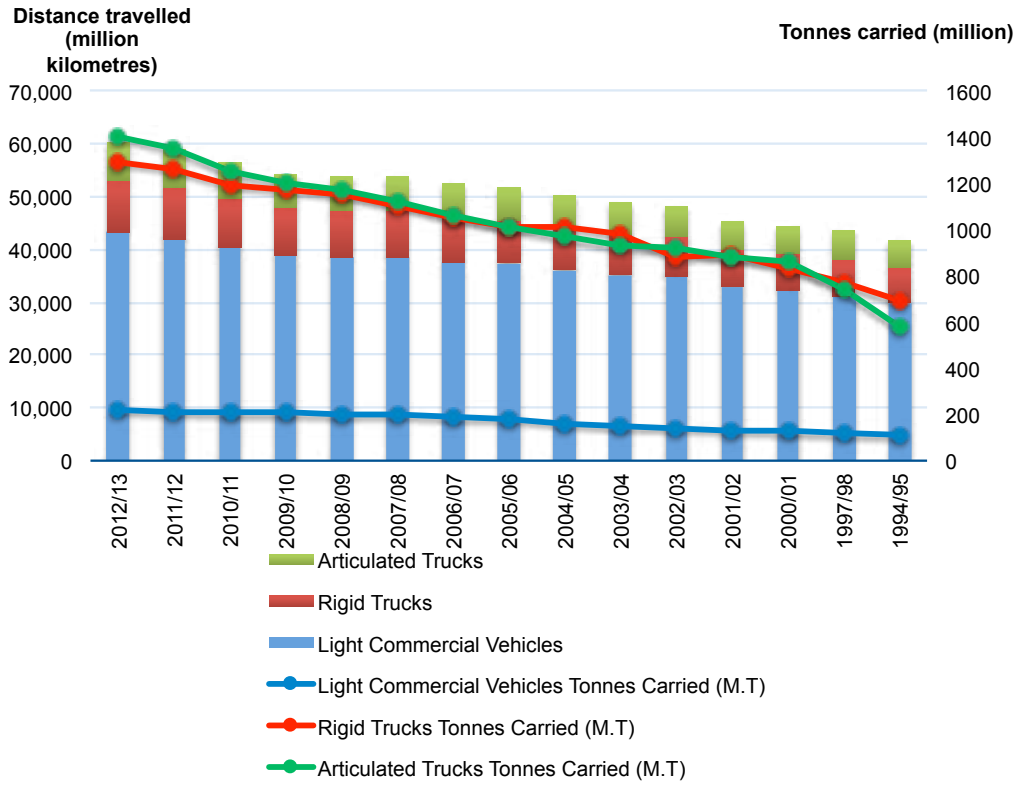
Source: ABS, 2014b

Table 1: Total tonne-kilometres of rigid trucks

	TYPES	NEW SOUTH WALES	VICTORIA	QUEENSLAND	SOUTH AUSTRALIA	WESTERN AUSTRALIA	TASMANIA	NORTHERN TERRITORY	AUSTRALIAN CAPITAL TERRITORY
RIGID TRUCKS	Rigid trucks - 2 axles	2,532	2,622	2,842	676	1,273	226	120	52
	Rigid trucks - 3 axles	7,045	5,305	4,643	1,449	2,142	627	70	155
	Rigid trucks - 4 or more axles	131	684	900	55	1,224	202	32	30
ARTICULATED TRUCKS	Single axle trailer	29	76	15	4	20	2	0	0
	Tandem axle trailer	897	1,132	476	250	182	28	10	5
	Triaxle trailer	13,456	14,857	12,242	3,207	3,010	1,064	61	108
	B-Double	12,167	23,553	15,919	7,586	3,249	696	58	91
	Road train	723	2,971	7,533	3,930	17,296	0	2,849	0
	Other	491	534	681	97	8,602	115	308	1

Source: ABS, 2014b

Figure 13: Kilometre-travelled and tonnes-carried by each vehicle class (million)



Source: Pekol Traffic and Transport, 2015

3.1.2 Vehicle classification information

According to BITRE, in 1983, hire & reward operation was estimated to account for 26% of the total number of trucks. This share rose to 40% in 2000.

However, part of this increase was due to the different methods adopted in compiling the data. While the BITRE 1983 estimates include all trucks over two tonnes, the TransEco (1996) and NRTC estimates include only trucks over 4.5 tonnes.

It is estimated there are 42,000 operators in the road freight transport sector, ranging from singletruck operators to large multi-national corporations. The overwhelming majority (98.5%) of these were engaged in road freight operations (ANZSIC 611) with the remainder in the road freight forwarding sector (ANZSIC 6642). It appears the distribution of trucking establishments within the hire & reward sector has changed little since 1983–84.

Given the lack of up-to-date data on the split between hire & reward and ancillary operators in the road freight industry, the NTC commissioned a special one-off cross-tabulation from the 2011 ABS Census, to quantify the number of truck or delivery drivers employed by industry group. It was assumed that drivers employed in the non-transport sectors (such as agriculture, mining and manufacturing) were performing an ancillary task, while those employed in the transport sector were performing a hire & reward role. These data are summarised in Table 2 and indicate that:

- In 2011, there were about 217,000 truck or delivery drivers employed in Australia, with the largest share employed in New South Wales (30.9% of the national total), followed by Victoria (22.9%), Queensland (22.6% and Western Australia (11.9%).

- About 125,000 (57.7% of the national total) of these drivers are employed in the Transport, Postal and Warehousing sector and are therefore classed as performing a hire & reward task.
- The other 91,800 drivers (42.3%) are considered to be fulfilling an ancillary role, within their primary industry of employment.
- Industry sectors employing the largest number of truck / delivery drivers in an ancillary role include:
  - Wholesale Trade 14,153 or 3.5% of all workers in this industry
  - Manufacturing 13,327 or 1.5% of all workers in this industry
  - Construction 11,133 or 1.3% of all workers in this industry
  - Retail Trade 8,808 or 0.8% of all workers in this industry
  - Electricity, Gas, Water and Waste 8,663 or 7.5% of all workers in this industry
  - Mining 7,345 or 4.2% of all workers in this industry
  - Accommodation and Food Services 6,054 or 0.9% of all workers in this industry
  - Public Administration and Safety 5,731 or 0.8% of all workers in this industry
- Between them, the eight industry sectors listed above employ over 80% of all truck / delivery drivers performing an ancillary role.
- Australian Jobs data from 2015 suggests that 46% of truck drivers work in ancillary businesses and 54% in hire and reward, while 22% of courier/postal deliverers work in ancillary businesses and 78% work in hire and reward (Department of Employment 2015).

Table 2: Ancillary and hire & reward truck / delivery drivers by state, 2011

STATE	ANCILLARY	HIRE & REWARD	TOTAL	% HIRE & REWARD
NSW	27,605	39,440	67,045	58.8%
VIC	19,956	29,815	49,771	59.9%
QLD	21,421	27,602	49,023	56.3%
SA	6,533	9,832	16,365	60.1%
WA	11,991	13,749	25,740	53.4%
TAS	2,292	2,964	5,256	56.4%
NT	1,060	845	1,905	44.4%
ACT	944	1,066	2,010	53.0%
AUST	**91,802**	**125,313**	**217,115**	**57.7%**

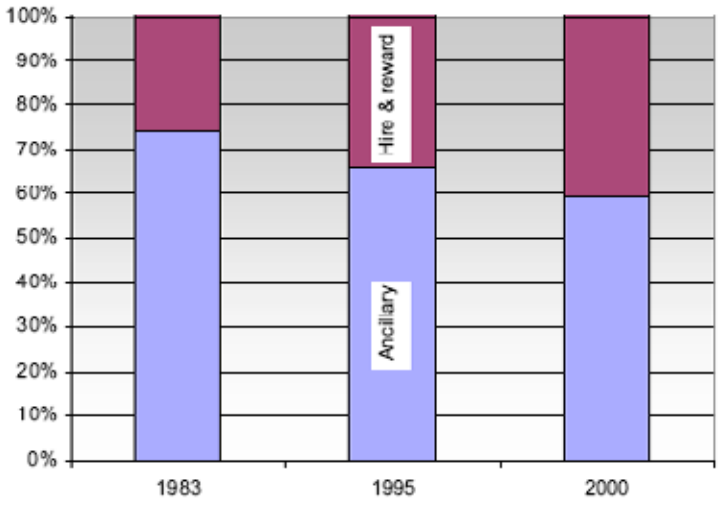
Source: ABS, June 2016

Table 5.1: Number of business establishments: hire & reward and ancillary

INDUSTRY	1982/83[A] (AS AT 30 JUNE)	1983/84[B] (AS AT 30 JUNE)	1994/95[C] (UNKNOWN)	2002[D] (AS AT 30 MARCH)
ANCILLARY				
Agriculture, forestry, fishing and hunting	81,910		108,370	
Building and construction	16,880		15,970	
Electricity, gas and water	880		0	
Manufacturing	6,350		10,290	
Mining and quarrying	2,620		630	
Wholesale and retail trade	14,950		24,770	
Other	8,240		5,660	
TOTAL ANCILLARY	**131,830**		**165,690**	
HIRE & REWARD				
Owner operators	16,110			
Other	16,570			
Total hire and reward	**32,680**			
Road freight (ANZSIC 611)		32,368	43,526	46,317
Road freight forwarding (ANZSIC 6642)		575	786	704
GRAND TOTAL	**164,510**		**210,000**	

Notes: a – Establisments operating trucks with tare weight of 2 tonnes and over;
b – Establisments operating trucks with GVM equal to or greater than 2.7 tonnes;
c – Establisments operating trucks with GVM equal to or greater than 4.5 tonnes; and
d – Business counts in road freight (ANZSIC 611) and road freight forwarding (ANZSIC 6642).
Source: Data for 1982/3 are from BTW (1986, pp. 21-2); Data for 1983/4 from ABS (1986a, p7); Data for 1994/5 from NRTC (1998, pp. 9-10); and data for 2002 from ABS unpublished data.
Source: BITRE, 2003

Figure 14: Distribution of trucks by type of operations (%)



Source: 1983 estimates are from BTW (1986); 1995 estimates are from TransEco (1996); and 2000 estimates were from NRTC by request. Source: BITRE, 2003

3.1.3 Employees information

According to IBISWorld in 2012–13, road freight revenue was worth an estimated $2.2 billion and employed around 7,770 employees (IBISWorld, 2015).

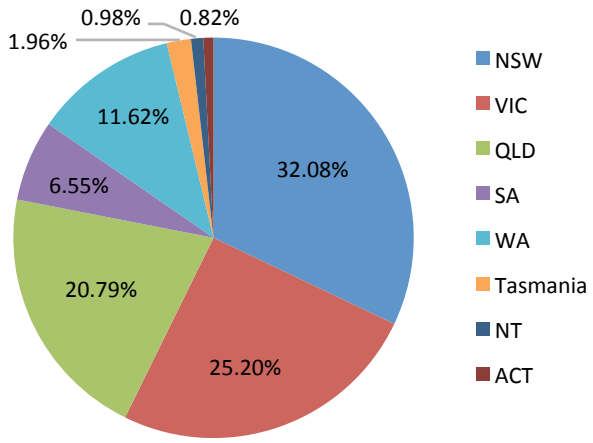
In 2015, there were about 1,480,000 employees in transport, postal and warehousing from which 1,093,000 were full-time and 388,000 were part-time. On average, 56,600 work in public sector and 553,400 are in private sector (ABS, 2016). Table 3 presents the number of employees in freight sector, and Figure 15 indicates share of each state.

Table 3: Top 10 occupations in road freight transport sector

OCCUPATION	NUMBER EMPLOYED (FOR QUARTER AVERAGE, 2014)
Truck Drivers	101,500
Automobile Drivers	40,600
Couriers and Postal Deliverers	37,400
Bus and Coach Drivers	34,800
Storepersons	28,400
Transport and Despatch Clerks	18,600
Forklift Drivers	17,600
Delivery Drivers	13,500
Transport Services Managers	12,200
Mail Sorters	12,100
SUM	**316,700**

Source: ABS, Feb 2016

Figure 15: Employment in transport and warehousing sector by state



Source: ABS, 2016

3.2 Rail freight operators

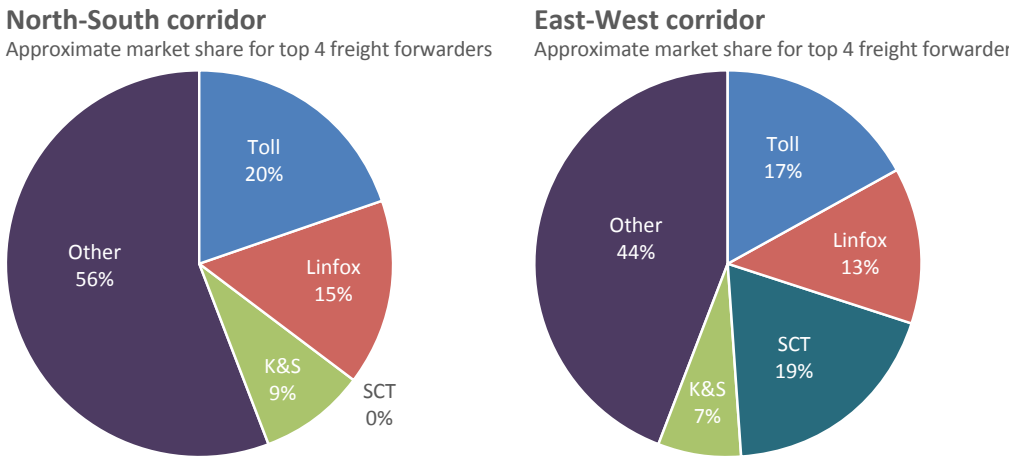
Historically, rail freight transport was operated by state governments but since the successful deregulation, privatisation and commercialisation of the industry, rail has developed into a competitive national industry. Australia's rail fleet comprises about 2,200 locomotives with an average age of 36 years (Ferrier Hodgson, 2014).

Train operation is undertaken by numerous organisations (BITRE, 2015c):

- National rail freight operators: the two largest national rail freight train operators are Aurizon and Asciano (operating under the subsidiary names Pacific National and Patrick). Their core activity is coal haulage in Queensland and New South Wales, with other important ancillary bulk-haulage activities. Both companies also operate intermodal services on the open access interstate network.
- Regional rail freight operators: Genesee & Wyoming Australia is a major train operator in South Australia and the Northern Territory. Other significant players include Southern Shorthaul Railroad and Freightliner Australia. TasRail provides the rail freight services in Tasmania while Watco WA Rail is contracted by Co-operative Bulk Handling Ltd. (CBH) to provide grain haulage in Western Australia.
- Logistics companies: Specialised Container Transport (SCT) Logistics and Qube Holdings are the large players and operate intermodal services for their own logistics chains. They also operate a small number of bulk services. SCT Logistics has a diverse portfolio of rail and road activities, including intercity intermodal operations. Qube Holdings also has a diverse intermodal and bulk portfolio, with a primary focus on local and regional port-based operations. Fletcher International is a new player in the rail transport industry. It provides agricultural products rail services from Dubbo to Port Botany in New South Wales. Other logistics companies such as Toll, Sadliers Logistics and Ettamogah Rail Hub use rail freight operators to undertake their rail haulage.
- Mining companies: such as Rio Tinto, BHP Billiton, Fortescue Metals Group and Karara. Mining operate trains on their own railways.

However, Figure 16 illustrates the estimated rail market share of the four major freight forwarders on the North-South and East-West corridors (Deloitte, 2011).

Figure 16: Estimate of freight forwarder's market share on rail



Source: Deloitte, 2011

3.2.1 The number of operators in the rail industry, key operators

Table 4 demonstrates the principle rail freight train operators.

Table 4: Principal train operators

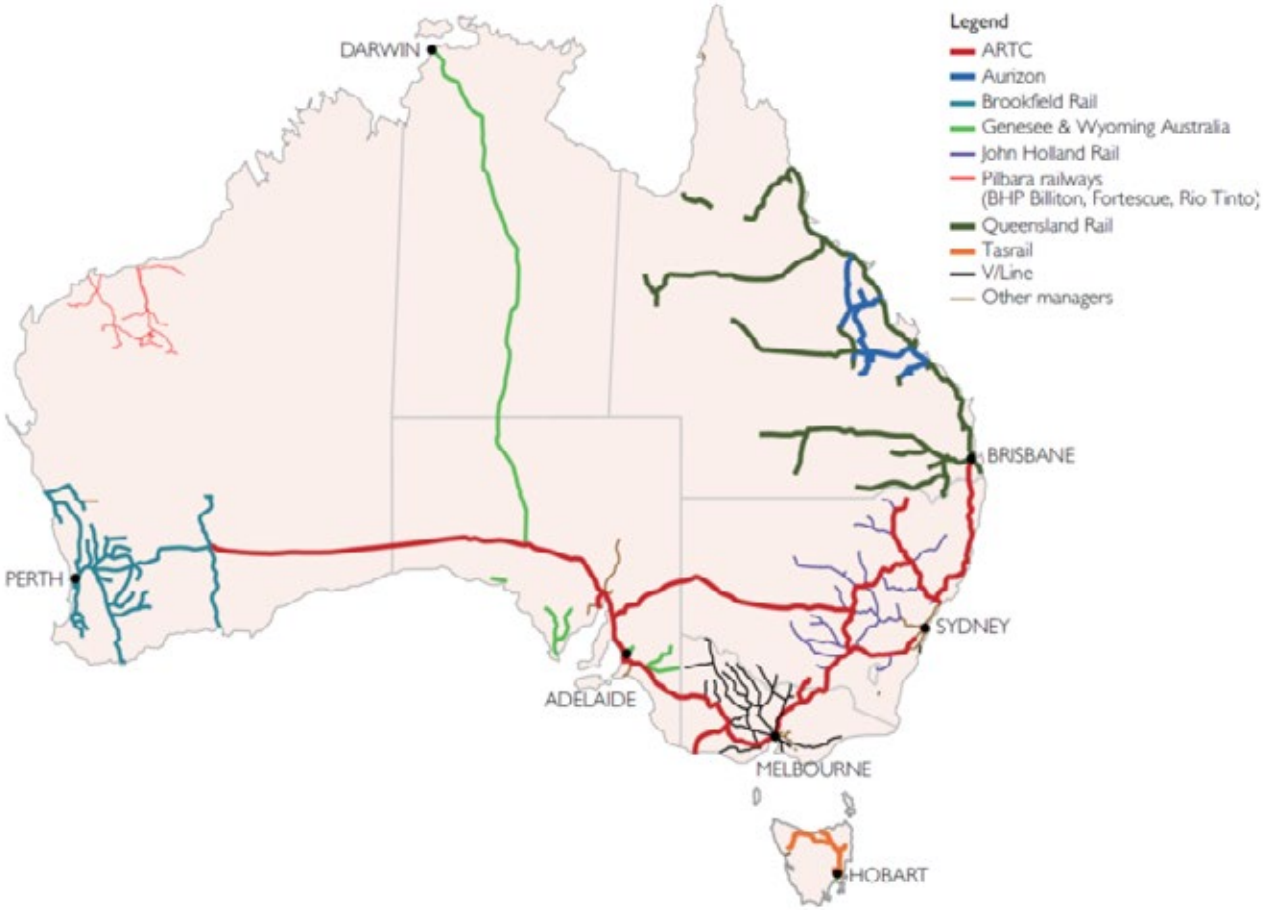
FREIGHT RAIL OPERATORS	INFRASTRUCTURE NETWORK USED	PRIMARY TASKS	STATE	SERVICE AREA
Aurizon	Aurizon, Queensland Rail, ARTC, Brookfield, NSW TrainLink, Sydney Trains	Coal, iron ore, intermodal,cattle, grain, mixed bulk	NSW QLD WA	Interstate Both North-South and East-West corridors, line haul and end-to-end service
Asciano (Pacific National, Patrick)	Aurizon, Queensland Rail, ARTC, V/ Line, John Holland, Sydney Trains, NSW TrainLink, Brookfield, GWA, MTM Melbourne	Coal, ores, intermodal, steel, grain, mixed bulk	All states	Interstate Both North-South and East-West corridors
Genesee & Wyoming Australia (GWA)	GWA, ARTC	intermodal, grain, gypsum, iron ore, manganese, copper	NSW SA	
SCT Logistics	ARTC, Brookfield Rail, GWA, V/Line	Specialised Bulk Rail , Intermodal, grain, iron ore	VIC WA	East-West corridor
Qube Logistics	ARTC, Brookfield Rail, V/Line, Sydney Trains, NSW TrainLink, John HollandMTM Melbourne	Intermodal, grain, mixed bulk	NSW VIC	between Melbourne and Adelaide
Watco	Brookfield	Grain	WA	
Southern Shorthaul Railroad	ARTC, Sydney Trains, NSW TrainLink, John Holland	Coal, grain, intermodal, infrastructure works	NSW VIC	
Freightliner Australia	ARTC, Sydney Trains, NSW TrainLink, John Holland	Coal, grain, cotton	NSW QLD WA	North-South corridor
TasRail	TasRail	Intermodal, coal, ores	TAS	

Table 5: Principal infrastructure managers of Australian railways (passengers and freight)

	INFRASTRUCTURE MANAGER	STRUCTURE	PRIMARY USAGE
1	Australian Rail Track Corporation (ARTC)	Separated	Intermodal, grain, ores, steel
2	Brookfield Rail	Separated	Intermodal, grain, ores, steel
3	Genesee & Wyoming Australia (GWA)	Integrated	Intermodal, ores
4	Aurizon	Integrated	Coal
5	Queensland Rail	Integrated and Separated	Passenger (integrated), grain, coal, cattle, ores, intermodal (separated)
6	John Holland	Separated	Grain, ores, cotton
7	ARTC (New South Wales regional and Hunter Valley)	Separated	Coal, grain, cotton
8	V/Line	Integrated (passenger); Separated (freight)	Passenger, grains, mineral sands, intermodal
9	ARTC (Portland, Benalla–Yarrawonga)	Separated	Grain, mineral sands
10	TasRail	Integrated	Intermodal, coal, ores
11	GWA (intra-state South Australia)	Integrated	Grain, gypsum, ores
12	Brookfield Rail (intra-state Western Australia)	Separated	Grain, ores
13	BHP Billiton	Integrated	Iron ore
14	Rio Tinto	Integrated	Iron ore
15	Fortescue Metals Group	Integrated	Iron ore
16	MTM (Metro Trains Melbourne)	Separated	Freight
17	Sydney Trains	Separated	Freight

Source: BITRE, 2015c

Figure 17: Principle infrastructure managers



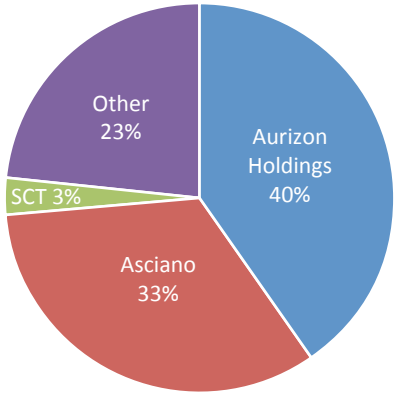
Source: BITRE, 2015c

Australia's rail freight transport industry generates $7.3 billion in revenue and consists of 25 operators, primarily located in southern states and resource rich areas (Ferrier Hodgson, 2014).

Four major operators dominate the rail freight transport industry: Aurizon, Asciano, SCT Logistics and Qube Holdings. The two largest operators, Aurizon and Asciano, provide quarterly trainoperator traffic data to the Australian Stock Exchange (ASX). There is limited information on the other freight train operators (BITRE, 2015c).

Figure 18 illustrates that Aurizon and Asciano by far the major rail operators.

Figure 18: Share by major rail operators



Source: Industry analysts
Source: Ferrier Hodgson, 2014

Aurizon

Aurizon (previously QR National) is the largest rail freight haulage operator in Australia (by tonnes hauled). It is a top-50 ASX-listed company controlling 40% of Australia's rail freight industry.

Aurizon transports more than 250 million tonnes of Australian commodities, connecting miners, primary producers, and industry with international and domestic markets. It owns and operates one of the world's largest coal rail networks, linking approximately 50 mines with three major ports in Queensland. Total active locomotives in 2015 was reported at 567 with active 13,960 wagons (Aurizon, 2015).

Aurizon's primary operations include:

- coal – transport from coal mines in New South Wales and Queensland to ports and end customers
- bulk freight – national bulk transport including intermodal containerised freight
- iron ore – Western Australia footprint with six depots
- network – based in Queensland, services include rolling stock maintenance, rail and track services and track construction.

Key customers:

- BHP Billiton
- Cliffs Asia Pacific Iron Ore
- Glencore Xstrata
- Mount Gibson Iron
- Rio Tinto
- Wesfarmers.

Table 6: **Aurizon Operations snapshot**

AURIZON OPERATIONS SNAPSHOT	
Operational staff	5,437
Coal hauled daily	554.9kt
Iron ore hauled daily	66.3kt
Bulk hauled daily	128.8kt
Intermodal hauled daily	15.1kt
Active locomotives	567
Active wagons	13,960

Source: Aurizon, 2015

Table 7: **Billion net tonne-km carried by Aurizon**

AURIZON	COAL	IRON ORE	BULK	NON-BULK – PLUS RESIDUAL BULK FROM 2011–12	TOTAL
2007–08	42.8	-	13.6	4.8	61.2
2008–09	43.5	-	14.3	4.2	62
2009–10	45.3	-	15.2	3.7	64.2
2010–11	40.9	-	-	18.9	59.8
2011–12	41.9	6.7	-	14.3	62.9
2012–13	43.6	10.3	-	13.2	67.1
2013–14	49.2	12.2	-	12.5	73.9
2014–15	49.1	10.4		12.9	72.4

Source: BITRE, 2015c

Asciano (Pacific National)

Asciano (or Pacific National, PN) is the largest of the 'interstate' Above Rail Operators. Its business model on these corridors is to provide rail line haul and terminal services for intermodal freight operators (Deloitte, 2011).

Asciano is Australia's only combined rail freight and port operator, consisting of Pacific National's rail operations and Patrick's port and stevedoring operations. Asciano holds 33% of Australia's rail freight market and 45% of the domestic stevedoring industry. The company was demerged from Toll Holdings in 2007 and owns Patrick Corporation and Pacific National as subsidiary companies. Asciano specialises in bulk and container shipping and transportation, with port and train operations across Australia. It has over 8000 employees (Wikipedia).

Pacific National Coal is Asciano's fastest growing division and one of Australia's largest coal haulage operators. They provide rail haulage services for the export and domestic coal markets in New South Wales, Queensland and South Australia. To service the haulage demand, Pacific National Coal operates a fleet of more than 5880 coal wagons and 246 locomotives across Australia (ASCIANO, 2013).

Pacific National Rail is Australia's largest intermodal rail provider and a major provider of bulk haulage rail services. To service the haulage demand, we have an active fleet of 350 locomotives and 7000 wagons and a network of strategic intermodal freight terminals in Sydney, Melbourne, Adelaide and Perth (ASCIANO, 2013).

Table 8: Billion net tonne-km carried by Asciano

ASCIANO	COAL	OTHER BULK	INTERMODAL (INCLUDING STEEL)	TOTAL
2007–08	12.7	2.8	25.9	41.4
2008–09	13.9	3.6	22.5	40
2009–10	18.1	3.4	22.2	43.7
2010–11	18.3	4	21.8	44.2
2011–12	20	5.6	23	48.6
2012–13	24.0	6	22.7	52.7
2013–14	29.2	5.1	21.5	55.8
2014–15	30.9	5.1	20.9	56.9

Source: BITRE, 2015c

3.2.2 Fleet profile information

Table 9 indicates the number of fleets, kilometres travelled and number of employees by each main operator.

Table 9: Principal train operators

FREIGHT RAIL OPERATORS	NO OF LOCOMOTIVES	NO OF WAGONS	KILOMETRES OF TRACK	EMPLOYEES
Aurizon	576	13,960	2,670	5,437
Asciano (Pacific National, Patrick)	596	12,880	n/a	8,000
Genesee & Wyoming Australia (GWA)	95	950	5,000	400
SCT Logistics/ Specialised Bulk Rail	36	n/a	n/a	n/a
Qube Holdings	55	n/a	n/a	n/a
Watco	n/a	300	n/a	n/a
Southern Shorthaul Railroad	n/a	n/a	n/a	n/a
Freightliner Australia	34	n/a	n/a	n/a
TasRail	29	n/a	843	n/a
Rio Tinto	191	11,500	1,700	200,000(total including mining)
BHP Billiton	107	248	426	n/a
Fortescue Metals Group	n/a	n/a	260	2,500(total including mining)
NRG Flinders (ancillary operator)	n/a	n/a	n/a	n/a
Independence Rail	114	n/a	n/a	n/a
FreightLink	6	n/a	n/a	n/a

Note: n/a means not available

Table 10: Freight task by hire & reward railways (net tonne-kilometres)

	INTERSTATE			INTRASTATE			TOTAL		
YEAR	BULK	NON-BULK	ALL CARGOES	BULK	NON-BULK	ALL CARGOES	BULK	NON-BULK	ALL CARGOES
2012–13	6.61	24.54	31.15	85.59	7.21	92.81	92.2	31.76	123.96
2011–12	6.61	25.75	32.37	82.11	6.79	88.9	88.72	32.54	121.27
2010–11	6.28	24.36	30.64	79.99	6	85.99	86.27	30.37	116.63
2009–10	5.59	25.7	31.29	83.77	5.46	89.23	89.36	31.16	120.52
2008–09	5.73	26.54	32.27	75.89	6.34	82.23	81.62	32.88	114.49
2007–08	5.84	28.81	34.65	72.95	7.05	80.01	78.79	35.86	114.65
2006–07	8.83	25.78	34.61	71.97	3.45	75.42	80.8	29.22	110.03
2005–06	4.82	26.9	31.72	65.28	9.14	74.41	70.1	36.03	106.13
2004–05	4.64	27.24	31.88	69.5	4.94	74.43	74.13	32.18	106.31
2003–04	4.87	24.75	29.62	66.61	4	70.61	71.48	28.75	100.23
2002–03	5.64	22.1	27.75	64.88	2.1	66.98	70.52	24.2	94.72
2001–02	5.69	18.24	23.92	64.67	2.47	67.13	70.35	20.71	91.06
2000–01	5.14	16.41	21.56	61.65	2.31	63.97	66.8	18.73	85.53
1997–98	4.09	15.23	19.32	48.96	2.49	51.45	53.05	17.72	70.77
1994–95	4.99	11.68	16.67	41.32	2.22	43.55	46.32	13.9	60.22

Source: Pekol Traffic and Transport, 2015

Table 11: **Freight task by ancillary railways, (net tonne-kilometres)**

	INTERSTATE			INTRASTATE			TOTAL		
YEAR	BULK	NON-BULK	ALL CARGOES	BULK	NON-BULK	ALL CARGOES	BULK	NON-BULK	ALL CARGOES
2012–13	4.56	10.02	14.58	415.62	11.57	427.19	420.17	21.59	441.77
2011–12	4.67	10.86	15.53	398.8	11.01	409.8	403.47	21.87	425.34
2010–11	4.43	10.21	14.64	387.74	9.43	397.16	392.16	19.64	411.8
2009–10	4.01	10.85	14.86	403.73	8.52	412.24	407.74	19.37	427.11
2008–09	4.69	11.29	15.99	363.58	8.47	372.04	368.27	19.76	388.03
2007–08	4.97	12	16.97	353.85	10.31	364.16	358.83	22.3	381.13
2006–07	6.92	10.16	17.07	341.99	9.37	351.37	348.91	19.53	368.44
2005–06	4.51	11.83	16.34	321.46	14.8	336.26	325.97	26.63	352.6
2004–05	3.88	10.19	14.07	336.42	8.73	345.15	340.29	18.93	359.22
2003–04	3.13	10.18	13.31	321.67	6.64	328.31	324.8	16.82	341.62
2002–03	4.03	10.03	14.06	310.26	6.49	316.75	314.29	16.52	330.81
2001–02	4.57	8.49	13.06	300	5.93	305.93	304.57	14.42	318.99
2000–01	4.3	8.23	12.53	288.88	6.1	294.98	293.18	14.33	307.51
1997–98	3.27	7.46	10.73	232.27	5	237.27	235.53	12.46	247.99
1994–95	4.01	6.19	10.2	190.7	6.4	197.1	194.71	12.59	207.3

Source: Pekol Traffic and Transport, 2015

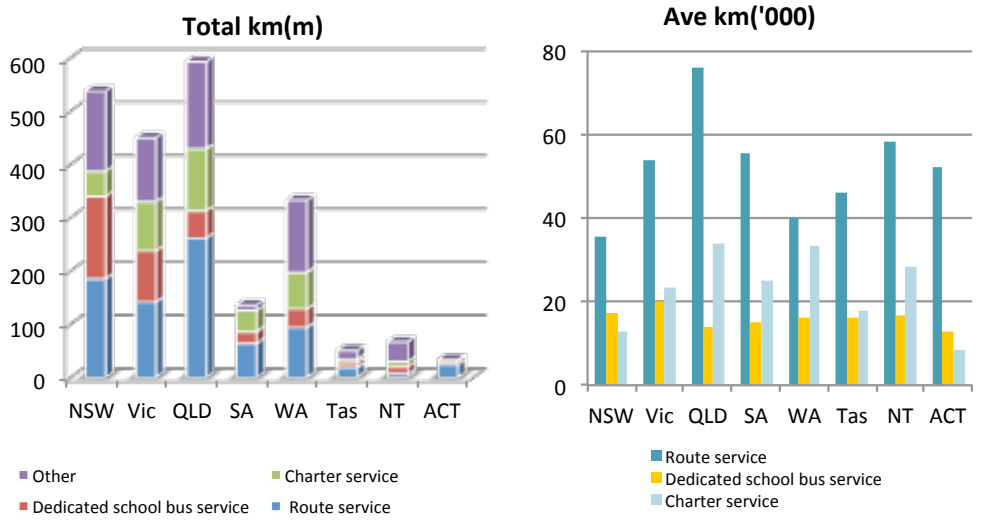
3.3 Road passenger operators

Buses provide an essential link to public transport in Australia. Buses in Australia provide a variety of services, generally in one or more of the following categories:

- route services: following a fixed route and a published timetable, operated by government or private companies
- school services: transporting students to and from school, often under a governmentsubsidised scheme
- long distance services: providing intrastate and interstate travel between major towns and cities
- tourist services: operating one-day and extended tours to popular destinations
- charter services: offering buses for hire to transport like-minded people to a chosen destination
- shuttle services: providing point-to-point transport, such as airport to hotels
- private vehicles: maintained by companies, schools, churches or other organisations to transport their members.

Figure 19 illustrates the total and average kilometres travelled by type of bus service in each state and territory.

Figure 19: Total and average kilometres travelled, by state / territory–by type of bus service



Source: ABS, 2014b

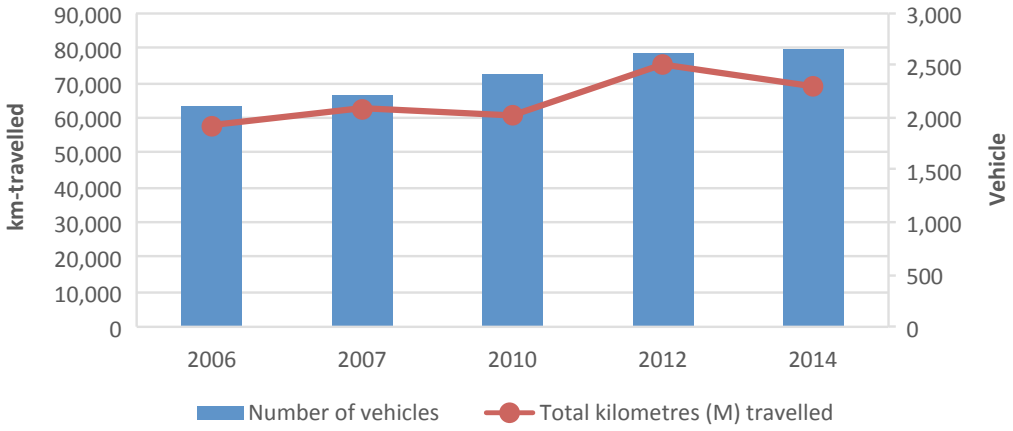
The ABS Census of motor vehicle (2014) identifies 79,686 registered buses in Australia (ABS, 2014b).

Table 12: Number of buses, 2006–14

BUSES	TOTAL KILOMETRES (M) TRAVELLED	NUMBER OF VEHICLES	AVERAGE KILOMETRES (000) TRAVELLED	TOTAL KILOMETRES TRAVELLED OF OVERALL ROAD USE	NUMBER OF VEHICLES
2006	1917	63,177	30.3	0.92%	0.44%
2007	2097	66,330	31.6	0.97%	0.45%
2010	2024	72,509	27.9	0.89%	0.45%
2012	2516	78,371	32.1	1.08%	0.47%
2014	2304	79,686	28.9	0.94%	0.45%

Source: ABS, 2014b

Figure 20: Summary of bus use, 2006–14



Source: ABS, 2014b

Table 13: Bus tasks by configuration

	TOTAL KILOMETRES TRAVELLED – ROUTE SERVICE (MILLION)	AVERAGE KILOMETRES TRAVELLED – ROUTE SERVICE ('000)
Buses with fewer than 20 seats	70	40.4
Buses with 20 or more seats	728	51.7
Total	798	50.5

Source ABS, 2014b

A 2003 Fact Sheet from Professor David Hensher of the University of Sydney Passenger Transport Activity in Australia identified the bus fleet breakdown as 62% small (less than 20 seats), 10% medium (21–40 seats) and 28% large (41 seats and above).

Applying these proportions to the current total of 79,686 we can estimate there are:

- 49,405 small buses
- 7967 medium buses
- 22,312 large buses.

3.3.1 The number of public bus operators in the road passenger transport industry

Bus services are delivered by a combination of government-owned and operated fleets and private bus companies. More than 3000 bus companies are operating across Australia servicing towns and regions, tour and charter services and major cities (OzeBus).

Table 14 lists the providers of public transport buses in each state and territory.

Table 14: Bus operators servicing public transport

STATE	MAIN METROPOLITAN BUS OPERATORS	NO. OF FLEETS	NO. OF METROPOLITAN OPERATORS	NO. OF REGIONAL OPERATORS	NO. OF PRIVATE CHARTERS
ACT	Action	420	10	-	-
NSW	Busways – Sydney	767	9	362	78
	Forest Coach Lines – Terrey Hills	116			
	Hillsbus (CDC Group)	1105			
	Interline Bus Services – Macquarie Fields	94			
	Maianbar Bundeena Bus Service – Bundeena	10			
	Punchbowl Bus Co – Riverwood	75			
	State Transit Authority - Sydney Buses & Newcastle Buses	2163			
	Transdev NSW	451			
	Transit Systems Sydney	220			
NT	BusLink Vivo, Howard Springs	148	6		
	BusLink, Berrimah	165			
QLD	Brisbane transport	1201	13	48	390
	Transdev Queensland	137			
SA	Light-City buses	381	21	n/a	42
	Southlink	381			
	Torrens Transit	342			
TAS	n/a	n/a	n/a	n/a	76
VIC	Ventura Group	862	61	n\a	173
	Transdev Melbourne	515			
	CDC Group	277			
	Dyson Group	402			
WA	Path transit	355	3	119	11
	Swan Transit	530			
	Transdev	330			

Source: Australian Bus Fleet Lists

3.3.2 The number of tourist bus operators

In the coach sector more than 5,000 coaches are in operation nationally, with a rolling stock value of more than $2 billion.(Bus Industry Confederation, 2010)

Australian interstate coach bus operators are listed in Table 15.

Table 15: Australian major coach bus operators

AUSTRALIAN INTERSTATE COACH OPERATORS	FLEET	EMPLOYEES
Australia Wide Coaches	16	n/a
Firefly Express	13	n/a
Greyhound Australia	2,412	n/a
Murrays	2,000	n/a
Premier Motor Service	64	140
Ventura Bus Lines	950	1600
Dyson Group	420	700

Source: WBR; Australian Bus Fleet Lists
Note: n/a means not available

- Australia Wide Coaches is an Australian coach company operating charter services, an express service between Orange and Sydney and services in Central West New South Wales under contract to NSW TrainLink.
- Firefly Express is an Australian interstate coach operator.
- Greyhound Australia is Australia's only long national distance coach operator running services in all mainland states and territories in 65 routes. It is owned by KordaMentha (85%) and the Chapman Group (15%).
- Murrays Coaches is an Australian express and coach charter company.
- The Premier Transport Group is an Australian operator of bus and coach services in New South Wales and Queensland.

Table 16: Total and average kilometres travelled for tour services

	TOTAL KILOMETRES TRAVELLED - TOUR SERVICE(MILLION)	AVERAGE KILOMETRES TRAVELLED - TOUR SERVICE('000)
Buses with fewer than 20 seats	35	33.1
Buses with 20 or more seats	108	46.8
Total	143	42.5

Source: ABS, 2014b

3.3.3 The number of employees

There are more than 50,000 people employed in the Australian bus industry. This includes employees in bus and coach operations, the Australian bus manufacturing sector and parts and service suppliers to the industry (Bus Industry Confederation, 2010).

3.4 Rail passenger

Train operation is undertaken by numerous organisations:

- Heavy rail urban passenger operators are largely integrated organisations, that is, they manage the tracks on which their trains run. Most are publically-owned entities, with the exception of Metro Trains Melbourne, which is a privately owned joint venture that operates trains and manages the network on behalf of the Victorian Government under a franchise agreement.
- Non-urban passenger services are largely government operated with a few exceptions, including Great Southern Rail, which operates the long-distance Ghan, Indian Pacific and Overland trains.
- Heritage passenger railways. Around 40 heritage volunteer-based organisations manage and operate railways, totalling approximately 555 route-kilometres (BITRE, 2015c).

Table 17: Principle rail infrastructure mangers

PRINCIPLE INFRASTRUCTURE MANAGERS OF AUSTRALIA	SERVICE AREA	PRIMARY USAGE
Queensland Rail	Brisbane, Gold Coast	passenger
Airtrain CityLink Limited	Brisbane	passenger
Sydney Trains	Sydney	passenger
NSW TrainLink	Intercity	passenger
MTM (Metro Trains Melbourne)	Melbourne	passenger
Adelaide Metro(Dept of Planning, Transport and Infrastructure)	Adelaide	passenger
Transperth	Perth	passenger

Source: BITRE, 2015c

3.4.1 The number of operators providing public transport

Table 18: Principal passenger train operators in Australia

NON-URBAN PASSENGER RAIL OPERATORS	INFRASTRUCTURE NETWORK USED
Queensland Rail	Queensland Rail
NSW TrainLink (long distance, interstate, intrastate, and inter-urban)	NSW TrainLink, Sydney Trains, ARTC, John Holland, V/Line, Queensland Rail
V/Line	V/Line, ARTC, MTM Melbourne
TransWA	Transperth, Brookfield Rail
Great Southern Railway	Sydney Trains, NSW TrainLink, John Holland, ARTC, Brookfield Rail, GWA

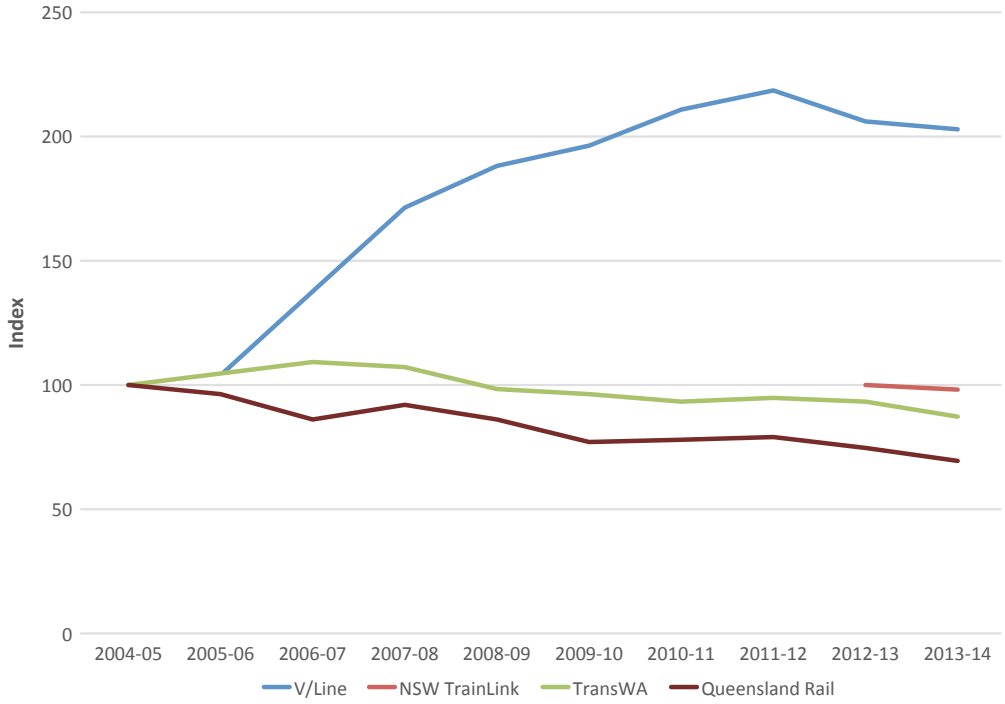
Source: BITRE, 2015c

Table 19: Passenger rail operators

	STATES	NO OF OPERATORS (BOTH PASSENGER AND FREIGHT)	MAIN OPERATORS	PUBLIC / PRIVATE	TRACK KILOMETRES, ROUTE KILOMETRESB	PASSENGER JOURNEYS (MILLION)
Non-urban	QLD	n/a	Queensland Rail		4617b	50.8
	NSW	81*	NSW TrainLink		4693a, 4275b	33.6
	VIC	37*	V/Line		1747a, 1655b	13.1a
	WA	n/a	TransWA		836b	167
	ACT	7*	John Holland Rail		n/a	n/a
	TAS	15*	TasRail		610a, 843b	n/a
	SA	43*	Interstate Rail Network (DIRN)		1990a	n/a
Urban	Heavy rail	SEQ	Queensland Rail	Public	230b	n/a
		Sydney	Sydney Train	Public	1820a, 346b	290a, 276.5b
		Melbourne	MTM	Private	830a, 403b	222.5a
		Adelaide	Adelaide Metro(Dept of Planning, Transport and Infrastructure)	Public	125a, 126b	66.7b
		Perth	Transperth	Public	173b	63b
	Light rail	Gold Coast	GoldLinQ	n/a	24a, 13b	6.18b
		Sydney	Transdev	n/a	12.8b	4a
		Melbourne	Yarra trams	n/a	250b	176.9b
		ACT	Under construction (a light rail service between Gungahlin and Civic)			
		Adelaide	Adelaide Metro(Dept of Planning, Transport and Infrastructure)	n/a	15b	3.4b

Source: a) National Rail safety Regulator, 2014-15, b) BITRE, 2015c, BITRE, 2012a
n/a means not available
*Number of operators in non-urban section accounts for both freight and passenger operators.

Figure 21: Index of non-urban rail patronage, by operator (million passenger movement)



Notes: NSW TrainLink is the sum of CountryLink patronage and former CityRail inter-city lines. There is no New South Wales data presented for the periods prior to 2012–13 due to the formation of TrainLink on 1 July 2013. The 2012–13 data is an estimation the New South Wales Bureau of Transport Statistics calculated as an indexing benchmark immediately prior to TrainLink's formation. Including previous years' data would not be comparing 'like for like'. Queensland Rail data exclude services under the TransLink brand on the Sunshine Coast and Gold Coast lines.
Source: BITRE, 2015c, sourced from VLine 2014, p. 10; BITRE correspondence with NSW TrainLink; Public Transport Authority of Western Australia 2014, p. 54; Queensland Rail 2014, p. 39; historical annual reports.

3.4.2 The number of operators providing tourist passenger

Luxury cruise train operators including The Ghan (Adelaide to Darwin), Indian Pacific (Sydney to Perth), The Overland (Adelaide to Melbourne) and The Southern Spirit (Adelaide to Brisbane) are shown in Table 20.

Table 20: Principal tourist train operators

TYPE	MAJOR TOURIST RAIL OPERATORS	STATE	ANNUAL PASSENGER	FLEET
Luxury cruise train	Great Southern Railway	Interstate The Ghan (Adelaide to Darwin), 2,979 km Indian Pacific (Sydney to Perth), 4,352 km The Overland (Adelaide to Melbourne), 828 km The Southern Spirit (Adelaide to Brisbane), seasonal		
Tourist services, minor railways and tramways	Puffing Billy railway	VIC Melbourne, from Belgrave to Gembrook (25km)		9 locomotives
	Queensland Rail	QLD Kuranda Scenic Railway(75 km) Queensland Rail's steam heritage	350,000 14,000	6 trains
	Australian Society of Section Car Operators, Inc. (ASSCO)	QLD Monto Loop Run between Biggenden and Calliope		
	Australia Sugar Cane Railway	QLD Botanic gardens, Bundaberg		
	SteamRanger Heritage Railway	SA between Victor Harbor and Mount Barker (75km)		10 locomotives
	West Coast Wilderness Railway	TAS between Strahan to Queenstown(35 km)		5 locomotives
	Pemberton Tramway Company	WA Pemberton to Lyall (21km) Pemberton to Northcliffe (36 km)		
	Cooma Monaro Railway tourist line	NSW Cooma and Chakola (19 km)		

Source: Tourism Victoria, 2014-15, Williams, 2016 , BITRE, 2015c, Queensland Rail, 2014-15

3.4.3 Fleet profile information for public transport

Australia's urban rolling stock is shown in Table 21.

Table 21: Urban rail rolling stock

	OPERATORS	NO OF CARS	CARRIAGE / VEHICLE TYPE	MULTIPLE-UNIT FORMAT
Heavy rail	Queensland Rail	633[a], 627[b]	single-deck	211 three-car
	Sydney Trainsa	1622[a], 1618[b]	double-deck	249 four-car, 78 eight-car
	MTM	1308[a], 987[b]	single-deck	436 three-car
	Adelaide Metro (Dept of Planning, Transport and Infrastructure)	130[a], 100[b]	single-deck	30 one-car, 20 two-car, 20 three-car
	Transperth	267[a], 234[b]	single-deck	48 two-car, 57 three-car
Light rail	GoldLinQ	14	Flexity 2	Length 43 m
	Transdev	20	Ubros 3	Length 33 m
	Yarra trams	471	Multiple classes	Range(14.2-33.5)
	Adelaide Metro(Dept of Planning, Transport and Infrastructure)	21	100 Flexity Classic, 200 Citads	Length 30 and 32 m

Source: [a]BITRE, 2015c, [b]BITRE, 2012a

Urban heavy rail rolling stock is generally modern, with the last of the 1970s stock in the process of being phased out. Operators are in the ongoing process of fleet replacement or procuring additional stock. Most of the rolling stock is air-conditioned, with the remaining 24 of Sydney's nonair-conditioned S-Set trains used on low patronage lines and for stand-by services (BITRE, 2015c).

Melbourne's light rail fleet is much larger and more varied than the other cities. Melbourne's older rolling stock, such as the Z and A classes—introduced between 1975–1984 and 1984–1986, respectively, are comparatively short and low capacity (BITRE, 2015c).

Over the past 30 years, there has been a progressive move towards longer, higher capacity vehicles, using vehicle articulation rather than the coupling of vehicles (as had been the practice with Adelaide's now-heritage H-class trams). Melbourne's E class—progressively introduced from 2013—is more than twice the length of the earlier Z and A classes. Similarly, rolling stock introduced in the last decade in other cities are all over 30 metres in length (BITRE, 2015c).

Non-urban passenger rolling stock

There are a wide range of non-urban passenger services in Australia. Thus, rolling stock, designed for individual markets and service types, vary considerably. Luxury cruise train operators including The Ghan (Adelaide to Darwin), Indian Pacific (Sydney to Perth), The Overland (Adelaide to Melbourne) and The Southern Spirit (Adelaide to Brisbane) are shown in Table 20.

Table 22 shows the number of vehicles / cars, by type and operator.

Table 22: Non-urban rail rolling stock

	TRAIN OPERATORS	NO. OF CARS	NO. OF ELECTRIC MULTIPLE UNIT CARS	NO. OF DIESEL MULTIPLE UNIT CARS	NO. OF LOCOMOTIVES	NO. OF CARRIAGES
Non-urban	Queensland Rail	230	150	27	26	27
	NSW TrainLink	589	445	65	19	60
	V/Line	351	-	177	41	133
	TransWA	14	-	14	-	-
	Asciano on Great Southern Railway	n/a	n/a	n/a	n/a	n/a

Source: BITRE, 2015c; n/a means not available; Equals zero or negligible

Locomotive-hauled trains are primarily used for long-distance routes. A number of Queensland Rail's long-distance services are locomotive hauled, although the diesel tilt train has recently replaced the locomotive-hauled Sunlander that travels between Brisbane and Cairns. V/Line's N class locomotives haul long distance trains on both the broad and standard gauges (BITRE, 2015c).

Medium-distance regional / commuter services are generally operated with diesel multiple units (DMUs). High-performance VLocity DMUs capable of travelling at 160 km/h are core components of Victoria's Regional Fast Rail services. TransWA uses DMUs exclusively for its service on the Perth–Bunbury and Perth–Kalgoorlie corridors. NSW TrainLink uses DMUs for the Sydney–Canberra service and intrastate services to Armidale, Broken Hill, Griffith and Moree. On board facilities, such as buffet services are provided depending on the length of the service. All DMUs are airconditioned and generally seat two either side of a central aisle (BITRE, 2015c).

NSW TrainLink and Queensland Rail have large EMU fleets, largely used for intercity / commuter services. New South Wales, uses its fleet is used for Wickham (Newcastle)–Sydney, Sydney–Lithgow and Sydney–Kiama (via Wollongong) services. Much of Queensland Rail's EMUs are used on the Sunshine Coast and Gold Coast lines (BITRE, 2015c).

A unique passenger rolling stock for Australia is Queensland Rail's fleet of tilt train (fixed-formation) sets. Queensland Rail has a fleet of electric tilt trains, used on Rockhampton–Brisbane services, and diesel tilt trains used on the Cairns–Brisbane services (BITRE, 2015c).

4 Networks

Key points

The main interstate road freight networks: (BITRE, 2014a)

- Hume Highway (between Sydney and Melbourne)
- Pacific Highway (Sydney–Brisbane)
- Newell Highway (Melbourne–Brisbane).

In contrast with much of the urban rail systems, the non-urban passenger services are not standalone networks. Typically, the non-urban services share track with urban passenger and freight trains.

Australia's largest inter-city rail commuter corridors: (BITRE, 2014e)

- Sunshine Coast – Brisbane
- Brisbane – Gold Coast
- Newcastle–Sydney (via the Central Coast)
- Sydney–Wollongong
- Melbourne–Geelong
- Perth–Mandurah.

BITRE (2012b) indicated no evidence of significant capacity constraints on the interstate routes.

Major parts of the Australian railway network are dedicated to serving individual bulk commodity flows. These are now considered iron ore, coal, steel, grain, and sugar cane networks.

The rail network caters predominantly for the movement of bulk non-time-sensitive commodities (such as coal and iron ore) and accordingly has a heavy export focus. The road network carries bulk and non-bulk freight and time-sensitive commodities such as fresh food, construction materials and fuel.

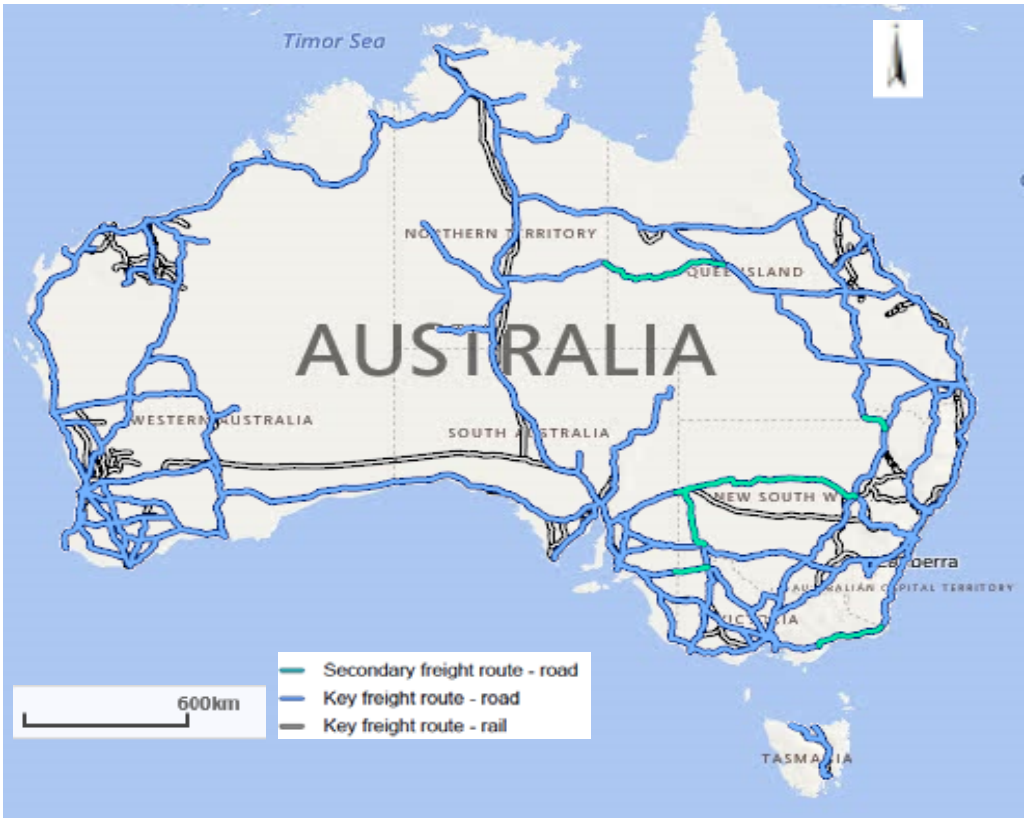
The main interstate road freight networks in Australia include the Hume Highway (connecting Sydney and Melbourne), the Pacific Highway (connecting Sydney and Brisbane) and the Newell Highway (connecting Melbourne and Brisbane).

In contrast to most of the urban rail systems, the non-urban passenger services are not standalone networks. Typically, the non-urban services share track with urban passenger and freight trains.

4.1 Road network

The national key freight route map provides a detailed picture of the road and rail routes connecting Australia's nationally significant places for freight as shown in Figure 22. The map also provides other information on the resource locations, major air and seaports, and intermodal terminals as well as road train assembly areas. It was designed as a policy tool to inform strategic planning, operational and investment decisions across the Australian freight network.

Figure 22: Indicative maps of national land freight network



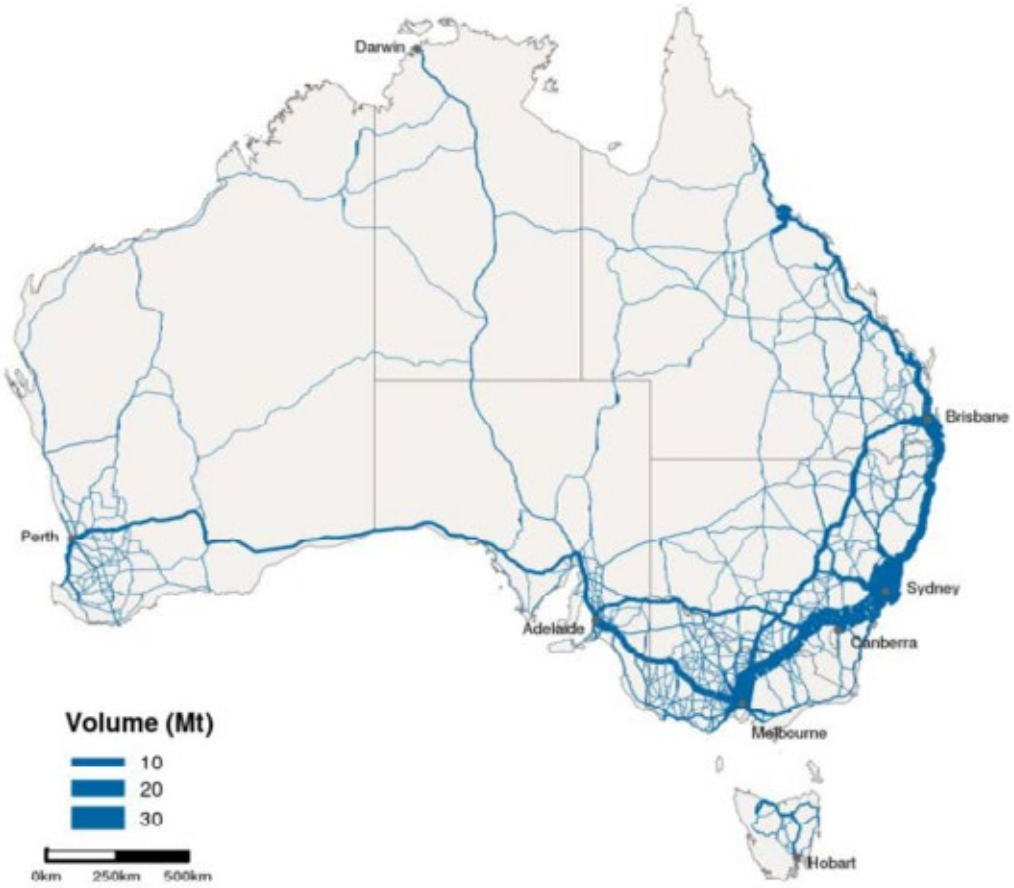
Source: Department of Infrastructure and Regional Development, 2016

Figure 22 illustrates where road freight moves across the road network, showing road freight volumes across the non-urban transport network in 2000–01. Figure 23 highlights the significance of road freight volumes on the National Land Transport Network, and particularly on the: (BITRE, 2014a)

- Hume Highway (between Sydney and Melbourne)
- Pacific Highway (Sydney–Brisbane)
- Newell Highway (Melbourne–Brisbane).

Freight volumes across the National Land Transport Network accounted for approximately 25% of all road freight in 2000-01 (BITRE, 2014a).

Figure 23: Inter-regional road freight task, 2000-01



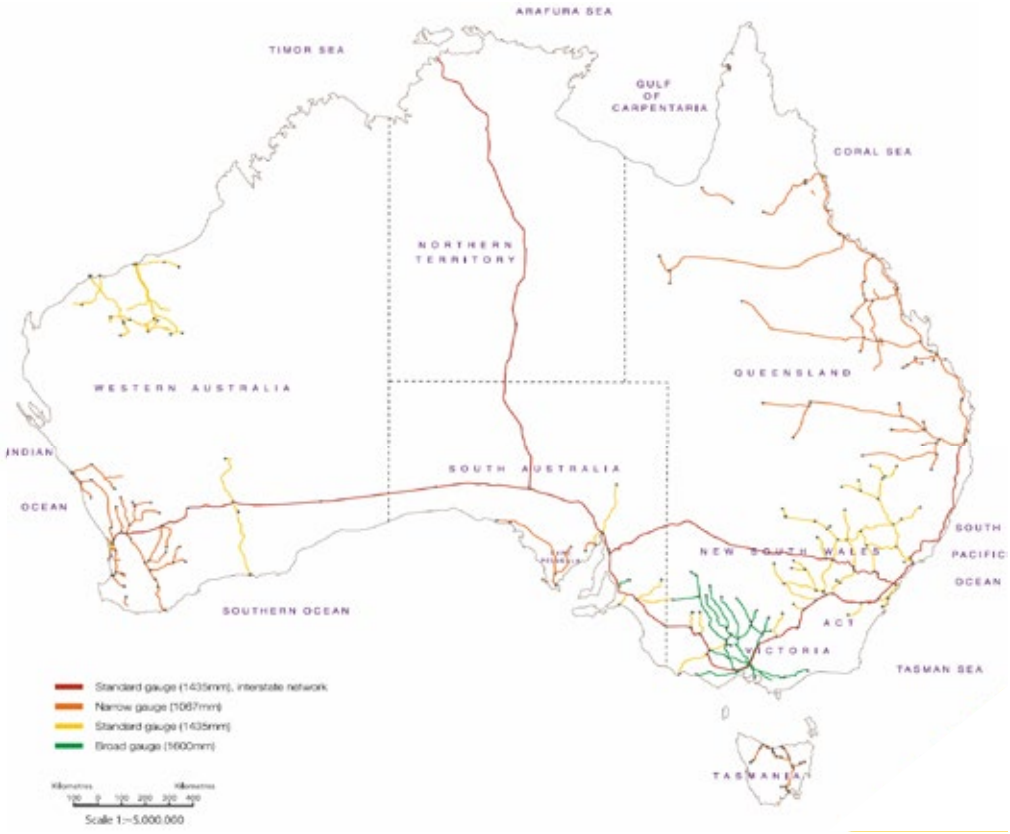
Source: BITRE, 2014a, sourced from ABS(2002) and BITRE estimates

Please note Chapter 5 explores the road freight task in more detail.

4.2 Rail network

The Australian rail network consists of a total of 41,461 kilometres of track on three major gauges, of which approximately 2940 kilometres is electrified. Except for a small number of private railways, most of the Australian railway network infrastructure is government-owned, either at the federal or state level. Figure 24 demonstrates the Australian Rail Network aggregated by gauge type.

Figure 24: Rail network



Broad ('Irish') gauge is 1600mm; standard ('Stephenson') gauge is 1435; narrow ('Cape) gauge is 1067 mm.
Source: National Rail safety Regulator, 2014-15

Queensland, Western Australia and New South Wales have similar-sized networks. Most of the network is single-tracked (approximately 89%) although with some exceptions, such as the Sydney–Melbourne line (of which around three-quarters is now double-track) and the East Turner River corridor through the Chichester Range in East Pilbara (with some BHP Billiton double track and some Fortescue double track) (BITRE, 2015c).

The coverage of the non-urban passenger operations services, by principal operator, is presented in Figure 25.

Figure 25: Non-urban rail network

Source: BITRE, 2015c

4.2.1 Where does freight operate over networks shared with passenger services?

In contrast to much of the urban rail systems, the non-urban passenger services are not standalone networks. Typically, the non-urban services share track with urban passenger and freight trains, although the June 2015 opening of the Regional Rail Link has reduced this in Victoria.

Much of the freight–passenger train segregation in Melbourne, Brisbane, Perth and Adelaide arises because the freight is moving on standard gauge while the urban passenger trains are operating on the local broad or narrow gauge. As a proportion of the total metropolitan route length, Sydney and Brisbane have the most shared passenger–freight track at 42% and 47% of the network, respectively. In contrast, passenger and freight trains on Perth's rail system are separate (excepting a small section of shared track across the Fremantle rail bridge) (BITRE, 2012a).

Table 23 indicates the route-kilometres of shared and dedicated rail network in Australian capital cities.

Table 23: Route-kilometres of shared and dedicated rail network

CITY	PASSENGER-ONLY LINES	FREIGHT-ONLY LINES	SHARED PASSENGER / FREIGHT	TOTAL
Sydney	190	70	156	416
Melbourne	232	59	171	462
Brisbane	90	81	140	311
Adelaide	126	62	30*	188
Perth	173	121	1	295

Source: BITRE, 2015d
* Broad gauge freight services over this track ceased during 2014

4.2.2 Rail passenger network utilisation

An analysis of Census 2011 data by Bernard Salt (2013) found Sunshine Coast – Brisbane, Brisbane – Gold Coast, Newcastle–Sydney (via the Central Coast), Sydney–Wollongong, Melbourne–Geelong and Perth–Mandurah are among Australia's largest inter-city commuter corridors (BITRE, 2014e).

Victoria, in particular, has high levels of service between Melbourne and major regional cities. Frequency increases were one of the key upgrades in Victoria's Regional Fast Rail project. The programme increased weekly services between Melbourne and regional cities by the following levels: Geelong (+13%), Ballarat (+83%), Bendigo (+71%) and Traralgon (+59%) (BITRE, 2014e).

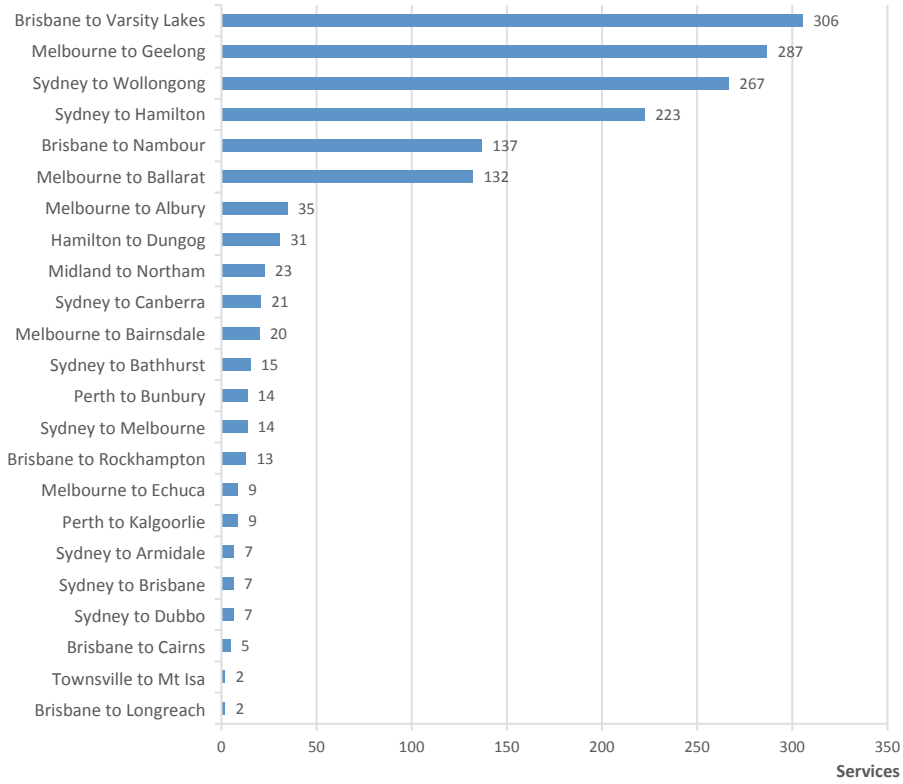
Frequencies are approximately similar except for the following:

- Melbourne–Geelong services have increased from 191 to 287 per week
- Melbourne–Ballarat services have increased from 112 to 132 per week.

The Melbourne–Albury figure has increased from 21 to 30 as this year's figures include the two daily Melbourne–Sydney NSW TrainLink XPT services that passengers can also use for Melbourne–Albury travel and which appeared on the published V/Line Melbourne–Albury timetable (BITRE, 2015c).

Figure 26 shows services per week on selected non-urban routes. Frequencies align with the function of each railway, the distance of the corridor and the size of the populations they serve. Railways that serve inter-city and regional centre – capital city commuter markets generally have the highest service frequency (BITRE, 2015c).

Figure 26: Non-urban passenger rail services per week



Source: BITRE, 2015c, sourced from: BITRE correspondence with NSW TrainLink; NSW TrainLink 2015a; Queensland Rail 2015; Transwa 2015; Yarra. A summary of the capacity measurements for different types of infrastructure sectors across Australia (ACIL Allen Consulting, 2014).

Based on calculation of outbound 'down' services. Does not include return services. As of January 2015 train services to Newcastle terminate at Hamilton as a result of a new transport interchange being constructed. The Sydney–Wollongong figures include truncated services that depart from Waterfall. Services include trains that arrive at but do not terminate at destination, for example, NSW TrainLink services from Melbourne to Albury that continue on to Sydney.

4.2.3 Rail freight utilisation

In terms of rail freight utilisation, it is difficult to compare various routes, because of seasonal variations of commodities, differences in capacity for states. In fact, it is difficult to determine a capacity metric for the rail network at a national level. Since each track and network carries a variety of freight, and tracks are not all the same (single or multiple tracks, double stacked, rail grade and tonne axle load, speed limits etc.) the value of a train path in terms of the weight which can be moved or the value of the freight carried can vary greatly (ACIL Allen Consulting, 2014).

Capacity on a railway can be variable. When a customer approaches a track manager to seek access, a preferred time (or window) of access is stated. There may be times when the track manager already has these times scheduled to other customers. If the customer is unwilling or unable to change the time they require access, there is a capacity constraint even if there is capacity at an alternate time. However, it is in-efficient for a track manager to maintain sufficient spare capacity so that all access requests can be accommodated at the preferred time (ACIL Allen Consulting, 2014).

However, a review of BITRE (2012b) indicated no evidence of significant capacity constraints on the interstate routes.

As discussed earlier, the main rail freight task consists of carrying bulk commodities. Bulk rail traffic is almost entirely intrastate, although there is some cross border rail traffic from southern New South Wales to Melbourne. The biggest bulk haulage task is in the Pilbara region of Western Australia. This represents approximately 70% of Australia's total rail freight task. Other sizeable intrastate bulk flows are in Queensland (approximately 19% of the total rail freight task) and New South Wales (approximately 6% of the total rail freight task), where there are large coal movements. Despite the reported end of the mining boom, bulk freight tonnages increased by approximately 25% from 2012–13 to 2013–14 (BITRE, 2015c).

The growth in commodity exports has been achieved through the expansion of ports, terminals, processing, mines and railways. The railways enable Port Hedland to be the world's largest bulk export port. Newcastle is the world's largest coal export port. The East Turner River valley in the Pilbara has the third-busiest rail corridor in the world—it may become the busiest corridor in coming years. The corridor also carries the world's heaviest rail wagon payloads (BITRE, 2015c).

Rail's non-bulk freight task is often considered minor, but there are strong performing areas. Rail accounts for the majority of inter-capital origin–destination non-bulk freight on the East–West corridor. Of the freight travelling between Brisbane and Melbourne, rail has approximately 30% market share of inter-capital non-bulk freight. On other corridors, rail carries a much smaller share of inter-capital non-bulk freight (BITRE, 2014a). Rail also performs a key role in some regional freight flows, mainly between inland terminals and ports. Griffith (New South Wales) to Melbourne is one example (BITRE, 2015c).

Approximately 53.2% of total freight flows on the North-South corridor are between New South Wales and Victoria. Rail imbalances exist, particularly for movements from New South Wales to Victoria and Queensland, of up to three to five times the relative movements returning to New South Wales from Victoria and Queensland (Deloitte, 2011).

The north-south rail corridor remains uncompetitive due to slow transit times and poor reliability. Consequently, it only accounts for 20% of all goods transported between Melbourne and Brisbane, and only 10% between Melbourne and Sydney, and Sydney and Brisbane. However, 81% of freight is transported by rail on the east-west corridor which is more cost and time competitive than road freight given the long distances and ability to double-stack freight cars between Adelaide and Perth (Ferrier Hodgson, 2014).

The numbers of scheduled weekly intermodal trains that originated and terminated in given city pairs are shown in Table 24. These origins and destinations are those of trains, and not those of goods on the trains. For example, Brisbane–Melbourne trains will often dwell in Sydney where goods are loaded and unloaded. Caution is also needed when comparing train numbers. Train numbers can decline when average train sizes increase (BITRE, 2015c).

Table 24: Number of weekly intermodal rail services, 2015

	BRISBANE	SYDNEY	MELBOURNE	ADELAIDE	PERTH	DARWIN
Brisbane	0	2	16	2	-	-
Sydney	2	0	1	-	8	-
Melbourne	16	0	0	6	20	-
Adelaide	2	-	6	0	0	6
Perth	-	8	20	0	0	-
Darwin	-	-	-	6	-	0

Source: BITRE, 2015c

The number of scheduled intermodal trains has fallen on the North–South corridor since 2006. On the East–West corridor, the number of scheduled intermodal trains between Melbourne and Perth has increased, offset by fewer trains between Melbourne and Adelaide, between Adelaide and Perth, and between Sydney and Perth (BITRE, 2015c).

The decline in Melbourne–Adelaide trains can be attributed to the reduction in land-bridge freight between Adelaide and the Port of Melbourne. These falls have arisen because a higher proportion of ships now call direct, with containers from Adelaide now transhipped at an overseas hub (notably Singapore) to vessels that deliver containers to their respective destination port. Previously, a higher proportion of containers were railed between Melbourne and Adelaide, with the Port of Melbourne as the hub for direct sailings to and from destination ports (BITRE, 2015c).

The North-South transcontinental railway from Darwin to Adelaide is a key intermodal and bulk freight route. The line operates six intermodal services a week from Adelaide to Darwin and carries around 800,000 tonnes of intermodal freight every year. The line also operates 24 bulk trains a week between mining sites and the Port of Darwin, and carries in excess of three million tonnes of bulk freight per annum. Mining developments along the central corridor will continue to drive demand along this route (Infrastructure Australia, 2015).

4.2.4 Commodity-based rail networks

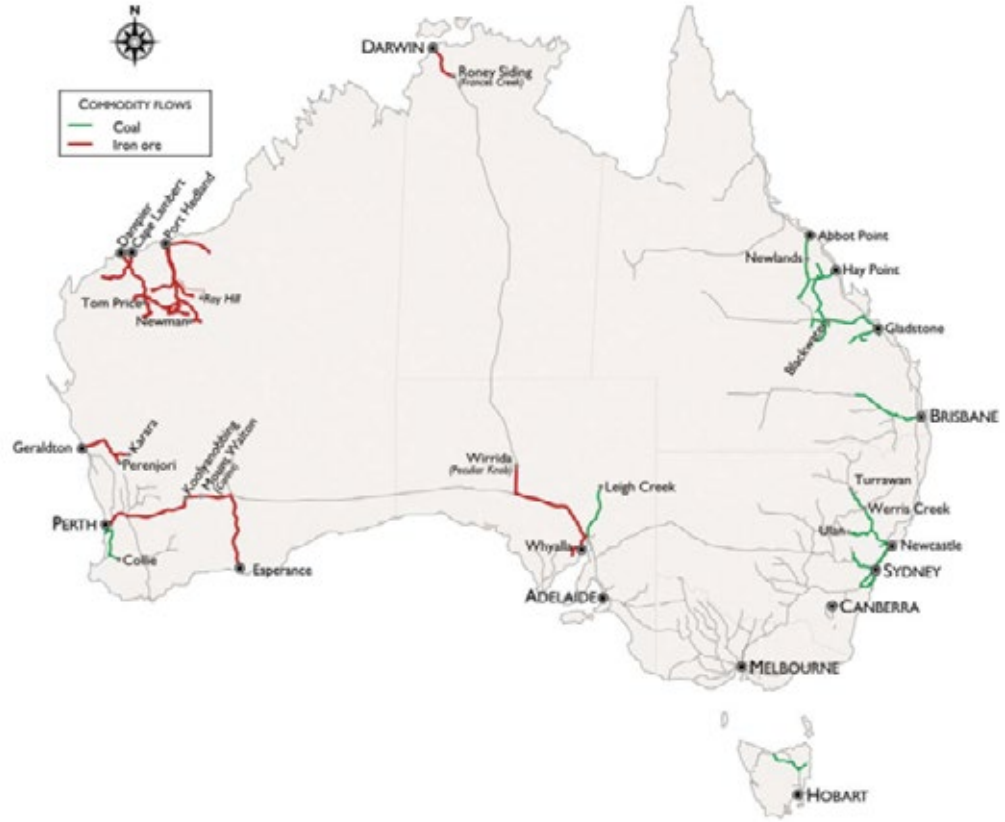
Major parts of the Australian railway network are dedicated to serving individual bulk commodity flows. These are now considered iron ore, coal, steel and grain networks.

Iron ore and coal network

Iron ore is Australia's largest export commodity, accounting for 23.7% of exports by value ($62.7 billion) in 2011–12 and approximately 56% by mass in 2011–12 (around 502 million tonnes). The BITRE estimates the total domestic iron ore freight task measured approximately 198.7 billion tonne-kilometres in 2011–12. Rail accounted for approximately 170.6 billion tonne-kilometres (86%), road 3.6 billion tonne-kilometres (2%) and coastal shipping 24.1 billion tonne-kilometres (12%).

The iron ore and coal networks are illustrated in Figure 27. Australia's iron ore exports are sourced from the Pilbara region with the majority of this supplied by three companies, Rio Tinto, BHP Billiton and Fortescue Metals Group, and transported along the Pilbara Iron Ore Railways. The Pilbara Railways consist of four private, heavy duty lines for the cartage of iron ore from mines in the Pilbara region to the export ports of Port Hedland, Cape Lambert and Dampier (Infrastructure Australia, 2015).

Figure 27: Iron ore and coal rail freight network

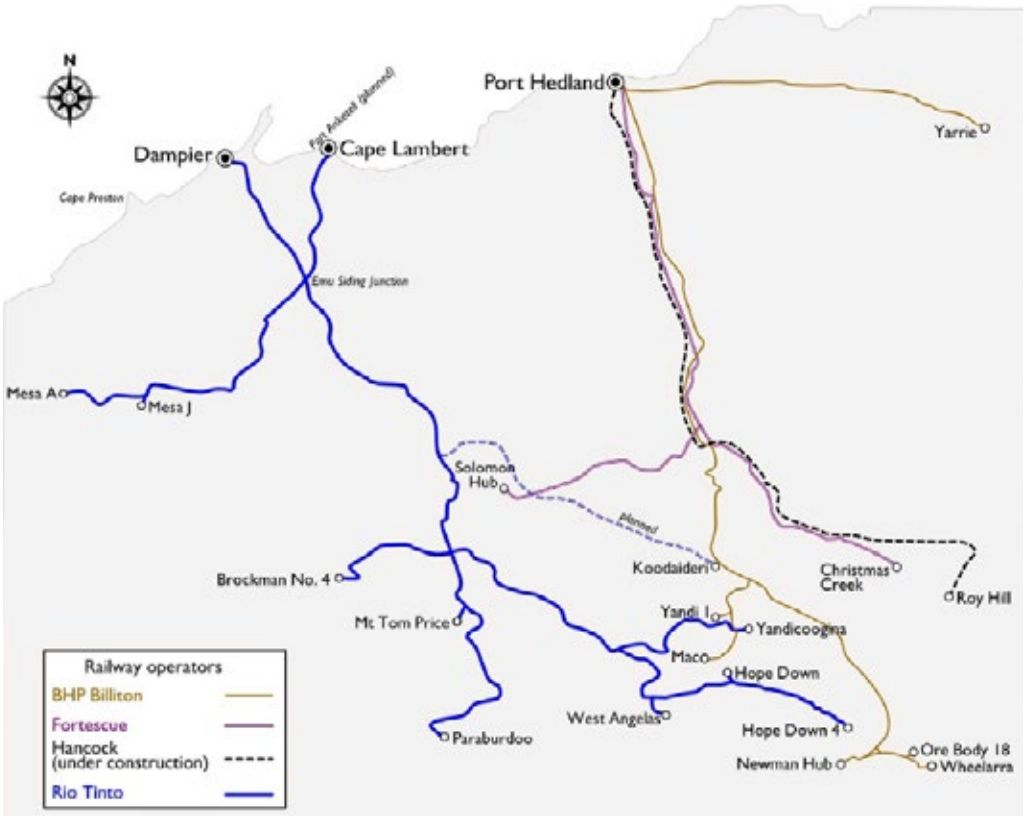


Source: BITRE, 2015c

The iron ore railway networks in the Pilbara region were built by mining companies exclusively to serve the iron ore mines, as was the Karara (Western Australia) spur line and the Middleback railways (near Whyalla) in South Australia. As bespoke developments, these lines were generally built to very high standards in order to accommodate the large traffic flows envisaged. On many of the lines there has been extensive subsequent capacity expansion (signalling, track and train capacity). Non-intermodal Iron Ore from the Yilgarn Region in Western Australia contributes a major proportion of tonnages hauled from the West Kalgoorlie – Koolyanobbing East line segment. Iron ore is railed in two directions. It moves eastward from Koolyanobbing, via Kalgoorlie, to Esperance Port. This flow rose from 1.5 million tonnes per annum in 1995 to over 11 million tonnes in 2012–13. Iron ore is also railed westward from Mount Walton siding (serving Carina Mine) to Kwinana. The rate of iron ore production at Carina Mine reached an annual rate of five million tonnes per annum in 2014 (BITRE, 2015c).

In the north of Western Australia a number of private heavy haulage rail lines transport iron ore to the ports of Port Hedland, Dampier and Port Walcott (Cape Lambert). These rail lines carry the vast majority of the iron ore volumes exported from these three ports. Figure 28 represents iron ore network in Pilbara region.

Figure 28: Rail network of iron ore in Pilbara region



Source: BITRE, 2014b

A considerable number of dedicated coal lines were developed in eastern Australia, generally being grafted onto the existing mixed-traffic network. While those standards are high—and include electrified systems—they are generally of a lower standard than the purpose-built iron ore lines (BITRE, 2015c).

There is extensive rail freight activity across Northern Queensland supported by multiple connected trading ports. Coal is by far the most significant export commodity by volume in Queensland; exports have increased by more than 50% since 2001, accounting for more than 84% of all Queensland exports. Strong, continued demand for coal will continue to drive tonnage on the Central Queensland Coal Network (Infrastructure Australia, 2015).

The rail freight task in Tasmania also mainly belongs to bulk commodities such as cement, coal and mineral ores, although, rail accounts for a small share of the Tasmanian land freight task (18% on a tonne-kilometre basis in 2011–12 compared with more than 50% nationally in 2009–10) (Australian Government, 2014).

Steel network

Steel is moved along the length of the East–West corridor between New South Wales (Newcastle and Port Kembla), South Australia and Western Australia (Port Augusta, Whyalla and Perth). There are also steel movements on the North–South corridor, primarily between Port Kembla and the interstate capitals.

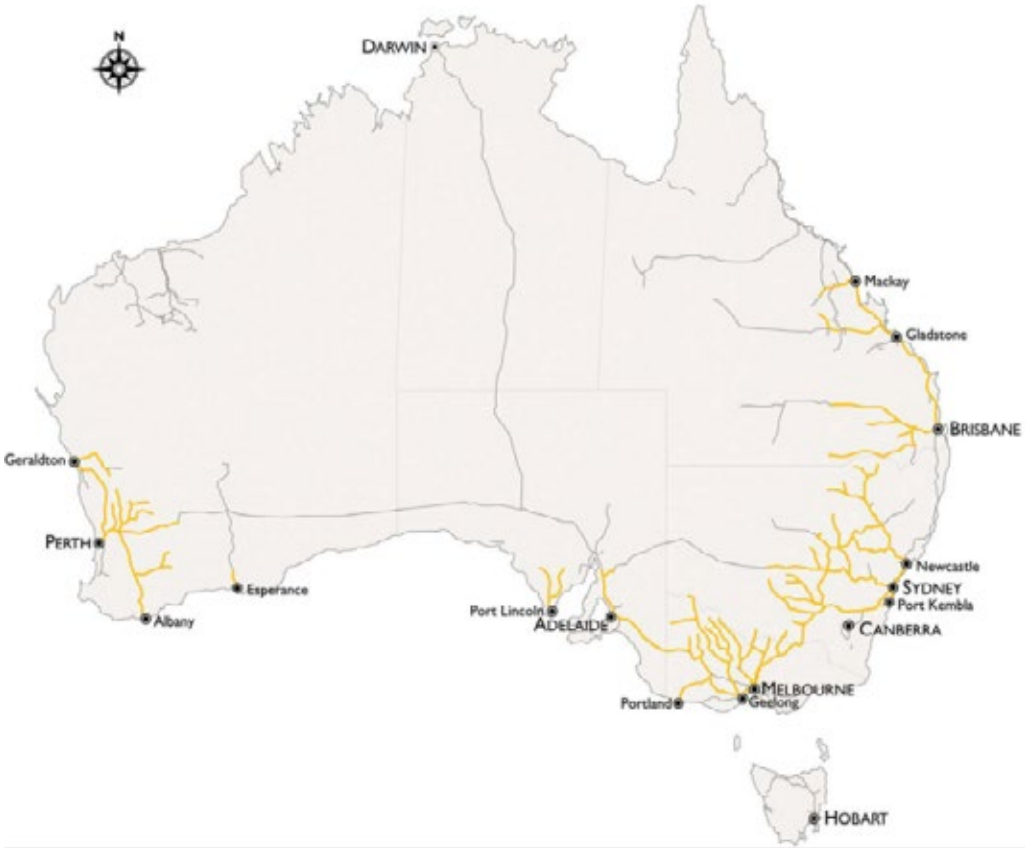
A notable freight operation on Melbourne's urban (broad gauge) network is the steel train between the Melbourne Steel Terminal and Long Island (near Hastings, on the east side of Melbourne) (BITRE, 2012a).

Grain network

The dedicated grain flow network has been shown in Figure 29. The flows include use of a number of branch lines which, with no other commodities being moved, are dedicated to grain haulage. In September 2015, there were approximately 5100 route-kilometres of operational railway track that was largely or exclusively provided for the haulage of grain. This is a reduction of approximately 300 kilometres from the previous year, following the closure of two lines in the South Australian Mallee district in August 2015.

Grain railways usually feed into secondary or main lines as shown in Figure 29. In contrast to iron ore and many coal railways, the grain lines are generally built to lower technical and operational standards and are in poorer physical condition. They generally join the network from a web of branch and secondary lines, connecting agricultural hinterlands to the port. Movements on the interstate network are heaviest close to Perth and in New South Wales. Compared with the variable, seasonal grain traffic, iron ore railways operate exceptionally long and heavy trains that run a number of times a day; consequently, they are maintained to much higher standards than grain lines. By way of illustration, while Fortescue railways have 40 tonne axle-load limits, some grain railway axle load limits may be as low as 15 tonnes (BITRE, 2015c).

Figure 29: Grain rail freight network



Source: (BITRE, 2015c)
The railway network referred to here uses a broad definition that is based around cereals, such as soft and hard grains, but also including other agricultural food products such as pulses (or "legumes") and chickpeas. (or "chick peas") Traditional soft grains include barley, oats, rye and soft white wheat; hard grains include sorghum/millet, durum wheat, hard white wheat and spelt. Pulses include lentils. Also included here are rice and oilseed. The map shows grain flows along the railway lines that are designated as operating in September 2015. Some railways—notably in south-west Western Australia and in central New South Wales—are not shown, having been classified as closed to traffic.

The technical and operational diversity of the grain lines—mostly reflecting the varying importance (levels) of different branch traffic flows—has led to the classification of lines according to their technical standard (and, thus weight-bearing capability or train speed), or to their economic importance or to their viability. The respective categories across the states are outlined here (BITRE, 2015c).

- Most of South Australia's railways have been closed and the remaining four lines have not been classified.
- The 'network capabilities' of railways in Queensland are classified according to the maximum permitted axle loads on a given section of track. Network information packs for access seekers provide details about track standards and permitted axle loads and train speeds. Often the axle-load limits are 15 tonnes. It has been noted that rail cannot be used to haul containerised grain for some flows as the loaded wagons would exceed axle load limits (Transport Housing and Local Government Committee, 2014).
- The New South Wales Government's grain railways are categorised by class of track. Mainline tracks can be at the highest physical condition and technical standard of 'Class 1'. The grain railways are either Class 3 (45% of the route-km) or the lowest standard, Class 5 (55 percent of the route-kilometres). The axle load limits on these two classes of line is 19 tonnes; this compares with 25 tonnes on Class 1 lines and 21 tonnes on Class 2 lines.
- Victoria department of Infrastructure (2007) established a classification of different railways. The classification attached descending priority for track rehabilitation (or upgrading)—from a high-priority Platinum, Gold, Silver, and Bronze—to restore the railway infrastructure to the original track condition classification (which was generally Class 4 or [at a lower standard] Class 5). Note, however, that while these lines are of different operating standards, they are all suitable for 19 tonne axle load grain trains.
- The Victorian Government is also investing in grain and other bulk transport by rail as part of the Murray Basin Rail Project. The project involves standardising the rail line gauges that serve the Murray Basin in north-western Victoria, and increasing axle loads from 19 to 21 tonnes. Gauge standardisation will enable the port at Portland (which only has a standard gauge rail connection, to compete with the dual gauge ports of Melbourne and Geelong.
- Grain railways in Western Australia are classified by their viability and competitiveness. Tier 1 lines are considered to be competitive with road transport at present and are perceived to remain competitive given probable future cost increases. Tier 2 railways are currently cost competitive with road, given prevailing rail access prices and train operating costs. Tier 3 lines are regarded as unviable as rail volumes are low and trains are uncompetitive with road transport. The lines are also typified by low (16-tonne) axle loads, with low-standard track structure.

Sugar cane

- Australia typically accounts for 2% to 3% of total world sugar production in any one year, but is the fourth-largest exporter of cane sugar. The inland sugar cane freight transport task is predominately handled by mill-owned cane rail systems, which accounted for about 85% of cane movements to mills (by mass) in 2011–12, with road transport accounting for the remaining 15%. Queensland accounted for about 94% of Australian sugarcane production in 2011–12, with the remainder grown in northern New South Wales (BITRE, 2015a).
- The movement of raw sugar from mills to refineries or ports, and refined sugar from refineries to ports, involves a mix of road, conveyor, rail and sea transport. Raw and refined sugar destined for export, for example, is transported by a mix of rail (53% by mass – of these the majority is by publicly-owned rail between Burdekin and Townsville with a significant minority by mill-owned railways) and road (47% by mass) to one of the six sugar exporting ports in Queensland. The bulk terminals in Queensland handle only raw sugar for export or to Yarraville, Victoria. Refined sugar is exported in containers through Sydney, Melbourne and Brisbane, and in bulk through the Port of Mackay (BITRE, 2015a).
- Combining cane sugar, raw and refined sugar and sugar by-products, BITRE estimates total sugar and related product freight was approximately 2.25 billion tonnes kilometres in 2011–12—631 million tonne-kilometres by rail, 349 million tonne-kilometres by road and 1272 million tonne-kilometres by coastal shipping—which was equivalent to around 0.4% of total domestic freight movements in that year (BITRE, 2015a).
- In Queensland, harvested sugar cane is transported from farms to nearby sugar mills primarily by narrow gauge rail (610 mm), which are all owned, operated and maintained by the milling companies, with a smaller amount transported directly by truck. Conversely, all sugar cane produced in New South Wales, where there is no dedicated cane rail network, is transported from farms to nearby sugar mills by truck.
- There are approximately 3980 kilometres of sugar railway network track in Queensland across 20 cane train networks, all use 610 mm gauge, except Pioneer Mill, which uses 1067 mm (narrow) gauge (ASMC 2012b; Browning 2007; Pernase & Pekol 2012). Current rolling stock comprises around 250 diesel hydraulic locomotives and about 52,000 cane bins (the common term for cane rail wagons) of between 4 and 15 tonnes capacity, both four-wheel and bogie (BITRE, 2015a).
- The dedicated cane rail system comprises nearly 4000 kilometres of track, which is integral to the cane milling supply chain. The cane rail system is owned and maintained by the sugar mill operators, and the typical transport distance for sugar cane by cane railway is between 13 and 35 kilometres (BITRE, 2015a).

4.3 Bus network

The main public bus networks or the most utilised bus routes have been identified based on the high frequency routes, and have been discussed for each metropolitan area in the relevant state attachment to this report, since they mostly give service at the urban level. However, the existence of automatic fare collection in capital cities facilitates the analysis of route patronage. Table 25 presents the automatic fare collection system in the Australian capital cities. Availability of both touch-on and touch-off data also provides information on origin-destination pattern.

Table 25: Automatic fare collection in Australian cities

	LAUNCH	COMPATIBLE MODES	AVAILABILITY OF BOTH TOUCH UP / OFF DATA
Queensland: go card	January 2008	Translink train, bus and ferry, Airtrain in Brisbane, Gold Coast, and Sunshine Coast	yes
Western Australia: SmartRider	April 2007	Train, bus, ferry and metered parking in Perth, bus services in Albany, Bunbury, Busselton, Geraldton and Goldfields	yes
Victoria: Myki	Dec 2008 (regional buses, suburban trains) 2010 (trams/ buses) 2013 (regional trains)	Train, tram, bus, V/Line commuter train services and bus services in Seymour, Ballarat, Bendgo, Geelong, the Latrobe Valley and Warragul	yes
New South Wales: Opal	2013 (ferries) 2014(other modes)	Train, tram, buses and ferries in Metropolitan Sydney and also Newcastle, Blue Mountains, Illawara, Central Coast, Hunter	yes
South Australia: Metrocard	2012	Train, tram, and buses in Adelaide	no
ACT: MyWay	2011	Bus	yes
Northern Territory: Tap and Ride card	2014	Buses in Darwin, and Alice Spring	no
Tasmania: Greencard	Sep 2009	Buses in Hobart, Launceston, and Burnie	no

The audit by Infrastructure Australia (2015) has identified, through consultation with tourism agencies, a number of roads in the northern Australia that are important as tourism routes or for accessing particular destinations, these are shown in Table 26. Notwithstanding, there is a lack of information on important tourist routes in the other states.

Table 26: Important tourist routes

STATES	RED CENTRE WAY – LARAPINTA DRIVE	REGIONAL TOURISM
NT	Arnhem Highway	Regional tourism
	Litchfield Park Road (Litchfield National Park)	Eco tourism
	Jim Jim Falls Road (Garnamarr campground)	Eco tourism
	Namatjira – Watarrka National Park (Larapinta Drive)	Eco tourism
	Cahills Crossing (East Alligator River)	Eco tourism
	Oenpelli Road (Kakadu National Park)	Eco tourism
QLD	Gladstone-Agnes Water	Eco tourism
	Proserpine-Whitsunday Coast Airport (Bruce Highway)	Eco tourism
	Gregory Development Road to Charles Towers	Regional tourism
	Yorkeys Kb Road and Captain Cook Highway	Resorts – Aquis, Cairns
	Dunne Road	Resorts – Aquis, Cairns
WA	Fairfield-Leopold Road (Gibb River to Great rthern Highway)	Regional tourism
	Broome – Cape Leveque Road to Dampier Peninsula	Coastal tourism
	Karratha to Tom Price (via Millstream-Chichester National Park)	Regional tourism
	Geikie Gorge Road	Regional tourism
	Tanami Road – Hall creek to the rthern Territory border	Regional tourism
	Carranya Road (Wolf Creek Crater Road)	Regional tourism
	Gibb River – Kalumburu Road (Mitchell River National Park)	Regional tourism

Source: Infrastructure Australia, 2015

5 Freight task

Key points

According to BITRE, in 2011–12 the domestic freight task totalled almost 600 billion tonne-kilometres, which is equivalent to about 26,000 tonne-kilometres of freight moved for every Australian. Rail transport accounts for approximately 49% of total domestic freight, with iron ore and coal exports accounting for over 80% of this, road freight about 35% of total freight and coastal sea freight 17%. Air freight comprises less than 0.01% of total freight by weight.

In 2012–13 the Australian domestic freight task totalled 639 billion tonne-kilometres, an increase of 4.6% compared with the previous year. Over the last 10 years, Australia's domestic freight tasks have grown 38.6%, responding to social and economic changes (Pekol Traffic and Transport, 2015).

Rail freight assigns about 49% of total tonne-kilometres of domestic freight task in Australia which is dominated by bulk commodities over long distances. While iron ore and coal accounts for 80% of this share, rail is also often central to moving other bulk commodities, such as grains, sugar, fertilizers and mineral sands, especially to sea ports. Rail and road compete strongly for longdistance non-bulk freight, but as distances increase rail transport's competitiveness increases. Rail plays significant role in transporting grains, rice, cotton and sugar for processing and/or export (BITRE, 2014a).

Bulk rail traffic is almost entirely intrastate, although there is some cross border rail traffic from southern New South Wales to Melbourne. The biggest bulk haulage task is in the Pilbara region of Western Australia. This represents approximately 70% of Australia's total rail freight task. Other sizeable intrastate bulk flows are in Queensland (approximately 19% of the total rail freight task) and New South Wales (approximately 6% of the total rail freight task), where there are large coal movements. Despite the reported end of the mining boom, bulk freight tonnages increased by approximately 25% from 2012–13 to 2013–14 (BITRE, 2015c).

For non-bulk rail freight, around 8% of the total Australian task is carried on three main corridors (QTLC, 2014):

- Eastern states to Perth (the majority of inter-capital non-bulk rail freight)
- Melbourne to Brisbane (30% of the corridor's non-bulk rail freight)
- Brisbane to northern and far north Queensland.

Road freight task in Australia has been estimated 215 billion tonne-kilometres in 2014 which shows 0.9% growth over the previous 12 months (Pekol Traffic and Transport, 2015).

Road freight incorporates light commercial vehicles (LCVs), rigid trucks, articulated trucks and other trucks.

Typical products carried by interstate road freight are the major commodities and products imported to, made in and consumed in Australian cities and towns (QTLC, 2014).

5.1 Road freight task

In 2012–13 the Australian domestic freight task totalled 639 billion tonne-kilometres, an increase of 4.6% compared with the previous year. Over the last 10 years, Australia's domestic freight tasks have grown by 38.6%, responding to social and economic changes (Pekol Traffic and Transport, 2015).

Road Freight task in Australia has been estimated 215 billion tonne-kilometres in 2014 which shows 0.9% growth over the previous 12 months (Pekol Traffic and Transport, 2015).

Road freight incorporates light commercial vehicles (LCVs), rigid trucks, articulated trucks and other trucks. Among the notable facts about road freight in Australia:

- Typical products carried by interstate road freight are the major commodities and products imported to, made in and consumed in Australian cities and towns (QTLC, 2014).
- Road freight in capital cities accounted for over one-fifth of total road freight in Australia during 2011–12, with road freight in other urban areas outside capital cities comprising a further 10%.

- Inter-capital road freight accounts for an approximately 18–19% of total road freight movements.
- The remaining, approximately 50%, comprises freight transported between capital cities and regional areas and other inter and intrastate freight.
- ABS (2014b) shows 34% of freight task(t-km) is carried by articulated vehicles, 39% by rigid trucks and the remaining 26% is transported by light commercial vehicles. However, light commercial vehicles only carry 6% of total tonnes, with rigid and articulated trucks carrying 46% and 48% respectively.
- B-double heavy vehicle combinations are now the most significant road freight vehicle combination, accounting for around 40% of total road freight in 2011–12.
- Road transport dominates the Australian market for non-bulk freight due to its advantages in price, speed, convenience and reliability.

Notwithstanding their contribution to the freight task, however, freight vehicles account for less than 10% of total road use—light vehicles account for approximately 92% of vehicles on the road.

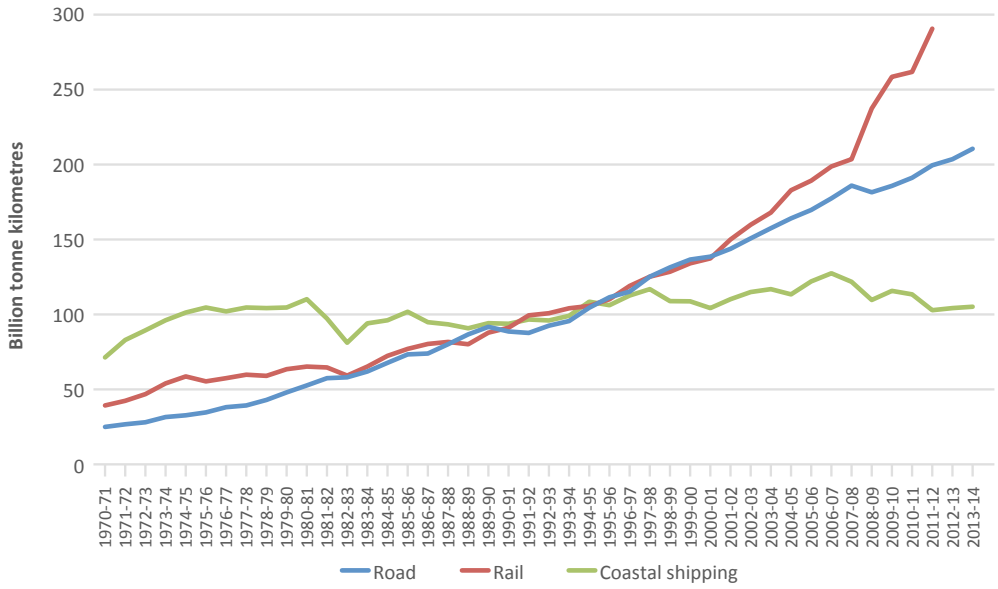
Table 27 shows road freight volume and freight task in each state. Numbers in italic represents the changes over the last year (Pekol Traffic and Transport, 2015).

Table 27: Road freight task

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	AUS
Freight (mt)	749.69	683.8	649.83	215.34	512.77	58.83	35.99	16.31	2922.56
	2.90%	2.20%	4.10%	3.60%	4.20%	2.80%	2.30%	2.40%	3.30%
Freight task (Bt-km)	46.73	44.64	59.1	18.18	36.08	3.5	6.61	0.66	215.49
	1.00%	-1.80%	2.10%	-4.00%	4.30%	-5.30%	11.30%	-3.50%	0.90%

Source: Pekol Traffic and Transport, 2015

Figure 30: Domestic freight task by mode of transport (billion tonne)



Source: BITRE, 2015d

The Australian freight task is diverse, and encompasses the movement of bulk export commodities, such as iron ore, coal, liquefied natural gas (LNG) and grains, the transport of imported motor vehicles, machinery and other manufactured goods, and the transport of finished products for household consumption through distribution centres to retail outlets (BITRE, 2014a).

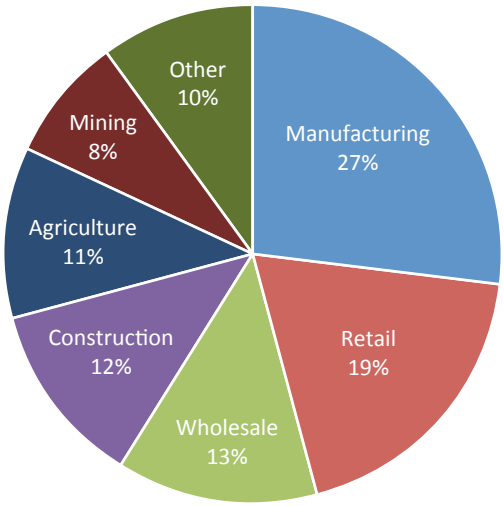
5.1.1 What are they moving?

Due to the variety of goods that are transported, this market can be segmented by four key cargo types each with specific transport service requirements (Deloitte, 2011):

- Import – Export freight (non-bulk) – this freight tends to be containerised (although there are significant volumes of break bulk import export cargoes). Due to the decline in Australia's manufacturing base over recent decades, there is a significant imbalance in trade with non-bulk imports exceeding exports. Much of the import traffic is destined for the local urban areas adjacent to the port of import. As a result, transport requirements tend to be for relatively short haul movements, which historically have favoured road transport.
- Fast moving consumer goods (FMCG) – incorporates everyday items, in which consignment sizes are progressively broken down as the product moves through the supply chain. These products tend to have multiple final distribution points (e.g. supermarkets) and require fast transit times from origin to destination.
- Intermediate goods – are goods which are used as inputs for the production of other products. These products tend to be manufactured (rather than raw materials) and include such items as steel, paper and packaging products, building and construction materials. Due to the point to point nature of the freight task for these segments (i.e. production plant to production plant), intermediate goods can be well suited to transport by rail.
- Bulk freight – this group consists of commodities that are transported unpackaged and in large quantities. Bulk freight can be further split into liquid or dry bulk, each with its own specific service and handling requirements.

With import-export freight, the inland transport is mainly undertaken by trucks handling containers. Whereas, bulk freight are well suited to transport by rail. However, FMCG and intermediate commodities are mostly transported by road.

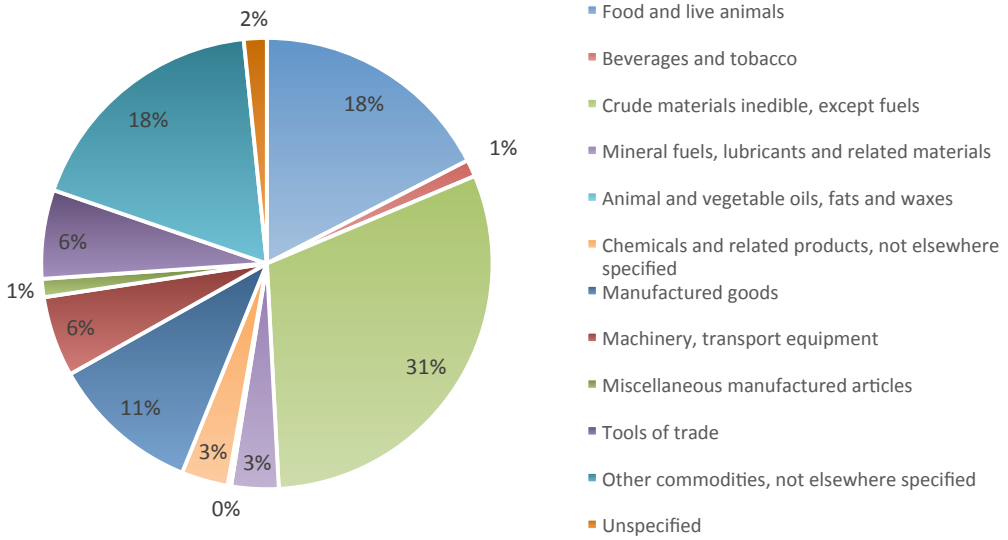
Figure 31: Commodity types carried by road freight



Source: Industry analysts
Source: IBISWorld, 2015

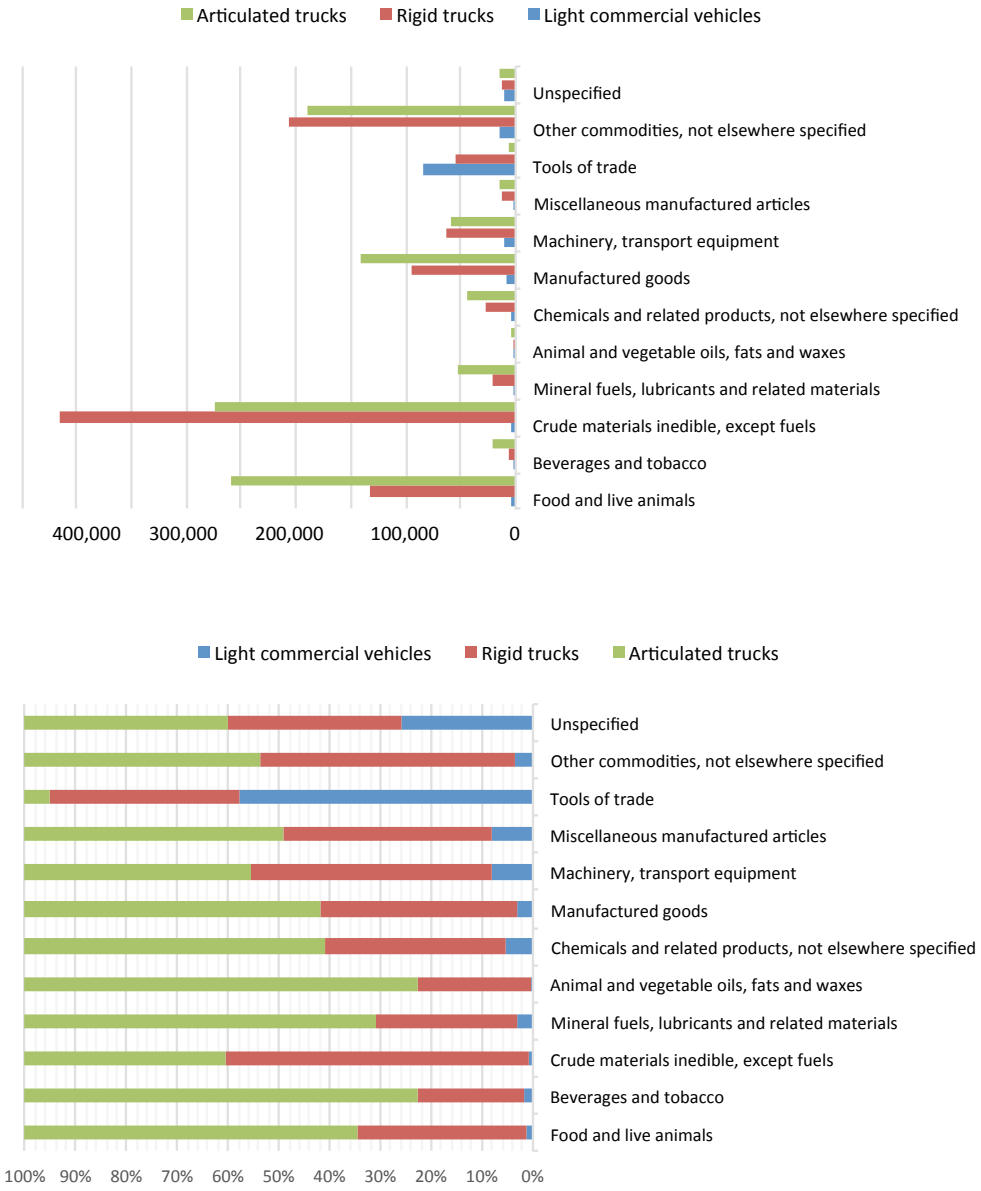
Nationally, crude materials are comparably significant (30%), followed by food and live animals (17%) and manufactured goods (11%). Figure 32 shows the tonnage percentage of each commodity type (ABS, 2014b).

Figure 32: Tonnage carried for each commodity type



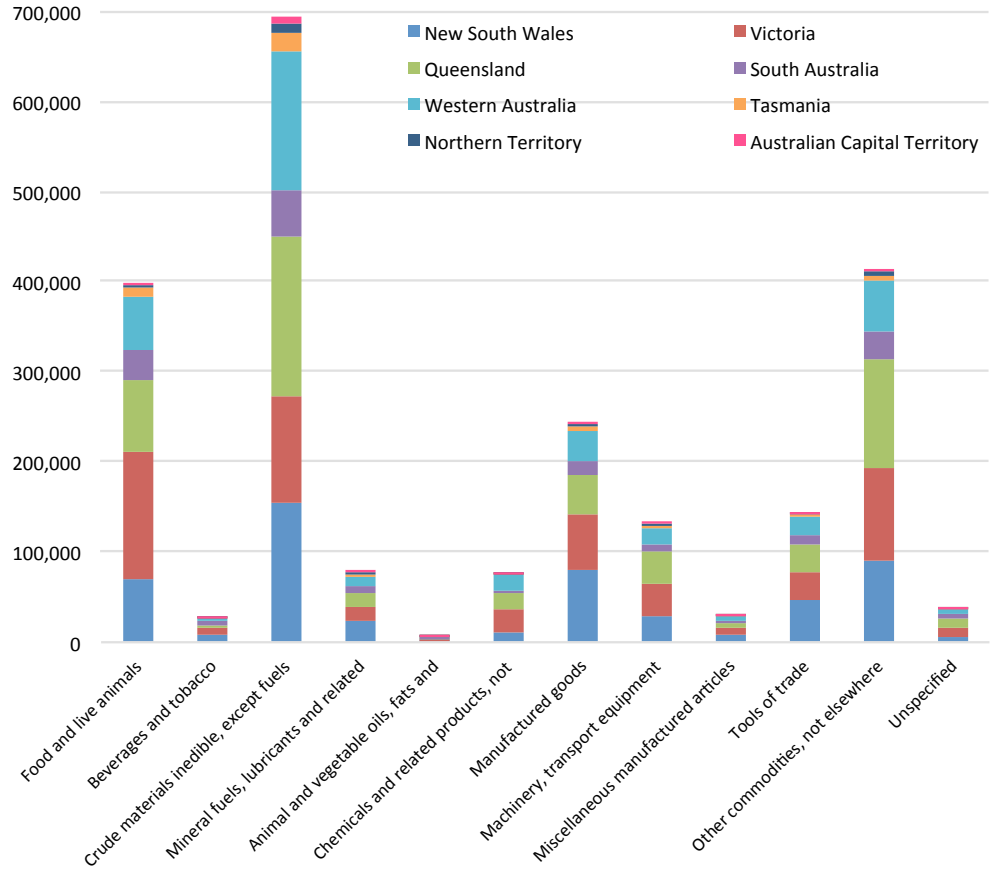
Source: ABS, 2014b

Figure 33: Tonnage carried by type of vehicle for each commodity (thousand tonnes)



Source: ABS, 2014b

Figure 34: Tonnage ('000) carried by state



Source: ABS, 2014b

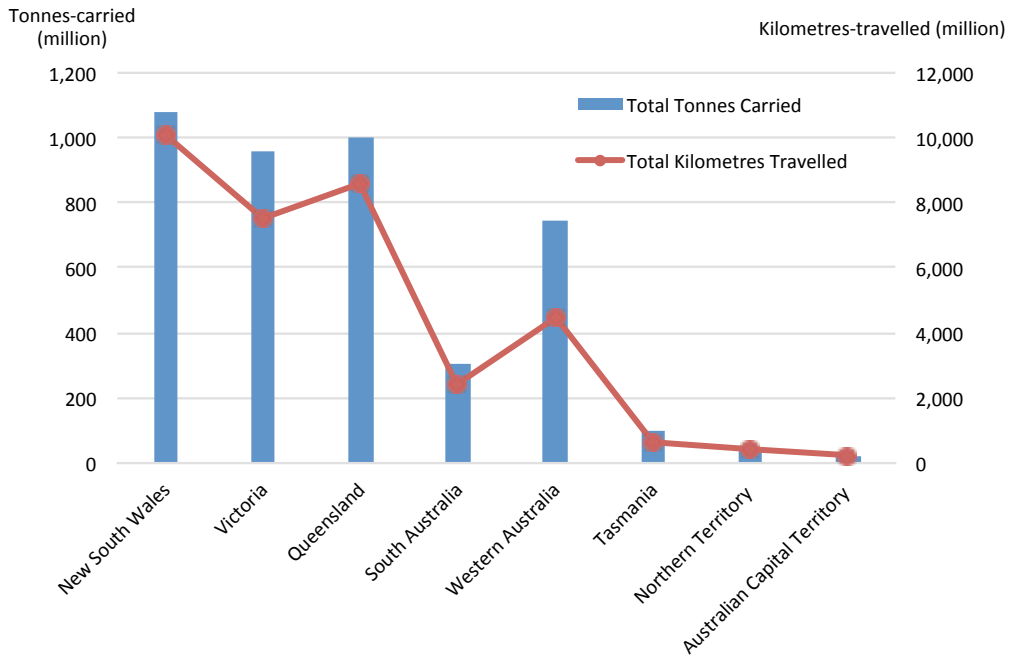
5.1.2 Where are they moving it to and from?

Table 28: Tonnage at each state ('000)

STATES	TOTAL TONNES CARRIED	TOTAL TONNE-KILOMETRES	TOTAL KILOMETRES TRAVELLED
New South Wales	1,076,510.5	101,203,825.0	10,106,306.0
Victoria	956,889.5	77,281,394.7	7,523,354.2
Queensland	1,001,995.6	90,977,619.4	8,591,001.8
South Australia	304,601.3	33,505,140.4	2,439,657.9
Western Australia	747,222.7	71,859,775.9	4,498,986.8
Tasmania	101,098.0	5,987,351.6	617,750.0
Northern Territory	50,518.6	9,115,389.9	410,688.1
Australian Capital Territory	24,571.7	1,306,876.9	239,143.5

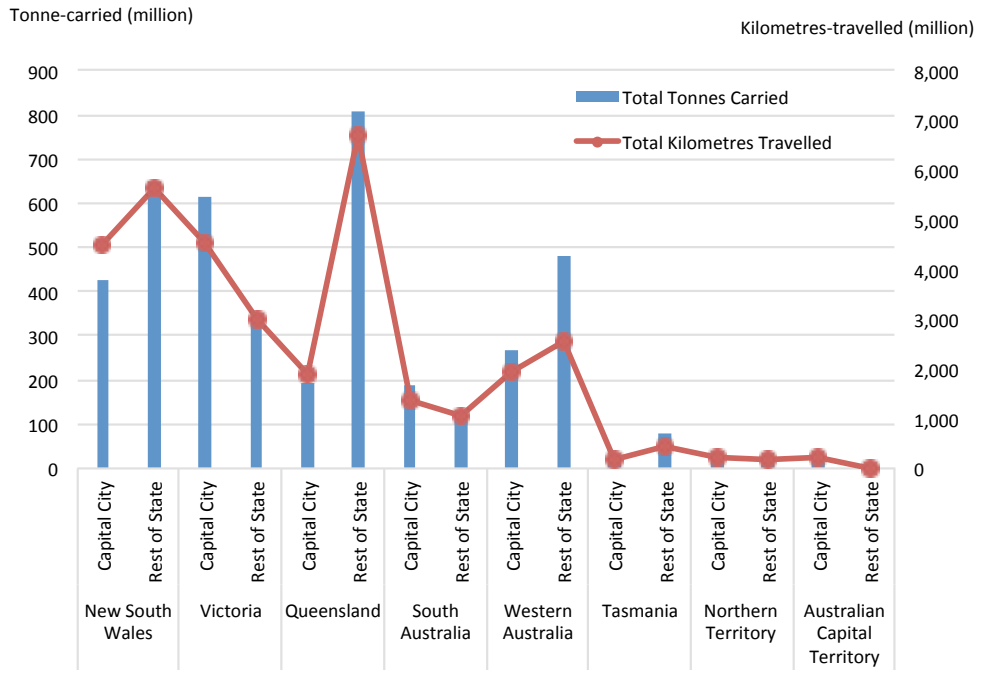
Source: ABS, 2014b

Figure 35: Total tonnes(million) carried, and kilometres(million) travelled by state



Source: ABS, 2014b

Figure 36: Total tonnes (million) carried, and total kilometres travelled (million)

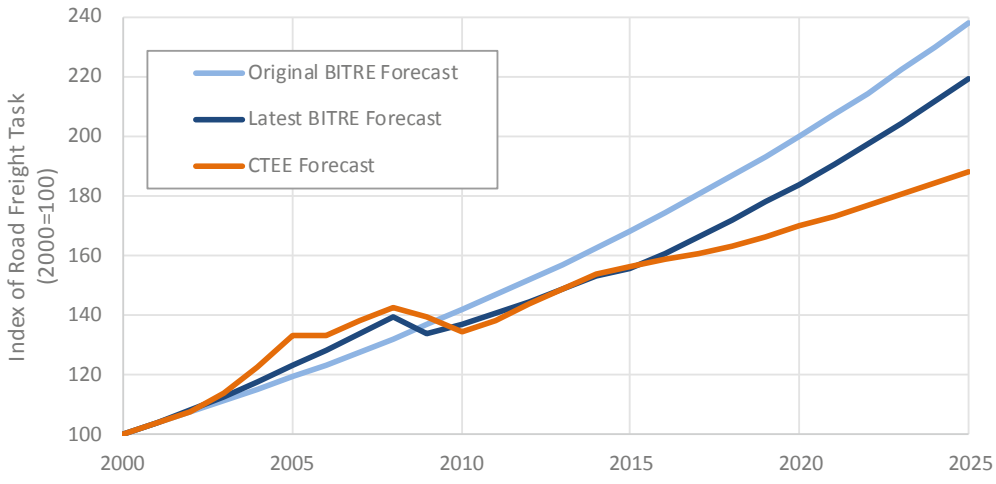


Source: ABS, 2014b

Growth in the road freight task

As shown in Figure 37, the economic slowdown following the global financial crisis caused a oneoff drop in road freight, lowering the base for subsequent growth. Furthermore, the rate of economic growth in Australia has slowed since, which in turn has lowered the expected rate of growth in the national road freight task. As a result, it is likely the BITRE's 2003 prediction of a doubling of road freight by 2020 will be delayed 5 to 8 years.

Figure 37: Relative growth in road freight task



Source: ABS, 2014b, BITRE (2003), BITRE (2016), CTEE (2016)

Factors contributing to continued growth in the domestic freight task include:

- GDP and domestic population growth—the projected increase in total freight volumes is in line with projected growth in GDP, but much faster than forecast population growth over the same period.
- Growth in Asia, which will increase the demand for Australian commodities, for example, projected that demand for iron ore, coal and LPG exports could grow by between 100 and 160%, in mass terms, from 2010 to 2025 (Ferrier Hodgson, 2014).

Major road freight corridors

Considering differences between the North-South and East-West market. We can divide freight tasks into these two corridors. The East-West corridor for intermodal freight consists of the following inter-capital origin- destination pairs:

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

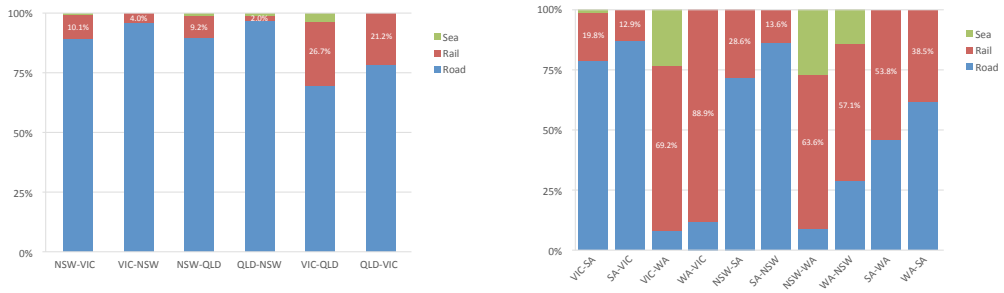
The North-South corridor for intermodal freight consists of the following inter-capital origin-destination pairs:

- Brisbane – Sydney
- Brisbane – Melbourne
- Brisbane – Adelaide
- Sydney – Melbourne
- Sydney – Adelaide.

General road freight is the dominant transport mode in terms of total market share on this corridor at 90.8%. A total of 60 million tonnes of freight was moved on this corridor in 2007. This volume includes both inter-capital freight and cross border freight (which originates and or terminates in parts of the states other than the capital cities). Average growth per annum has been forecast at 3.9% for all modes on the North-South corridor. Approximately 53.2% of total freight flows on the North-South corridor are between New South Wales and Victoria. Rail imbalances exist, particularly for movements from New South Wales to Victoria and Queensland, of up to three to five times relative to movements returning to New South Wales from Victoria and Queensland.

While there is an imbalance in rail freight flows, road freight movements are relatively balanced in either direction which may reflect Freight Forwarders motivation to fully utilise their own road fleets and to utilise rail to cater for overflow in demand (Deloitte, 2011).

Figure 38: Freight task on North-South and East-West corridors



Source: Deloitte, 2011

Figure 39: Comparison of freight task and transport mode share for both corridors

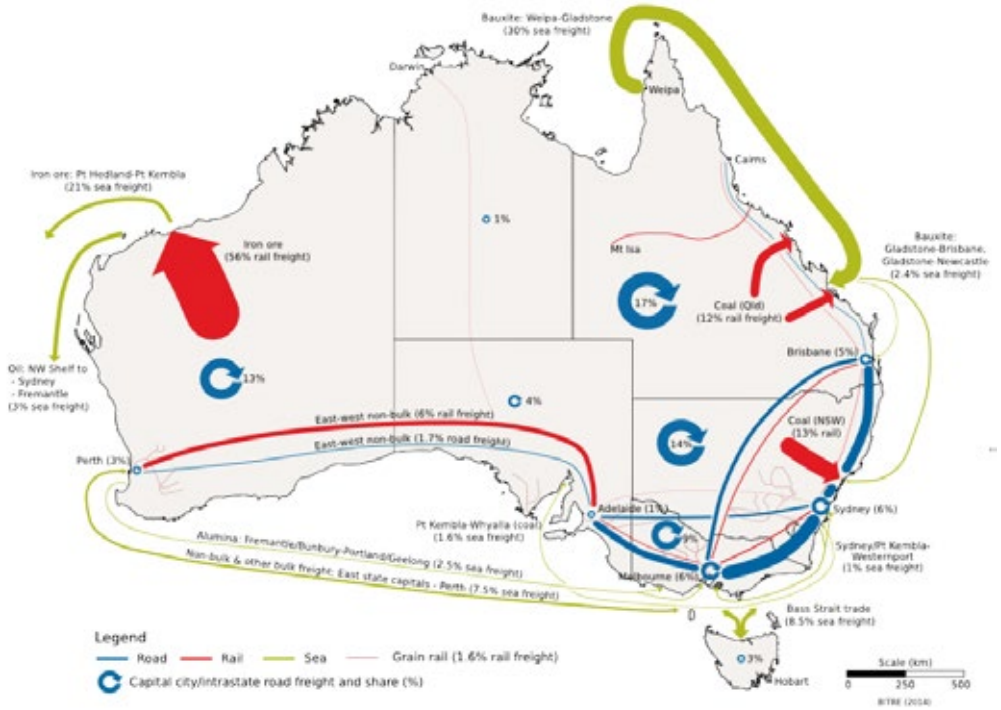
YEAR	ROAD		RAIL		COASTAL SHIPPING	
	NORTH–SOUTH	EAST–WEST	NORTH–SOUTH	EAST–WEST	NORTH–SOUTH	EAST–WEST
			Freight task (billion tkm)			
Estimates						
1972	4.7	0.2	3.5	1.3	1.7	1.8
2007	56.2	5.3	8.0	10.7	1.2	2.3
Forecasts						
2008	61.4	5.7	8.8	11.4	1.5	2.0
2030	139.2	13.0	23.9	22.3	2.8	3.1
			Mode share (per cent)			
Estimates						
1972	47	7	35	40	17	53
2007	86	29	12	59	2	13
Forecasts						
2008	86	30	12	59	2	11
2030	84	34	14	58	2	9

Note: Total may not add to 100 due to rounding
Source: Appendix E (Table E.1 and Table E.2)
Source: BITRE, 2010

5.1.3 Origin-destination pattern

The Australian freight task is diverse, and encompasses the movement of bulk export commodities, such as iron ore, coal, liquefied natural gas (LNG) and grains, the transport of imported motor vehicles, machinery and other manufactured goods, and the transport of finished products for household consumption through distribution centres to retail outlets. Figure 40 provides a stylistic representation of the major elements of Australian freight movements in 2011–12. Several of the more notable aspects of the freight task are described below (BITRE, 2014a).

Figure 40: Major freight flows in Australia, 2011–12

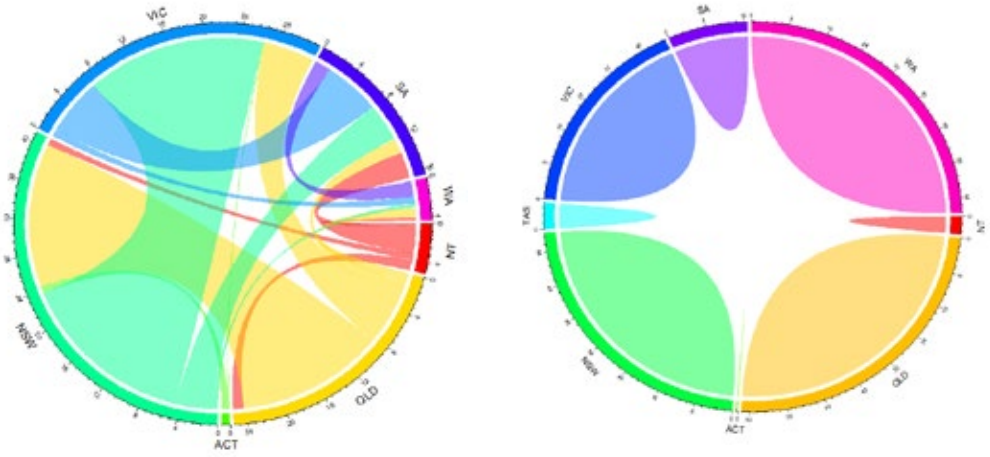


Note: Line widths show relative freight volume (tonnes). Share estimates related to freight tonne kilometres.
Source: ABS (2013), ARA (2013), BITRE (2010b, 2013a, 2013b) and BITRE estimates.

Source: BITRE, 2014a

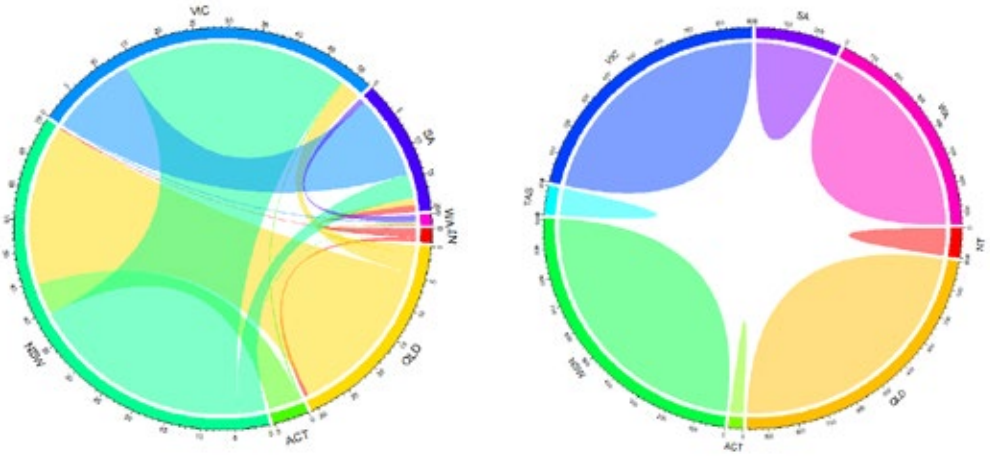
ABS (2014b) also gives freight volume and freight task between states which has been shown in the following figures.

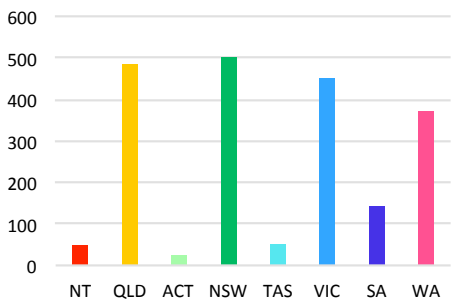
Figure 41: Total tonne-kilometres travelled (billion) and total tonne intrastate flow (million)



Source: ABS, 2014a

Figure 42: Total tonnes carried between states (million) and Total tonne intrastate flow (million)





Source: ABS, 2014a

Figure 43: Containerised (billion t-km)

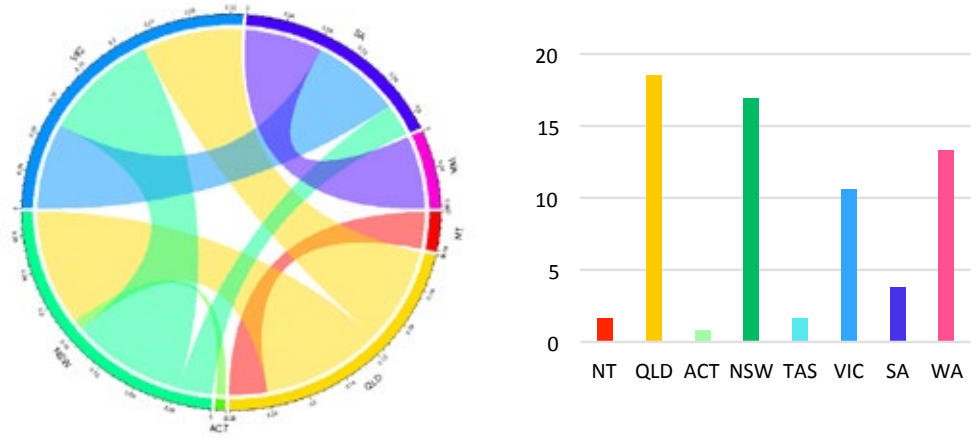


Figure 44: Liquid bulk (bt-km)

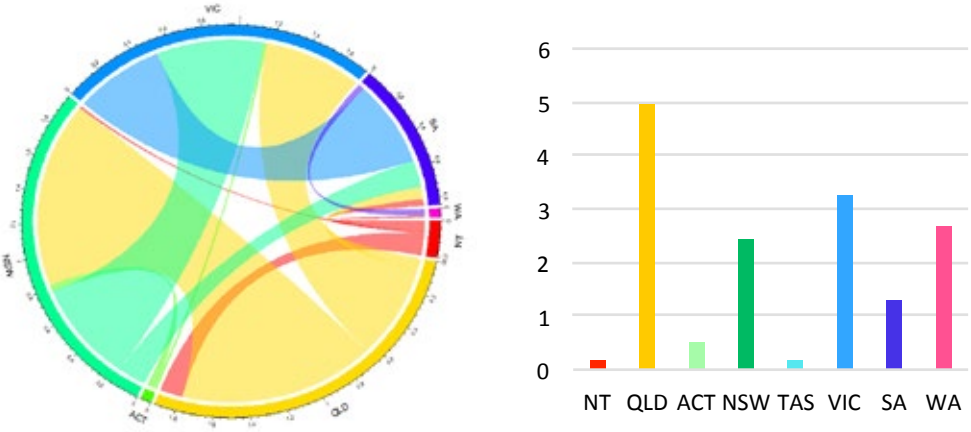


Figure 45: Solid bulk (bt-km)

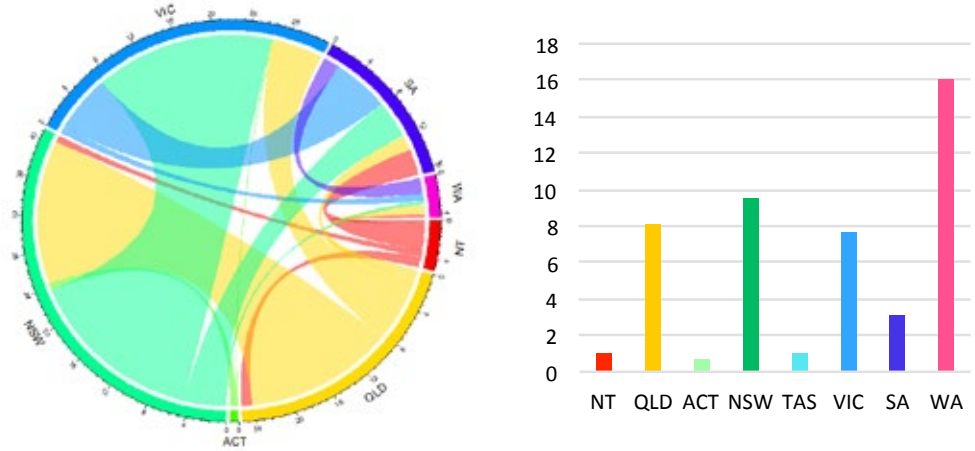


Figure 46: Other freight (bt-km)

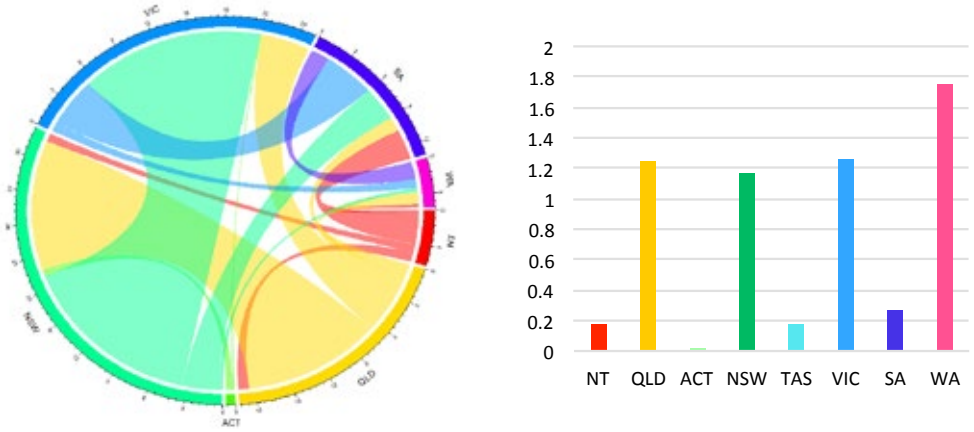


Figure 47: Laden kilometres travelled (million)

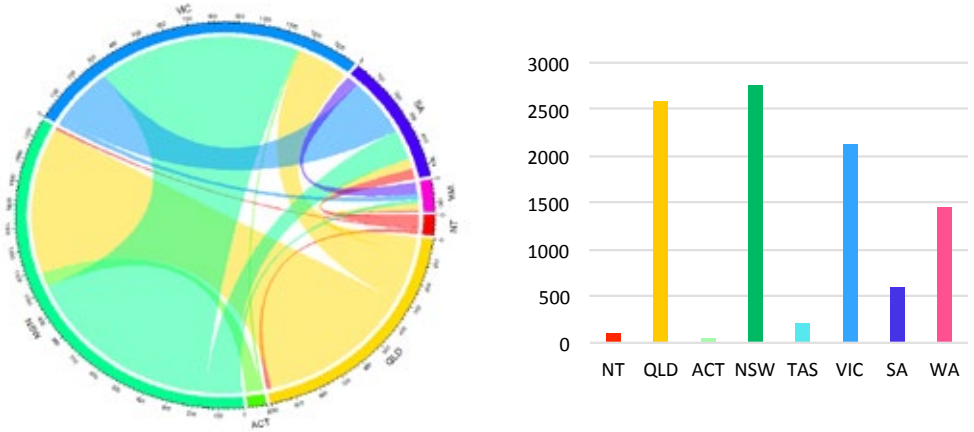
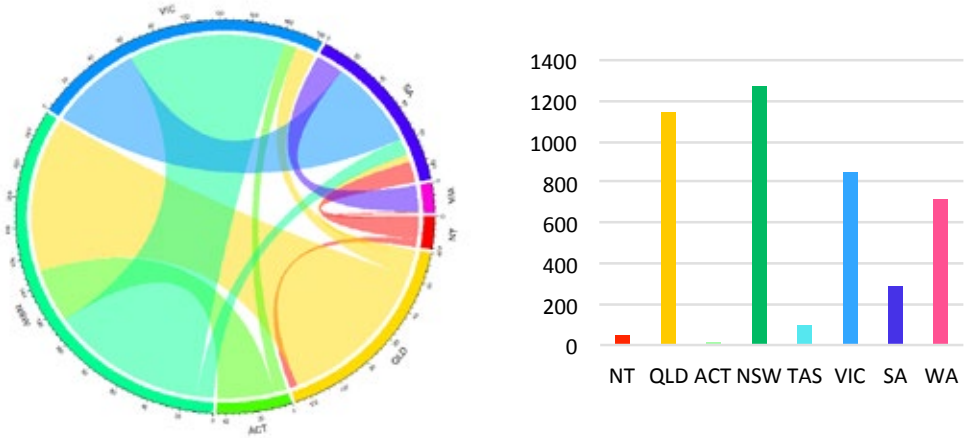


Figure 48: Unladen kilometres travelled (million)



Source: ABS, 2014a

5.2 Rail freight task

Rail freight assigns about 49% of total tonne-kilometres of domestic freight task in Australia which is dominated by bulk commodities over long distances. While iron ore and coal accounts for 80% of this share, rail is also often central to moving other bulk commodities, such as grains, sugar, fertilizers and mineral sands, especially to sea ports. Rail and road compete strongly for longdistance non-bulk freight, but as distances increase rail transport's competitiveness increases. Rail plays significant role in transporting grains, rice, cotton and sugar for processing and/or export (BITRE, 2014a).

For non-bulk rail freight, around 8% of the total Australian task is carried on three main corridors: (QTLC, 2014):

- Eastern states to Perth (the majority of inter-capital non-bulk rail freight)
- Melbourne to Brisbane (30% of the corridor's non-bulk rail freight)
- Brisbane to northern and far north Queensland.

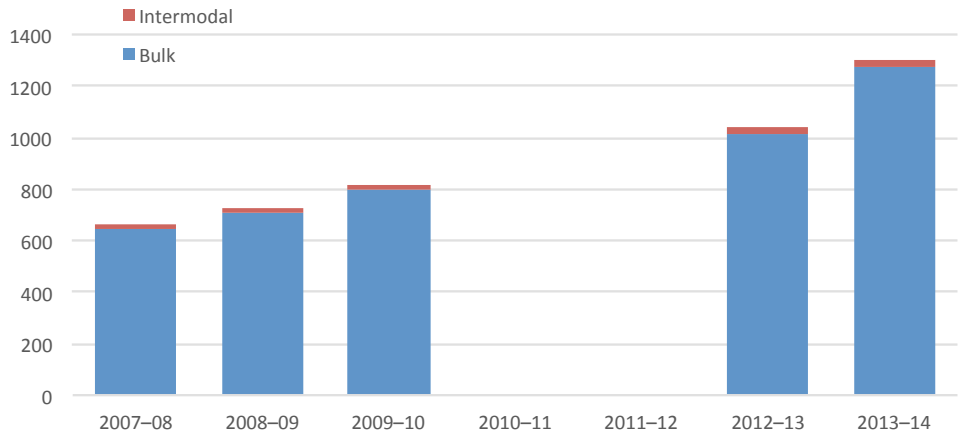
Rail freight dominates the east-west corridor (Melbourne-Adelaide-Perth) but due to infrastructure constraints, it is generally considered uncompetitive against road freight on the north-south corridor (Melbourne-Sydney-Brisbane) (Ferrier Hodgson, 2014).

ARTC's rail network provides critical corridor links between capital cities in South Australia, Victoria, Western Australia, New South Wales and Queensland. The bulk of ARTC's revenue on the interstate rail network comes from the intermodal freight market, where rail actively competes with two other transport modes – coastal shipping and particularly road freight. In 2007–08, rail's mode share of 29% equated to a total of 12.8 million tonnes of freight across these corridors. This was split between intermodal freight at 61% and bulk freight at 39% (Deloitte, 2011).

However, on the North–South corridor, intermodal traffic by tonnage has declined on every segment over three financial year periods (2011–14), while East–West intermodal tonnages have fluctuated across the segments. Some have experienced growth, some have declined and some have remained relatively steady. According to ARTC, intermodal market conditions have been soft on all corridors due to the slowing economy, the continuing decline in Australian manufacturing, and a trend toward importing direct into major ports rather than distribution from a single national distribution centre (BITRE, 2015c).

The estimated total national rail freight task is presented using data provided by above-rail train operators (data for 2010-11 and 2011-12 is not available) (Figure 49). The freight task is measured in tonnes. The figures presented are conventional net tonnes, excluding the tare (non-payload) weight of the vehicle.

Figure 49: Rail freight task (million-tonne)



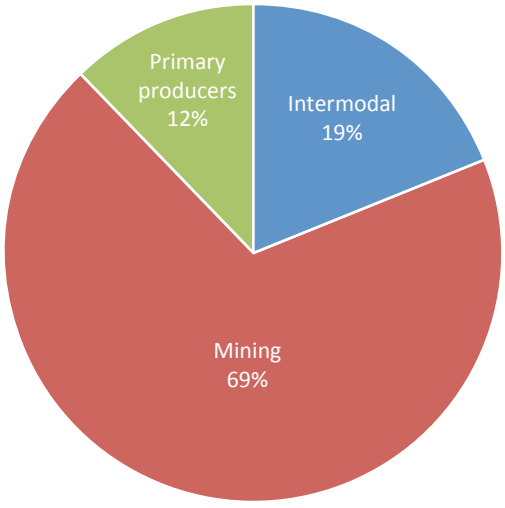
Source: BITRE, 2015c

The last Freight Movement Survey in rail, sea and air was published in 2001. This publication presents results from the 2000 Freight Movements Survey (FMS 2000) and provides estimates of freight moved by road, rail, sea and air for the period 1 April 2000 to 31 March 2001. Movements were classified by origin, destination, commodity and method (solid bulk, other bulk (liquid / gas), containerised or other) and whether the goods were dangerous and/or refrigerated. Both private operators and public authorities provided data in a census which is conducted among all rail, sea and air movements within Australia and its states and territories. International freight moving into or out of Australia or in transit and also freight moved by defence forces was excluded (ABS, 2001).

5.2.1 What are they moving?

Bulky product items such as iron ore and coal primarily travel by rail to bulk export ports, and this is the key sector serviced by the rail industry. Intermodal freight accounts for approximately a fifth of all rail transport in Australia (Ferrier Hodgson, 2014).

Figure 50: Rail demand segment

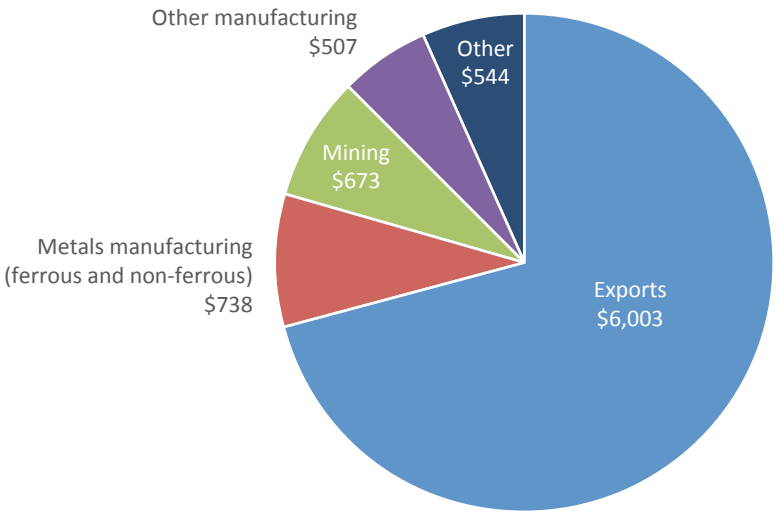


Source: Industry analysts
Source: Ferrier Hodgson, 2014

Commodity share of rail transport:

- Iron ore and coal together account for over 80% (in tonne-kilometre terms) of all rail freight (BITRE, 2014a). The largest flows are in the Pilbara region of Western Australia, which accounts for over 94% of Australia's iron ore exports (BITRE, 2014b). The majority of Australia's iron ore is exported by rail. Iron ore export was 280.2 million tonnes in 2012–13 (BITRE, 2015c). Coal haulage also is done by rail most of which is extracted in Queensland and New South Wales. Annual net tonnage was 384 million in 2014–15 from these two states (BITRE, 2015c).
- Grains, sugar, fertilisers and other bulk products account for a further 8% of all rail freight. Grain harvests are cereal grains, however the broader logistics task includes pulses, chickpeas and oilseed. Illustrative volumes involved are 20 million tonnes of wheat (of which around 15 million are exported); 7.5 million tonnes of barley (with almost 5 million tonnes exported); 2 million tonnes of oilseeds (with around 1 million tonnes exported); and smaller volumes of sorghum, other pulses, oats, triticale and corn (BITRE, 2015).
- Non-bulk rail freight, which comprises around 8% of total rail freight.

Figure 51: Use of rail by industry



Note: The estimates above include expenditure on below and above-the-rail services, but excludes expenditure on passenger services
Source: Australia Bureau of Statistics (ABD) Catalogue number 5209.0.55.001 Australian National Accounts: Input-Output Tables - 2009-10 Released at 11.30am (Canberra time) 20 September 2013.
Source: ACIL Allen Consulting, 2014

5.2.2 Where are they moving it to and from?

The largest rail freight flows in Australia are bulk freight. The total rail freight task was approximately 1.29 billion net tonnes in 2013–14, of which approximately 1.27 billion tonnes (approximately 98%) was bulk freight and 22 million tonnes was intermodal freight[1] (BITRE, 2015c).

Combined bulk and intermodal rail freight transport has grown since 2007–08. Most of this growth has been in bulk commodity transport, which itself has been driven by the mining resources sector. Previous intermodal tonnages indicate it recovered from the Global Financial Crisis. The decline in intermodal traffic from 2007–08 to 2009–10 coincided with the economic slowdown (BITRE, 2012b). By 2012–13, the intermodal task had increased approximately 67% from 2009–10. While tonnages reduced approximately 21% in 2013–14 on the previous year, they were still approximately 32.5% higher than 2009–10 (BITRE, 2015c).

Table 29: Billion net tonne-km carried by Aurizon and Asciano (two major operators)

YEAR	AURIZON				ASCIANO			SUM
	Coal	Iron ore	Bulk	Non-bulk —plus residual bulk from 2011–12	Coal	Other Bulk	Intermodal (including steel)	
2007–08	42.8	-	13.6	4.8	12.7	2.8	25.9	102.6
2008–09	43.5	-	14.3	4.2	13.9	3.6	22.5	102
2009–10	45.3	-	15.2	3.7	18.1	3.4	22.2	107.9
2010–11	40.9	-	-	18.9	18.3	4	21.8	104
2011–12	41.9	6.7	-	14.3	20	5.6	23	111.5
2012–13	43.6	10.3	-	13.2	24.0	6	22.7	119.8
2013–14	49.2	12.2	-	12.5	29.2	5.1	21.5	129.7
2014–15	49.1	10.4		12.9	30.9	5.1	20.9	129.3

Source: BITRE, 2015c

1 It is important to note tonnage data is not distance-weighted. The intermodal task would be a higher proportion of the total freight task if net tonne-kilometres were measured. This is because the largest intermodal flows travel comparatively long distances; reflecting the market in which intermodal rail is most competitive against road transport.

Table 30: Summary of rail freight task

TASK	YEAR	HIRE & REWARD HEAVY RAIL	ANCILLARY	TOTAL
Tonnes carried (million)	2012–13	441.77	575.58	1,017.34
	2011–12	425.34	513.74	939.08
	2010–11	411.8	480.74	892.54
	2009–10	427.11	460.94	888.05
	2008–09	388.03	414.24	802.27
	2007–08	381.13	366.42	747.55
	2006–07	368.44	329.54	697.99
	2005–06	352.6	316.71	669.32
	2004–05	359.22	303.68	662.9
	2003–04	341.62	276.57	618.19
	2002–03	330.81	270.22	601.03
	2001–02	318.99	186.51	505.5
	2000–01	307.51	189.43	496.94
	1997–98	247.99	244.2	492.2
	1994–95	207.3	213.97	421.27
Net Tonne-km (billion)	2012–13	123.96	161.86	285.82
	2011–12	121.27	157.56	278.83
	2010–11	116.63	147.77	264.4
	2009–10	120.52	139.16	259.68
	2008–09	114.49	124.4	238.89
	2007–08	114.65	108.6	223.25
	2006–07	110.03	91.88	201.9
	2005–06	106.13	85.54	191.67
	2004–05	106.31	79.33	185.64
	2003–04	100.23	70.06	170.3
	2002–03	94.72	67.21	161.94
	2001–02	91.06	59.27	150.33
	2000–01	85.53	53.99	139.52
	1997–98	70.77	53.47	124.24
	1994–95	60.22	45.46	105.6

Source: Pekol Traffic and Transport, 2015

Table 31 presents the principal intermodal freight flow task within each state/territory, defined in millions of tonnes. Around 19% of the intermodal freight task is for origin–destination pairs entirely within a jurisdiction, that is, intrastate. Queensland has the largest intrastate intermodal task, reflecting the long intermodal task linking the cities between Brisbane and Cairns.

By contrast with intermodal freight, bulk haulage is almost entirely intrastate (96.2%). As is illustrated in Table 31, the biggest bulk haulage task (defined in tonnes) is in WA, dominated by rail's iron ore task in the Pilbara region. The other sizable intrastate bulk flows are recorded in Queensland and New South Wales, reflecting the coal haulage in those states (BITRE, 2007-08b).

5.2.3 Origin-destination

A matrix of the bulk freight task by state of origin and destination is presented in Table 31.

Table 31: Bulk rail freight, by origin and destination (thousand net tonnes), 2013–14

	QLD	NSW	ACT	VIC	TAS	SA	NT	WA	TOTAL
QLD	197,017	3	-	-	-	-	-	1	197,021
NSW	593	70,732	-	801	-	52	1	202	72,381
ACT	-	-	-	-	-	-	-	-	-
VIC	56	31	-	62		112	-	117	378
TAS	-	-	-	-	1,680	-	-	-	1,680
SA	65	735	-	78	-	22,383	7	57	23,325
NT	-	-	-	-	-	-	2,566	-	2,566
WA	1	-	-	-	-	-	-	913,900	913,901
Total	**197,732**	**71,501**	**-**	**941**	**1,680**	**22,547**	**2,574**	**914,277**	**1,211,252**

Source: BITRE, 2015c

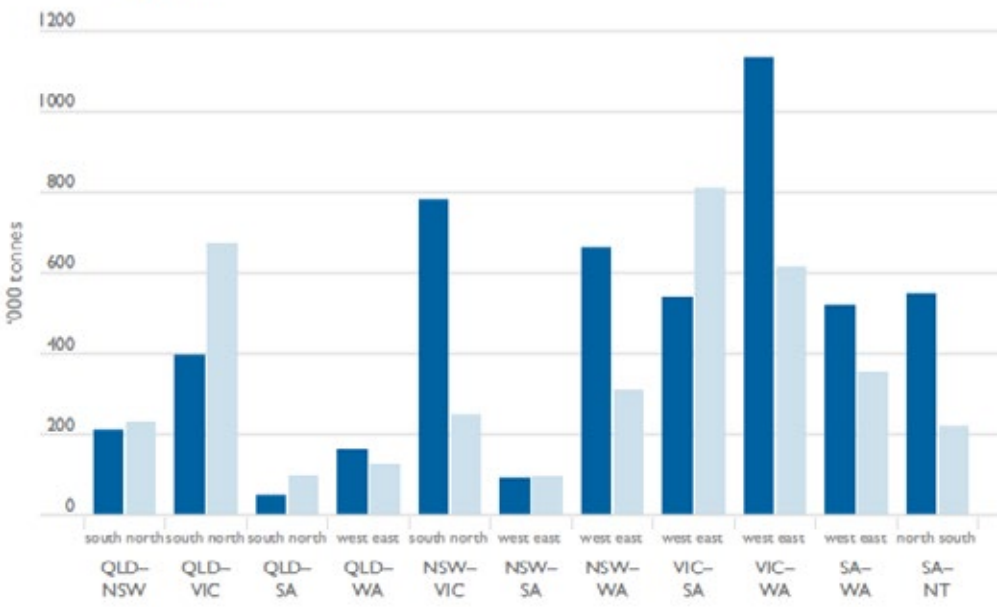
Table 31 details the rail freight task, from data provided by above-rail train operators who have provided data or for whom data can be established from published material (data provided by Asciano, Aurizon, Fortescue Metals Group, BHP Billiton, Rio Tinto, Freightliner Australia, Genesee & Wyoming Australia, Qube, SCT Logistics, and TasRail). These above-rail operators are the predominant operators in Australia. However, the data exclude freight carried by some smaller intrastate above-rail operators. The freight task is measured in terms of tonnes and net tonne-kilometres.

The railway freight task in Australia is dominated by bulk freight. The total rail task of the included operators amounted to 197.6 billion net tonne-kilometres in 2007–08, of which 25.9 billion net tonne-kilometres was intermodal freight and 171.7 billion net tonne-kilometres was bulk freight (BITRE, 2007-08a).

Figure 52 presents the principal intermodal rail flows by tonnage. The principal intermodal rail flows are on the East–West corridor, especially between Victoria and Western Australia. The relatively strong flows between Victoria and South Australia reflect the international land bridging traffic between Adelaide and the Port of Melbourne.

The most marked freight flow imbalance is between New South Wales and Victoria, with the southbound flow being more than 3.5 times the northbound flow between the states. This imbalance may partly reflect the onwards movement of the southbound freight to Tasmania (to the extent that the rail freight flow in the southerly direction is greater than in the northerly direction). It should also be noted that the observed flow imbalance is partly compensated by the strong northbound flow from Victoria to Queensland (primarily in intermodal freight). Although; some reporting bias may misrepresent the freight flows (BITRE, 2007-08a).

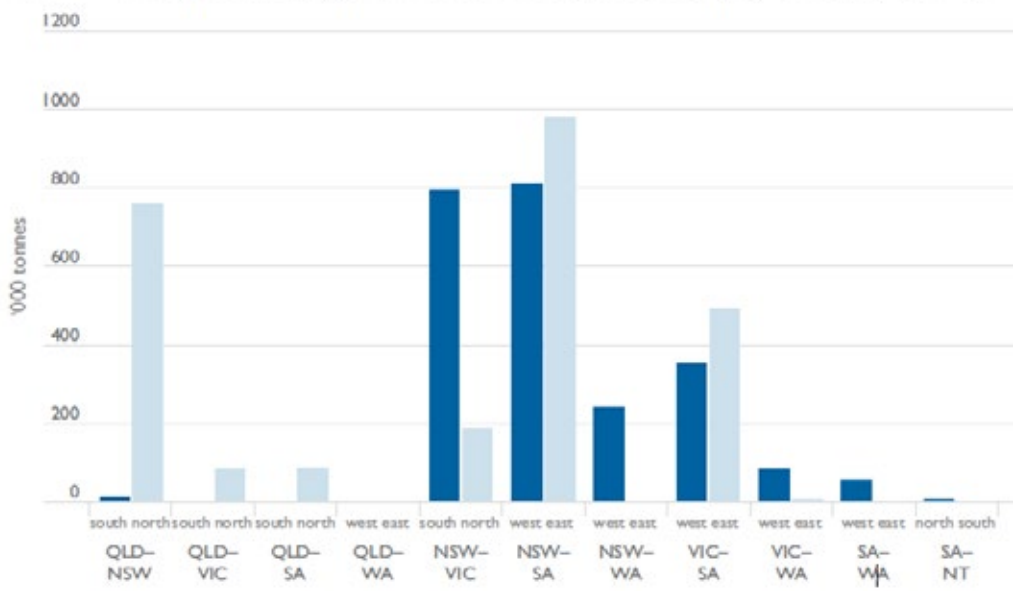
Figure 52: Principal intermodal freight flows between states / territory, by direction, 2007–08



Source: BITRE, 2007-08b

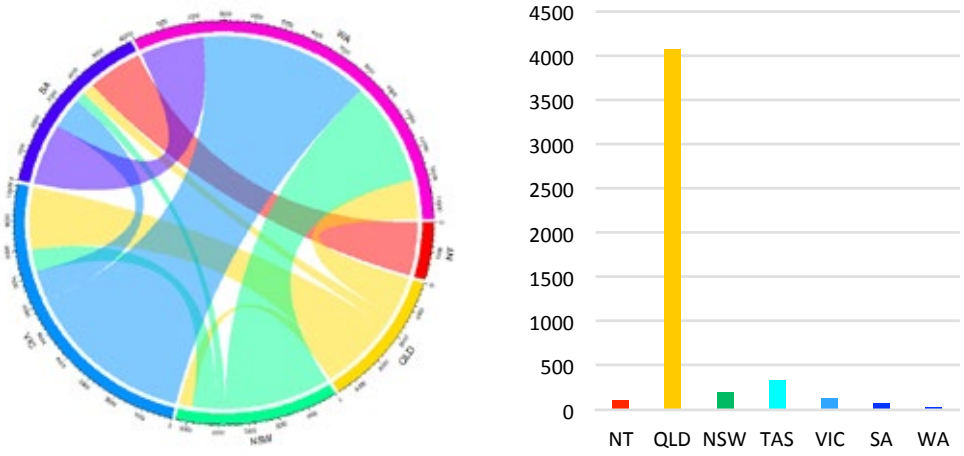
Figure 53 presents the principal bulk rail flows, by tonnage. In 2007–08, the predominant bulk flows were from New South Wales, to South Australia, Victoria and Queensland; and from South Australia to New South Wales. The principal underlying driver of these patterns is steel movements, such as movements from New South Wales to Westernport (Victoria) and from Whyalla (South Australia) to Newcastle and Sydney. Some of the flow also reflects the movement of ores and minerals, such as from the Broken Hill region to Port Pirie and Port Adelaide (BITRE, 2007-08b).

Figure 53: Principal bulk rail freight flows between states / territory, by direction, 2007–08



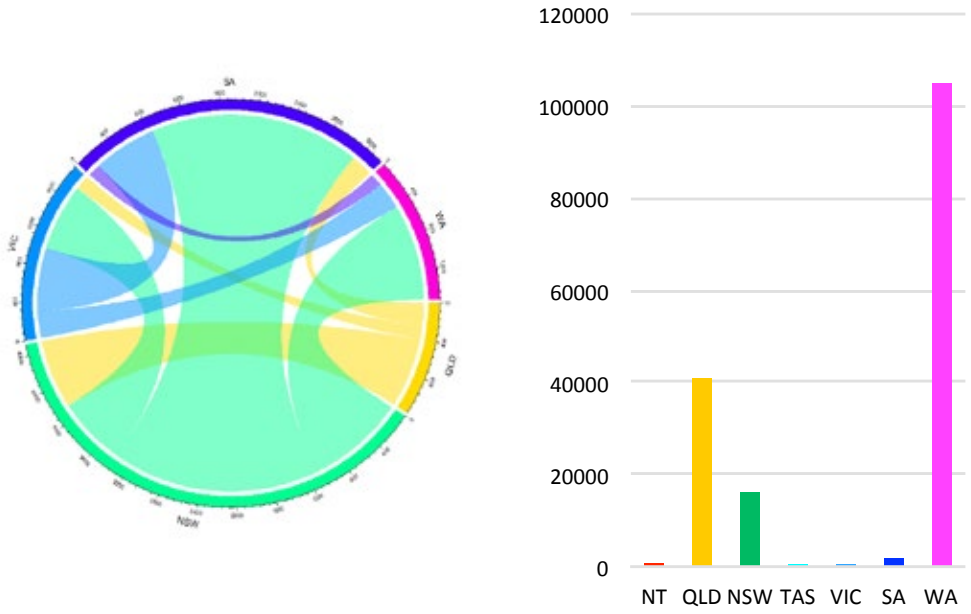
Source: BITRE, 2007-08b

Figure 54: Intermodal origin-destination (million net tonne-kilometres), 2007–08



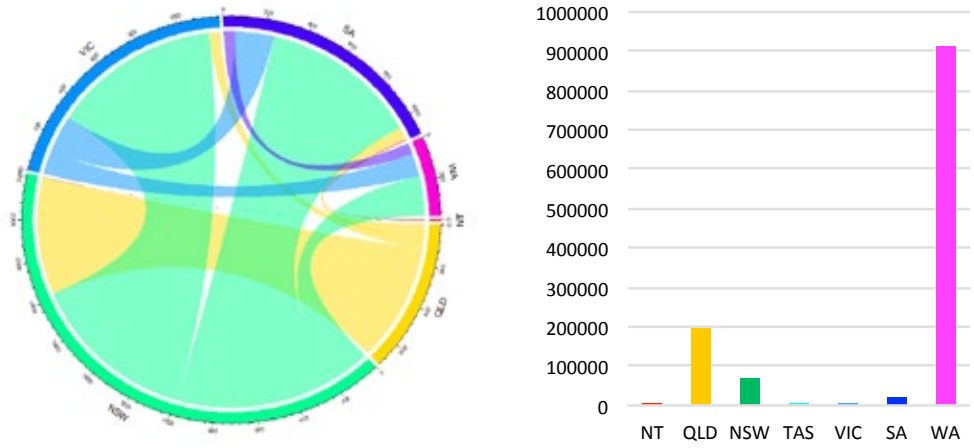
Source: BITRE, 2007-08a

Figure 55: Origin-destination bulk commodities (million net tonne-kilometres), 2007–08 (Rail)



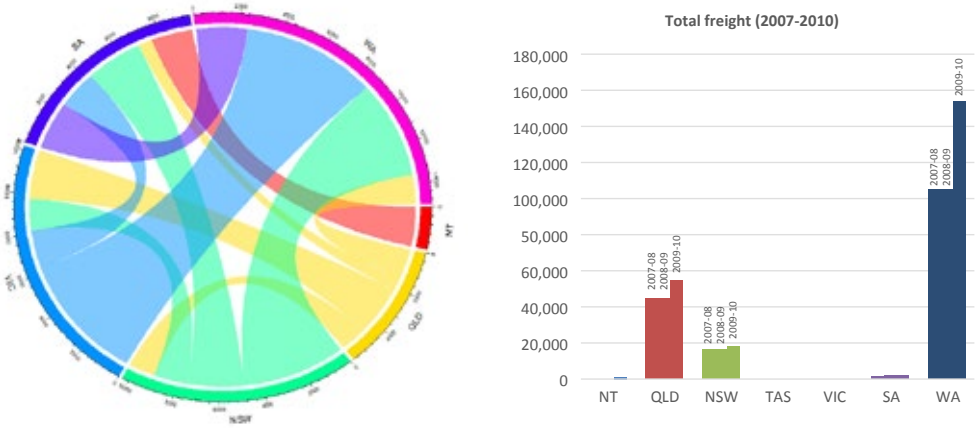
Source: BITRE, 2007-08a

Figure 56: Origin-destination of bulk (million net tonne-kilometres), 2013–14



Source: BITRE, 2015c

Figure 57: Origin-destination of total freight (million net tonne-kilometres), 2007–08



Source: BITRE, 2007-08a

Table 32: OD for bulk commodities carried by rail freight, 2007–08 (million net tonne kms)

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	TOTAL
NSW	16,262	588	767	563	1,076	–	–	–	19,256
VIC	162	458	164	217	297	–	–	–	1,298
QLD	10	0	40,839	–	2	–	–	–	40,851
SA	1,752	486	241	1,819	136	–	0	–	4 434
WA	4	10	1	2	105,047	–	–	–	105,064
TAS	–	–	–	–	–	119	–	–	119
NT	–	–	–	–	–	–	673	–	673
ACT	–	–	–	–	–	–	–	–	–
Subtotal	**18,190**	**1,542**	**42,012**	**2,601**	**106,558**	**119**	**673**	**–**	**171,695**

Source: BITRE, 2007-08b

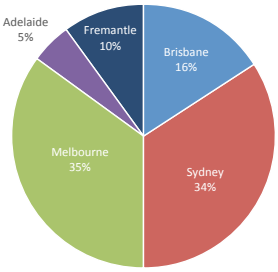
Table 33: OD for total freight carried by rail freight, 2007–08 (million net tonne kms)

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	TOTAL
NSW	16,466	1,156	1,015	749	3,632	–	–	–	23,018
VIC	396	586	1,607	908	4,182	–	–	–	7,679
QLD	234	861	44,910	145	822	–	–	–	46,972
SA	1,922	935	519	1,899	1,461	–	1,388	–	8,123
WA	1,206	2,150	637	940	105,048	–	–	–	109,981
TAS	–	–	–	–	–	456	–	–	456
NT	–	–	–	558	–	–	780	–	1,338
ACT	–	–	–	–	–	–	–	–	–
Total	**20,224**	**5,687**	**48,688**	**5,199**	**115,145**	**456**	**2,168**	**–**	**197,567**

Source: BITRE, 2007-08b

5.3 Container movement

Figure 58: International container volume at five major Australian ports and trends

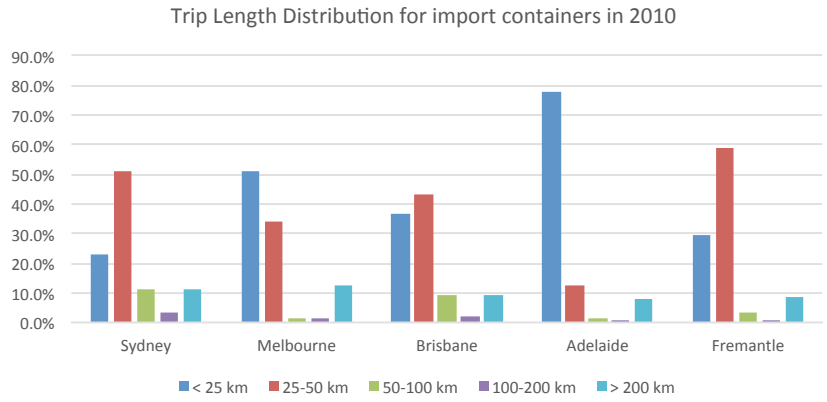


YEAR	MELBOURNE	SYDNEY*	BRISBANE	FREMANTLE	ADELAIDE	TOTAL
2010	2,112,000	1,927,506	1,526,000	582,400	352,500	6,500,406
2015	2,800,000	2,634,641	2,023,000	772,000	467,300	8,696,941
2020	3,676,000	3,635,299	2,656,000	1,013,000	613,300	11,593,599
2025	4,620,000	5,033,446	3,338,000	1,274,000	770,900	15,036,346

Source: Booz & Company, Intermodal Supply Chain Study, 2009, prepared for National Transport Commission (*Sydney Figures provided by Sydney Ports Corporation).
Source: BITRE, 2015b

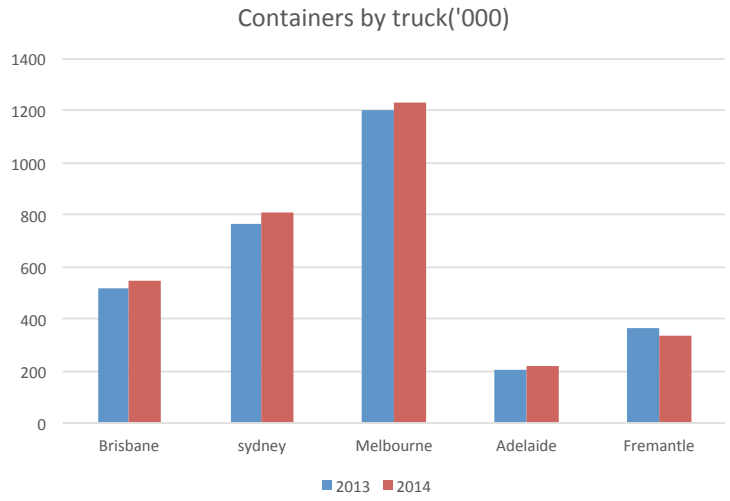
ABS (2011) provides destination of import containers by postcode in the financial year of 2009–10. Based on the shortest distance of each port to centroids of suburbs on the network, trip length distribution has been estimated approximately as Figure 59 shows.

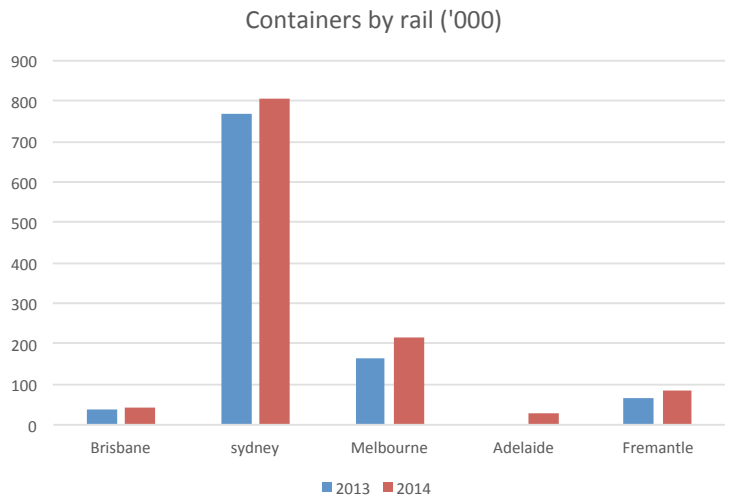
Figure 59: Trip length distribution for import containers in 2010



Source: ABS, 2011

Figure 60: Containers by transport mode by major ports, 2013–14





Source: BITRE, 2015b

6 Passenger task

Key points

The breakdown of urban public transport use in 2010 has been estimated as: (BITRE, 2013)

- Rail: 61.7 %, 11.8 billion pkm
- Bus: 33.6 %, 6.4 billion pkm
- Tram: 4.3%, 819 million pkm
- Ferry: 0.8%, 152 million pkm.

The key features of urban passenger transport trends in Australian capital cities include:

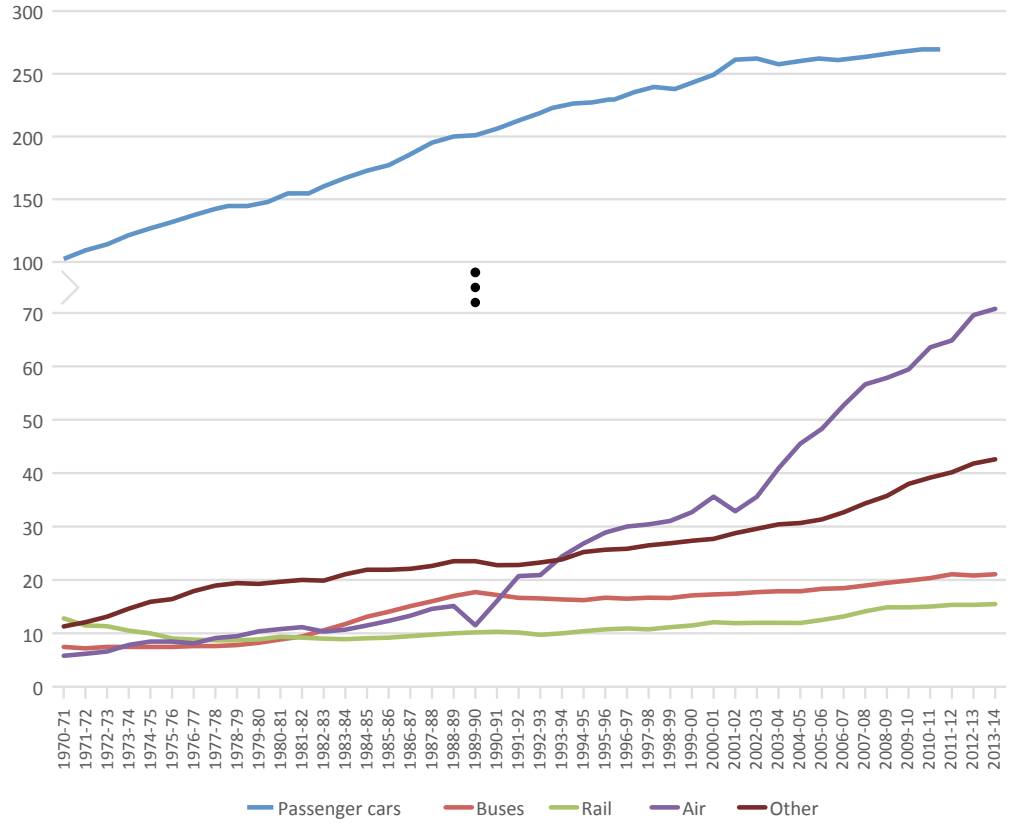
- The passenger task (both car and transit kilometres travelled) is growing at a slower rate than our population. This could mean we travel less, or take shorter trips or a mode shift has happened from motorised to non-motorised modes.
- Urban bus kilometres travelled surpassed rail kilometres after 1981 due to expanding bus network. However, rail usage has remained relatively unchanged since then.
- In 2014, Sydney had the highest public transport usage per capita, followed by Melbourne, Brisbane, Perth, Adelaide, Canberra, Hobart and Darwin.
- Among the five major capital cities, the transit passenger-kilometres per capita travelled shows a sharp growth in Melbourne, Perth and a relatively slower increase for Brisbane. However, after 2012, Brisbane declined.
- Car passenger-kilometres per capita has been increasing in capital cities since 2004, except Hobart and Adelaide. Darwin also peaked in 2009, but declined since then and after 2012 remained unchanged.
- Car remains the main method of travel to work (82% either as passenger or driver), followed by smaller share by public transport (10%), walk (5%), and others (3%).

In 2012–13 the Australian domestic transport task totalled 422 billion passenger-kilometres (pkm). An increase of 4.1% respectively compared with the previous year. Over the last 10 years, Australia's domestic passenger tasks has grown 9.9%, responding to social and economic changes (Pekol Traffic and Transport, 2015).

The market share for urban public transport in Australia comprises rail (61.7%), bus (33.6%), tram (4.3%) and ferry (0.8%).

The total passenger task in Australia has been shown in Figure 61.

Figure 61: Total passenger travel by transport mode (billion passenger-kilometres)



Source: BITRE, 2015d

As Figure 62 shows, in capital cities, the motorised kilometres travelled per person has been decreased. It can be interpreted as fewer trips, shorter trips, or increasing share of non-motorized travel modes in cities.

Considering the high proportion of motorised kilometres travelled belong to passenger cars, Figure 62 shows car passenger-kilometres per capita for all capital cities with a peak between 1995 to 2004 (in some cities peak happened later around 2000) and a decline pattern since then. Canberra has the highest car passenger-kilometres per capita – perhaps due to the low-density city, relatively sparse bus services, lack of rail transit system, and general ease of using private transport. Figure 62 also shows relatively little growth in total car passenger-kilometres in most cities in the 10 years since 2003–04, except Adelaide and Canberra.

Figure 62: Car passenger-kilometres in capital cities

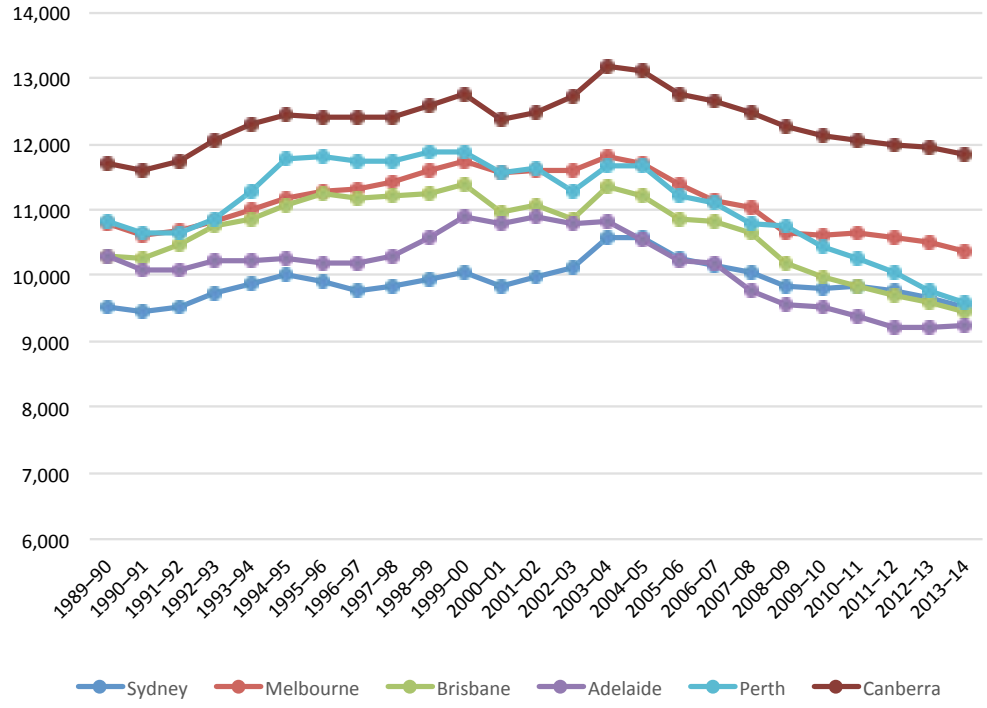
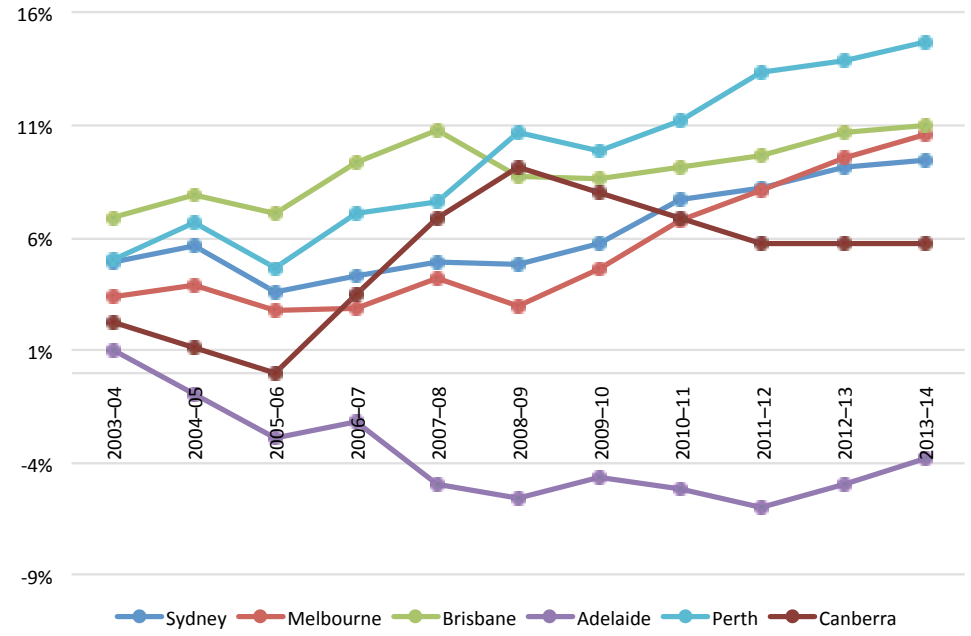


Figure 63: Growth in car passenger-kilometres in capital cities



Source: BITRE, 2015d

Private vehicle travel has steadily increased over the last 65 years. Urban public transport, now only accounts for approximately 10% of total urban passenger travel. Yet despite its apparent low share of overall travel, the transit system is still an essential component of urban transport systems, responsible for the majority of commuter trips to/from the CBDs of our major cities and providing specialist services for school children (BITRE, 2013).

However, public transport passenger-kilometres per capita rose significantly in Melbourne and Perth from 2005 to 2011, while there were slight declines in Brisbane, Perth, Adelaide, and Canberra. Sydney and Melbourne have more transit kilometres per capita than others, mainly due to their extensive rail networks.

Figure 64: Transit passenger-kilometres for capital cities

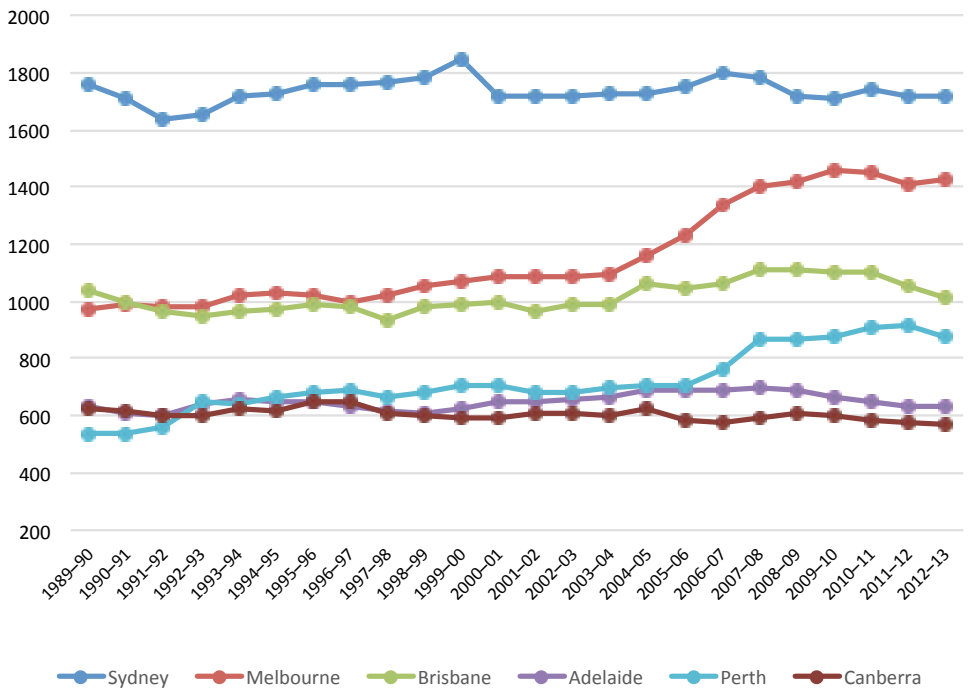
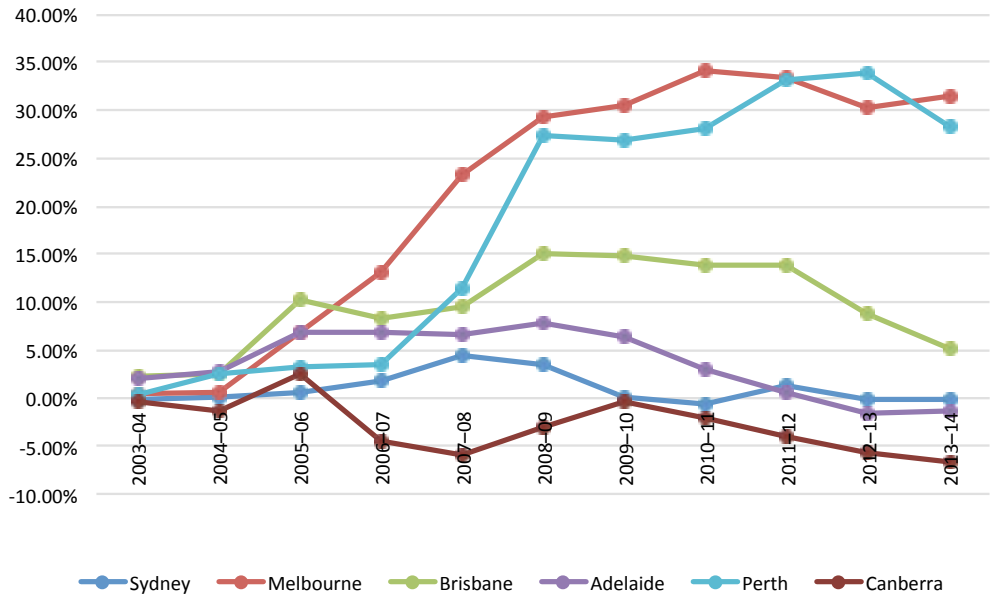


Figure 65: Growth in transit passenger-kilometres for capital cities

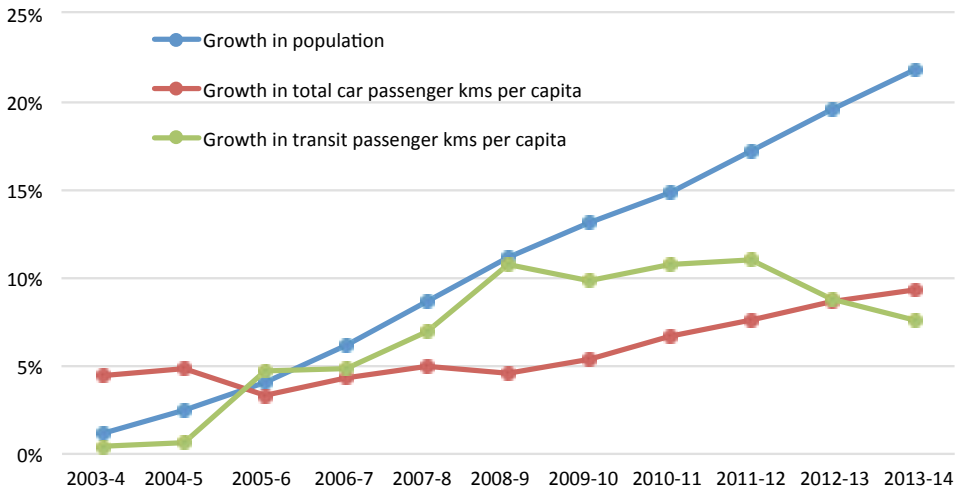


Source: BITRE, 2015d

Melbourne and Perth have higher transit mode shift based on these figures, particularly after 2008. Brisbane also saw mode shift from 2008 to 2012, which has declined since.

Finally, Figure 66 indicates the comparison of total car and transit passenger-kilometre growth since 2003–04 (with population growth included for reference). Transit kilometres experienced a decline pattern after 2012, while car passenger-kilometres increased more slowly than population growth.

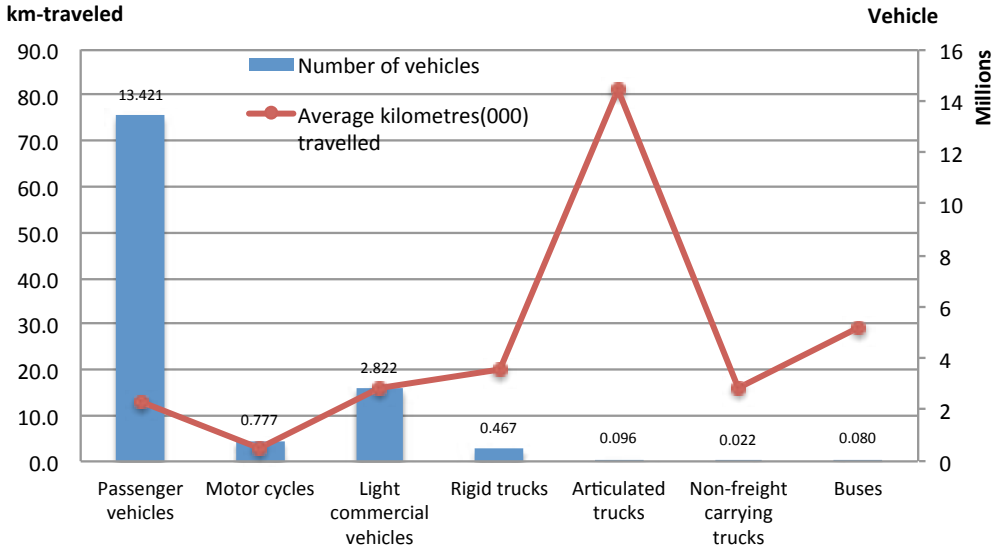
Figure 66: Mode shift (passenger-kilometres for all seven capital cities)



Source: BITRE, 2015d

Figure 67 represents number of vehicles and kilometres travelled by each vehicle type, obtained from the Survey of Motor Vehicle Use (2014). It shows that non-urban vehicles have higher average kilometres travelled.

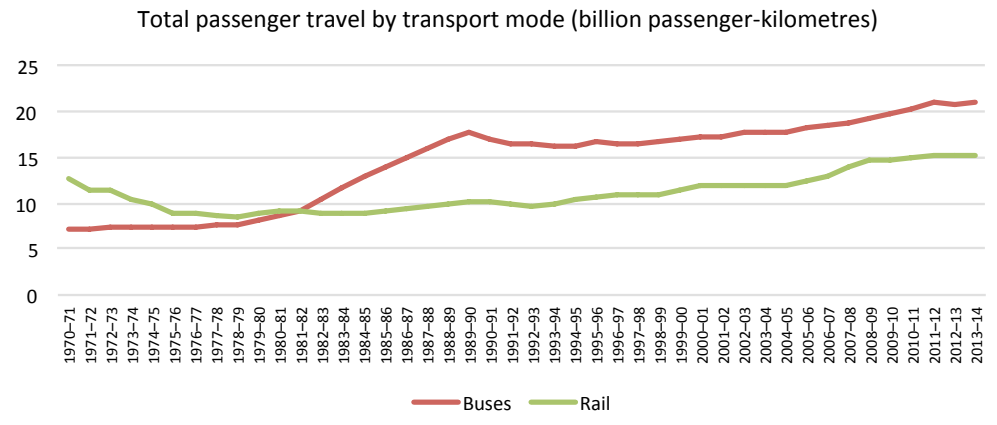
Figure 67: Motor vehicle use, 2014



Source: ABS, 2014b

Figure 68 shows a mode shift between bus and rail after 1981 which buses dominated the urban passenger task.

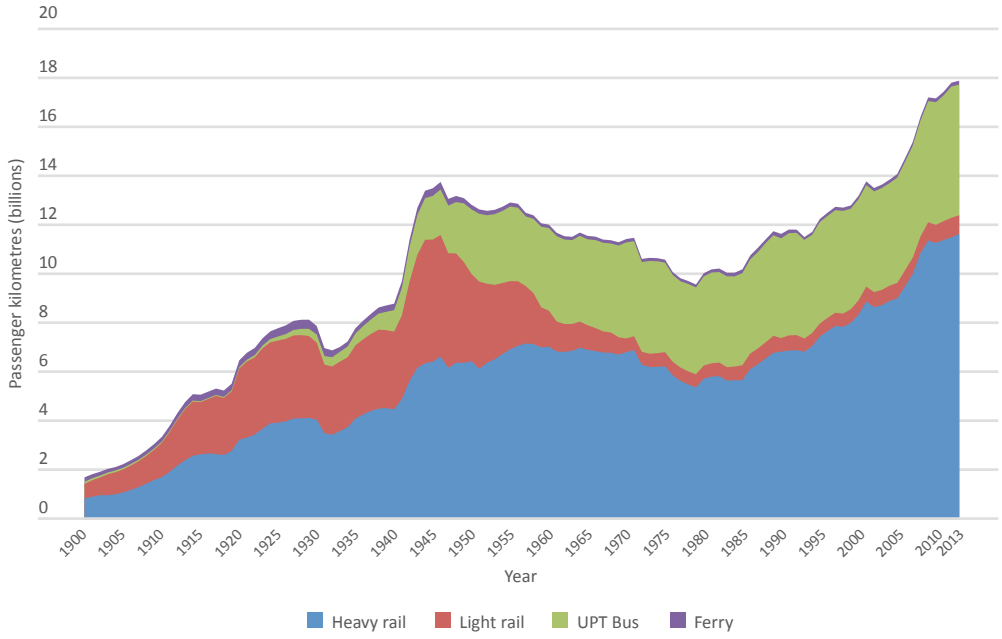
Figure 68: Rail and bus passenger-kilometres



Source: BITRE, 2015d

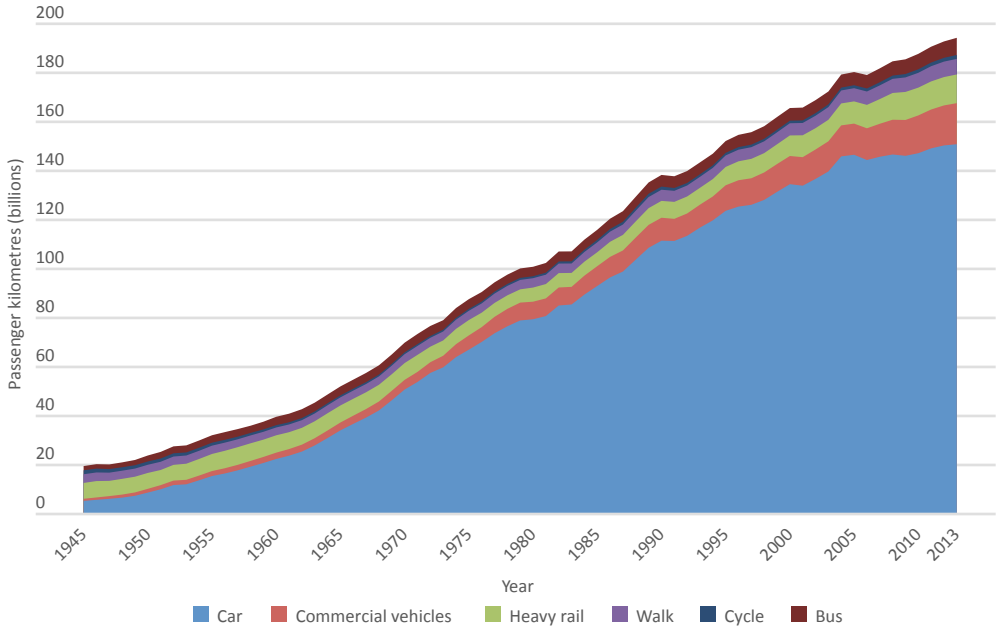
Public transport kilometres travelled in Australia's cities, as shown in Figure 69, have grown by more than 4 billion passenger-kilometres since the late 1940s, when over half of metropolitan trips were on public transport. In the past decade, the rate of average annual growth of public transport patronage (2.4%) surpassed the rate of population growth in capital cities (1.8%). The bulk of these kilometres travelled are carried on the heavy rail lines of Australia's cities, reflecting both growth in patronage due to population growth as well as longer trips being undertaken from extending outer areas (BITRE, 2014-15).

Figure 69: Public transport passenger-kilometres, metropolitan Australia



Source: BITRE, 2014-15

Figure 70: Total urban passenger task for Australia (selected modes), 1945–2013



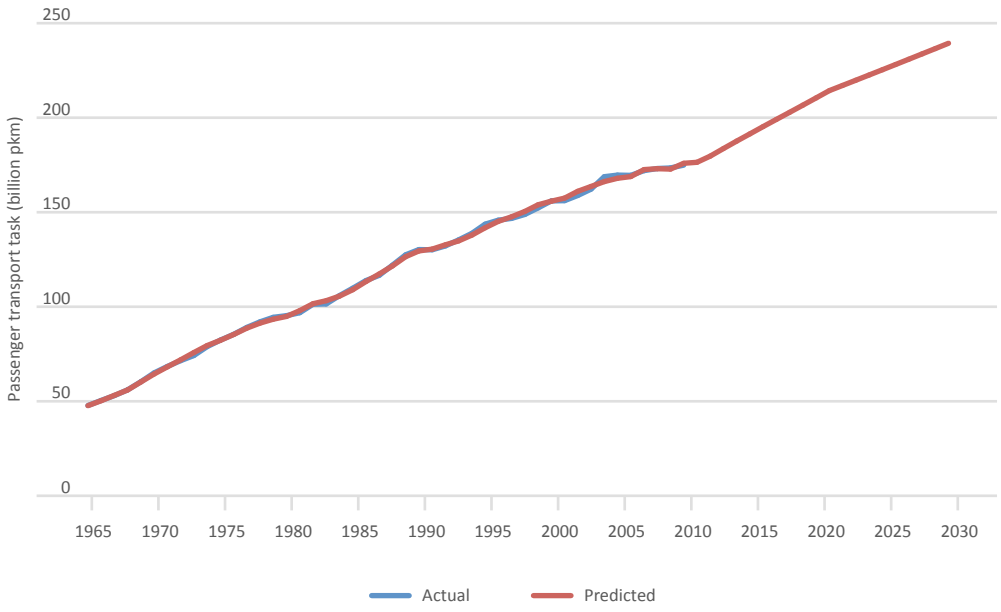
Source: BITRE, 2014-15

The urban passenger-kilometres travelled and public transport passenger task (pkmpp) by capital city have been modelled in BITRE (2013), of the form:

- Urban Passenger Transport (UPT) mode share = f(real UPT fares, household disposable income constraint ,GFC effects, and event/supply/trend dummies)
- pkmpp = f(saturating trend, petrol prices, unemployment, GFC and dummies).

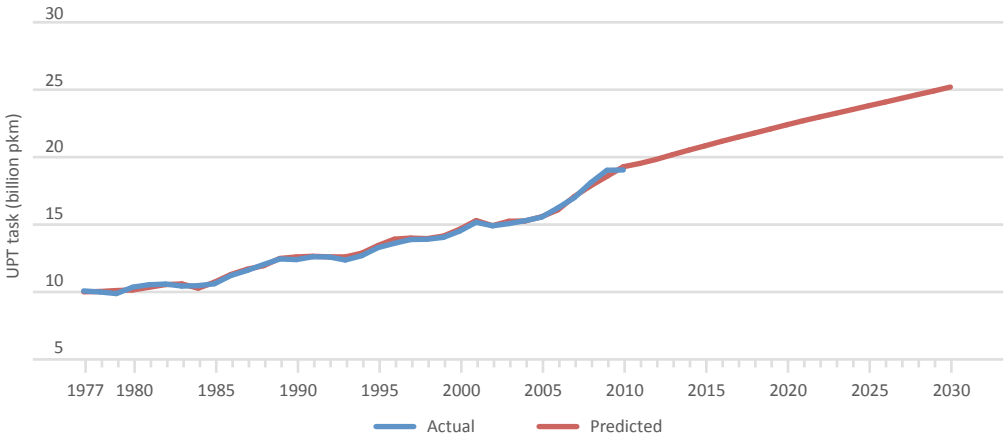
The figures and tables below illustrate the result of this model.

Figure 71: Actual and predicted passenger-km task, metropolitan Australia



Source: BITRE, 2013

Figure 72: Forecast urban passenger transport task, metropolitan Australia



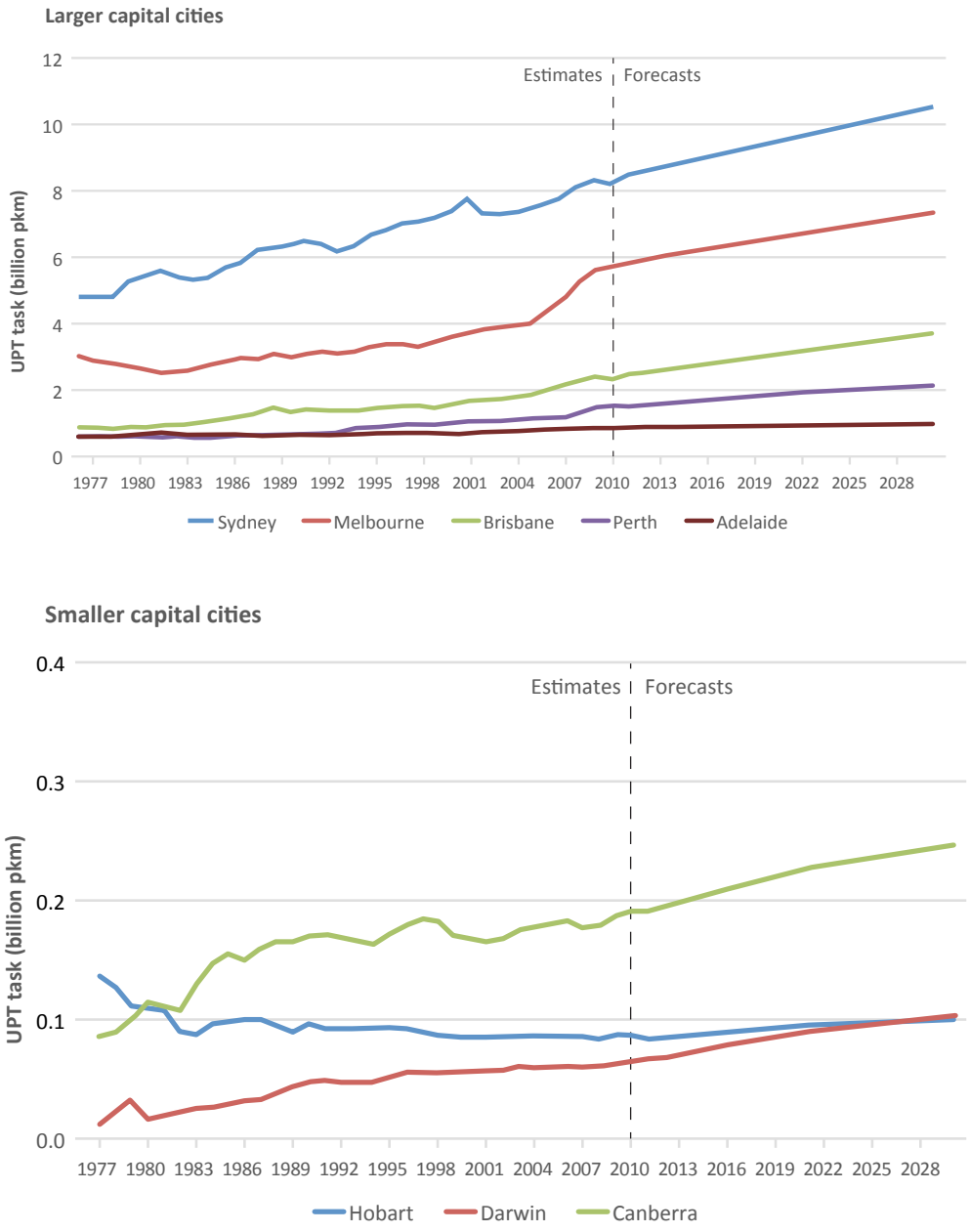
Source: BITRE, 2013

Table 34: Forecasts of urban public transport passenger tasks by capital city, 2011–2030

CAPITAL CITY	UPT TASK (BILLION PKM)		GROWTH[a] (PER CENT)	UPT SHARE (PER CENT)	
	2011	2030		2011	2030
Sydney	8.50	10.56	1.15	15.1	14.8
Melbourne	5.85	7.38	1.23	11.6	10.7
Brisbane	2.49	3.71	2.13	9.8	12.3
Adelaide	0.89	0.98	0.52	6.4	6.10
Perth	1.58	2.18	1.70	6.8	6.70
Hobart	0.09	0.1	0.86	3.5	3.50
Darwin	0.07	0.1	2.10	5.8	5.90
Canberra	0.26	0.33	1.31	5.3	5.30
All Capitals	**19.72**	**25.34**	**1.33**	**11.1**	**11.0**

a: Average annual growth rate of UPT task between 2011 and 2030.
Source: BITRE, 2013

Figure 73: Urban passenger transport passenger task and forecasts



Source: Table 5.1
Note: Data from 1977 to 2010 are estimates, while from 2011 to 2030 are forecasts
BITRE, 2013

The utilisation of urban transport by mode for each combination (extended urban areas beyond the GCCSAs) in 2010–11 is shown in Table 35.

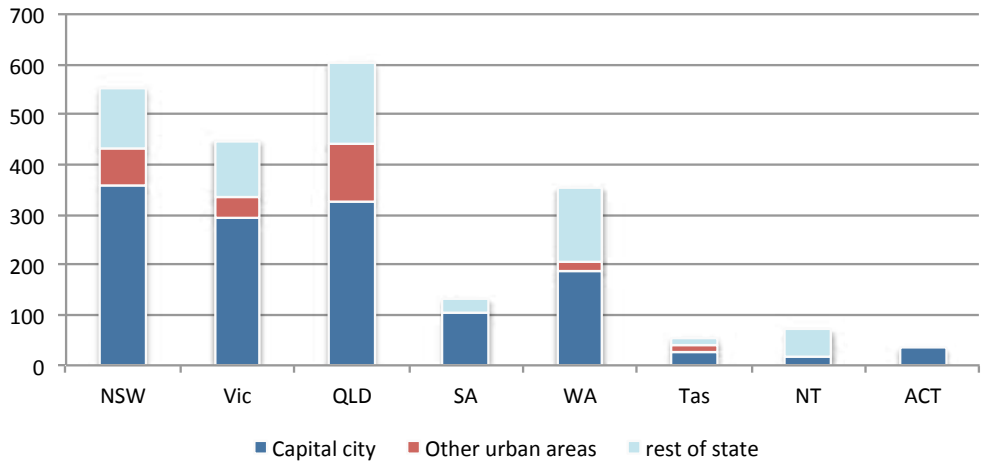
Table 35: Utilisation by conurbation and mode, 2010–11

	ROAD (VKT PER DAY)	RAIL (PASSENGER-KMS PER DAY)	BUS (PASSENGER-KMS PER DAY)	FERRY (PASSENGER-KMS PER DAY)	LIGHT RAIL (PASSENGER-KMS PER DAY)
Sydney-Newcastle-Wollongong	132,187,467	20,836,852	8,118,279	223,304	28,512
Melbourne-Geelong	116,880,115	17,622,360	2,312,022	n/a	4,075,718
Brisbane-South-East-Queensland	83,745,007	4,320,496	3,214,913	75,928	n/a
Perth-Wheatbelt	49,845,107	2,965,370	1,367,563	303	n/a
Adelaide-Yorketown	28,225,360	582,748	1,141,167	n/a	24,613
Canberra-Goulburn-Yass	9,906,834	n/a	652,146	n/a	n/a

Source: VLC, 2014

Figure 74 represents intrastate bus kilometres, travelled by capital city, other urban areas, and the rest of the state. Table 36 indicates the trend.

Figure 74: Intrastate bus kilometres (M) travelled, by state – by area of operation



Source: ABS, 2014b

Table 36: Total kilometres (m) travelled, by state registration – by area of operation

STATES	CAPITAL CITY	OTHER URBAN AREAS	OTHER AREAS	TOTAL INTRASTATE	CAPITAL CITY	OTHER URBAN AREAS	OTHER AREAS
	kilometres (million)				percentage		
NSW	357	74	121	552	64.67%	13.41%	21.92%
VIC	293	43	111	446	65.70%	9.64%	24.89%
QLD	328	112	162	602	54.49%	18.60%	26.91%
SA	103	0	30	133	77.44%	0.00%	22.56%
WA	188	20	146	354	53.11%	5.65%	41.24%
TAS	27	14	14	55	49.09%	25.45%	25.45%
NT	19	0	52	71	26.76%	0.00%	73.24%
ACT	34	0	0	34	100.00%	0.00%	0.00%

Source: ABS, 2014b

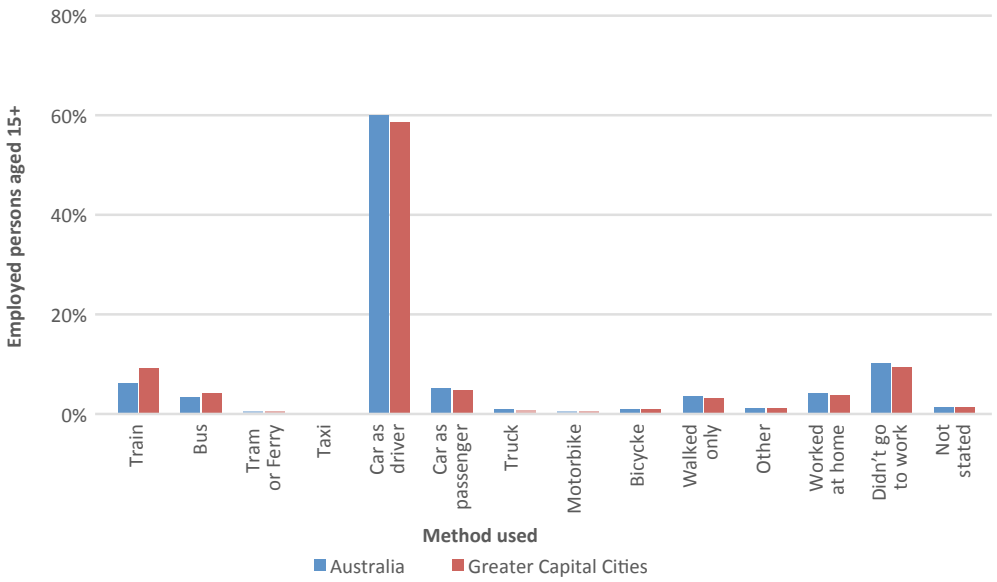
Table 37: Total kilometres (m) travelled, share for urban and non-urban areas

YEAR	CAPITAL CITY	PROVIN-CIAL	SUB-TOTAL	REST OF STATE	INTER-STATE	SUB-TOTAL NON-URBAN	TOTAL	% OF
	(M.km)	Urban (M.km)	Urban (M.km)	(M.km)	(M.km)	(M.km)	(M.km)	Total
2012–13	1,324.80	426.4	1,751.20	671.9	82.1	754	2,505.10	1.10%
2011–12	1,285.50	426.7	1,712.20	665.9	84.1	750	2,462.20	1.10%
2010–11	1,195.80	423.8	1,619.60	654.1	85.7	739.8	2,359.40	1.10%
2009–10	1,100.80	417.9	1,518.60	642.1	88.8	730.9	2,249.50	1.00%
2008–09	1,111.70	414.8	1,526.50	655.6	98	753.7	2,280.20	1.10%
2007–08	1,119.30	408	1,527.30	646.5	99.7	746.2	2,273.50	1.00%
2006–07	1,062.70	405.2	1,467.90	641.1	95.4	736.5	2,204.40	1.00%
2005–06	1,043.30	415.4	1,458.70	677.9	90	767.9	2,226.60	1.00%
2004–05	1,052.10	414.5	1,466.60	666.4	93.8	760.2	2,226.80	1.00%
2003–04	991.9	390.4	1,382.30	650	110.9	760.9	2,143.30	1.00%
2002–03	993.8	384.3	1,378.10	653.1	103.8	756.9	2,134.90	1.00%
2001–02	944.7	329.2	1,273.90	629.7	98.2	727.9	2,001.80	1.00%
2000–01	894.8	325.6	1,220.40	637.2	77.3	714.4	1,934.90	1.00%
1997–98	906.2	253	1,159.10	662.1	119	781.1	1,940.30	1.00%
1994–95	736.7	175.3	912	572	86.6	658.6	1,570.70	0.90%

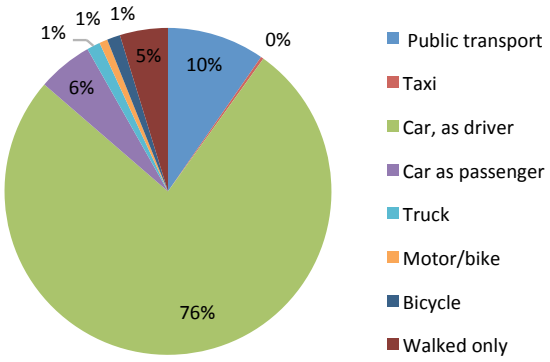
Source: (Pekol Traffic and Transport, 2015)
Note: These are based on the Australian Standard Geographical Classification (ASGC) 2008 as being either Statistical Districts with a population greater than 40,000 or clusters of collection districts and other urban areas with a population greater than 40,000

Figure 75 and Table 38 indicate methods of travel to work, obtained from the 2011 Census and compared with the 2006 Census.

Figure 75: Methods of travel to work, 2011



Source: profile.id, 2011, sourced from ABS, 2012



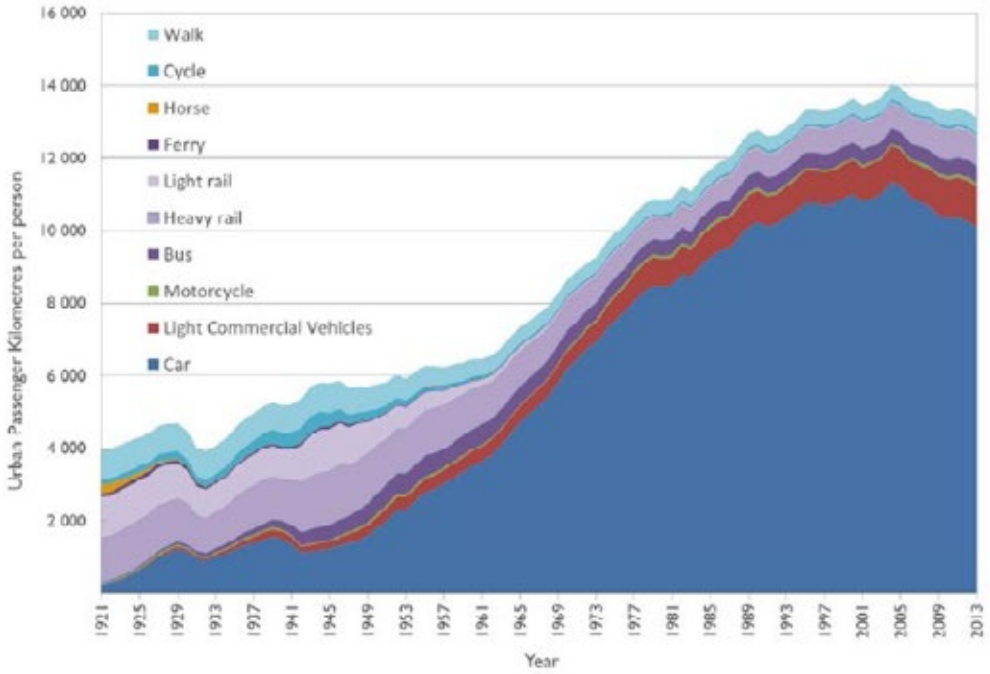
Source: BITRE, 2015d sourced from ABS, 2012

Table 38: Australia method of travel to work

MAIN METHOD OF TRAVEL	2011			2006			CHANGE
	Number	%	Greater capital cities %	Number	%	Greater capital cities %	2006 to 2011
Train	632,341	6	9	486,837	5	8	145,504
Bus	347,472	3	4	284,327	3	4	63,145
Tram or Ferry	57,341	1	1	45,776	1	1	11,565
Taxi	22,065	0	0	21,973	0	0	92
Car - as driver	6,059,265	60	59	5,404,034	59	59	655,231
Car - as passenger	537,476	5	5	533,323	6	5	4,153
Truck	104,732	1	1	120,404	1	1	-15,672
Motorbike	64,297	1	1	60,771	1	1	3,526
Bicycle	103,890	1	1	90,118	1	1	13,772
Walked only	376,890	4	3	367,168	4	3	9,722
Other	132,395	1	1	103,778	1	1	28,617
Worked at home	443,909	4	4	426,523	5	4	17,386
Did not go to work	1,024,784	10	10	995,170	11	10	29,614
Not stated	149,893	1	1	163,985	2	2	-14,092
Total employed persons aged 15+	**10,056,750**	**100**	**100**	**9,104,187**	**100**	**100**	**952,563**

Source: ABS, 2011, 2006, Compiled and presented by profile.id, 2011

Figure 76: Urban passenger travel per person



Source: BITRE (2012a, 2012b), Cosgrove (2011), BITRE estimates.
Source: BITRE, 2014d

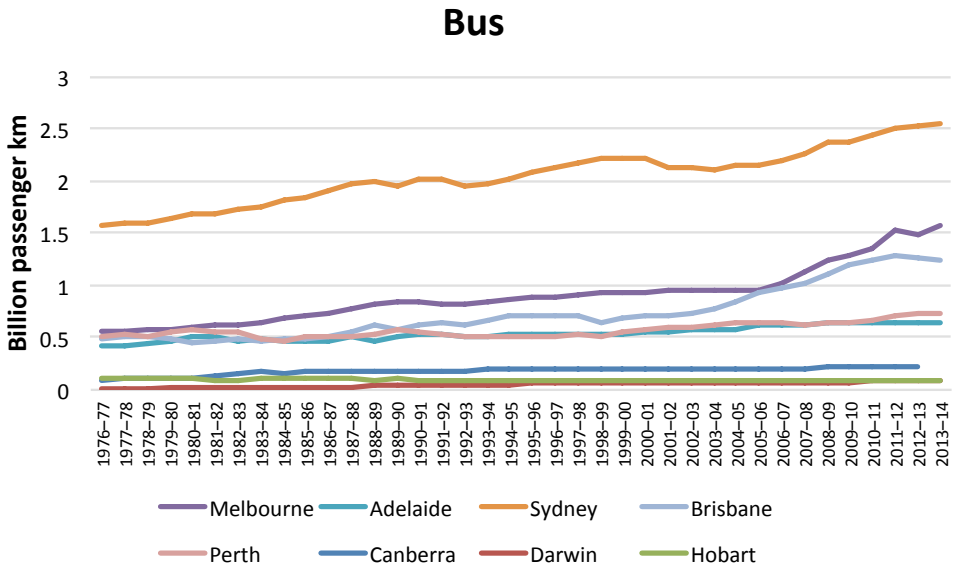
6.1 Road passenger task

The Australian bus and coach industry services more than 1.5 billion passenger trips over a distance of 18 billion kilometres annually (Bus Industry Confederation, 2010).

6.1.1 Public bus usage statistics-trends for each state/territory

Although total bus boarding can be influenced by the degree of timetable integration between the various modes of public transport, bus passenger travel task from 1977 to 2010 was much higher in Sydney compared with other capital cities (BITRE, 2013).

Figure 77: Bus passenger-kilometres task in capital cities



Source: BITRE, 2013

Among the five larger capital cities, the average annual growth rate of the bus passenger transport task from 1977 to 2010 was highest in Brisbane (2.47%); followed by Melbourne (2.34%); and was lowest in Sydney (1.08%). Among the smaller capital cities, Darwin had highest average annual growth rate of bus passenger transport task from 1977 to 2010, while Hobart experienced negative growth.

Since 2004, Brisbane and Melbourne experienced a sharp increase in bus passenger-kilometres. The increase in bus passenger-kilometres in Brisbane was due to the introduction of an integrated ticketing system in 2007. Brisbane also relies significantly on an expansive bus network that uses a system of dedicated bus ways, serviced by public and private operators. Brisbane's largest operator 'Brisbane Transport' is the corporate transport arm of Brisbane City Council.

BITRE (2009) also found that Brisbane recorded the highest growth (10.9%) of bus service kilometres from 2006 to 2007, followed by Melbourne (8.7%).

The increase in bus passenger-kilometres in Melbourne was enabled by extending bus operating hours, creating new bus routes, upgrading frequencies and extension or rerouting of some existing services (Victorian Department of Transport 2008; cited in BITRE (2009)).

The New South Wales Government (2013–14) reported an increase in the number of bus services provided and an increase in customer usage. The number of passenger boardings on Metropolitan Bus Services (private and STA) increased by more than 4.2 million from 2012–13 to 2013–14. Passenger boardings across the regions operated by private bus operators increased 6.9% from 2012–13 to 2013–14. The corresponding increase in STA passenger boardings was 0.47%, which was indicative of the more established nature of the regions in which State Transit Authority (STA) operates. The number of bus trips provided increased by 313,400 from 2012–13 to 2013–14, or 3.7%.

6.1.2 Tourist bus usage statistics-trends for each state / territory

The coach sector of the bus industry, comprising long distance, rural, tour, charter and express bus operators moves more than 1.5 million domestic travellers (Tourism Research Australia, 2008). Coaches make up 8% of the total non-urban passenger task (Hensher. 2003, Passenger Transport Activity in Australia, Institute of Transport and Logistics Studies University of Sydney, UNSW).

The coach sector of the bus industry comprises long-distance, rural, tour, charter and express bus operators and contributes more than $5 billion dollars to the Australian economy. It provides almost 16 million nights of tourism enjoyed by almost half a million international and more than 1.5 million domestic travellers (Tourism Research Australia, 2008, Transport Fact Sheet, Department of Resources, Energy and Tourism, Canberra).

6.2 Rail passenger task

6.2.1 Urban public transport

Each of the mainland state capitals operates urban passenger rail services. These services provide transport conduits through built-up areas, enabling the mass movement of passengers to and from capital city centres. At their broadest, urban passenger rail services provide an alternative to private cars which minimises road congestion. These services also provide a transport alternative for those without cars (BITRE, 2015c).

Table 39: Urban rail passenger movement (million)

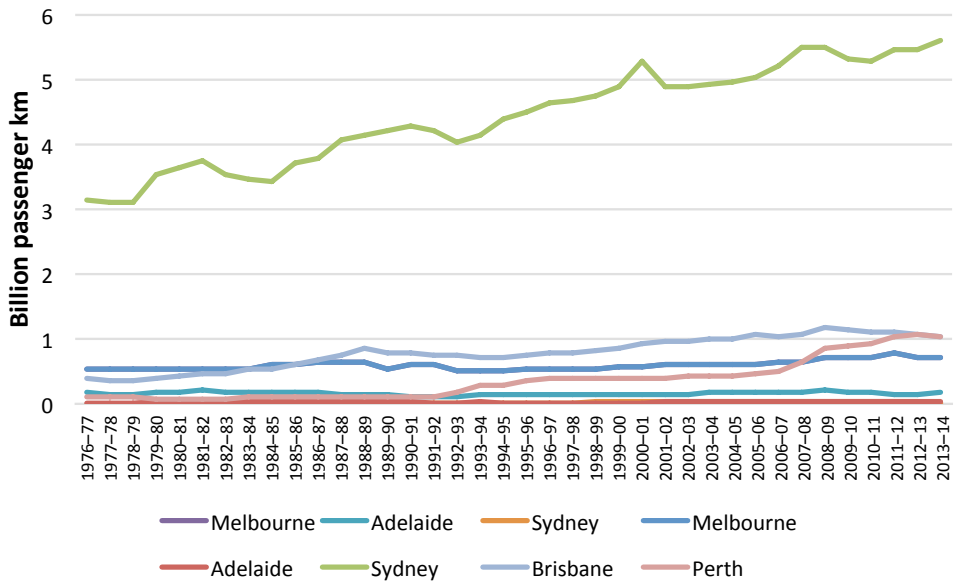
	BRISBANE		SYDNEY		MELBOURNE		ADELAIDE		PERTH	
year	Heavy rail	Light rail	Heavy rail	Light rail	Heavy rail	Light rail	Heavy rail	Light rail	Heavy rail	Light rail
2013–14	50.9	-	272.5	3.9	232	176.9	8.2	2.3	63.5	-

Source: BITRE, 2015c, Sourced from: Public Transport Authority of Western Australia 2014 p .44; Public Transport Victoria 2014 pp. 26, 27; Department of Planning, Transport and Infrastructure 2014, p. 88; Queensland Rail 2014, p. 13.
Methodologies for calculating patronage vary between cities. Patronage here means passenger movement(million)
Brisbane does not include the separately administered Airtrain line. Patronage for this line are included in BITRE 2014e.
This is a combined Sydney Trains and NSW TrainLink total.
Patronage data are those reported by operators. For some cities, data differ to those reported in BITRE 2014e. This is because BITRE 2014e adjusts data where necessary to allow comparison across networks.

Sydney has the most utilised heavy rail system. In 2013–14, Sydney's heavy rail network attracted approximately 21.5% more patrons than heavy rail patrons in the second highest city, Melbourne. As Figure 78 shows, urban passenger traffic in Perth grew strongly over the last decade but declined in 2013–14. Melbourne also recorded heavy rail growth but a slight decline in light rail patronage beginning in 2013 (BITRE, 2015c).

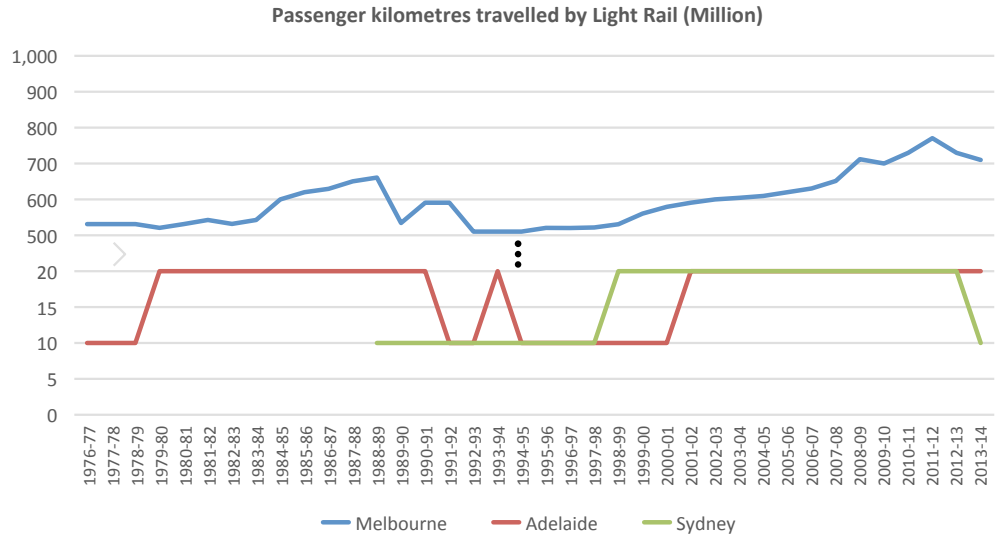
Total rail patronage in New South Wales grew year-on-year by 2.6% to just under 316 million passenger journeys, driven by strong growth in the Sydney area. Sydney Trains carried over 89% of all passenger journeys. NSW TrainLink Intercity services and NSW TrainLink regional services carried just over 10% and 0.6% of passenger journeys respectively in 2014–15. NSW TrainLink regional services load factor (the number of occupied seats) was 43.6%, slightly below the target of 46% for the year (NSW Government, 2013–14).

Figure 78: Heavy rail passenger-kilometres in capital cities (billion)



Source: BITRE, 2015d

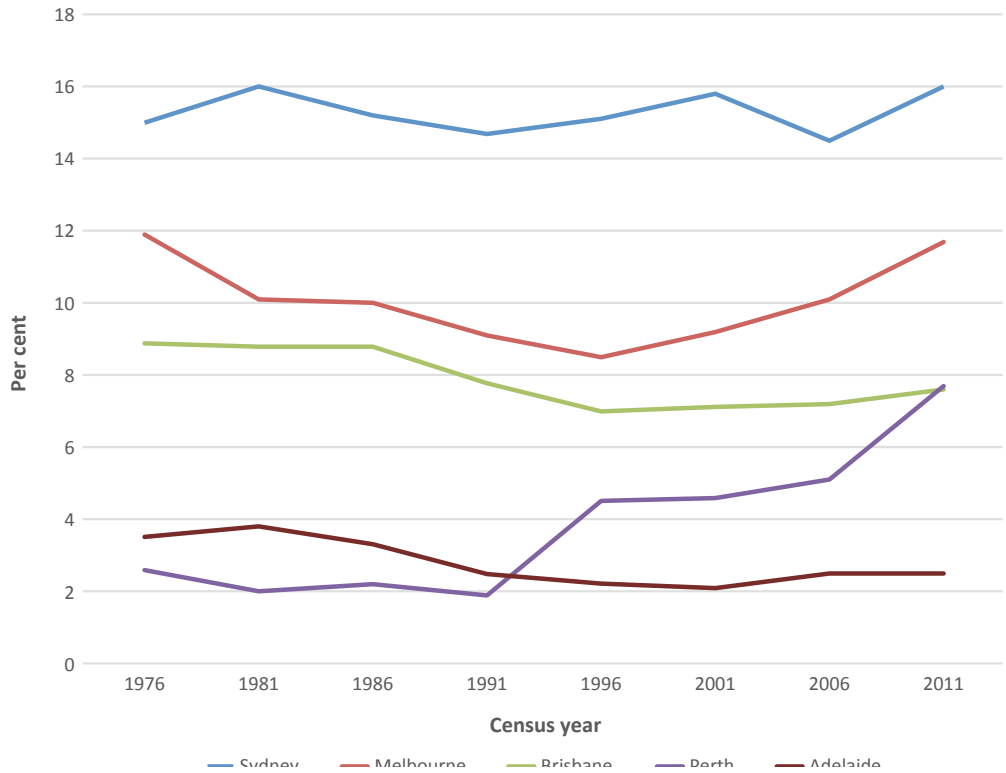
Figure 79: Light rail passenger-kilometres (billion) in capital cities



Source: BITRE, 2015d

Figure 80 shows the journey-to-work mode share data for heavy rail, derived from the Census, since 1976. The journey to work data from 2001 closely resembles total patronage trends over the last decade (BITRE, 2015c).

Figure 80: Journey to work mode share by heavy rail



Source: BITRE, 2015c

6.2.2 Non-urban public transport

Non-urban passenger traffic, broadly described as day-return (under 4 hours) and long-distance (over 4 hours) travel, can be further classified by the primary travel markets served:

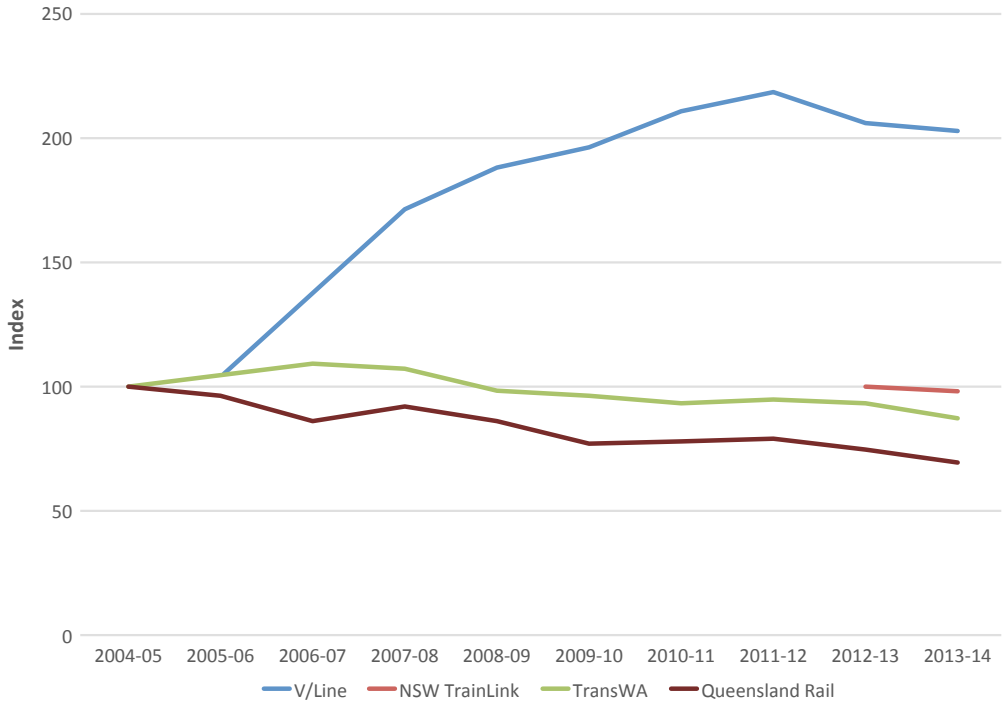
- 'inter-urban' or 'regional' travel, such as Sydney–Newcastle (now truncated), Sydney–Wollongong/Bomaderry, Melbourne–Ballarat and Perth–Bunbury. Such services could include daily commuting or day-return business or leisure travel
- long-distance connections between cities (such as Brisbane–Sydney) and regional centres, such as Sydney–Canberra and Perth–Kalgoorlie
- heritage railway travel, for nostalgia and leisure purposes; and tourist-focused services such as the Kuranda Scenic Railway (Queensland Rail), and Adelaide–Darwin (The Ghan) (Great Southern Rail).

Table 40: Non-urban rail patronage (thousands)

YEAR	QUEENSLAND RAIL	NSW	V/LINE	TRANSWA
2013–14	700	34,680	13,000	219

Source: BITRE, 2015c

Figure 81: Index of non-urban rail patronage by operator



Source: BITRE, 2015c
Notes: NSW Trainlink is the sum of CountryLink patronage and former CityRail inter-city lines. There is no New South Wales data presented for the periods prior to 2012–13 due to the formation of TrainLink on 1 July 2013. The 2012–13 data is an estimation the New South Wales Bureau of Transport Statistics calculated as an indexing benchmark immediately prior to TrainLink's formation. Including previous years' data would not be comparing 'like for like'.
Queensland Rail data exclude services under the TransLink brand on the Sunshine Coast and Gold Coast lines.
Sources: VLine 2014, p. 10; BITRE correspondence with NSW TrainLink; Public Transport Authority of Western Australia 2014, p. 54; Queensland Rail 2014, p. 39; historical annual reports.

Some noteworthy trends are (BITRE, 2015c):

- Queensland Rail non-urban rail travel has declined over the last decade. Long-distance and scenic railway services are vulnerable to reductions in discretionary spending because they rely on leisure travel and tourism (including foreign tourism which may be influenced by changes in the value of the Australian dollar). According to the Queensland Rail 2013–14 annual report, approximately half of its non-urban patronage for the financial year was on the Kuranda Scenic Railway.
- NSW TrainLink – it is not yet possible to assess meaningful NSW TrainLink patronage trends due to the formation of TrainLink on 1 July 2013. According to data TrainLink provided to BITRE however, regional patronage declined from 1.86 million journeys in 2012–13 to 1.80 million journeys in 2013–14 and 1.76 million journeys in 2014–15. Transport for NSW note the declining quality of long-distance services, including on-time running and frequency, has made train travel uncompetitive with cars.
- V/Line patronage has more than doubled over the last decade. This follows major upgrades from 2003 to 2006 under the Regional Fast Rail programme. The upgrades provided service enhancements that reduced scheduled transit times and increased frequencies. Other contributory factors on the patronage trend include a fare reduction (20% in March 2007), central Melbourne employment growth, and strong population growth in the affected corridors (such as in the Melton/Bacchus Marsh area, which grew 34% from 2007 to 2012. The rail upgrades may have stimulated such population growth. The 2012–13 decline can be attributed to the completion of the Sunbury Electrification Project that transferred some former V/Line passengers to Melbourne Metro services. V/Line further attributes the decline to the upgrades work and lengthy temporary line closures during the 2013–14 financial year. The opening of Regional Rail Link in June 2015, which separates inter-city trains from Geelong, Ballarat, and Bendigo from suburban Melbourne trains has further reduced scheduled inter-city transit times, which may make non-urban rail travel more attractive.
- TransWA patronage has declined since 2006–07, due to patronage decline on the PerthBunbury (Australind) route, which accounts for almost half the patronage of TransWA's rail. The service was disrupted by track work in 2008–09. The service's competitiveness was reduced in 2009–10 when the upgraded Forrest Highway was opened. This reduced road travel time between Perth and Bunbury. Another possible reason for declined patronage on the Australind is the opening of the Perth–Mandurah line, which runs roughly parallel to the Australind line immediately south of Perth.

Traffic data are not available for Great Southern Rail services (Sydney–Perth Indian Pacific; Melbourne–Adelaide The Overland; Adelaide–Darwin The Ghan) although, with one or two services per week, relatively modest patronage levels can be assumed.

6.2.3 Where are they moving them to and from?

Table 41 demonstrates the passenger-kilometres travelled by rail.

Table 41: Passenger-kilometres travelled by rail

RAIL	URBAN	NON URBAN	TOTAL	% OF DOMESTIC PKM	% OF TOTAL
Year	(b.pkm)	(b.pkm)	(b.pkm)	Task	Task
2012–13	12.93	2.28	15.21	3.60%	2.50%
2011–12	12.94	2.41	15.35	3.70%	2.60%
2010–11	12.69	2.31	15	3.70%	2.60%
2009–10	12.57	2.22	14.79	3.70%	2.60%
2008–09	12.48	2.16	14.64	3.70%	2.70%
2007–08	11.87	2.01	13.89	3.50%	2.50%
2006–07	10.98	1.89	12.87	3.30%	2.40%
2005–06	10.11	1.74	11.86	3.00%	2.20%
2004–05	9.57	1.81	11.38	2.90%	2.20%
2003–04	9.56	1.9	11.46	2.90%	2.20%
2002–03	9.19	2.06	11.26	2.90%	2.30%
2001–02	8.92	2.21	11.13	3.00%	2.30%
2000–01	8.92	2.16	11.08	3.00%	2.30%
1997–98	8.03	2.04	10.07	2.90%	2.30%

Source: Pekol Traffic and Transport, 2015

6.2.4 Percentage of urban, intrastate, interstate trips

Table 42 breaks down the rail passenger task with respect to urban and non-urban trips.

Table 42: Rail passenger task, percentage of urban, non-urban trips

RAIL	URBAN	NON URBAN	TOTAL	% OF DOMESTIC	% OF TOTAL
Year	(b.pkm)	(b.pkm)	(b.pkm)	Task	Task
2012–13	12.93	2.28	15.21	3.60%	2.50%
2011–12	12.94	2.41	15.35	3.70%	2.60%
2010–11	12.69	2.31	15	3.70%	2.60%
2009–10	12.57	2.22	14.79	3.70%	2.60%
2008–09	12.48	2.16	14.64	3.70%	2.70%
2007–08	11.87	2.01	13.89	3.50%	2.50%
2006–07	10.98	1.89	12.87	3.30%	2.40%
2005–06	10.11	1.74	11.86	3.00%	2.20%
2004–05	9.57	1.81	11.38	2.90%	2.20%
2003–04	9.56	1.9	11.46	2.90%	2.20%
2002–03	9.19	2.06	11.26	2.90%	2.30%
2001–02	8.92	2.21	11.13	3.00%	2.30%
2000–01	8.92	2.16	11.08	3.00%	2.30%
1997–98	8.03	2.04	10.07	2.90%	2.30%

Source: Pekol Traffic and Transport, 2015

7 Data gaps

Key points

There is sufficient data in the catalogue of sources to address the majority of the questions nominated in the terms of reference either fully, or at least partially.

The following 'gaps' in the available data were identified:

- number of ancillary versus hire-and-reward vehicles involved in road freight
- number of employees per fleet involved in road freight
- freight rail network utilisation using an agreed metric
- fleet profile for tourist train operators
- tourist rail usage
- passenger rail network utilisation using an agreed metric.

Based on the review of the catalogue of sources, there is sufficient data to address the majority of the questions nominated in the terms of reference either fully or at least sufficiently for strategic policy decision-making. For example, in some areas such as the split between hire and reward and ancillary, an estimate can be made which is sufficient for many purposes, but should more detailed analysis be required, a new collection may be necessary. The gaps are further explained below.

7.1 Road freight data gaps

7.1.1 Number of ancillary versus hire-and-reward vehicles

While we have made an estimate using 2011 Census data, a more specific and up-to-date analysis would provide an accurate indication of the number and types of vehicles specifically engaged in the 'business of transport', as opposed to those that transport freight in order to meet high-order business objectives. The function of and factors that influence these two groups are quite different, and policy and regulatory decision implications could be quite different for each group.

The most recent detailed estimate prior to the one in this report dates back to 2002 and so does not reflect current operations.

7.1.2 Number of employees per fleet

This information would allow the distribution of business size to be determined, facilitating a more targeted planning and policy response to road freight related issues.

Some information is available for a handful of the major operators (such as from their annual reports). However, no information is available relating to the (presumably) numerous smaller / owner-operator type businesses.

7.2 Rail freight data gaps

7.2.1 Commodities moved

Information on the commodities moved by rail is critical to understand the relationship between the various sectors of the economy and the scale of the rail freight task.

Presently, information is available that allows a broad classification of commodities into bulk, nonbulk, and intermodal. Also, detailed information is available for select commodities such as coal, sugar and ion-ore.

However, competition in the Australian rail freight industry means that operators are currently reluctant to provide information at the commodity specific level.

7.2.2 Rail network utilisation

Data on the utilisation of Australia's freight rail network would better inform planning and policy of road and rail networks in cases where they serve similar markets.

No information on rail network utilisation was found. It would be challenging to derive a consistent and accepted measure of network utilisation that takes into account the often dual passenger / freight function performed by the more congested parts of the network.

7.3 Rail passenger data gaps

7.3.1 Fleet profile for tourist train operators

Information is available on the length of track and rolling stock by operator in each state and territory. This information allows the supply of rail passenger services to be quantified.

No information on tourist train rolling stock was found. However, given the comparatively small share of the national passenger task performed by rail (i.e. less than 4%) and the even smaller share of this attributable to tourist related travel, the need to obtain information on this metric may be considered a lower priority.

7.3.2 Tourist rail usage

As above, no information was available about tourist train usage.

Given the comparatively small share of the national passenger task performed by rail (i.e. less than 4%) and the even smaller share of this attributable to tourist related travel, the need to obtain information on this metric may be considered a low priority.

7.3.3 Rail network utilisation

Data on the utilisation of Australia's passenger rail network would better inform planning and policy discussions about road and rail networks in cases where they serve similar markets.

No information on rail network utilisation was found. It will be challenging to derive a consistent and accepted measure of network utilisation that takes into account the often dual passenger/freight function performed by the more congested parts of the network.

7.4 Next steps

The NTC will work with stakeholders to identify the current and potential decisions that better transport use data could inform, as well as opportunities to standardise and improve information gathering, storage, sharing and analysis. We will determine whether the existing available information is sufficient, or whether we need to fill some of the identified gaps and if so, how. We will do this through producing two outputs:

1. a public discussion paper summarising the findings of phase 1, exploring some opportunities for improved information and discussing some draft recommendations to Ministers with government and industry in early 2017.
2. a report to the Transport and Infrastructure Council in late 2017.

If you would like to contribute to the next stages of the project, please check the National Transport Commission website for further information.

State attachments

New South Wales

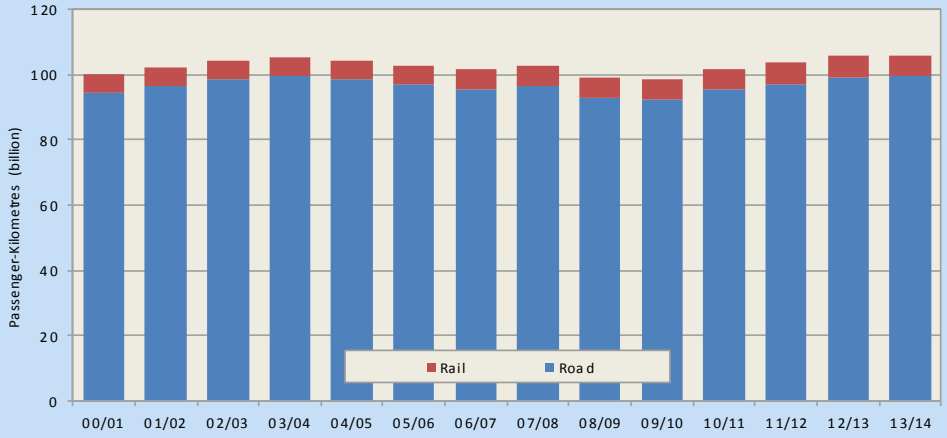
1

Overview

Domestic passenger task

In 2013–14, the combined road and rail passenger task in New South Wales increased 0.28% to 106 billion passenger-kilometers. The proportion of the passenger task serviced by road transport was 94% with rail contributing the remaining 6%, as shown in Figure 82. In the past 10 years the combined road and rail passenger task increased 0.28% per annum compared with a population growth of 1.23% per annum.

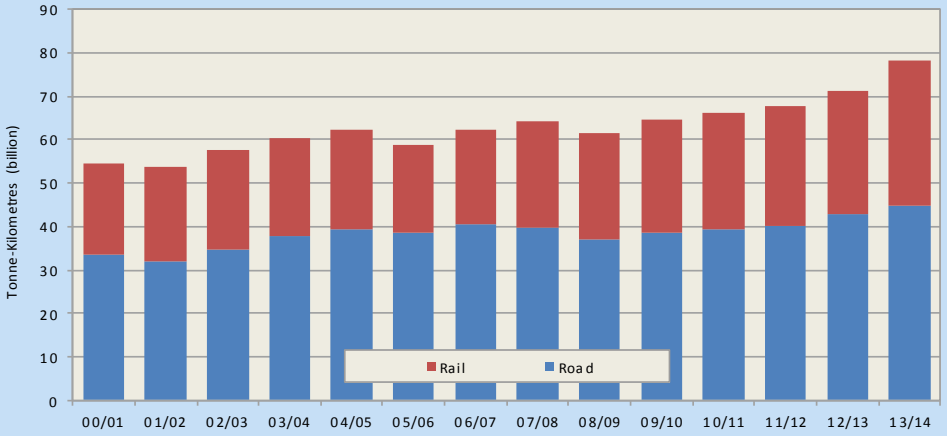
Figure 82: Road and rail passenger task, NSW



Domestic freight ask

The total amount of freight moved within New South Wales by road and rail increased 9.8% to 78.4 billion tonne-kilometres, with road accounting for 57% and rail accounting for the remaining 43%, further detailed in Figure 83. In the past 10 years the freight task undertaken by road and rail in New South Wales increased 2.7% per annum compared with a 1.96% per annum growth in GDP.

Figure 83: Road and rail freight task, NSW



A more detailed view of the road and rail passenger and freight task in New South Wales follows.

1.1 Networks

1.1.1 Road network

Key urban roads for container movements in Sydney are: Pennant Hills Rd., M2, M4, M5, M5 East, Airport tunnel, General Holmes Drive, King George Rd., Roberts Rd., Princes highway as well as Parramatta Rd., Eastern Distributor, and Qantas Drive (Shipping Australia Limited, 2011).

The regional freight roads are: M31 Hume highway, M1 Pacific Motorway, A32 Great Western highway, A15 New England highway, A1 Princes highway, A39 Newell highway, and A20 Sturt highway.

Figure 84: Sydney's freight road network

Source: NSW Government, 2013–14

Figure 85: B-double and road train routes in NSW, 2011

Source: NSW Government, 2013-14

1.1.2 Rail network

Major networks operating in New South Wales include:

- The Metropolitan Rail Area (MRA) is centred in Sydney under the management and control of Sydney Trains. It is used mainly by Sydney Trains for urban passenger services and NSW TrainLink for intercity and country services, but also carries intra and interstate freight trains.
- Approximately 4693 kilometres of track is managed by the ARTC under a long-term lease from the New South Wales Government. This includes the DIRN, the inland route between Parkes and Werris Creek, and the Hunter network, the latter comprising 1100 track kilometres. It is used primarily for transporting coal to Newcastle ports. It also carries bulk intermodal freight as well as commuter and long distance NSW TrainLink passenger services.
- The NSW Country Regional Network is owned by the New South Wales Government and managed by John Holland Rail. The network comprises 2500 kilometres of track and is used primarily for bulk commodities such as grain but carries other freight and longdistance passenger services. Dedicated metropolitan freight lines are relatively small in terms of their collective track length but serve a critical role in the effective management of the freight and passenger tasks in metropolitan areas.
- The Southern Sydney Freight Line (SSFL) is a 36-kilometre dedicated freight line that links the DIRN at Macarthur and the Metropolitan Freight Network.
- The Metropolitan Freight Network connects with the SSFL and provides dedicated access for freight trains to the Main Northern Line near Strathfield, the Illawarra Line near Tempe, as well as to major terminals including Port Botany which handles the majority of New South Wale's import / export containerised freight.

Sydney's primary freight and passenger train services operate over the North–South and East–West (via Lithgow) interstate corridors. Freight and passenger trains intensively and extensively share a common rail (standard-gauge) network. Sydney's urban network directly shares rail conduits with the national interstate rail freight system (BITRE, 2012a).

The dedicative freight lines are the Sandown Line, the Metropolitan Goods Line (Marrickville Junction – Campsie Junction – Chullora Junction – Sefton Park Junction and Flemington Junction – Chullora Junction), the Port Botany Goods Line (Marrickville Junction – Port Botany), and Strathfield Junction – Flemington Junction (BITRE, 2012a).

Important freight trackage in the city are the Metropolitan Goods Line and the Southern Sydney Freight Line, linking the interstate network with freight facilities at Leightonfield, Minto, Chullora, Cooks River and Port Botany. Southern Sydney Freight Line is a new line constructed in 2012 to remove the curfews for trains entering or leaving the southern side of Sydney. The Macarthur–Sefton Park Junction line connects with the existing dedicated Metropolitan Goods Line (Sefton Junction–Port Botany). Thus the line links the North–South Corridor with freight terminals at Port Botany, Chullora and Enfield (BITRE, 2012a).

Figure 86: Sydney's rail freight network

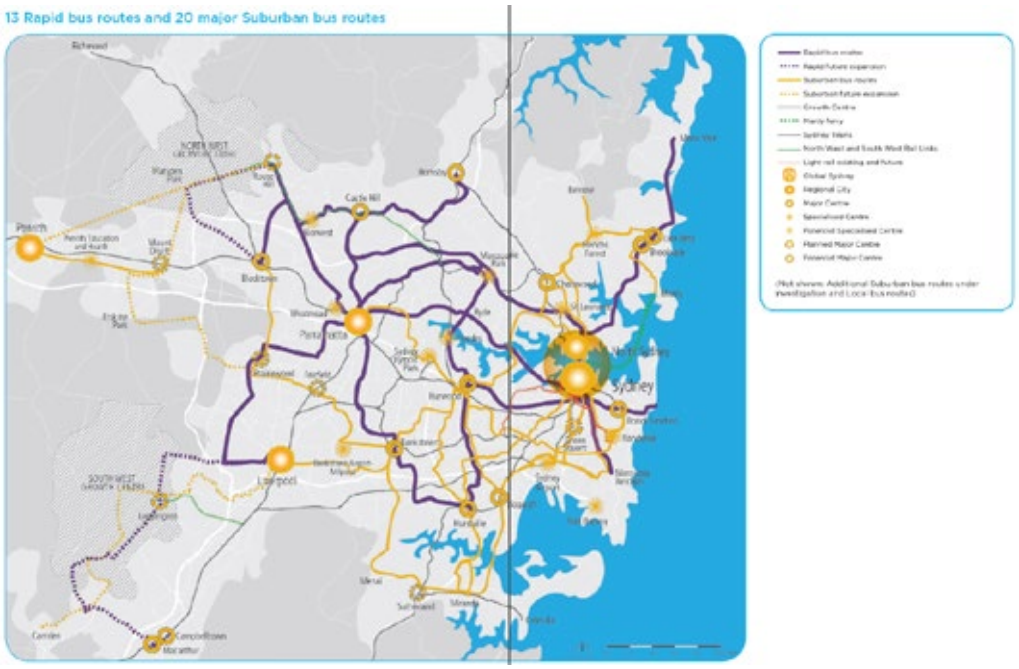
Source: BITRE, 2012a

1.1.3 Bus network

The bus network in Sydney also operates tightly with train and tram networks in 600 routes. There are special services as follows:

- Metrobus: high frequency, a high capacity bus network which runs every 10 minutes during peak hours, 15 minutes in off-peak, and 20 minutes during weekends, in a distinctive red colour. This service connects major activity centres in outer and inner suburbs as well as the CBD with long routes. There are 13 routes which provide 400,000 bus passengers weekly (Sydney Buses Info).
- Rapid bus routes: these operate as a backbone of the public transport, running every 5 minutes on weekdays and every 8 minutes on weekends. There are 13 rapid routes with exclusive bus lane, head-start traffic light and off-street interchanges. Twenty suburban routes will be confirmed in future.
- Express service on freeways: there is a bus lane operating along the M2 motorway, with bus stations in the median, which provides north-south connection in western Sydney.
- Hop-on hop-off services: free and commercial shuttle services operating in Sydney, Parramatta and Wollongong, running in a loop around popular shopping and business precincts.

Figure 87: Major bus routes in Sydney

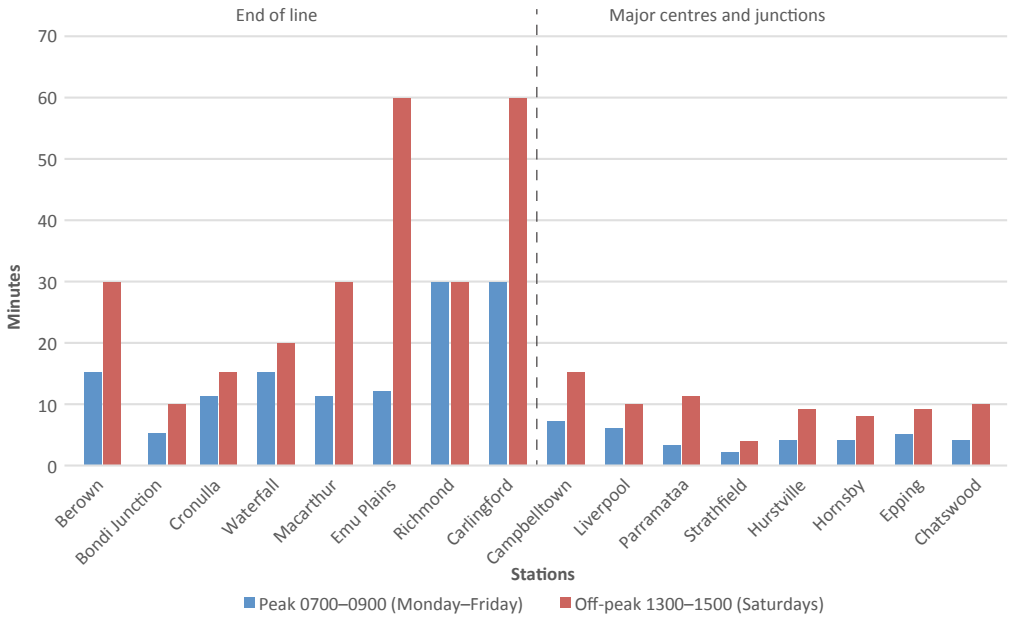


Source: NSW Government, 2013

1.14 Rail network utilisation

- The CityRail network has the largest patronage level in the country. Weekday commuting is an important task for Sydney's urban railway network. Around 46% of Sydney CBD workers travel to work by train. In addition, rail's mode share of work trips is over 25% to North Sydney, Chatswood, Bondi Junction, and St Leonards; the share is 24% to Parramatta (BITRE, 2012a).
- Of the five cities, arguably Sydney has the most challenging network capacity issues especially as the core urban lines also form the backbone of the North–South corridor. Each city has challenges in planning for future patronage but Sydney's existing network provides significant capacity challenges.
- Average train intervals vary greatly throughout the network. Strathfield has the best train interval (or, put another way, highest train frequency) with an average 2 minutes between trains during the peak and 4 minutes between trains in the defined off-peak period. Strathfield railway station benefits from short train intervals due to its location at the junction of the Northern line with the Inner West, South and Western lines. It is a major interchange station which also serves regional and interstate CountryLink passengers and abuts a bus interchange. By contrast, stations on branch lines such as Carlingford and Richmond have relatively long intervals between trains in both the peak and off-peak.
- Sydney's passenger railway network is cast around the North–South interstate spine and the East–West 'via Lithgow' spine to Perth.
- The existing urban passenger task is mostly focused on radial corridors linking the city centre and the suburbs. Sydney's rail system also caters well for non-radial links to some key urban centres, including commercial centres at Parramatta, Chatswood and North Sydney, event centres such as Olympic Park and residential developments such as Green Square (BITRE, 2012a).

Figure 88: Average time between trains for services arriving at Sydney Central



Source: BITRE, 2012 #53, sourced from CityRail timetables in Oct 2011

1.2 Rail operators

Interstate and Hunter Valley lines are leased to the Commonwealth Government-owned Australian Rail Track Corporation (ARTC). The Sydney urban system is operated by New South Wales Government-owned Sydney Trains. The Countrylink and outer services to the Central Coast, Blue Mountains and Illawarra are operated by NSW Trains. Regional branch lines are owned by the New South Wales Government agency Transport for NSW and operated under contract by ARTC (Australian Government, 2015).

On 30 June 2015 there were 81 operators accredited by the National Rail Safety Regulator under Rail Safety National Law for operations in New South Wales:

- Sydney's urban passenger network comprises heavy and light rail. Heavy rail carries the majority of passengers, with an estimated 290 million passenger journeys over 1820 track kilometres.
- Light rail operates an estimated 4 million passenger journeys over approximately 24 track kilometres, following a significant extension to the light rail network in Sydney's inner west. In regional New South Wales, NSW TrainLink is the major passenger railway carrying an estimated 16 million passengers on a number of networks managed by other operators (National Rail Safety Regulator, 2014-15).

1.2.1 Rail tourist operators

- Cockatoo Run diesel hauled heritage tourist train running from Sydney over Cityrail lines to Wollongong, and thence via the little used line via Robinson to Moss Vale in the Southern Highlands.
- Cooma Monaro Railway tourist line using heritage railcars, between Cooma and Chakola (19 km).
- Dorrigo Steam Railway proposed tourist service on portions of the line between Glenreagh and Dorrigo.
- Glenreagh Mountain Railway tourist line operating occasional steam trains on a short section of line from Glenreagh West. An eventual extension is proposed to Ulong, a distance of some 35 km.
- Katoomba Scenic Railway funicular in Scenic World at Katoomba in the Blue Mountains. The line descends 415 metres through a cliff tunnel into rain forest.
- Lachlan Valley Railway steam and diesel hauled trains and heritage railcars operating from Cowra.
- Lithgow State Mine Railway Eskbank Goods Yard, Lithgow, to the Lithgow State Mine, about 3 km, standard gauge. Tourist operation with heritage railcars planned to commence in 2015.
- Richmond Vale Railway Museum offers train rides within the Museum grounds on certain days. Steam or diesel hauled.
- Skitube Bullock Flats to the Perisher Ski Resort, about 10 km, most of which is in tunnel. Although primarily intended for skiers, day trips are also offered. Standard (1435 mm) gauge rack railway, electric railcars.
- Zig Zag Railway steeply inclined tourist railway operated by adhesion, with switchbacks. Located at Clarence, near Lithgow.
- Heritage Park Railway miniature railway in Lismore. 429 m, 184 mm gauge, diesel hauled.
- Sydney Tramway Museum operating preserved trams.
- Valley Heights Steam Tramway carriages hauled by steam tramway and other locomotives at the Loco Depot Heritage Museum in Valley Heights.

(Williams, 2016)

1.3 Freight task

Port of Botany in Sydney:

About 85% of containers originate from or are bound for a destination within 40 km of Port of Botany. Despite having lower trade volume compared with import volume, export containers account for an average of 60% of the total containers moved by rail through the Port of Sydney in 2010. Currently, in Sydney, road freight accounts for nearly 86% of total freight movement, with some 70–75% of the road transport task handled via off-port facilities (Shipping Australia Limited, 2011).

1.4 Passenger task

The following points summarise the estimated public transport trips in 2031 and changes compared with 2011 notable for each state: (VLC, 2014).

Sydney

- Total weekday rail and bus in-service vehicle kilometres have increased (in percentage terms) by far less than the projected increase in population. Rail in-service vehicle-kilometres increased 11%, while bus in-service vehicle-kilometres increased 13%, the population is projected to increase by 34%.
- The rate of increase in usage of the public transport system is predicted to be higher than the projected increase in population. This is particularly the case for CityRail and the ferries.
- Bus usage increases in line with the projected increase in population.
- There is a very large increase in light rail usage (657%) as a result of the planned expansion of the network and the large increase in light rail vehicle-kilometres.
- Total weekday rail in-service vehicle kilometres have increased (in percentage terms) by far less than the projected increase in population. Rail in-service vehicle-kilometres increased 11%, whereas the population is projected to increase by 34%.
- The rate of increase in usage of the public transport system is predicted to be higher than the projected increase in population. This is particularly the case for CityRail.

Table 43 summarises the modelled base year and the 2031 public transport trips for the modelled area in terms of patronage and network supply indicators and by time of day.

Table 43: Predicted growth in public transport ridership in Sydney (2011–2031)

		TOTAL BOARDING				SERVICE KILOMETRES			
		AM Peak	off-peak	PM peak	24 Hours	AM Peak	off-peak	PM peak	24 Hours
Rail	2011	320,838	802,461	284,771	1,408,070	17,032	88,526	18,254	123,845
	2031	502,405	1,215,046	446,333	2,163,784	19,625	96,953	20,818	137,396
	Changes	57%	51%	57%	54%	15%	10%	14%	11%
Light Rail	2011	2,149	10,014	2,188	14,351	190	945	190	1,325
	2031	18,470	71,798	18,366	108,634	1,436	4,828	1,439	7,706
	Changes	759%	617%	739%	657%	657%	411%	657%	482%
Bus	2011	301,691	847,420	640,657	1,389,768	94,232	349,507	89,910	533,649
	2031	405,581	1,151,947	325,469	1,882,997	109,067	886,783	104,750	600,600
	Changes	34%	36%	35%	35%	16%	11%	17%	13%
Ferry	2011	9,022	22,923	8,104	40,049	1,259	5,312	1,199	7,770
	2031	16,893	33,433	13,260	63,586	1,259	5,312	1,199	7,770
	Changes	87%	46%	64%	59%	0%	0%	0%	0%

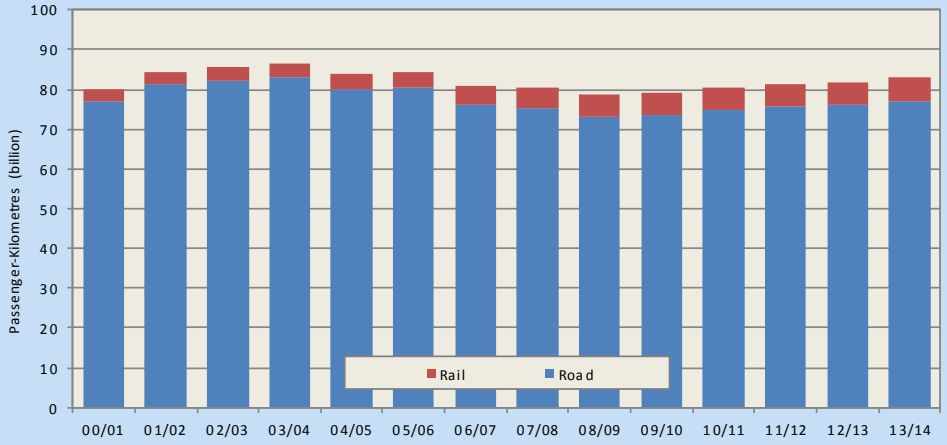
2 Victoria

Overview

Domestic passenger task

In 2013–14, Victoria's combined road and rail passenger task increased 1.75% to 83.2 billion passenger-kilometres. The proportion of the passenger task serviced by road transport was 93% with rail contributing the remaining 7%, as shown in Figure 89. In the past 10 years the combined road and rail passenger task decreased 0.4% per annum compared with a population growth of 1.71% per annum.

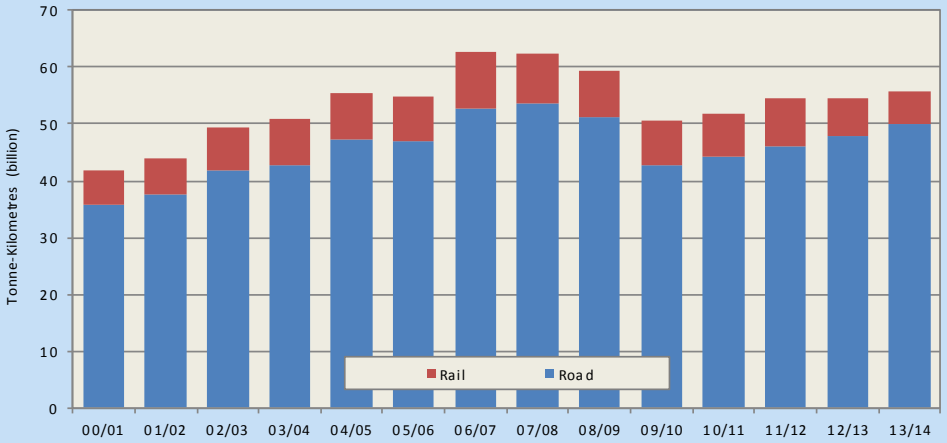
Figure 89: Road and rail passenger task, VIC



Domestic freight task

The total amount of freight moved within Victoria by road and rail increased 2.2% to 55.7 billion tonne-kilometres, with road accounting for 90% and rail accounting for the remaining 10%, further detailed in Figure 90. In the past 10 years the freight task undertaken by road and rail in Victoria increased 0.9% per annum compared with a 2.25% per annum growth in GDP.

Figure 90: Road and rail freight task, VIC



A more detailed view of the road and rail passenger and freight task in Victoria follows.

2.1 Networks

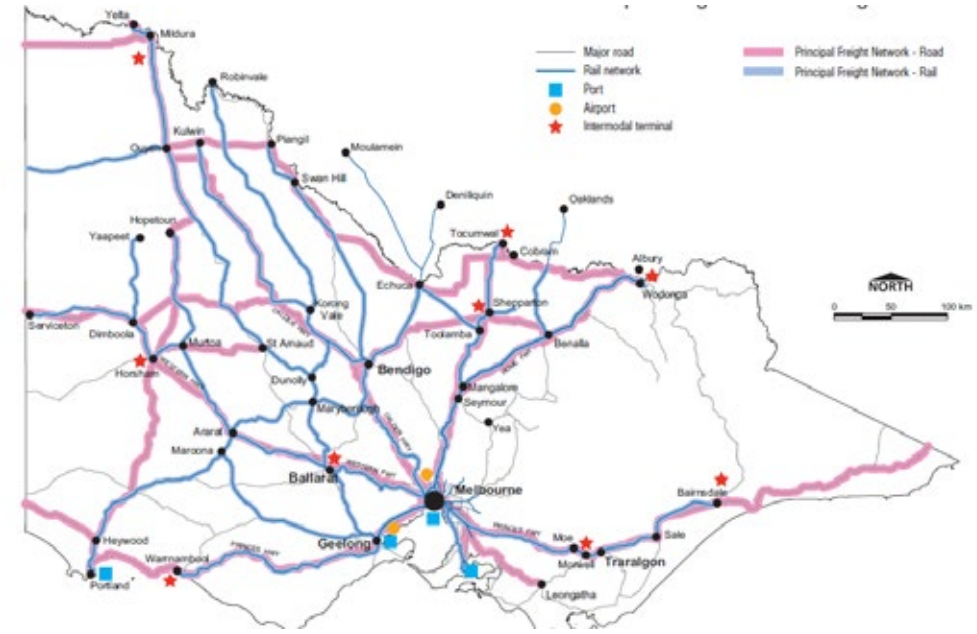
2.1.1 Road network

VicRoads manages freeways and arterial roads. All declared arterial roads managed by VicRoads have the capacity to carry heavy freight traffic (State of Victoria, 2008).

Major road link for container movements are: West Gate Bridge, the Monash-West Gate corridor, Western ring Rd., Eastern corridor, Tullamarine freeway and Citylink. (Shipping Australia Limited, 2011).

The number of tonnes of freight moving around Melbourne by road will almost double by 2030 from 2008 (State of Victoria, 2008).

Figure 91: Principal regional freight network in Victoria



Source: State of Victoria, 2008

Figure 92: Principal metropolitan freight network

Source: State of Victoria, 2008

2.1.2 Rail network

Victoria rail's network comprises (State of Victoria, 2008):

- The urban or metropolitan network consists of the wider broad gauge track, predominantly servicing commuter passenger services within Melbourne.
- The intrastate network is also predominantly broad gauge track, servicing regional freight and passenger services.
- The interstate network is exclusively standard gauge track, also servicing both freight and passenger services.

Interstate standard gauge lines are leased to the Australian Rail Track Corporation (ARTC). Broad gauge (and some standard gauge) branch lines are owned by the Victorian Government-owned VicTrack. VicTrack also owns a significant portion of the state's passenger rolling stock (trains and trams). The Melbourne urban passenger system is operated by the Victorian Government authority Public Transport Victoria (Australian Government, 2015).

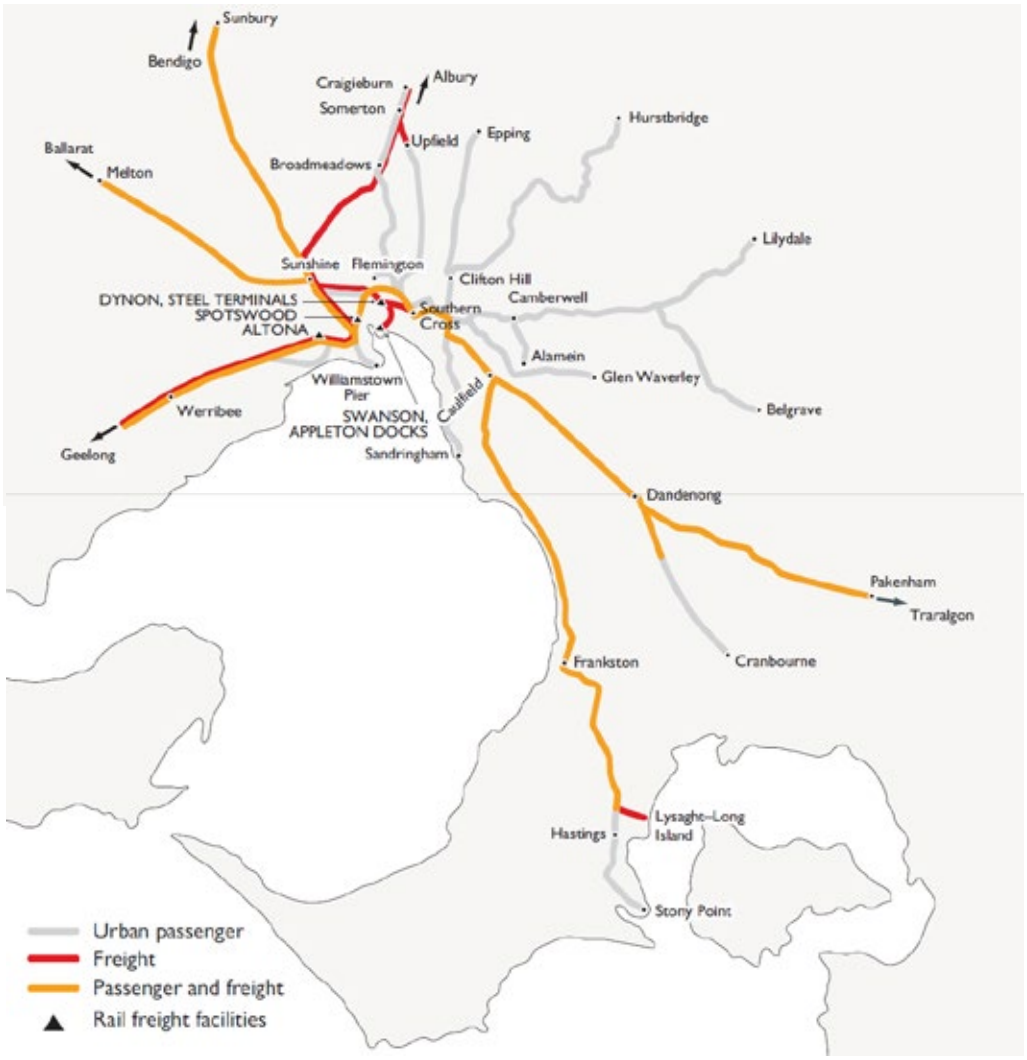
In Victoria there is the following primary freight network (National Rail Safety Regulator, 2014-15):

- The ARTC freight network, predominantly two standard gauge lines (with some branch lines) consisting of approximately 1332 km of track.

The intrastate network is also predominantly broad gauge track, servicing regional freight and passenger services. The interstate network also is exclusively standard gauge track, also servicing both freight and passenger services (State of Victoria, 2008).

Melbourne's broad gauge passenger network is largely separated from interstate standard gauge freight movements; the dedicated, and un-electrified, freight network in the city is relatively large (66 km route length). Urban and non-urban passenger trains share some tracks with broad gauge freight trains. Other dedicative freight lines in Melbourne metropolitan area are Donnybrook in the north and Werribee in the south west. There are also dual gauge freight lines between Newport, Tottenham and Dynon (BITRE, 2012a).

Figure 93: Melbourne's rail freight network

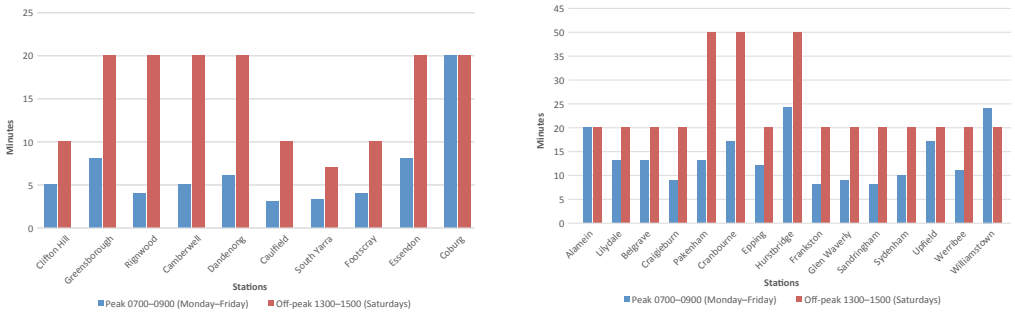


Source: BITRE, 2012a

2.1.3 Rail network utilisation

- In the Melbourne Working Zone, 9.4% use the train to journey to work, with 2.2% using tram/light rail and 1.4% using bus. Tram/light rail has a dense network / service in the inner suburbs, so it has a relatively high mode share (13%) in those suburbs. Trains carry over 70% of Melbourne residents who use public transport for journeying to work (BITRE, 2012a).
- The structure of the network into branch lines means that stations which are closer to the city loop will generally have higher service standards than more remote stations. Thus, although Melbourne's network is designed as a radial system, with lines converging on central Melbourne, the rail system provides service standards that enable some suburban centres to provide attractive service quality to non-CBD destinations (BITRE, 2012a).
- Melbourne's passenger rail network is the most widely-used public transport mode in the city, albeit less prominent than in the commuting-only task (BITRE, 2012a).

Figure 94: Average time between trains arriving at Flinders St Station from major centres and junctions (left-hand), at Flinders street (right-hand)



Source: BITRE, 2012 #53, sourced from MetroTrains Melbourne timetables in Oct 2011

2.1.4 Bus network

Melbourne's bus network is predominantly radial. Melbourne also has an extensive tram network (largest in the world, 245 km route length) which is integrated into bus and train networks and carries a significant share of the public transport task in Melbourne. Thus, to provide access to CBD, tram also plays an important role. The most utilised public transport networks in Melbourne can be implied as:

- SmartBus: facilitating access to city and complementing Melbourne's radial train and tram network, with high frequency and extended hours (every 15 minutes from 6:30 am to 9 pm on weekdays, and 30 minutes other times). The SmartBus network includes three orbital SmartBus routes and four Doncaster Area Rapid Transit SmartBus routes that run from Manningham to the City. SmartBus has features of bus rapid transit (BRT) such as lowfloor buses, priority at traffic lights, and new communication technologies.

Figure 95: SmartBus routes in Melbourne

2.1.5 Tourist bus routes

- In Melbourne, the bus shuttle stops at 13 key city locations. It runs every 30 minutes, seven days a week from 9.30 am to 4.30 pm. The full trip takes approximately 90 minutes and includes on-board commentary.

2.2 Rail operators

As at 30 June 2015 there were 37 operators accredited by the National Rail Safety Regulator (NRSR) under Rail Safety National Law for operations in Victoria. The Office of the NRSR regulated rail industry in Victoria comprises the following primary networks (National Rail Safety Regulator, 2014-15):

- Commercial passenger rail operator Metro Trains Melbourne (MTM) operating over 830 kilometres of track with 222.5 million passenger trips in 2014.
- Commercial regional rail operator V/Line has a network consisting of five short haul and eight long haul lines totalling 1747 km with 13.1 million passenger trips in 2014.
- The ARTC freight network, predominantly two standard gauge lines (with some branch lines) consisting of approximately 1332 km of track, various tourist and heritage rail operators.

2.2.1 Tourist rail operators

Puffing Billy Railway

This century-old steam train continues to run on its original mountain track from Belgrave to Gembrook in the magnificent Dandenong Ranges 40 kilometres east of Melbourne. Puffing Billy was built to serve at the turn of the century and is a genuine relic of Victoria's more leisurely days. The Railway is the major survivor of four experimental lines used to develop rural areas in the early 1900s. Puffing Billy Railway is now a major tourist attraction and operates every day except Christmas Day, thanks to the efforts of more than 900 dedicated volunteers (Tourism Victoria, 2014-15).

In October 2010, Tourism Victoria released estimates of the direct and indirect contribution to that state's economy of a single rail heritage operator, Puffing Billy which totalled $49.4 million a year (Scott et al., 2013).

Other operators are:

- Alexandra Timber Tramway steam hauled trains on a short 2 ft (610 mm) gauge line at a museum in Alexandra.
- Bellarine Railway 3 ft 6 in (1067 mm) gauge tourist railway with steam hauled trains and luxury railcars between Queenscliff and Drysdale, a distance of 16 km.
- Bulla Hill Railway miniature railway in Bulla. 5 in (127 mm) and 7¼ in (184 mm) gauge, about 1.5 km in length; steam or diesel hauled. Open to the public for rides during the afternoons of two Sundays each month throughout the year.
- Coal Creek Bush Railway steam and diesel hauled trains on a 2 ft (610 mm) gauge line in the Coal Creek Heritage Village at Korrumburra.
- Daylesford Spa Country Railway 5 ft 3 in (1600 mm) gauge tourist with heritage railcars between Daylesford and Bullarto. Dining facilities on certain trains.
- Diamond Valley Railway miniature railway in Lower Park, Eltham. 7¼ in (184 mm) gauge, over 2 km in length with extensions proposed; steam or diesel hauled or battery electric railcar. Operates Sundays throughout the year, on certain other days during school holidays, or by private charter.
- Kerrisdale Mountain Railway 2 ft (610 mm) gauge tourist line at Kerrisdale (between Seymour and Yea). The steeply graded line has diesel hauled trains using former industrial locomotives.
- Mornington Railway 5 ft 3 in (1600 mm) gauge tourist railway with steam and diesel hauled trains between Mornington and Moorooduc.
- Perisher Skitube modern rack railway, 8.5 km in length of which 6.3 km is in tunnel, serving the Kosciuszko National Park near Jindabyne in the Snowy Mountains.
- Puffing Billy steam hauled 2 ft 6 in (762 mm) gauge tourist railway between Belgrave and Gembrook in the Dandenong Ranges (a distance of 23 km), also serving Emerald Lake Park.
- Red Cliffs Historical Steam Railway steam hauled trains on a 2 ft 6 in (610 mm) gauge line, 2 km in length, at Red Cliffs (Website provided by ATR).

- South Gippsland Tourist Railway 5 ft 3 in (1600 mm) gauge railway with diesel hauled trains and heritage railcars between Nyora and Leongatha, a distance of about 38 km. The principal station is at Korumburra.
- Steamrail Victoria steam hauled rail tours on 5 ft 3 in (1600 mm) gauge main lines.
- Victoria Goldfields Railway 5 ft 3 in (1600 mm) gauge tourist railway with steam and diesel hauled trains between Castlemaine and Maldon.
- Walhalla Goldfields Railway 2 ft 6 in (762 mm) gauge tourist railway with steam hauled trains on the spectacular river gorge line between Thomson and Walhalla, a distance of 4.5 km.
- Yarra Valley Railway the 5 ft 3 in (1600 mm) gauge line from Healesville to Yarra Glen and Lilydale is in the course of restoration as a tourist railway. At present, trips operate only on a short section of the line.
- Ballarat Tramway Museum operating preserved trams.
- Bendigo historic trams in the city centre.
- Portland Cable Trams diesel powered replica of former cable trams, serving various tourist attractions in Portland.
- Tramway Museum Society of Victoria operating preserved trams in the grounds of the museum at Bylands.
- Altona Miniature Railway 5 in (127 mm) and 7¼ in (184 mm) gauge miniature railway some 1.5 km in length, in Lynch Reserve, Melbourne. Steam and diesel hauled.
- Diamond Valley Railway extensive 7¼ in (184 mm) gauge miniature railway in Eltham Lower Park, Melways.

(Williams, 2016)

2.3 Freight task

Port of Melbourne

Nearly 80% of international freight moving through the Port of Melbourne has origins and destinations within a radius of about 40 km of the port. Road transport is the dominant mode of transport used for port-related containers (more than 90%) while rail transport accounted for only nine percent of the total movement (Shipping Australia Limited, 2011). In particular, total container trade through the Port of Melbourne is projected to increase at least four-fold to eight million containers (TEUs) by 2035 (State of Victoria, 2008).

2.4 Passenger task

The following points summarise the estimated public transport trips in 2031 and changes compared with 2011 notable for each state (VLC, 2014):

- Total public transport boardings are expected to nearly double (+95%) over the period. This is slightly higher than the 84% increase in public transport trips, thus indicating a higher level of interchanging.
- The highest growth is expected on the regional services (+271%) doubling its share of total rail trips from 4% to 8% over the period.
- The rate of growth for rail boardings is higher than the total public transport increase (i.e. 103%) while the increase for tram boardings is lower at 77%.

Table 44 summarises the modelled base year and the 2031 public transport trips for the modelled area in terms of patronage and network supply indicators and by time of day.

Table 44: Predicted growth in public transport ridership in Melbourne, 2011–31

		TOTAL BOARDING				SERVICE KILOMETRES			
		AM Peak	off-peak	PM peak	24 Hours	AM Peak	off-peak	PM peak	24 Hours
Rail	2011	263,357	508,503	232,548	1,004,408	16,299	59,018	15,098	90,415
	2031	491,761	1,108,455	441,022	2,041,237	21,706	106,010	21,707	149,423
	Changes	87%	118%	90%	103%	33%	80%	44%	65%
Light Rail	2011	103,620	344,706	118,426	566,752	9,653	46,873	10,568	67,094
	2031	176,442	623,557	203,399	1,003,398	11,863	70,312	12,069	94,244
	Changes	70%	81%	72%	77%	23%	50%	14%	40%
Bus	2011	107,079	331,196	73,535	511,811	61,380	273,022	61,050	395,451
	2031	206,601	653,197	148,442	1,008,240	92,216	522,903	92,835	707,954
	Changes	93%	97%	102%	97%	50%	92%	52%	79%

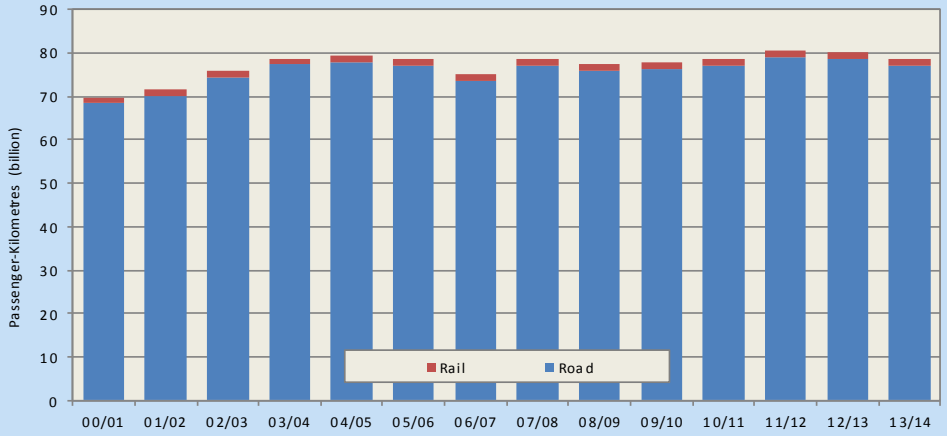
3 Queensland

Overview

Domestic passenger task

In 2013–14, Queensland's combined road and rail passenger task decreased 1.84% to 78.6 billion passenger-kilometres. The proportion of the passenger task serviced by road transport was 98% with rail contributing the remaining 2%, as shown in Figure 96. In the past 10 years the combined road and rail passenger task decreased 0.03% per annum compared with a population growth of 2.1% per annum.

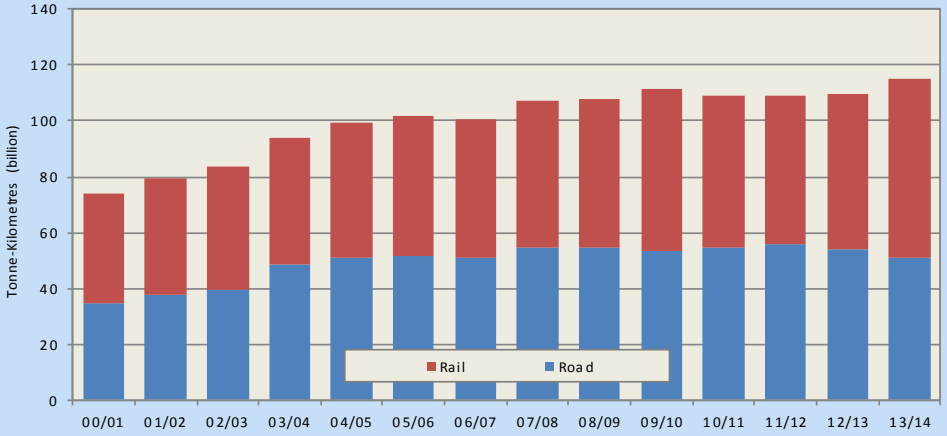
Figure 96: Road and rail passenger task, QLD



Domestic freight task

The total amount of freight moved within Queensland by road and rail increased by 4.95% to 115.4 billion tonne-kilometres, with road accounting for 44% and rail accounting for the remaining 56%, further detailed in Figure 97. In the past 10 years the freight task undertaken by road and rail in Queensland increased 2.1% per annum compared with a 3.7% per annum growth in GDP.

Figure 97: Road and rail freight task, QLD



A more detailed view of the road and rail passenger and freight task in Queensland follows.

3.1 Networks

3.1.1 Road network

Bruce highway is the Queensland's major north-south corridor connecting coastal population centres from Brisbane to Cairns and supporting 58% of the state population. Other major routes include the Warrego highway, Flinders and Barkly Highways, Gateway, Logan, Ipswich and Pacific motorways, Toowoomba road range crossing, Burleigh connection Rd., Labrador-Corrara Rd., Stapylton-Jacobs well Rd, Gympie-Brooloo Rd., Miva Rd., Maryborough Rd., Sunshine Motorway and Mooloolah connection Rd (Queensland Government, 2013; QTLC, 2014).

Figure 98: Road freight in Queensland

Source: QTLC, 2014

3.1.2 Rail network

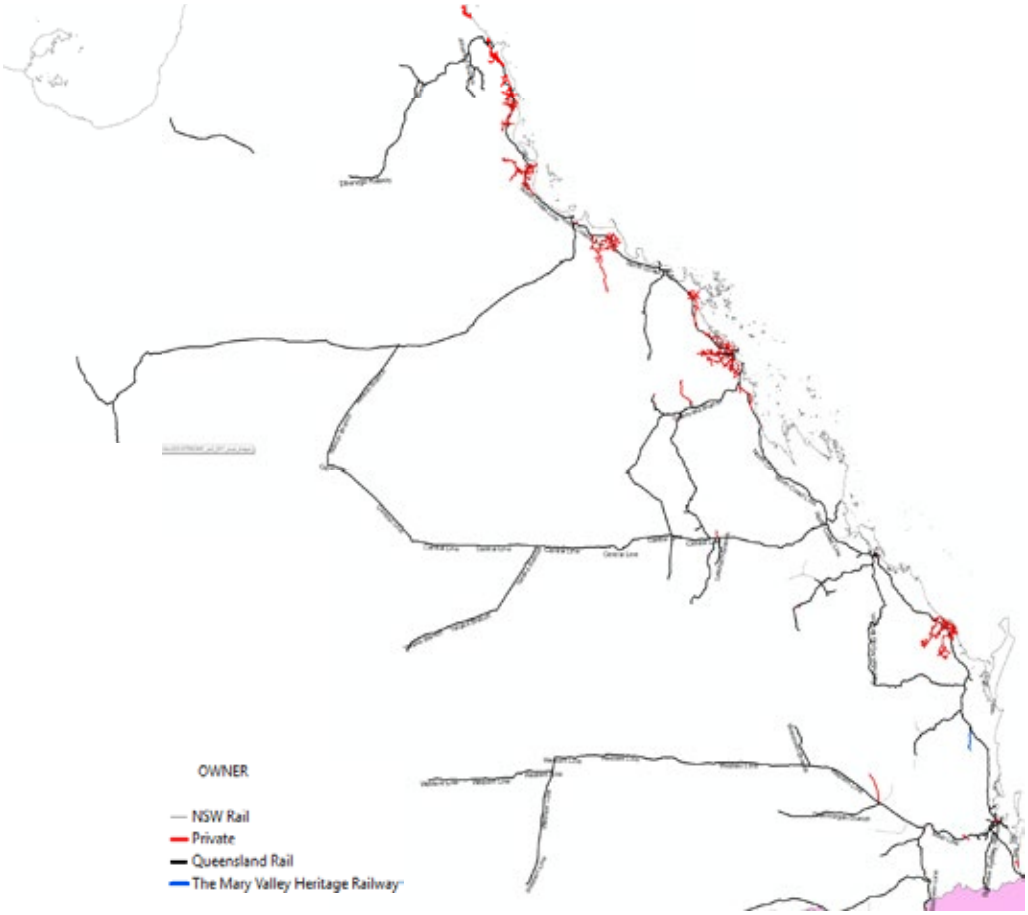
In 2014–15, Queensland Rail had total railings of approximately 18,128 million gross tonne-kilometres (GTKs) of freight by operators Pacific National and Aurizon. The regional system and commodity details of these freight movements are:

- Mount Isa line – $94.73 million revenue railing mineral concentrate, intermodal freight, sulphuric acids and fertiliser
- West Moreton system – $58.11 million revenue railing coal, wheat and sorghum
- North Coast line – $45.73 million revenue railing minerals, sugar and molasses and containerised freight
- Regional system – $1.81 million revenue railing sorghum, wheat and live cattle.

There is an interstate standard-gauge freight (and limited intercity passenger) line, forming the northern end of the Brisbane–Melbourne North–South rail corridor. The line connects Brisbane Roma Street to a freight-only dual narrow / standard gauge to the Port of Brisbane at Fisherman Islands.

The dedicated freight network also includes the dual gauge line from Bromelton to Yeerongpilly Junction, where it joins the passenger network, spur lines to Fisherman Islands, Swanbank, Ipswich Workshops and Ebenezer. Brisbane also has the second-longest dedicated freight network at 81 km. Much of this route length is the interstate line between Acacia Ridge and Bromelton, the northern end of the Brisbane–Melbourne north–south corridor, as per Figure 99 and Figure 100.

Figure 99: Regional rail network, Queensland



- The North Coast Line, Western and South Western rail systems are shared by metropolitan and long-distance regional passenger rail demands, with passenger and freight trains sharing parts of the same rail corridors and network passenger services prioritised over freight (Transport and Main Roads, 2013).
- The Central West rail is used both for mixed commodity services and for the Spirit of the Outback passenger service, a once-weekly service between Longreach and Brisbane, accommodating up to 200 passengers per trip (Infrastructure Australia, 2015).

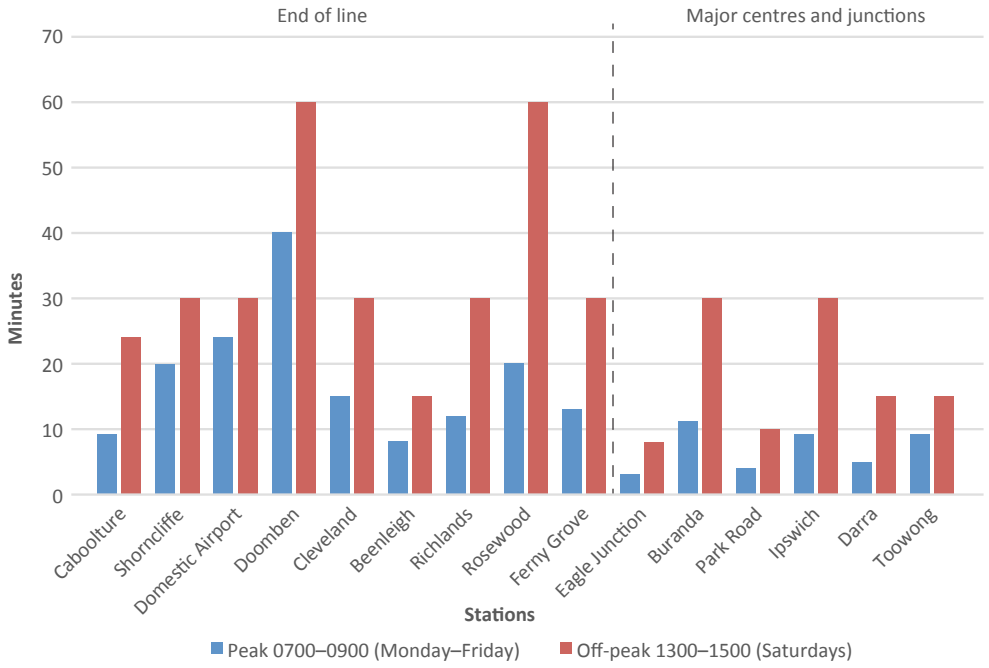
Figure 100: Brisbane's rail freight network

Source: BITRE, 2012a

3.1.3 Rail network utilisation

- The Queensland Rail system (urban and inter-urban), carries around 60 million passengers per annum. Rail represented about 6% of total passenger-kilometres travelled in Brisbane in 2008 (BITRE, 2012a).
- The urban passenger network is focused on the central Brisbane stations of Roma Street, Brisbane Central and Fortitude Valley (formerly Brunswick Street), and with most trains also serving South Brisbane and South Bank (formerly Vulture Street). In recent years, TransLink have constructed bus-only corridors ('busways') into the city centre; some of these operations connect with Queensland Rail services at Roma Street and other central Brisbane railway stations. More generally, the objective has been to coalesce the dedicated rail and bus corridors within the city and, indeed, the busways and passenger railways are presented on the same maps for would-be travellers (BITRE, 2012a).
- The suburban network is dominated by three core lines: The Beenleigh line (with interurban services beyond, to Varsity Lakes), the Ipswich / Rosewood line (with country passenger and freight services to Toowoomba and westward to Quilpie and Goondiwindi), and the North Coast line (with inter-urban and country passenger services and freight). (BITRE, 2012a).
- Railway stations that are located at junctions generally have higher train frequencies. The relatively low-time intervals for Caboolture–Brisbane and Beenleigh–Brisbane trains also reflect the stations' dual roles as urban and inter-urban stations (for Sunshine Coast and Gold Coast services respectively) (BITRE, 2012a).
- As with Sydney and Melbourne, the operations are strongly geared towards commuting, with extended, 30-minute intervals in the off-peak (Saturday daytime) (BITRE, 2012a).

Figure 101: Average time between trains for services arriving at Brisbane Central



Source: BITRE, 2012a

3.1.4 Bus network

In Brisbane, the most utilised public network can be referred to high frequency routes which are categorised as:

- BUZ (Bus Upgrade Zones): providing services on main corridors every 10 minutes or less during commuter peak times and every 15 minutes or less at all other times from 6 am to 11 pm.
- CityGlider: servicing the CBD and passing attraction points between Newstead and West End every 5 minutes during peak hours and 10 to 15 minutes during off-peak.
- Free City loop and Spring Hill loop: providing access within CBD, City Loop operates in distinctive red colour and runs clockwise and anti-clockwise. Spring Hill Loop operates in a continuous loop between city and Spring Hill using distinctive yellow colour. The CityHopper is free ferry service running every 30 minutes from 6 am to midnight, seven days a week. The CityHopper travels along the Brisbane River, stopping at North Quay, South Bank 3, Maritime Museum, Thornton Street, Eagle Street Pier, Holman Street, Dockside and Sydney Street terminals.
- Great Circle line: operating clockwise and anti-clockwise around Brisbane's outer suburbs to provide access between suburbs.

Figure 102: Buz and CityGlider network map in Brisbane

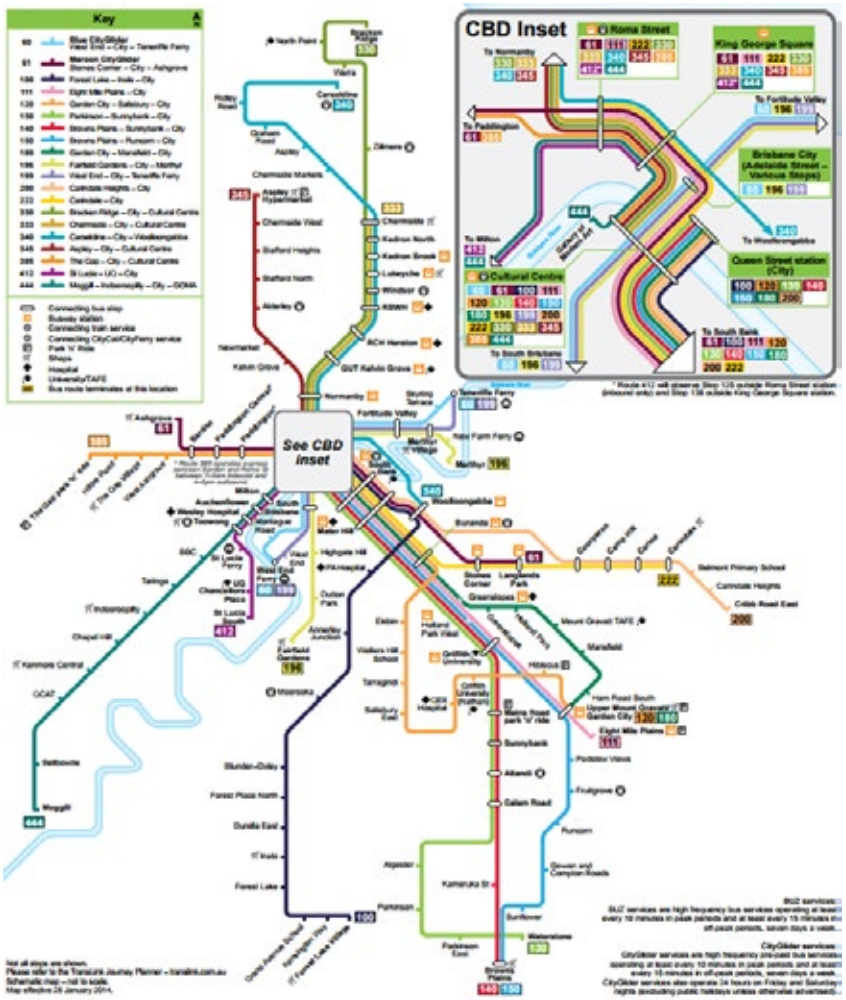
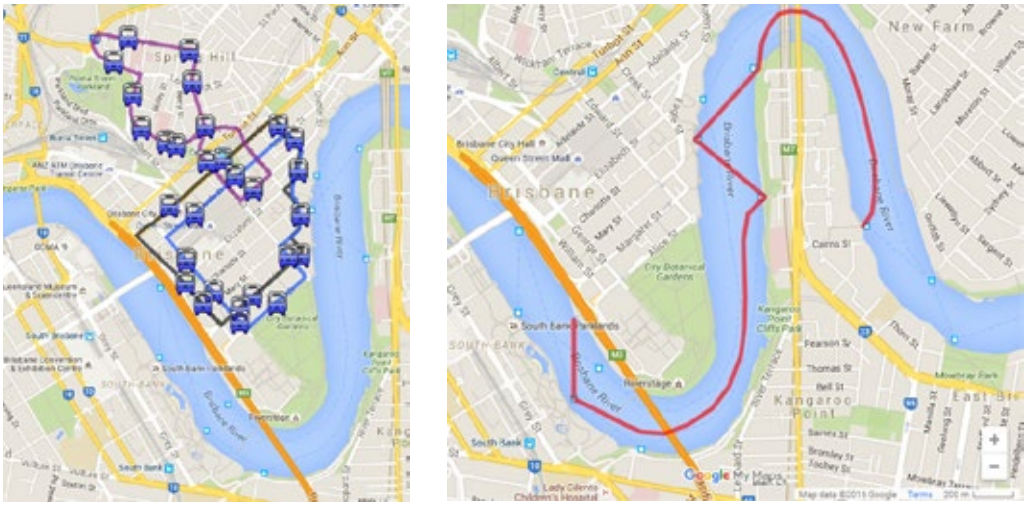


Figure 103: Free bus and ferry routes in Brisbane



3.1.5 Tourist routes

- Brisbane provides a tourist bus service named Explorer. Buses start running in the morning and leave every 45 minutes. The full circuit takes about 90 minutes with 20 stops between Brisbane and Mount Coot-tha. There are two free services servicing major key points in CBD, the free City Loop and the Spring Hill loop both provide access within CBD. City Loop is a distinctive red colour and runs clockwise and anti-clockwise. Spring Hill Loop operates in a continuous loop between the city and Spring Hill and is a distinctive yellow colour. The CityHopper is also a free ferry service running every 30 minutes from 6 am to midnight, seven days a week. The CityHopper travels along the Brisbane River, stopping at North Quay, South Bank 3, Maritime Museum, Thornton Street, Eagle Street Pier, Holman Street, Dockside and Sydney Street terminals.

3.2 Rail operators

Queensland Rail is the state's major rail network and moves product in the containers into the north of the state on the north coastline, with typically 70 scheduled services a week. From Brisbane, the main locations serviced are Rockhampton, Mackay, Townsville and Cairns, with inter-regional services between Gladstone and Townsville. Product for western regions can be transhipped via these locations. There are dedicated meat refrigerated container trains, known as the Sea-Freighter, with capacity to move more than 20,000 TEUs a year to Brisbane for export. The Sea-Freighter can carry standard 20 foot and 40 foot refrigerated containers. Interstate rail is used to bring freight into Queensland from southern locations. There are an estimated 2,000 daily heavy vehicle movements into and out of the South East Queensland intermodal terminals network (QTLC, 2014).

The interstate network between the New South Wales border and Acacia Ridge Intermodal Freight Terminal is leased to the Australian Rail Track Corporation. Heavy freight haul and the Central Queensland Coal Network are leased by Aurizon (formerly QR National), a privately-owned corporation. Regional freight systems, passenger rail services and the urban rail network (including South East Queensland) are owned and operated by the Queensland Government-owned Queensland Rail (Australian Government, 2015).

3.2.1 Rail tourist operators

- Australia Sugar Cane Railway 2 ft (610 mm) gauge railway about 1 km in length, located in the Botanic Gardens, Bundaberg. Steam or diesel hauled using equipment from the former sugar cane industry.
- Bally Hooley Steam Railway in Port Douglas, Marina to St Crispin's station. About 4 km, 600 mm gauge, steam hauled.
- Dreamworld Express 2 ft (610 mm) gauge railway about 1.5 km in length in Dreamworld theme park, Coomera. Usually hauled by a diesel-powered steam outline locomotive, a genuine steam locomotive is available which operates on certain days and by special charter.
- The Gulflander Normanton to Croydon in a heritage diesel railcar. Outward from either terminus for a single journey in one day, or return journey with an overnight stop. Short return journeys of up to a few hours are also available from Normanton.
- Kuranda Scenic Railway Cairns to Kuranda via the Barron Valley, about 75 km.
- Mary Valley Heritage Railway steam hauled tourist railway between Gympie and Imbil.
- Queensland Pioneer Steam Railway 3 ft 6 in (1067 mm) gauge tourist railway in Ipswich, with stations at Swanbank and Bundamba Racecourse. Usually steam hauled.
- Rosewood Railway 3 ft 6 in (1067 mm) gauge tourist railway between Cabanda and Kunkala, near Ipswich. Usually steam hauled.
- The Savannahlander Cairns to Forsyth in a heritage diesel railcar. The whole line can be covered in a four-day tour with overnight hotel stops; shorter journeys are available as day trips.
- Woodford Railway 2 ft (610 mm) gauge railway at the Australian Narrow Gauge Railway Museum in Woodford. Line about 1 km in length, extensions planned. Steam or diesel hauled using historic equipment, mainly from the former sugar cane industry.
- Archer Park Steam Tram operating preserved steam tram at Archer Park Station in Rockhampton.
- Brisbane Tramway Museum operating preserved electric tram in Ferny Grove, near Brisbane.

(Williams, 2016)

3.3 Freight task

The extent of the general freight task in Queensland is summarised below:

- The total interstate freight task is 36.2 million tonnes a year.
- Approximately 3,300 B-Doubles enter and leave Queensland on interstate haulage runs daily (32 tonnes per unit of movement) (QTLC, 2014).
- Approximately 8,300 heavy vehicle general freight movements occur around Brisbane daily (15 tonnes per unit of movement) (QTLC, 2014).
- Approximately 21,900 heavy vehicle general freight movements occur around regional Queensland daily (15 tonnes per unit of movement) (QTLC, 2014).
- The Queensland freight task is expected to increase by nearly 90 percent, from 871 million tonnes in FY11 to over 1,643 million tonnes by FY26 (Infrastructure Australia, 2015).

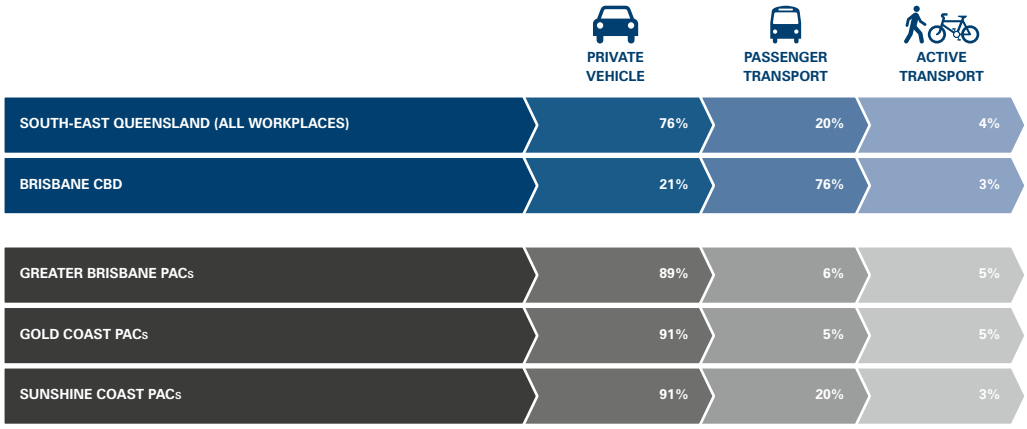
Major roads with high freight vehicle movements based on the percentage of heavy vehicles obtained from traffic census in SEQ are the Flinders and Barkly Highways. These connect northern Queensland, from the Port of Townsville to the Northern Territory border, to national and international markets and link communities to employment, commerce, essential services and the regional centre of Townsville. Also, Landsborough Highway is a key route for moving freight between southern Australia, Brisbane and Darwin (Infrastructure Australia, 2015).

Port of Brisbane in SEQ:

Containers transported by rail in South East Queensland in 2012 represent only 5% (56,000 TEUs) of total containers transported to and from the port, which is low compared with other Australian container ports. A high proportion of the imported commodities in SEQ (85%) were manufactured products (e.g., clothing and footwear). Most of these were destined for business-to-consumer industries (e.g., personal retail), and in many cases were transported through distribution centres (DCs). A small proportion of containers were transported to and unpacked at processing / manufacturing industries (e.g. pulp and paper). A range of vehicle types (articulated trucks, rigid trucks, light commercial vehicles and passenger vehicles) are used to transport commodities from their unpack location and could use a wide range of sections of the road network in and beyond Brisbane (QTLC, 2014).

A high proportion (approximately 70%) of identified export commodities were from primary industries (e.g. fruit and vegetables) or related production / processing (e.g. meat products). Approximately 8% (26,000 TEUs) of export containers were transported from regional areas in Queensland by rail to the port. Cotton, cottonseeds and pulp-paper are significant components of the export commodities. A range of vehicle types (light trucks, rigid trucks and articulated trucks) are used to transport commodities to their pack location. A large number of packing facilities are located near the regional terminals or at the production / processing locations of the exporters supporting export container transport by rail (QTLC, 2014).

3.4 Passenger task



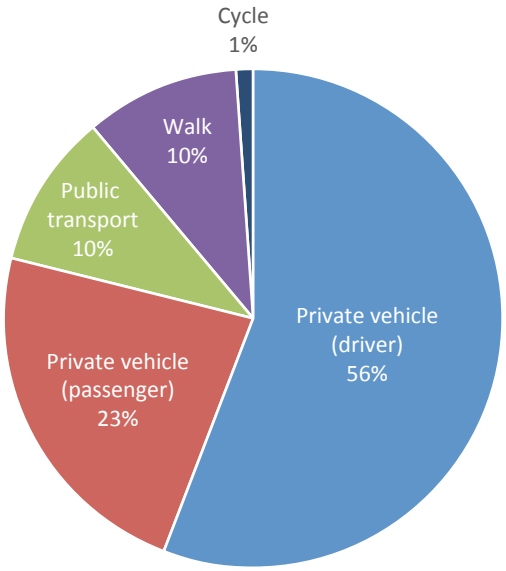
In 2011, on an average weekday, south-east Queensland residents made around 9 million trips and travelled 86 million kilometres.

In the Brisbane CBD, where 10% of all trips are made by public transport – the highest mode shares in the state – the competitiveness and size of the passenger transport network drives its use across education, work and social needs. Elsewhere, with the exception of Queensland's larger regional centres, passenger networks fulfil specific needs, such as community service or school transport. These differences are reflected in mode share choices.

Across Queensland, passenger transport plays a key role in servicing education trips. The highest mode share is in rural areas such as Mackay (52%), Bundaberg (47%) and Whitsunday (41%), compared with 30% in Greater Brisbane.

Work commutes using passenger transport are a different story. In Greater Brisbane, 14% of workers commute by passenger transport, compared with just 1% in regional areas. Low regional use reflects the greater distance and time required to travel (Department of Transport and Main Roads).

Collectively, Brisbane residents made 6.3 million trips per weekday in 2011, covering 57 million kilometres of network. This accounts for 70% of weekday trips within south-east Queensland and represents a 62% increase in the total distance travelled by Brisbane residents from 1992.



Source: Department of Transport and Main Roads, 2012

The following points summarise the estimated public transport trips in 2031 and changes compared with 2011 notable for each state (VLC, 2014):

- The total daily increase in trips by public transport is from about 600,000 in 2011 to 1 million in 2031—an increase of more than 60% (cf. the population increase of 50 percent). Note the distinction between public transport boardings and trips (a trip may involve multiple boardings such as bus or rail).
- In-vehicle passenger-kilometres and hours both increase disproportionately (at 93% and 88% respectively) which is clearly indicative of longer trips as well as increased patronage.
- The increase in rail patronage is most pronounced at 94% daily probably reflecting its relative insulation from increased road congestion.
- Bus patronage, on the other hand, increases (more or less) in line with population movements.
- Predicted light rail patronage on the Gold Coast is 17,000 per day.
- Patronage on the Brisbane cross-river ferries is forecast to increase by over 60%.

Table 45 summarises the modelled base year and the 2031 public transport trips for the modelled area in terms of patronage and network supply indicators and by time of day.

Table 45: Predicted growth in public transport ridership in SEQ (2011–2031)

		TOTAL BOARDING				SERVICE KILOMETRES			
		AM Peak	off-peak	PM peak	24 Hours	AM Peak	off-peak	PM peak	24 Hours
Rail	2011	70,414	142,461	52,987	265,863	5,447	24,645	4,774	34,865
	2031	133,455	272,123	111,015	516,593	7,041	27,163	6,582	40,786
	Changes	90%	91%	110%	94%	29%	10%	38%	17%
Light Rail	2011	-	-	-	-	-	-	-	-
	2031	2,997	11,278	2,727	17,001	584	2,920	584	4,088
	Changes	-	-	-	-	-	-	-	-
Bus	2011	91,053	249,253	65,863	406,168	48,350	186,613	48,443	283,406
	2031	130,449	359,462	98,853	588,764	57,670	218,574	57,343	333,587
	Changes	43%	44%	50%	45%	19%	17%	18%	18%
Ferry	2011	3,295	12,545	3,385	19,224	537	2,872	531	3,940
	2031	5,348	20,420	5,572	31,341	575	3,024	606	4,205
	Changes	62%	63%	65%	63%	7%	5%	14%	7%

Source: VLC, 2014

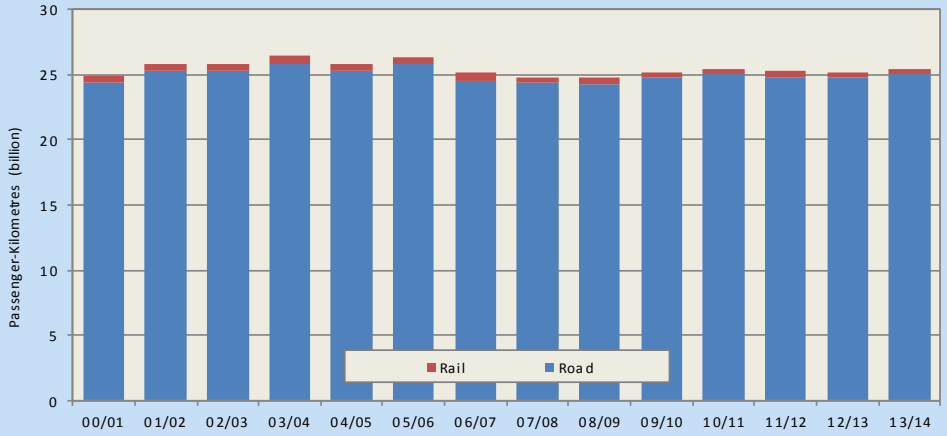
4 South Australia

Overview

Domestic passenger task

In 2013–14, South Australia's combined road and rail passenger task increased 0.87% to 78.6 billion passenger-kilometres. The proportion of the passenger task serviced by road transport was 98% with rail contributing the remaining 2%, as shown in Figure 104. In the last 10 years the combined road and rail passenger task decreased 0.37% per annum compared with a population growth of 0.98% per annum.

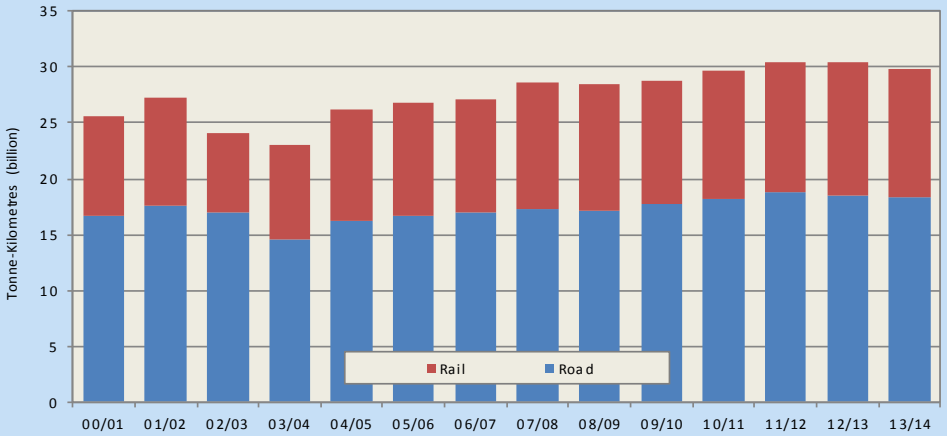
Figure 104: Road and rail passenger task, SA



Domestic freight task

The total amount of freight moved within South Australia by road and rail decreased 1.93% to 29.8 billion tonne-kilometers, with road accounting for 61% and rail accounting for the remaining 39%, further detailed in Figure 105. In the last 10 years the freight task undertaken by road and rail in South Australia increased 2.6% per annum compared with a 1.97% per annum growth in GDP.

Figure 105: Road and rail freight task, SA



A more detailed view of the road and rail passenger and freight task in South Australia follows.

4.1 Networks

4.1.1 Rail network

Adelaide has a dedicated freight network of 62 km, the core of which is the interstate standard gauge tracks. Adelaide's broad gauge passenger network is largely separate from freight lines. The standard gauge interstate line runs adjacent to the broad gauge passenger tracks between Belair (in the Adelaide Hills) and Salisbury (on the northern edge of Adelaide). Other dedicative lines are between Belair and Dry Creek South Junction where it splits into two lines; one heads to Port Adelaide and Outer Harbor and the other, interstate line, continues north to Salisbury where it leaves Adelaide.

Figure 106: Adelaide's rail freight network

Source: BITRE, 2012a

The Adelaide Metropolitan Passenger Rail Network (AMPRN) is centred in Adelaide and comprises approximately 125 route kilometres of track primarily for passenger trains. It also services a limited number of broad gauge freight services. (National Rail safety Regulator, 2014-15)

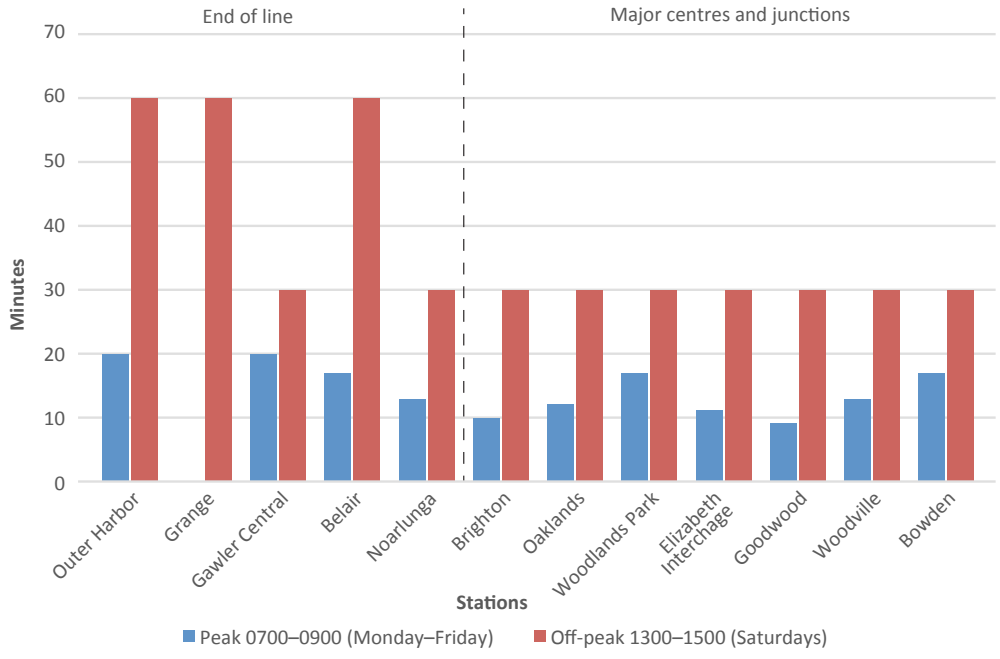
The Adelaide Hills rail alignment is part of the interstate freight rail corridor that connects Sydney and Melbourne (and to a lesser degree Brisbane) with Adelaide, Perth and Darwin. The interstate track runs parallel to the urban passenger rail network from Belair to Adelaide. The existing rail line has a maximum capacity of 10.7 million tonnes per year. About 82% of this freight was containerised goods including household whitegoods, clothing, processed food stuffs, beverages (wine), motor vehicle components, building materials and general consumables. The remaining 18% was bulk goods, including break-bulk steel and bulk commodities like pulp, hay, grain and mineral sands (Department of Infrastructure, 2009).

According to a study completed by the Department of Infrastructure (2009), the total volume of rail freight carried on the Adelaide Hills section is forecast to rise from its current level of 4.8 million tonnes to approximately 14.3 million tonnes by 2039. This represents an annual average growth of around 3.6% over the 30-year period.

4.1.2 Rail network utilisation

- Adelaide's rail system has the smallest traffic levels of the five capital city networks. Adelaide's rail patronage has languished in recent years. Train patronage in 1991–92 was 7 million; in 2010–11 it was around 9 million. A driver for patronage growth would be activity in central Adelaide, such as employment, tertiary education enrolments and retailing. Important offsets would include increments to low-cost car parking provision (BITRE, 2012a).
- Adelaide's Patronage is shared unevenly across the network with the two longest lines, Gawler and Noarlunga, sharing most of the passenger task. Belair is the least patronised line and its passenger numbers have fallen in recent years (BITRE, 2012a).

Figure 107: Average time between trains for services arriving at Adelaide railway station



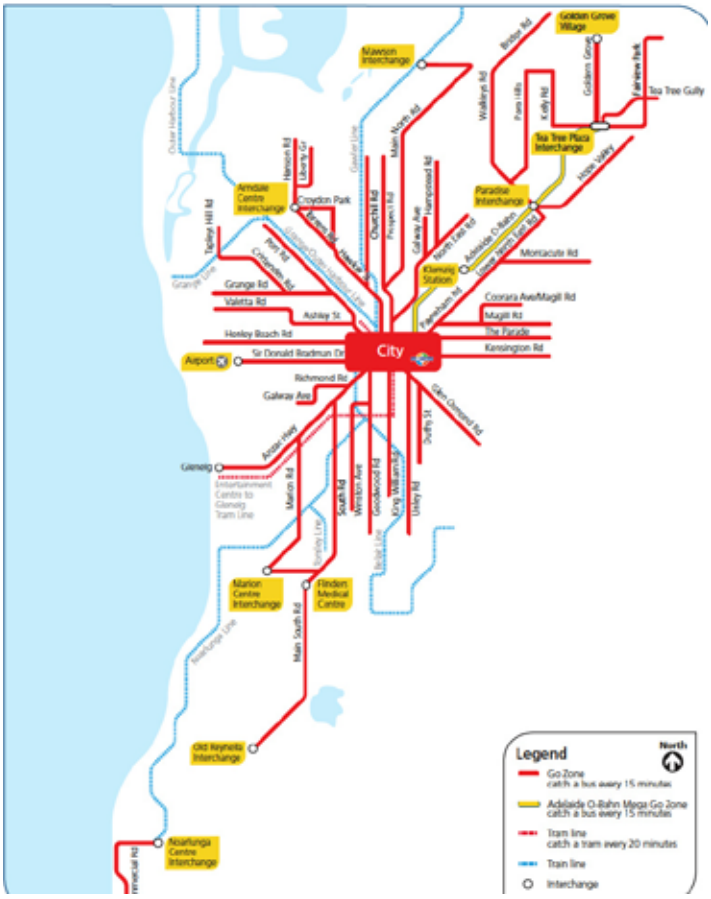
Source: BITRE, 2012 #53

4.1.3 Bus network

Adelaide:

- O-Bahn: a guided busway (only case in the world) which allows travel at high speed running 12 km servicing the north-eastern suburbs of Adelaide. The Adelaide O-Bahn begins just north of the city in the parkland suburb of Gilberton and travels to an interchange at Tea Tree Gully. Beyond this point, buses continue on suburban road routes.
- Free city connector bus: The Free City Connector buses operate as two loops; an inner city loop and an extended North Adelaide loop providing a link to popular city attractions and shopping, dining and services destinations. Routes 98A and 98C link the city and North Adelaide every 30 minutes, seven days a week. Routes 99A and 99C link the main city destinations every 30 minutes on weekdays. Together they provide a 15-minute service at major points of the city.

Figure 108: Major bus and tram routes in Adelaide



4.2 Rail operators

There are three primary rail networks in South Australia (National Rail Safety Regulator, 2014-15):

- The Adelaide Metropolitan Passenger Rail Network (AMPRN) centred in Adelaide comprising approximately 125 route kilometres of track primarily for passenger trains and also servicing a limited number of broad gauge freight services. There is also a tram network within Adelaide comprising approximately 15 route kilometres.
- The Defined Interstate Rail Network (DIRN) managed by the Australian Rail Track Corporation (ARTC) comprising approximately 1990 kilometres of track in South Australia. The DIRN covers the main interstate rail lines linking Melbourne and Sydney to Adelaide as well as Adelaide to Western Australia.
- The Genesee & Wyoming (G&W) network covers the main line to Darwin (linking with the ARTC network at Tarcoola as well as the residual networks throughout regional South Australia). The extent of the G&W network is approximately 1870 kilometres.

Interstate standard gauge lines are owned by Australian Rail Track Corporation. Other lines (mainly grain) are operated by Genesee and Wyoming Australia Pty Ltd, a subsidiary of Genesee and Wyoming based in North America. This includes the railway line that runs from Tarcoola to Darwin. The Adelaide urban passenger system is operated by the South Australian Government-owned Adelaide Metro (Australian Government, 2015).

4.2.1 Rail tourist operators

National Railway Museum in Port Adelaide:

- Museum Train Rides on a short section of 18 in (457 mm) gauge line within the museum grounds. Operates every day except Christmas Day. Steam or diesel hauled.
- Semaphore and Fort Glanville Tourist Railway Semaphore Road to Fort Glanville, about 1¼ miles (2 km). Operates Sundays and public holidays during the summer, and certain weekdays during school holidays. 18 in (457 mm) gauge. Usually steam hauled.
- Pichi Richi Railway steam and diesel hauled tourist railway between Port Augusta and Quorn. The line formed part of the original 3 ft 6 in (1067 mm) gauge Ghan line to Alice Springs
- Steamranger steam and diesel hauled tourist railway between Victor Harbor and Mount Barker, southeast of Adelaide. The total length of the 5 ft 3 in (1600 mm) gauge line is some 77 km, although the entire line is not necessarily covered on all operating days.
- Victor Harbor historic horse drawn trams.

(Williams, 2016)

4.3 Passenger task

The following points summarise the estimated public transport trips in 2031 and changes compared with 2011 notable for each state (VLC, 2014):

- Total public transport boardings increase by 38% over the period; this is in contrast to the 33% increase in public transport trips (implying a higher level of interchanging is expected to occur).
- The rate of growth is highest on the rail system (at about 7%) which is presumably mainly a function of the fact that the rail system is largely insulated from the effects of congestion.
- This conclusion is reinforced by the fact that the level of service parameters has changed only moderately (e.g. service frequency levels in 2031 are assumed to be the same as in 2011).
- However, other contributing factors would include parking charges which have been assumed to increase at an annual rate of 1.5% in real terms (or 35% over 20 years).
- In vehicle passenger-kilometres and hours both increase disproportionately (at 93% and 88% respectively) which is clearly indicative of longer trips as well as increased patronage.
- Predicted light rail patronage on the Gold Coast is 17,000 per day.

Table 46 summarises the modelled base year and the 2031 public transport trips for the modelled area in terms of patronage and network supply indicators and by time of day.

Table 46: Predicted growth in public transport ridership in Adelaide, 2011–2031

		TOTAL BOARDING				SERVICE KILOMETRES			
		AM Peak	off-peak	PM peak	24 Hours	AM Peak	off-peak	PM peak	24 Hours
Rail	2011	11,902	17,273	9,203	38,379	2,053	8,433	2,029	12,516
	2031	21,435	27,276	17,133	65,845	2,134	8,858	2,126	13,118
	Changes	80%	58%	86%	72%	4%	5%	5%	5%
Light Rail	2011	1,225	2,200	960	4,385	398	1,939	391	2,729
	2031	1,743	3,205	1,531	6,479	399	1,945	392	2,736
	Changes	42%	46%	60%	48%	0%	0%	0%	0%
Bus	2011	46,795	107,822	37,015	191,811	27,571	105,346	27,923	160,840
	2031	59,189	141,956	49,997	251,142	27,579	105,279	27,987	160,846
	Changes	26%	32%	35%	31%	0%	0%	0%	0%

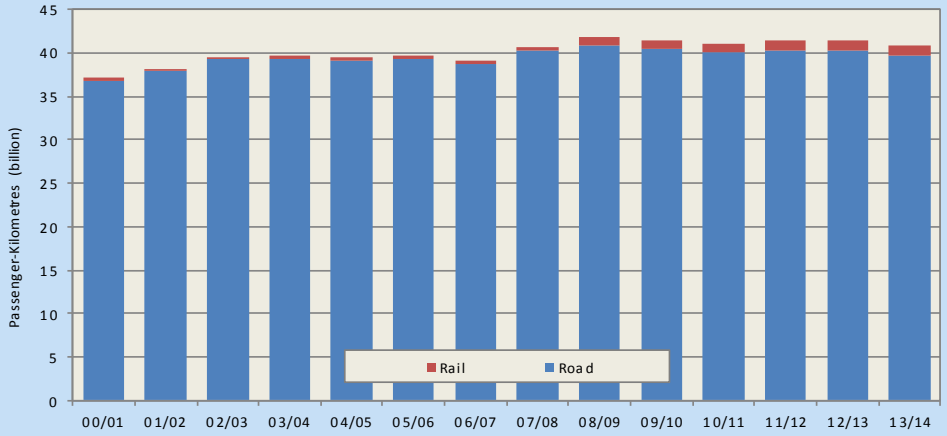
5 Western Australia

Overview

Domestic passenger task

In 2013–14, Western Australia's combined road and rail passenger task reduced 1.57% to 40.8 billion passenger-kilometres. The proportion of the passenger task serviced by road transport was 97% with rail contributing the remaining 3%, as shown in Figure 109. In the 10 years to 2014, the combined road and rail passenger task increased 0.29% per annum compared with a population growth of 2.6% per annum.

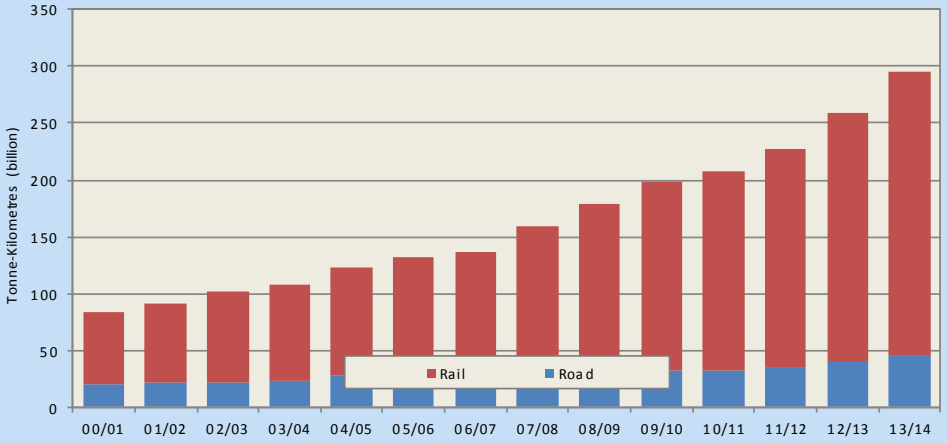
Figure 109: Road and rail passenger task, WA



Domestic freight task

The total amount of freight moved within Western Australia by road and rail increased 13.7% to 295.4 billion tonne-kilometres, with road accounting for 15% and rail accounting for the remaining 85%, further detailed in Figure 110. In the 10 years to 2014, the freight task undertaken by road and rail in Western Australia increased 10.5% per annum compared with a 5.3% per annum growth in GDP.

Figure 110: Road and rail freight task, WA



A more detailed view of the road and rail passenger and freight task in Western Australia follows.

5.1 Networks

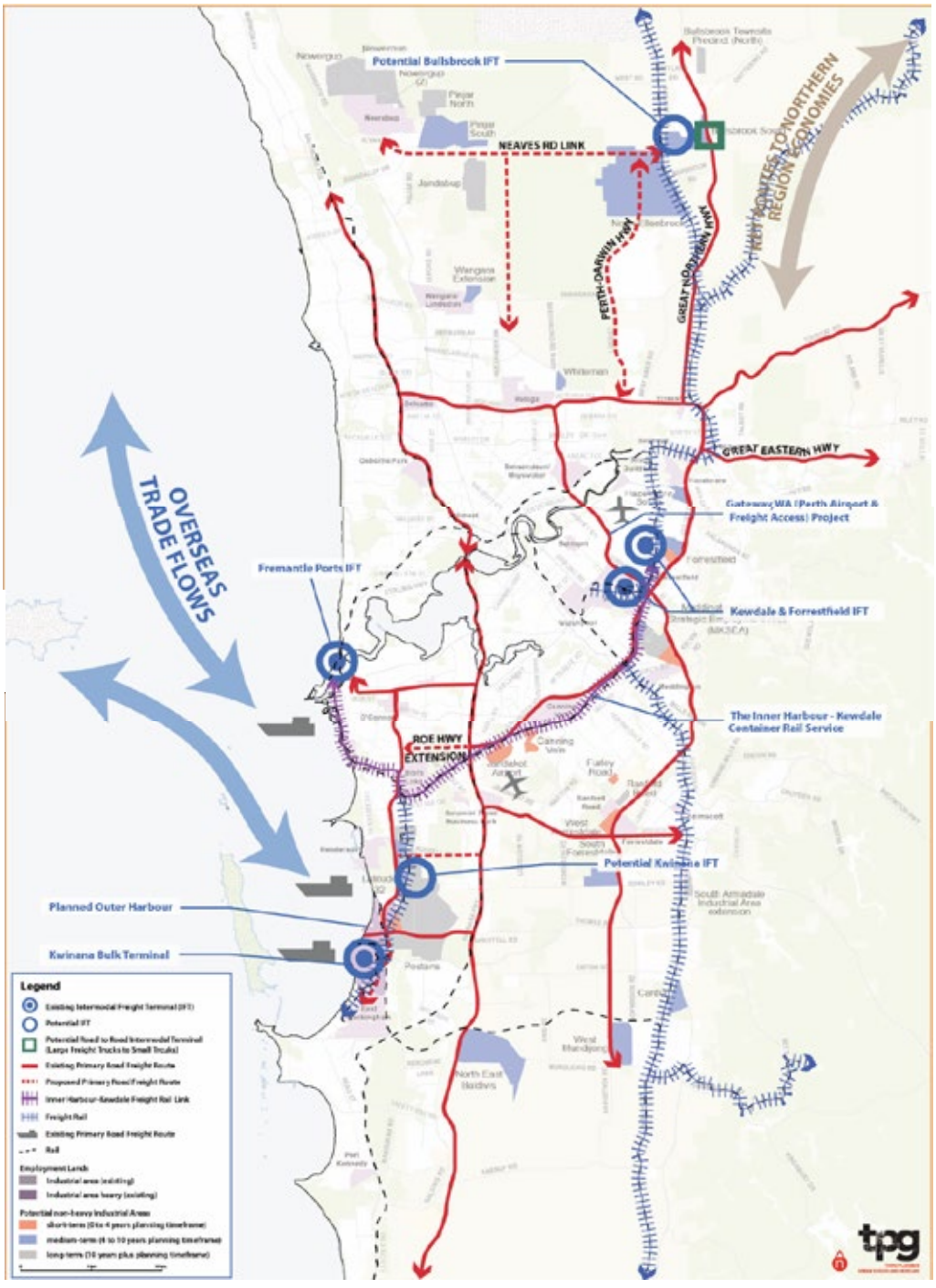
5.1.1 Road network

Great Northern Highway which is 2452 kilometres in total length and connects Perth in Western Australia to the Northern Territory is a vital link to economic resource regions including the Pilbara and the Kimberley. Besides linking other remote and agricultural areas between southern and northern Western Australia, the Great Northern Highway provides alternative access to Port Hedland and Wyndham (Infrastructure Australia, 2015).

The Great Northern Highway will continue to act as an important supply corridor to the north of the state. However, the increasing scale of the future outbound and inbound freight task, together with the development of Strategic Industrial Areas and greenfield infrastructure along the Pilbara seaboard, will result in significant growth in freight movements along the coastal strip. This has implications for both the North West Coastal Highway and the regional roads between it and the Great Northern Highway, as cargo is moved from port to projects along the coast or to mines located inland, requiring investment and policy responses from Government (Government of Western Australia, 2013).

Ripon Hills Road and Marble Bar Road are the second and third most heavily used regional road link, particularly by industry and freight. Three other roads (Onslow Road, Madigan Road and Karijini Drive) with heavy vehicle shares of around 40% or higher are the other freight routes in WA (Infrastructure Australia, 2015).

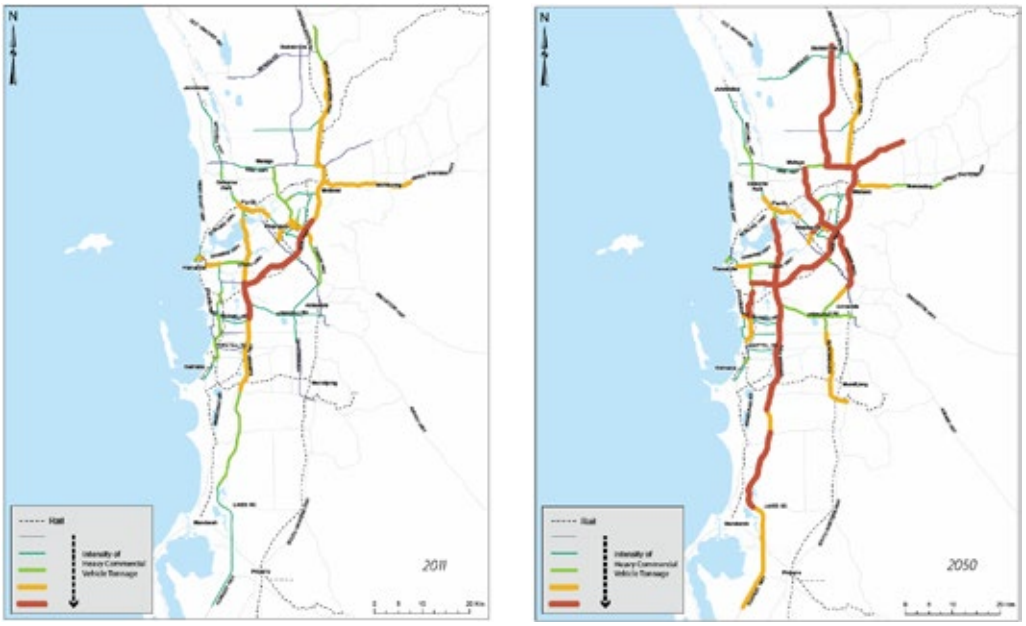
Figure 111: Metropolitan road and rail freight corridors and hubs in WA



Source: Freight and Logistics Council of Western Australia, 2014

The indicative changes in road freight traffic in these corridors are illustrated in the following figures. The Figure 112 shows the total heavy commercial vehicle (HCV) tonnage as of 2011. Roe Highway and a portion of Kwinana Freeway are the most intensely used movement networks for HCVs. By the year 2050 the intensity of HCVs is forecast to be much more widespread throughout the metropolitan road network; spanning from Bullsbrook down through the planned Perth–Darwin Highway, Roe Highway (and extension), Tonkin Highway and the Kwinana Freeway through to Mandurah and beyond. All other freight routes also intensify as a result of increased freight tonnage movements (Freight and Logistics Council of Western Australia, 2014).

Figure 112: Road and Rail freight demand changes in WA (tonnage in 2011 vs. 2050)



Source: Freight and Logistics Council of Western Australia, 2014

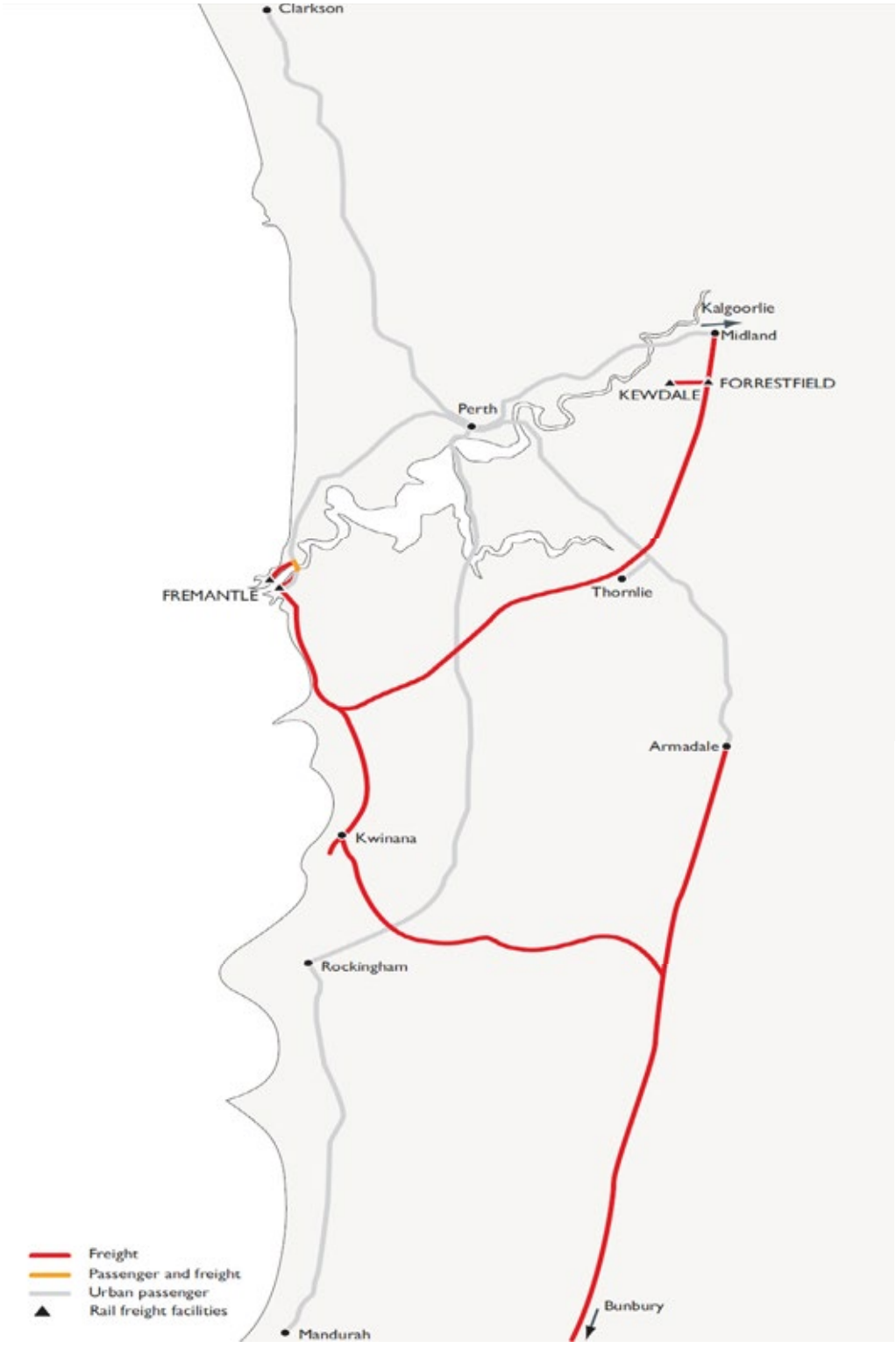
5.1.2 Rail network

Two major freight rail networks in WA which carry both passenger and freight are (Government of Western Australia, 2013):

- The state-owned freight rail network is privately operated by Brookfield Rail under a lease in force until 2049. Brookfield Rail operates the network as an open-access, multi-user network. The company provides track infrastructure and train control services and is responsible for negotiating commercial access with end users and above-rail service providers.
- The interstate mainline (together with the track east of Kalgoorlie, which is owned by the Australian Rail Track Corporation) and the south-west mainline are also recognised under the National Land Transport Network.

Perth has an extensive dedicated freight operation, focused on the Midland–Fremantle Goods Line, linking freight terminals at Forrestfield/Kewdale and the port at Fremantle. With the exception of the Fremantle rail bridge, freight and passenger trains run on separate tracks. Other dedicative lines include the Kwinana Loop, Alcoa and Mundijong Junction.

Figure 113: Perth's rail freight network

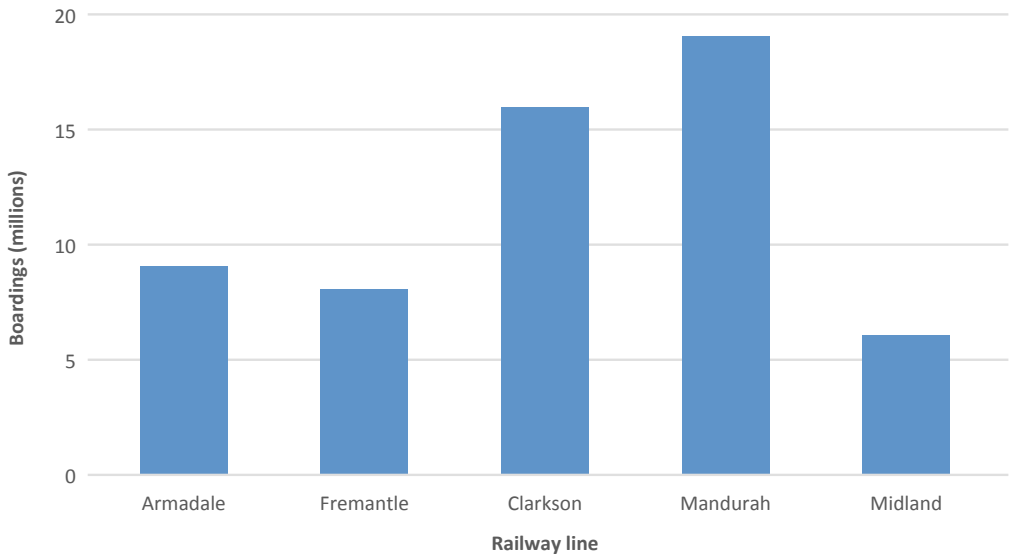


Source: BITRE, 2012a

5.1.3 Rail network utilisation

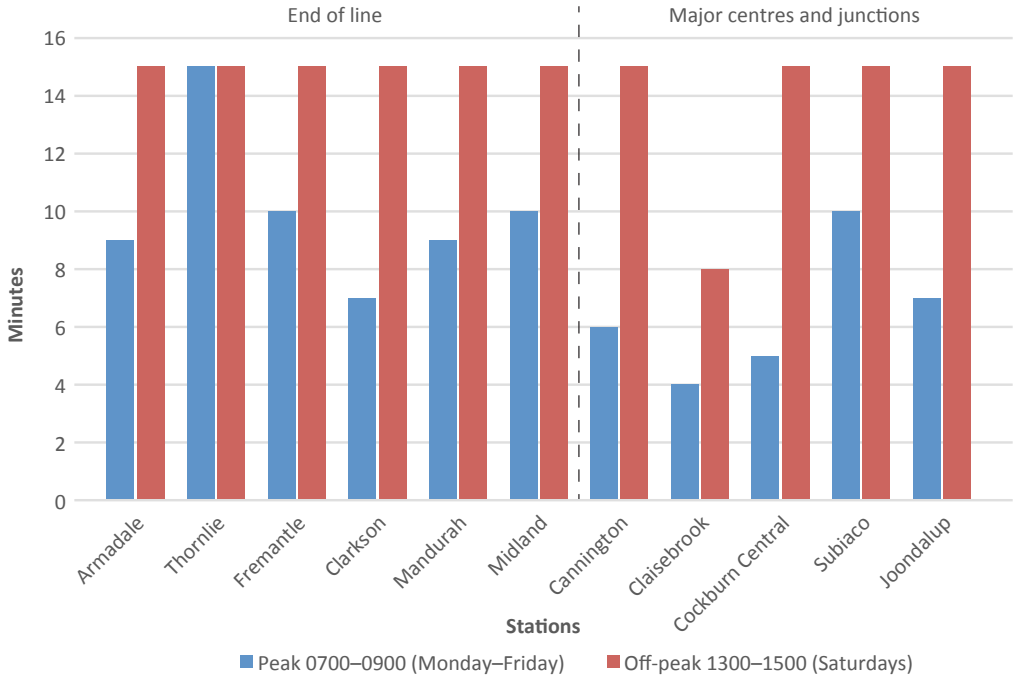
- Perth has a network based around a long north–south spine, an east–west corridor and a south–east line. Perth's urban railways fulfil an important role in the commuting task, particularly links to Perth's central city area. This area contains 18% of metropolitan area jobs.
- Over 60% of peak hour travel to Perth CBD is by public transport. Rail's contribution to that task has increased in the last 20 years: in 1990, the rail services were 10% of public transport trips; this had risen to 34% in 2004–05 and to 44% in 2010. In 1992, rail patronage was 7 million, with two major route expansions since that time, and complementary increases in the train fleet, this patronage level had risen to 59 million in 2010–11.
- There are two notable aspects of the urban rail services in Perth. First, service standards are fairly consistent across the network, across and within lines. The difference in service levels between major centres and junctions and stations located at the end of railway lines is far less significant than the difference in Sydney, Melbourne and Brisbane. Part of the reason for this consistency arises from the low number of express services and the absence of inter-urban services. In addition, the low number of railway junctions—with only two junctions outside of the city centre—reduces the type of 'service densification' that can be seen when operations merge at junction stations in Melbourne, Brisbane and Sydney. The second notable aspect of the Transperth services is that, except at the extreme ends of the operating day, the maximum time between trains is 15 minutes—even in off-peak periods. That is, the system is not focused entirely on the commuting task (BITRE, 2012a).

Figure 114: Transperth patronage (million boarding), by line, 2010–11



Source: BITRE, 2012 #53, sourced from Public Transport Authority of Western Australia, 2011

Figure 115: Average time between trains for services arriving at Perth Central



Source: BITRE, 2012a

5.1.4 Bus network

Perth:

- Free city and Fremantle services: operating around the CBD of Perth or Fremantle on the Red, Blue and Yellow CAT (Central Area Transit), the Fremantle CAT and travel within the Free Transit Z.
- High frequency routes: there will be high frequency routes in the next year in Perth by consolidating existing bus routes into one high-frequency service. At peak times, the service will run every 5 minutes between Curtin and ECU, Mount Lawley.

5.2 Rail operators

The interstate standard gauge line from Kalgoorlie to Adelaide is owned by the Australian Rail Track Corporation. Rail lines in the south-west of the state are leased to Brookfield Rail, a privately owned corporation. Pilbara railway lines are owned and managed by privately listed companies including BHP Billiton, Rio Tinto and Fortescue Metals Group (Australian Government, 2015).

5.2.1 Rail tourist operators

- Bennett Brook Railway 2 ft (610 mm) gauge line some 6 km in length, in Whiteman Park near Perth. Steam and diesel hauled
- Hotham Valley Railway 3 ft 6 in (1067 mm) gauge line operated in 2 sections:
- Etimlyn Forest Railway Dwellingup to Etimlyn, about 8 km. Diesel hauled. Dining trains operate at certain times.
- Steam Ranger Dwellingup to Isandra, about 14 km. Steam hauled.
- Trains operate most weekends and certain other days throughout the year. The two services do not operate on the same day.
- Pemberton Tramway Company 3 ft 6 in (1067 mm) gauge line with steam and diesel hauled trains from Pemberton to Lyall (21 km) and diesel powered trams from Pemberton to Northcliffe (36 km).
- Western Australia's Heritage Tramway standard gauge historic electric trams connecting Whiteman Village, Perth with Village Junction rail station (21 km).
- Castledare Miniature Railways 7¼ in (184 mm) gauge miniature railway, in two sections totalling over 6 km, located in Wilson Park in the suburbs of Perth. Steam and diesel hauled.
- Pilbara Railways Historical Society railway museum near Karratha with a miniature railway.

(Williams, 2016)

5.3 Freight task

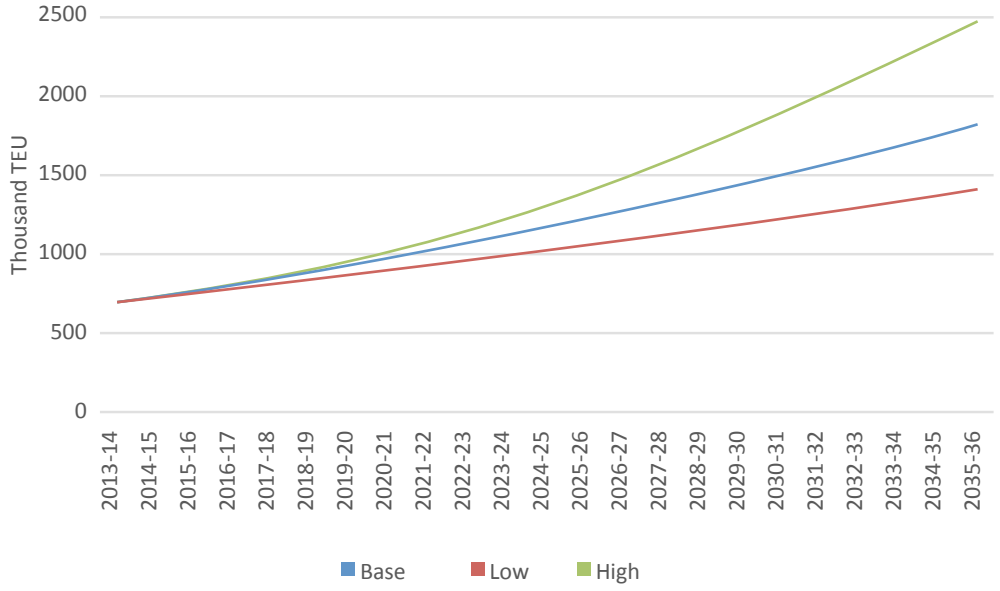
It is anticipated there will be a significant increase in rail freight movement by 2031 in WA. Preliminary forecasts suggest there will be substantial increases in traffic along the Fremantle to Kwinana line and through to Forrestfield (Freight and Logistics Council of Western Australia, 2014). The rail freight task on the State-owned rail network, managed by Brookfield Rail, will increase up to 126% to 2030 from 50+ million net tonnes per annum to more than 130 million net tonnes per annum. In the mid-west, Brookfield Rail expects freight growth to increase exponentially to 2030, with much of the growth — and investment in additional capacity — likely to be concentrated on the Morawa-Mullewa-Narngulu-Geraldton arc. The Goldfields-Esperance and South West regions are also likely to be a focus for growth projects. Future growth on the Leonora to Esperance line will necessitate capacity upgrades including partial rail line duplication and the construction of new passing loops, as well as the upgrading and re-sleepering of the line to enable it to carry higher axle loads. Future growth on the Collie to Bunbury rail line will underpin capacity upgrades, including duplication of the line between Brunswick Junction and the port of Bunbury where northern and eastern rail freight flows converge (Government of Western Australia, 2013).

Iron ore demand in particular is forecast to increase significantly from approximately 20% of total rail demand to more than 40% of total demand by 2030 in WA. Much of this increase is likely to occur in the shorter term, given emerging industrial developments. While the State-owned regional rail freight network is extensive, the distribution of the resources sector, and potential changes in supply chains in the south of Western Australia, may require the development of new rail links or the activation of historic corridors. These links would be facilitated as private developments, as emerging resource projects become viable and proceed to final investment decision (Government of Western Australia, 2013).

5.3.1 Port of Fremantle

Freight container movements through the Fremantle Port's current Inner Harbour and future container port in Cockburn Sound are expected to increase from 680,000 containers per annum in 2013–14 to approximately 1.5 million per annum by the year 2030 (Freight and Logistics Council of Western Australia, 2014).

Figure 116: Forecast Freight Container Numbers at Fremantle Port's Inner and Outer Harbours



Source: Freight and Logistics Council of Western Australia, 2014, Fremantle Ports Authority (TEU means 'Twenty-foot (6.1 m) Equivalent) Units')

5.4 Passenger task

The following points summarise the estimated public transport trips in 2031 and changes compared with 2011 notable (VLC, 2014):

- Total public transport boardings increase by almost 100% over the period; this is in contrast to the 88% increase in public transport trips (implying a higher level of interchanging is expected to occur).
- The rate of growth is highest on the rail system (at about 14%) which is presumably mainly a function of the fact that the rail system is largely insulated from the effects of congestion as will the rail network extension to Butler.
- This conclusion is reinforced by the fact that the assumed level of service parameters is changed only moderately.
- However other contributing factors would include parking charges which have been assumed to increase at an annual rate of 1.5% in real terms.

Table 47: Predicted growth in public transport ridership in Perth, 2011–2031

		TOTAL BOARDING				SERVICE KILOMETRES			
		AM Peak	off-peak	PM peak	24 Hours	AM Peak	off-peak	PM peak	24 Hours
Rail	2011	44,057	129,259	41,331	214,647	5,115	21,976	5,196	32,288
	2031	106,382	300,646	107,313	514,341	5,343	22,948	5,401	33,692
	Changes	141%	133%	160%	140%	4%	4%	4%	4%
Bus	2011	53,652	152,812	37,911	244,375	35,726	133,275	36,468	205,469
	2031	92,766	241,576	63,040	397,382	35,875	133,824	36,619	206,318
	Changes	73%	58%	66%	63%	-	-	-	-
Ferry	2011	33	140	37	209	14	54	14	82
	2031	74	373	102	549	14	54	14	82
	Changes	128%	167%	176%	162%	-	-	-	-

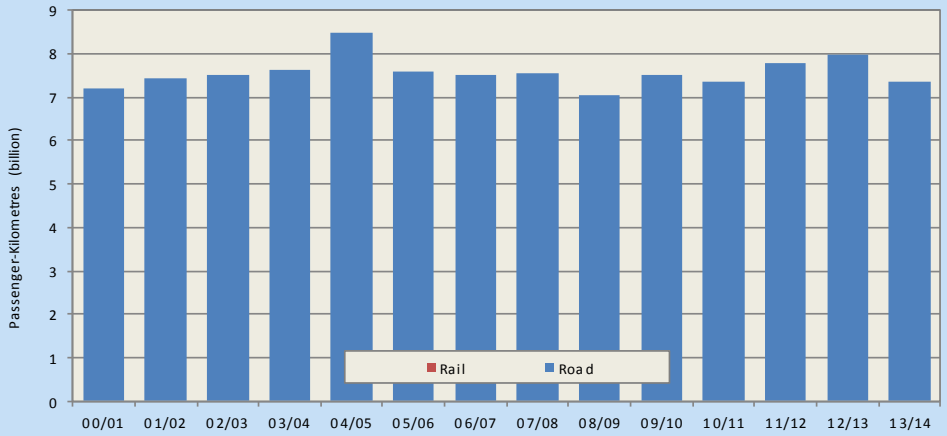
6 Tasmania

Overview

Domestic passenger task

In 2013–14, Tasmania's road passenger task reduced 7.7% to 7.4 billion passenger-kilometres, shown in Figure 117. In the past 10 years the road passenger task decreased 0.4% per annum compared with a population growth of 0.6% per annum.

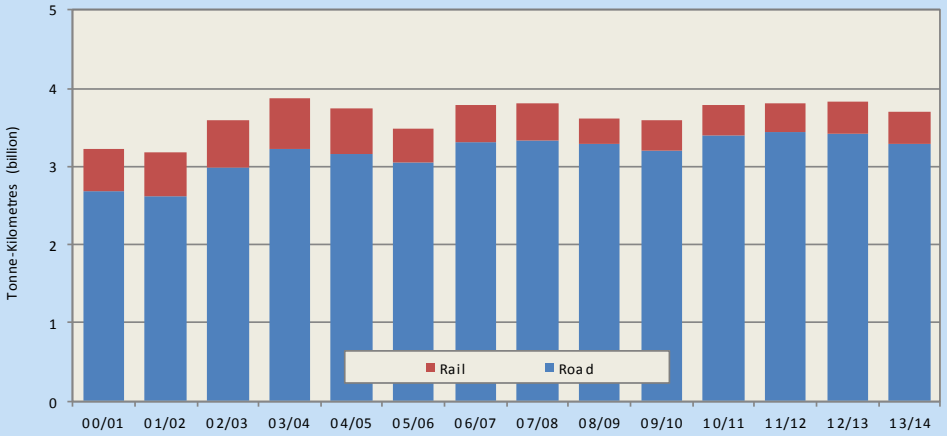
Figure 117: Road passenger task, TAS



Domestic freight task

The total amount of freight moved within Tasmania by road and rail decreased 3.15% to 3.7 billion tonne-kilometres, with road accounting for 89% and rail accounting for the remaining 11%, further detailed in Figure 118. In the past 10 years the freight task undertaken by road and rail in Tasmania decreased 0.4% per annum compared with a 1.2% per annum growth in GDP.

Figure 118: Road and rail domestic freight task, TAS



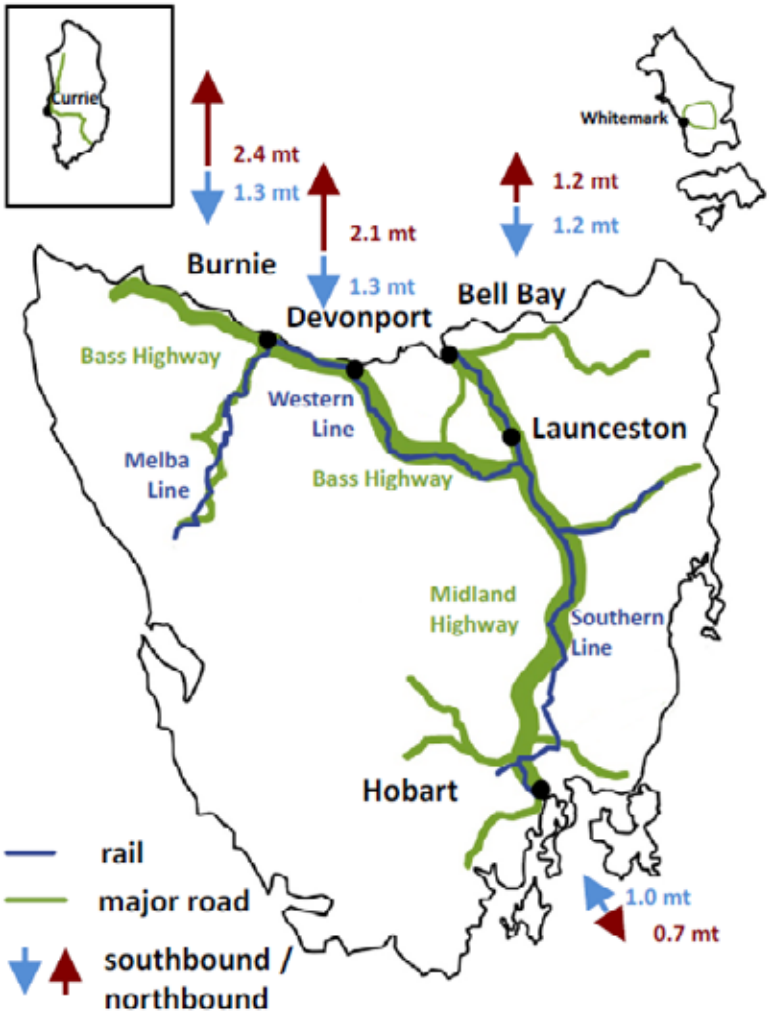
A more detailed view of the road and rail passenger and freight task in Tasmania follows.

6.1 Networks

6.1.1 Road network

The road network in Tasmania accounts for the majority of the freight task to and from ports. While Tasmania has an extensive road network, there are regulatory limitations on the use of high productivity vehicles such as B-Doubles. The heaviest freight volumes are carried through the Burnie-Devonport to Hobart corridor due to its linkages to major ports, key urban areas and industrial and processing areas in Burnie, Devonport, Launceston and Hobart (Australian Government, 2014).

Figure 119: Road freight network in Tasmania



Source: Australian Government, 2014, *Data sources*: Adapted from DIER (2013a) (figure 1). Southbound / northbound data from TasPorts (2013)

6.1.2 Rail network

Tasmania has a less developed passenger rail network compared with other states, which is also likely to contribute to higher reliance on motor vehicles as a means of travel (ACIL Allen Consulting, 2014).

Railways in Tasmania comprise the freight-only Tasmanian Rail Network and the historic rail lines. There are no passenger services.(Australian Government, 2014)

Figure 120: Tasmania's rail freight network

Source: Australian Government, 2014

6.2 Rail operators

The primary rail network in Tasmania is the freight network operated by TasRail which runs approximately 130 services a week over approximately 610 kilometres of operational track (National Rail Safety Regulator, 2014-15).

Rail is owned and operated by Tasmanian Railway Pty Ltd (TasRail), a Tasmanian Governmentowned rail company established in December 2009 (Australian Government, 2015).

As at 30 June 2015 there were 15 operators accredited by the National Rail Safety Regulator under Rail Safety National Law for operations in Tasmania. Eleven of these operators are accredited solely for operations within Tasmania. The primary rail network is the freight network operated by TasRail which runs approximately 130 services a week over approximately 610 kilometres of operational track. Tasmania has a diversity of tourist and heritage operators ranging in technical complexity as well as passenger numbers (National Rail Safety Regulator, 2014-15).

6.2.1 Tourist rail operators

- Tasmania has a network of 3 ft 6 in (1067 mm) gauge lines reaching most parts of the island. There are no regular passenger services but several tourist operations, some of which use the freight lines of Tasrail.
- Don River Railway tourist railway near Devonport. Steam and diesel hauled.
- Derwent Valley Railway steam and diesel hauled tourist operation based at New Norfolk, using Tasrail lines.
- Redwater Creek Railway steam hauled, 600 mm gauge tourist line 1 km in length, in Sheffield.
- Ida Bay Railway Lune River to Elliott›s Beach, about 7 km. 2 ft (610 mm) gauge bush railway now converted for tourist operation, using original diesel locomotives.
- Wee Georgie Wood Steam Railway steam hauled, 2 ft (610 mm) gauge tourist line 1.6 km in length, in Tullah.
- West Coast Wilderness Railway steam and diesel hauled tourist line from Strahan to Queenstown through the gorge of the King River, a distance of 35 km, part rack equipped.
- Railtrack Riders pedal powered trolleys on an otherwise disused section of line between Maydena and Florentine, about 2.5 km. The gauge is quoted as 1080 mm, but is probably closer to the more usual 1067 mm.
- Launceston Tramway Museum offering rides on a heritage tram.

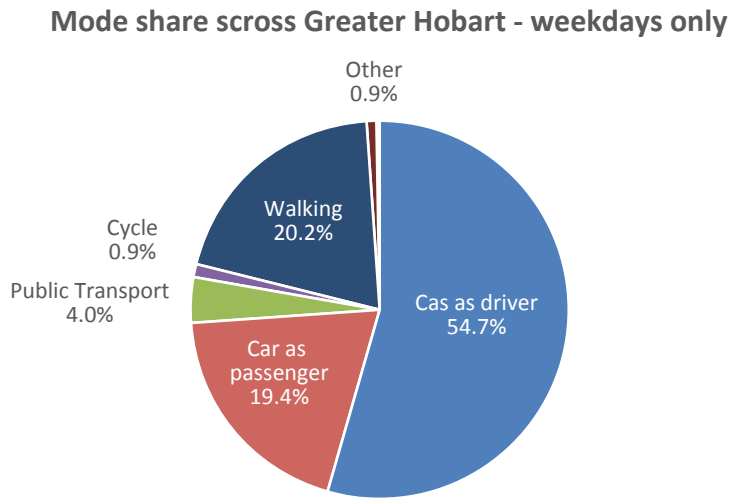
(Williams, 2016)

6.3 Freight task

The total volume of Tasmanian freight shipped in 2011–12 (the latest available data at a disaggregated level) was just under 13 million tonnes. Non-bulk freight, which is the main freight task across Bass Strait, accounted for around five million tonnes or around 380 000 TEUs. Regular Bass Strait shipping services are provided by Sea Road, Toll ANL Bass Strait Shipping, TT Line, LD Shipping, and Furneaux Freight (Australian Government, 2014).

6.4 Passenger task

On average, each resident of Greater Hobart makes 2.7 trips per day on a typical weekday and 2.2 trips on a typical day on the weekend. The average number of weekday and weekend trips is highest in Hobart and Kingborough, and lowest in Derwent Valley and Brighton. The highest percentages of weekday trips are made from Hobart (26.3%), Clarence (24.8%) and Glenorchy (20%).



Source: Greater Hobart Household Travel Survey, December 2010

There is little overall use of other modes. Around 4% of trips are made using public transport, including school buses, and less than 1% of trips are made by bicycle. There is relatively little use of other modes, such as motor cycles or taxis (Greater Hobart Household Travel Survey, December 2010).

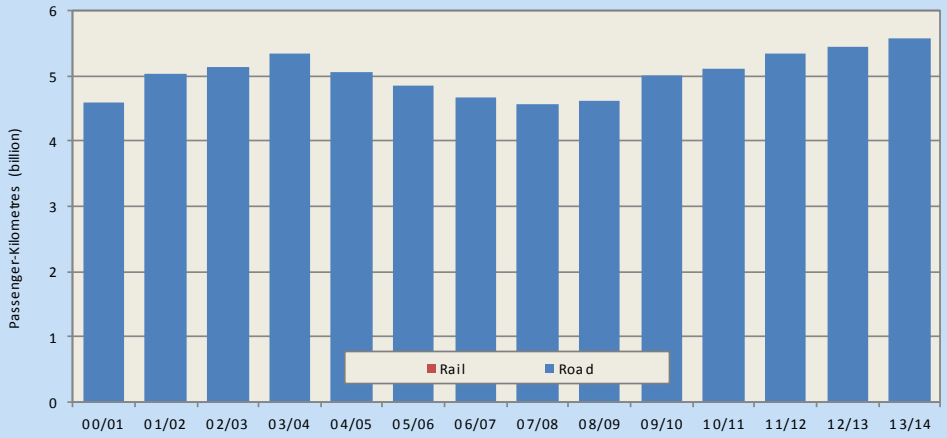
7 Northern Territory

Overview

Domestic passenger task

In 2013–14, the Northern Territory's road passenger task increased 2.2% to 5.6 billion passengerkilometres, shown in Figure 121. In the past 10 years the road passenger task increased 0.4% per annum compared with a population growth of 1.8% per annum.

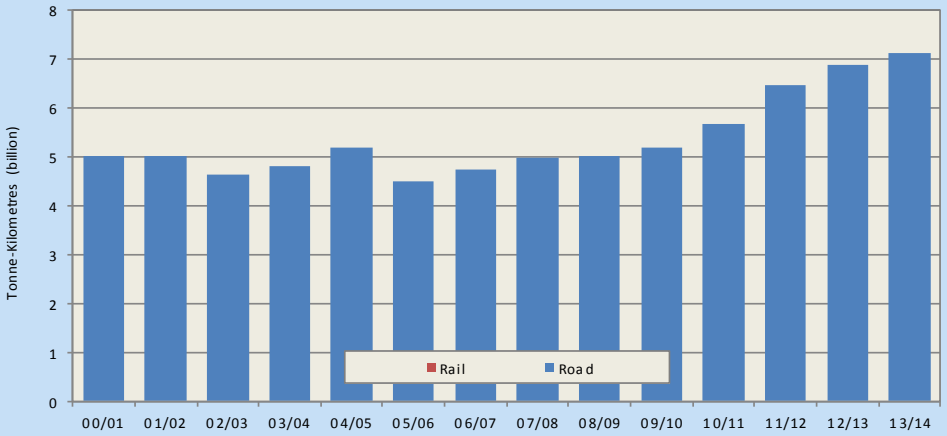
Figure 121: Road passenger task, NT



Domestic freight task

The total amount of freight moved within the Northern Territory by road increased 3.5% to 7.1 billion tonne-kilometres, shown in Figure 122. In the past 10 years the freight task undertaken by road in the Northern Territory increased 3.9% per annum compared with 3.2% per annum growth in GDP.

Figure 122: Road domestic freight task, NT



A more detailed view of the road and rail passenger and freight task in the Northern Territory follows.

7.1 Networks

The bulk of intrastate and interstate freight in the Northern Territory has historically been transported by road, although the opening of the Darwin to Adelaide rail link in January 2004 has reduced the volume of interstate road freight, with rail now taking some 80% of freight on the north – south transport corridor. The road network is the most comprehensive freight transport link in terms of connectivity. The Stuart Highway runs the length of the Northern Territory and connects Darwin with Adelaide. The Victoria Highway, which intersects the Stuart Highway at Katherine, provides the main road freight link with WA, while the Barkly Highway, which intersects the Stuart highway near Tennant Creek, provides the main road freight link with Queensland. Other highways are generally unsealed and carry limited freight volumes (Northern Territory Government, 2006).

In the Northern Territory, road is not only the most viable mode to move freight into the jurisdiction and to the destination customer, but also, provides community access (e.g. the Central Arnhem Highway connects Nhulunbuy and other the communities in East Arnhem Land). Furthermore, many of the highways located within central Australia (e.g. the Buntine and Plenty highways), provide access and egress for the cattle industry, linking properties to domestic and international markets. The Tanami road provides the link between Central Australia, Alice Springs, and the Pilbara region in Western Australia, enabling Pilbara products to access the south and east of Australia (Infrastructure Australia, 2015).

7.1.1 Road network

Other key road links include:

- Stuart Highway (2717 kilometres), which connects Adelaide in South Australia to Darwin in Northern Territory. Data outlining heavy vehicle use indicate that roads located to the east of the Stuart Highway experienced the highest heavy vehicle use in 2012 in the Northern Territory (Infrastructure Australia, 2015).
- Lasseter Highway and Tjukaruru Road, part of Outback Way when connecting Uluru Kata Tjuta National park to Western Australia border.
- Victoria Highway, adjoining the Katherine and Kununurra regions.
- Barkly Highway, running east which connects Mount Isa to the Stuart Highway.
- Roper Highway, linking the East Arnhem region to the Stuart Highway.
- Carpentaria Highway, linking the growth town of Borroloola to the Stuart Highway (Infrastructure Australia, 2015).

7.1.2 Rail network

The AustralAsia rail link between Adelaide and Darwin was completed in September, 2003 with first freight and passenger trains arriving early in 2004 (DPC, 2011e). Currently, five general freight train services are operated to and from Darwin each week by GWI (see also Section 2.2.3), whilst the Great Southern Railway operates two return trips each week by 'The Ghan' passenger train. Both the freight train and passenger train services operate between Adelaide and Darwin. The Ghan passenger service stops at the Darwin Passenger Rail terminal, approximately 1 km north east of the EAW precinct. Freight trains continue past the Darwin Passenger Rail terminal and enter the EAW precinct to unload their freight (Northern Territory Government, 2011).

7.1.3 Bus network

Public buses in Darwin are run by Buslink and Territory Transit with most services operating seven days a week including public holidays. The Darwinbus network operates from the Darwin, Casuarina and Palmerston interchanges.

7.2 Rail operators

As at 30 June 2015 there were 11 operators accredited by the National Rail Safety Regulator under Rail Safety National Law for operations in the Northern Territory. In July 2014, the Ghan Preservation Society surrendered its accreditation for railway operations at its premises in Alice Springs. The primary rail network is the freight network operated by Genesee & Wyoming joining Darwin to the ARTC network in South Australia consisting of approximately 1737 kilometres. The iconic Ghan passenger train service of Great Southern Rail also operates on this network (National Rail safety Regulator, 2014-15).

The primary Northern Territory rail network is the freight network operated by Genesee & Wyoming joining Darwin to the ARTC network in South Australia consisting of approximately 1737 km. The iconic Ghan passenger train service of Great Southern Rail also operates on this network (National Rail safety Regulator, 2014-15).

7.2.1 Rail tourist operators

- Old Ghan Historical Railway tourist trains on an 8 km section of the original 3 ft 6 in (1067 mm) gauge Ghan railway route, located about 10 km south of Alice Springs. Operates most Sunday mornings and other times by prior arrangement. Usually diesel hauled, with a steam locomotive available for special events and charters. Dining facilities for pre-booked evening groups.

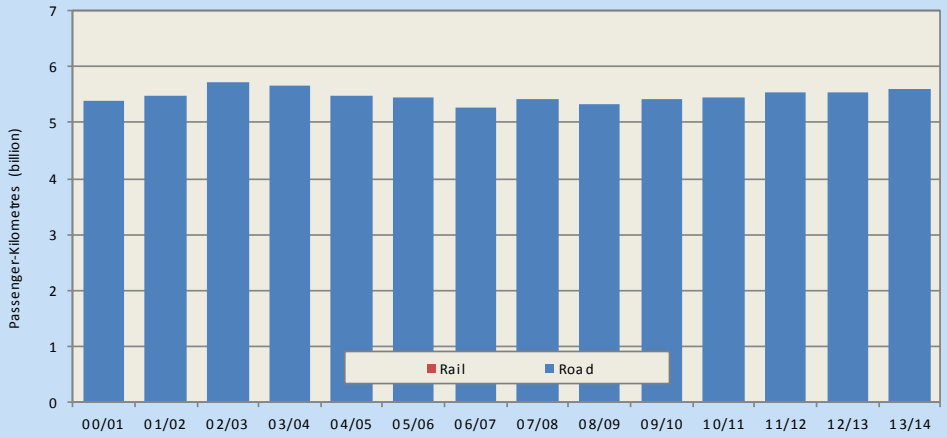
8 Australian Capital Territory

Overview

Domestic passenger task

In 2013–14, the Australian Capital Territory's road passenger task increased 0.9% to 5.6 billion passenger-kilometres, shown in Figure 123. In the past 10 years the road passenger task decreased 0.1% per annum compared with a population growth of 1.6% per annum.

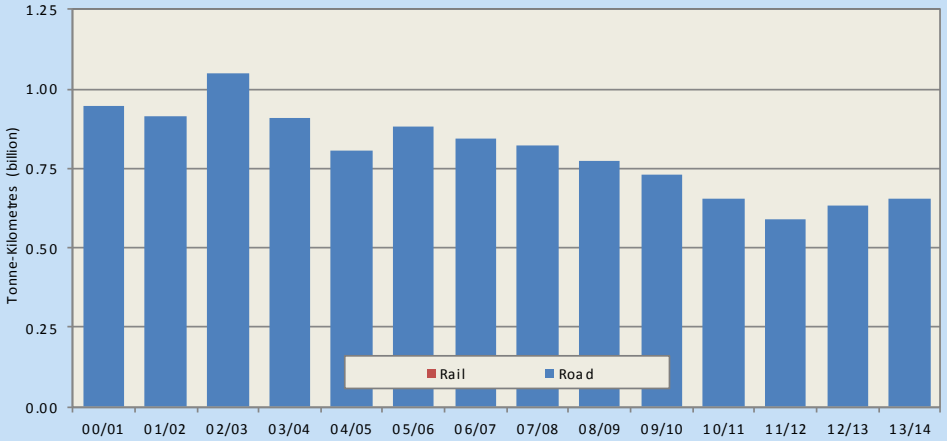
Figure 123: Road passenger task, ACT



Domestic freight task

The total amount of freight moved within the Australian Capital Territory by road increased 3.5% to 0.7 billion tonne-kilometres, shown in Figure 124. In the past 10 years the freight task undertaken by road in the Australian Capital Territory decreased 3.2% per annum compared with a 2.6% per annum growth in GDP.

Figure 124: Road freight task, ACT



A more detailed view of the road and rail passenger and freight task in the Australian Capital Territory follows.

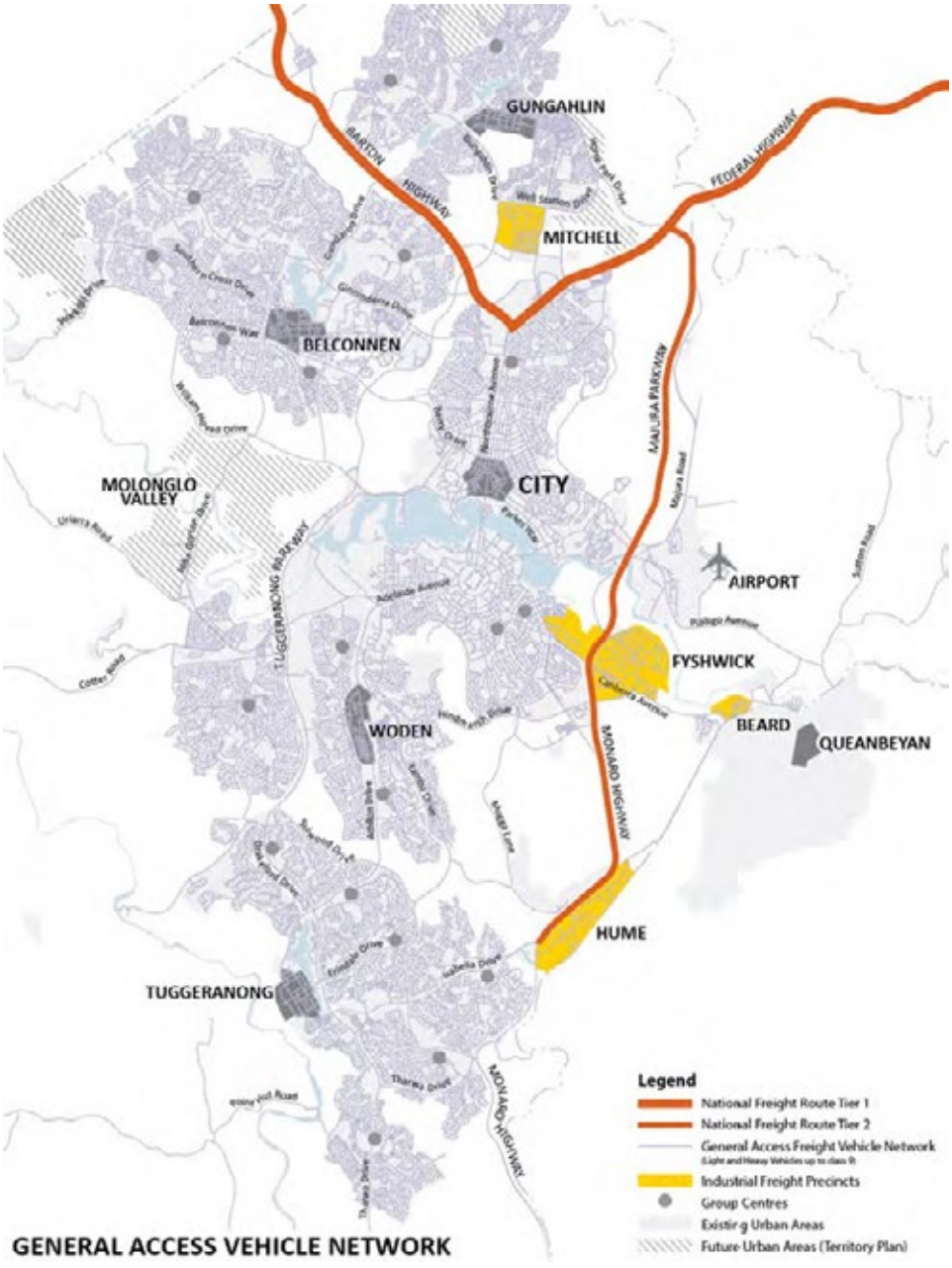
8.1 Networks

8.1.1 Freight network

Key freight routes:

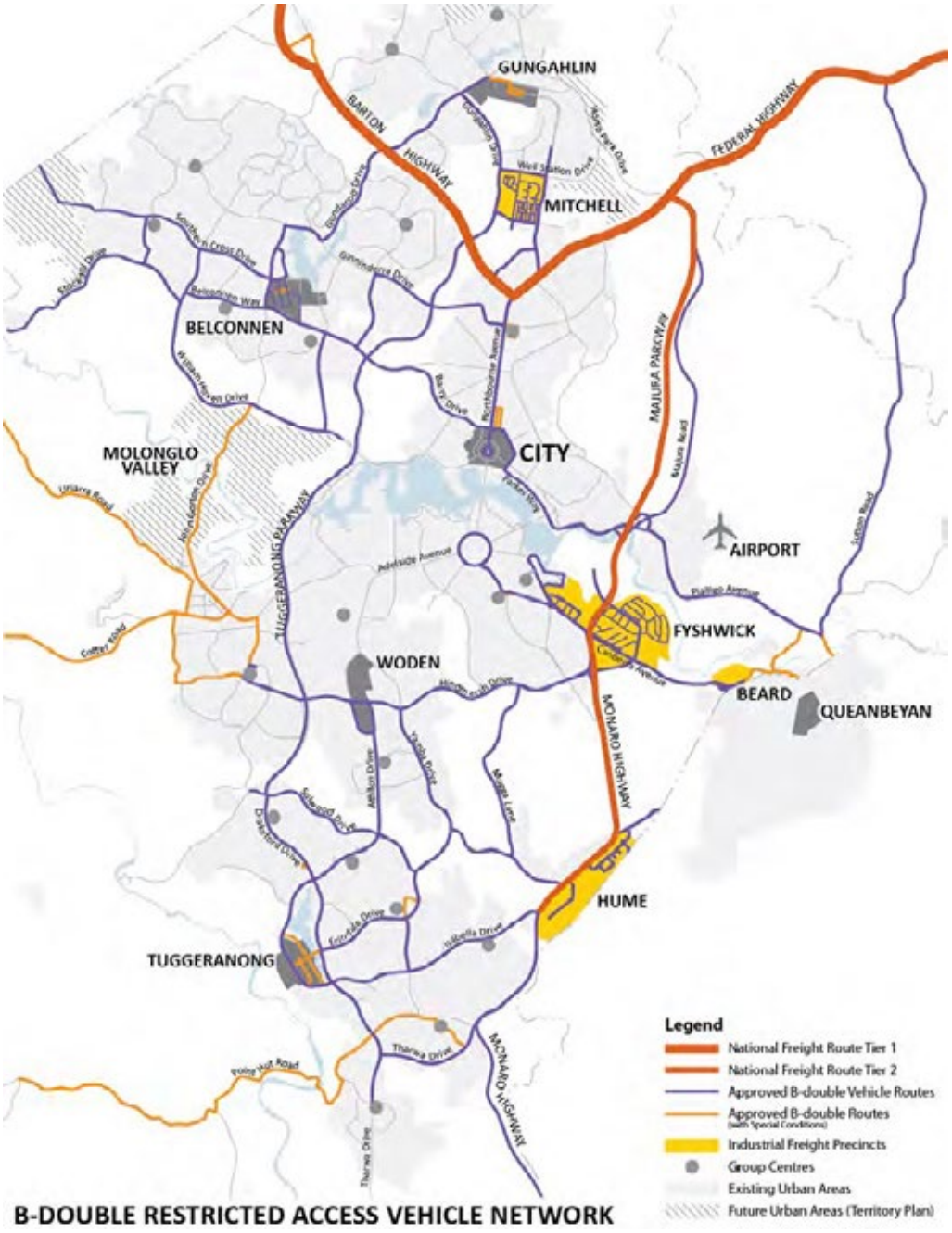
- Barton highway and federal highway serve as the national freight route tier 1.
- Majura Parkway and Monaro highway serve as the national freight route tier 2.
- Northboune Avenue, Parks way, Pialligo Avenue, Canberr Ave, Isabella Drive, Erindale Drive, Tharwa Drive, Drakeford Drive, Tuggeranong Parkway, Gumgahiln Drive Extension, Gungahlin Drive, Gundaroo Drive, William Slim Drive, Belconnen Way, Barry Drive, William Hovell Drive, Cotter Road.

Figure 125: ACT General Mass Limits road network



Source: ACT Government, 2016

Figure 126: ACT Restricted Access Vehicle road network



Source: ACT Government, 2016

8.1.2 Bus network

Canberra:

- Rapid bus routes: operating in two high frequency routes in red and blue distinctive colour. Blue rapid operates from Tuggeranong to Belconnen and Red rapid operates from Gungahlin to Fyshwick.
- There will be also the other six high frequency routes across Canberra and one new Parkway express route, linking Canberra hospital and Woden bus station to Calvary hospital and Belconnen bus station (canberra transport future) as shown in Figure 127.

Figure 127: Existing and planned rapid bus routes in Canberra

Source: Canberra Transport Future

8.2 Rail operators

As at 30 June 2015 there were seven operators accredited by the National Rail Safety Regulator under Rail Safety National Law for operations in the Australian Capital Territory (ACT).

The ACT network comprises the Canberra to Queanbeyan railway line linking with the Country Regional Network managed by John Holland Rail. NSW Trainlink operates passenger rail services from New South Wales into the ACT. Canberra is also the home of the ACT Division of the Australian Railway Historical Society, which operates tourist and heritage passenger service and a freight rail service. (National Rail safety Regulator, 2014-15).

The ACT Government is currently undertaking a tendering process for the construction and operation of a light rail service between Gungahlin and Civic, Canberra.(National Rail Safety Regulator, 2014-15).

8.2.1 Tourist rail operators

The Australian Railway Historical Society operates short journeys heritage railcars from its museum in Canberra to Fyshwick, regular steam or diesel hauled trains to Bungendore and Tarago in New South Wales, and occasional longer journeys by luxury train (Williams, 2016).

8.3 Freight task

In the 12 months ending June 2012, there were over 12 million tonnes carried by all freight vehicles in the ACT. The majority of these goods belong to the 'crude materials' category comprising construction materials, metal scrap, wood, pulp and paper. Also significant were freight goods comprising containerised manufactured goods delivered overnight from New South Wales and Victoria in bigger and heavier freight vehicles, which are then delivered locally in smaller freight vehicles. Among these providers is StarTrack, a business of Australia Post, which moves approximately 60% of its freight by air and 40% by road. Nationally, it operates from various depot locations. Locally, it operates from its depot at Hume and delivers across the ACT and throughout the region (ACT Government, 2016).

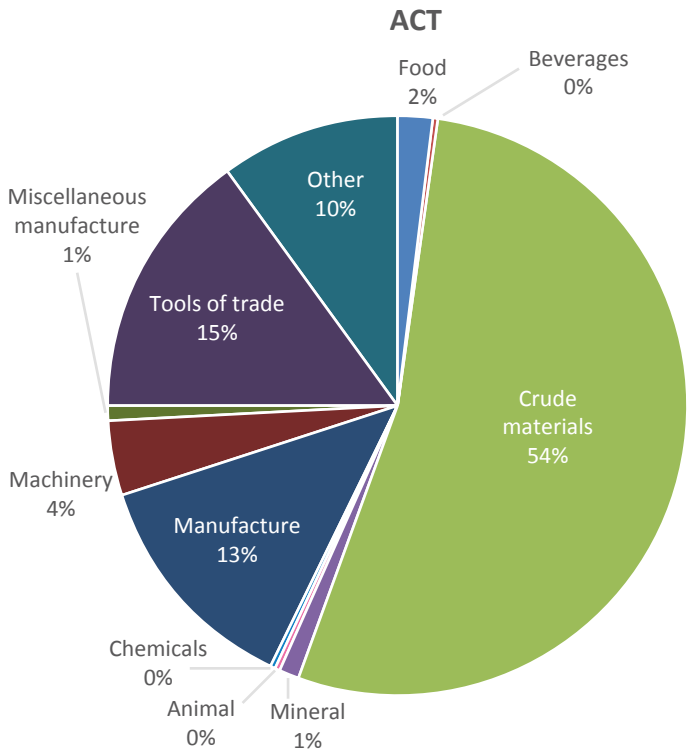
Nearly all freight (by volume) into and out of the ACT is road based. ACT road freight flows are primarily imports into the ACT rather than exports, with the majority coming from New South Wales (ACT Government, 2016).

Interstate road freight has grown rapidly throughout the country in recent decades. Freight flowing from New South Wales to the ACT is forecast to increase from a 2007 estimate of 720 million tonnekilometres to 1422 tonne-kilometres in 2030, at an average annual growth rate of 3.1%. With regard to Victoria, where the two-way freight volume totals 72 million tonne-kilometres, BITRE estimates that outbound freight will continue to grow strongly, as it will in New South Wales (ACT Government, 2016).

In some contrast, freight imported into the ACT appears to comprise a high proportion of manufactured goods. According to Transport for NSW data, of the top nine regional freight flows into the ACT, five comprised manufactured goods, consumer goods or containers while the other four were building products, crude materials, fuel and food products (ACT Government, 2016).

In 2014, there were over 12.8 million tonnes carried by all freight vehicles in the ACT. At about 7 million tonnes (54% of the total), the 'crude materials' category, comprising construction materials, metal scrap, wood, pulp and paper and other products was by far the most significant. This was followed by tools of trade (15%) and manufactured goods (13%) (ABS, 2014b).

Figure 128: Commodity break down of road freight



8.4 Passenger task

The following points summarise the estimated public transport trips in 2031 and changes compared with 2011 (VLC, 2014):

- Total bus boardings are expected to increase 69% over the period, in contrast to the 53% increase in public transport trips (implying a higher level of interchanging is expected to occur).
- While in-vehicle passenger-kilometres are projected to increase 63%, the in-vehicle passenger hours increase 86%, which indicates the relative decline in average speeds within in a road network expected to experience increasing congestion.

Table 48: Predicted growth in bus ridership in Canberra, 2011–2031

	TOTAL BOARDING				SERVICE KILOMETRES			
	AM Peak	off-peak	PM peak	24 Hours	AM Peak	off-peak	PM peak	24 Hours
2011	18,867	40,369	14,107	73,343	14,591	46,930	13,217	74,738
2031	31,784	66,953	25,001	123,738	14,591	46,930	13,217	74,738
Changes	68%	66%	77%	69%	0%	0%	0%	0%

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