ARTC

Melbourne-Brisbane Inland Rail Alignment Study

Final Report July 2010

Appendix B Market Take Up

ACIL Tasman
Economics Policy Strategy

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1 Introduction

The purpose of this appendix, which relates to the demand chapter in the main report, is to provide estimates and commentary on total freight on the Melbourne-Brisbane corridor. It assesses total freight carried in the corridor by road and rail, and freight with and without an inland railway.

This appendix develops estimates that were an input to route selection and to the economic and financial analysis. The methodology behind it comprises:

- Assessment of the current freight market in the corridor by origin, destination and commodity, using official statistics, information from rail operators and ARTC, and forecasts of external drivers such as GDP, fuel prices and labour prices
- A questionnaire and in-depth interviews with key freight/logistics companies and key customers to understand how modal choices are made and how they would respond to changes in price or service attributes
- Input from ARTC and the technical consultants on expected future service attributes (relating to journey time, reliability and capacity) of the current rail route and the potential inland railway route
- Development of a nested multinomal logit model to simulate the responses from market participants to changes in the configuration of services and on that basis estimate future mode shares
- Analysis of other freight that is potentially additional to these estimates, e.g. freight resulting from a route through Shepparton, diversion of grain from other routes and new coal sources near Toowoomba
- Estimation of future rail tonnages with and without an inland railway, with multiple scenarios to cover different underlying estimates of GDP, fuel and labour prices, customer responses.

The structure of the appendix follows this methodology.

This appendix considers a wide corridor between Melbourne and Brisbane that includes both the alignment identified in this study and other points between that and the coast, because freight can move by alternative, competing routes (and modes). For example, road freight between Melbourne and Brisbane can move through the far western corridor on the Goulburn Valley and Newell highways, or through Sydney on the Pacific Highway. Similarly rail freight currently moves through Sydney but could move on a new inland railway.

There is other transport in the area that largely moves across the north-south flow and is not covered in this study, except for indirect effects. Examples are freight to and from Port Kembla, and urban freight. However in some cases there are implications for rail freight in this study. For example an improved inland route could divert some central and northern NSW grain from Newcastle to Port Kembla; this grain would move along part of the inland line instead of the Hunter Valley line.

This appendix also considers freight for which the origin or destination is outside the corridor, for example freight between Brisbane and Perth that travels in the corridor between Brisbane and Parkes, freight from Tasmania to points north of Melbourne, or freight from north Queensland to points south of Brisbane.

It also considers sea freight. The only Australian based coastal shipping serving the corridor carries bulk commodities such as petroleum and cement that generally do not move in the corridor by other modes, for price and logistics reasons. However international shipping lines, using multiple voyage permits[1], collectively provide a reasonably regular service along the east coast, the domestic legs forming part of an international service.

In principle the study includes 'land-bridging', being land (road or rail) freight of imports or exports from one port to another (the coast-to-coast North American rail services are a well-known example). In practice, little land-bridging now takes place in the corridor because there are sufficiently frequent international shipping services to each of Brisbane, Sydney and Melbourne.[2]

This demand study also includes rail passenger services but again, in practice, such services are limited due to the widespread use of cars, airlines which are used for nearly all intercapital travel and some regional travel, and because buses best suit services between smaller centres.

This appendix will concentrate largely, though not exclusively, on:

- Freight between Melbourne and Brisbane and vice versa, consisting mainly of manufactured material on pallets inside trucks or containers, plus certain bulk commodities such as steel and paper
- Freight between points along the route, consisting mainly of grain and other agricultural products
- Freight between points outside the route and points on it (e.g. Perth-Brisbane)
- Coal in southern Queensland that could travel along part of an inland railway.

[1] The Australian Government is reviewing the policy on voyage permits that allow international shipping lines to carry Australian coastal freight.

[2] Land-bridging is more significant on the Adelaide - Melbourne route (outside the scope of this study), for shipping frequency reasons. Tasmania-Melbourne - Sydney/ Brisbane is not treated as land-bridging for the purposes of this study.

2 Total freight

2.1 Commodity forecasts

Various types of freight are carried in this corridor; grouped in this appendix as:

- Non-bulk
- Agricultural products
- Coal and minerals
- Steel
- Other bulk (e.g. paper).

The main type of freight is non-bulk (typically manufactured products), which in 2004[3] accounted for 86% of the tonnes transported along the Melbourne-Brisbane corridor. Agricultural products (mostly grains) represented approximately 8% of total tonnes, and other bulk, (e.g. steel and paper) accounted for most of the remainder (5%) of total tonnes.

In determining the size of the total market between Melbourne and Brisbane (including freight to/from points beyond the corridor, and between intermediate points) ACIL Tasman used the same starting estimate of 2004 freight as used in the previous North-South Rail Corridor Study. This was calculated using estimates of production and consumption at a large number of origins and destinations, and goods transported between production and consumption locations. The derived freight flows were then adjusted to match known freight flows[4].

Forecasts from 2004 were then made using established relationships between commodities and drivers of demand. Longer term relationships have been used instead of shorter term fluctuations, as rail route decisions are made for the long term. The following sections set out assumptions that were made about the future freight of commodities.

2.1.1 Non-bulk

Transport of non-bulk manufactured goods, measured in net tonne kilometres (ntk), moves in line with real GDP, although the ratio of non-bulk freight movements to GDP movements has changed over time. Historically, freight was more sensitive to movements in GDP because manufacturing was a larger component of GDP. In the 1970s a percentage change in real GDP led to a 1.5% change in freight tonnes. In the 1980s this had declined to 1.26 and in the 1990s it was 1.1. This trend is expected to continue and econometric estimates have been used in this study to calculate the future elasticity of demand with respect to GDP.

The ratio of non-bulk freight to GDP was estimated at 1.07:1 in 2007 and was forecast to decline over time as Australia's GDP growth becomes more dependent on the services sector. This ratio is consistent with survey responses from freight forwarders – they typically use a stable 1:1 ratio for their planning.

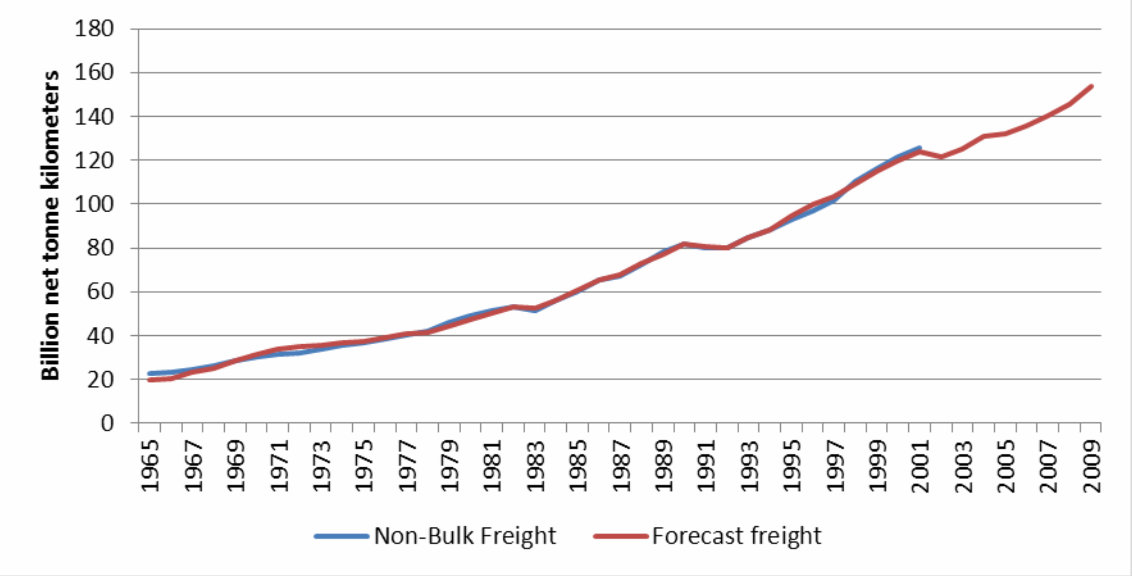
Analysis in *Freight Measurement and Modelling in Australia* (BTRE, 2006) showed that a regression of interstate non-bulk freight tonne kilometres on real GDP has an income elasticity of 1.4 – meaning that a 1% increase in real GDP generates a 1.4% increase in freight. However, the BTRE did not correct for movements in the real price of freight during the period of their study.

[3] The most recent year for which comprehensive statistics are available.

[4] As discussed later, not all freight flows are clearly known, largely because of inadequate road freight data.

ACIL Tasman performed this regression also incorporating freight prices published in *Information Paper 28, Freight rates in Australia 1964–65 to 2007–08* (BITRE, 2008). By including a quadratic specification for price, it was possible to estimate a model which fit the data very well (adjusted R^2 was 0.995) and which could be used to estimate future non-bulk freight in response to modelled freight rates and GDP forecasts. The graph below shows the fit of the model to data for Australian GDP, prices and total non-bulk freight.

Figure 1 Actual and predicted non-bulk freight in Australia (billion net tonne kilometres)



Data source: BITRE datasets, ACIL Tasman analysis

The same series of BITRE data allowed ACIL Tasman to calculate the short-run price elasticity of demand. In 2001 the price elasticity of demand for freight was −0.36, meaning that a 1% fall in price would lead to a 0.36% increase in the demand. This elasticity has steadily declined from -0.5 in the 1980s as freight has become cheaper and it is estimated that the current elasticity is approximately −0.3.

It is notable that increases in fuel prices have seen the real average freight price increase since 2002, with a brief decline in 2009. However, since the GDP effect is much stronger than the price effect, freight demand for some commodities continued to grow strongly over this period.

Besides general price increases, the rail operators have also changed the structure of their prices, raising some more than others. Such changes are designed to improve rail operator revenue, and the available data do not show a noticeable effect on overall tonnages.

Consistent with the long life of railway assets, this report includes long-term (to 2080) demand projections. However the long-term numbers should be seen as indicative only as they could be affected by changes in circumstances, such as the structure of the economy, the relative growth of different areas, technology and policy.

2.1.2 Agricultural products

Freight of agricultural products responds to different drivers from manufactured goods. Essentially the freight task within Australia depends mainly on population growth with a small impact from GDP.

Tonnages of export grain are largely aligned with domestic production, minus the quantities used by domestic customers. The international price varies according to world supply and demand, but the market always clears at some price and eventually the grain is moved. This means grain freight tonnages are not much affected by changes in international demand.

Tonnages of export grain carried in the corridor reflect production trends, including short-term fluctuations due to droughts and longer term effects due to improved grain varieties and farming techniques. In recent years, the grain supply has been very low due to drought and declines in the planted acreage. This has affected both domestic and export freight quantities but export more so.

Thus in broad terms agricultural output and hence freight is dependent on farming techniques and the weather. Weather causes major year-to-year changes, and the safe course of action is to assume that agricultural output continues past productivity trends, and grows at an annual rate of 2.2%. This is indicative only in the longer term because 2010 is expected to be a better harvest than in preceding years.

2.1.3 Coal and minerals

Coal and minerals along the inland route potentially provide high tonnages over relatively short distances.

Although there are huge coal movements in the Hunter Valley, most of that coal is unlikely to use any part of the corridor. Significant volumes of coal are transported from the Central Highlands (immediately west of the Blue Mountains) to Port Kembla (12 mt in 2004) but, again, this is not a corridor route.

Much of the coal in northern NSW and southern Queensland is thermal, and is sent to either power stations or to ports for export. It is less valuable than coking coal, which is used in making steel (typically less than half the price), and it is not economical to transport by rail over long distances. Thermal coal near the inland railway in Queensland could be economically transported to Brisbane but not to other ports. There is also a small deposit of coking coal in northern NSW which could use part of the inland railway on the way to Newcastle. Coal freight is discussed in section 3.3.2.

2.1.4 Steel

Steel freight includes raw steel, used in construction, and other inputs to domestic production. Steel travels on dedicated steel freight trains which are efficient and well utilised, if slow. The trains use a coastal railway between Hastings via Melbourne and Port Kembla and between Newcastle and Port Kembla.

Demand for freight of steel is extremely sensitive to industrial production and construction trends. Conversations with steel companies have indicated that the recent slowdown in the economy has severely affected their business, with a strong reduction in production and a cutback in freight. Based on longer term experience a steel freight tonnes to real GDP ratio of 1.5:1 has been assumed, which may prove optimistic if the competitiveness of the Australian steel industry, relative to overseas producers, declines.

2.1.5 Other bulk

The other bulk categories mostly consist of paper products and fertiliser. Other bulk demand is assumed to grow based on population and GDP trends. Its effective growth rate has therefore been assumed to be the same as the non-bulk rate within the inland corridor.

The estimated relationship with GDP has been established for land freight, but conversations with freight forwarders and some customers have revealed that international ships operating coastal legs on round trips under voyage permits have begun to have an impact on this market.

2.1.6 Commodities summary

The following table summarises the assumptions used in this study for the drivers of demand and the parameters estimated to model that demand.

Table 1 Drivers of demand

Commodity	Driver	Source	Short-run estimates	Long-run estimates
Non-bulk	GDP with a multiplier effect	BITRE data	Multiplier begins at 1.07 times GDP in 2008	Trends down towards 1:1 ratio in 2080 – GDP and freight move at the same rate
Agricultural products	Long-run productivity growth	ABARE data	Short-run forecasts reflect long-run productivity growth – 2.2% pa	Long-run growth rate of 2.2% pa to 2080
Coal and minerals	Specific to coalfields	Coal mine operators, Queensland planning authorities	Same as long run – despite recent price collapse	Constant, with large potential demand from the Gunnedah basin constrained by Brisbane capacity and policy.
Steel	Long-run productivity growth	ABARE data, survey responses	Strong contraction expected in 2009 – 15%, flat in 2010 then resumption of long-run output growth of 1.9% pa	Long-run output growth – 1.9% pa to 2080
Other bulk	GDP with a multiplier effect	BITRE data	Multiplier begins at 1.07 times GDP in 2008	Trends towards 1:1 ratio by 2080

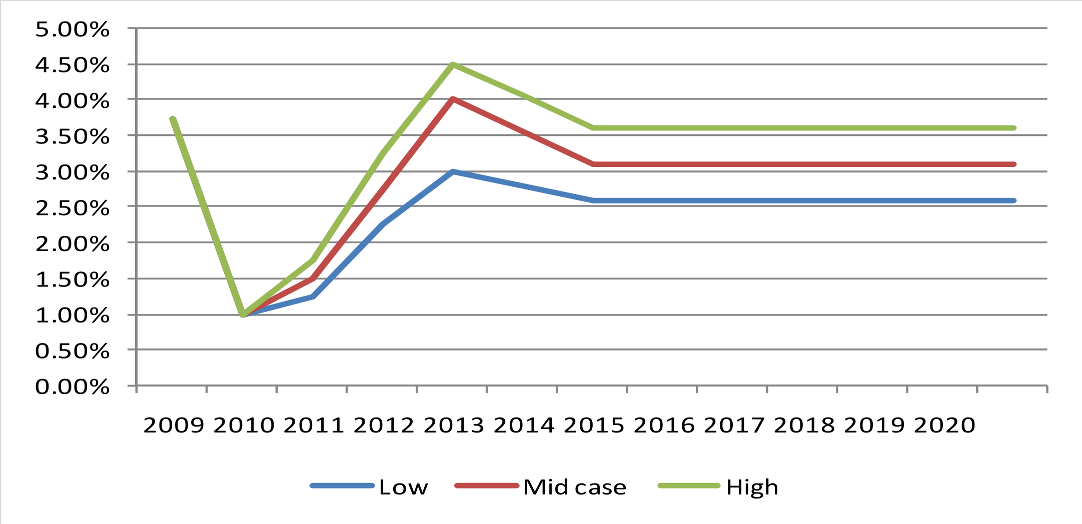
2.2 GDP forecasts

The long-run real GDP growth rate for Australia since 1977 has been 3.3% pa. Australia is now picking up from the recent recession and mineral export prospects appear promising, but it is not clear whether the long run trend will be at the past level.

The market share analysis has considered three scenarios, shown in the figure below.

- The **base-case/ mid-GDP** scenario is a mix of consensus and Treasury forecasts – that 2008-09 will see only low (1%) growth in real GDP followed by 1.5% growth in 2009-10, 2,75% in 2010-11 and 4% in 2011-12. After this period GDP has been assumed to trend down to long-run real growth of 3.1% pa from 2014 and into the future.
- The **high GDP** scenario predicts 1% real GDP growth in 2008-09, with 1.75% growth in 2009-10, 3% in 2010-11 and 4.5% in 2011-12 after which GDP trends down to 3.6% from 2014 and into the future.
- The **low GDP** scenario predicts 1% growth in 2008-09, 1.25% in 2009-10, 2.25% in 2010-11, 3% in 2011-12 and then GDP trends down to 2.6% from 2014 onwards.

Figure 2 Real GDP forecast scenarios



Data source: Australian Treasury, ABARE, RBA, ACIL Tasman analysis

2.3 Driver shortages and their effects

Road freight is more labour-intensive than rail freight, so driver recruitment difficulties have a greater impact on road freight by increasing its relative costs and prices.

Increases in the freight task, a large number of retirements in the aging driver workforce and difficulties in recruiting and retaining workers have created a truck driver shortage, though with a respite during the recession. It has also been found that driver shortages are more severe in long-distance operations and in rural Australia (ATA 2000b, Lawson 2002, Transport and Logistics 2007).

There were 130,127 truck drivers in 2006 (ABS Census). BITRE has forecast that growth in the Australian road freight task will average around 3.8% pa to 2020, which means that the tonne-kilometre task of the road freight sector in 2020 will be more than 1.5 times that of 2008. Even if more modest forecasts were made in the light of recent events, and even if allowance is made for increasing road freight productivity as maximum truck sizes and weights increase, there will be strong demand for truck drivers.

BITRE estimated that if demographic trends in the driver workforce observed between 1996 and 2001 were to continue, 70% of the truck driver workforce would be aged over 45 by 2011, and only about 10% of the workforce would be less than 35 (Appendix 60, 2005). The Transport Workers Union of Australia estimates that, to meet the projected 2020 freight task, 90,000 truck drivers will be need to be recruited (TWU 2007).

The principal means of attracting a larger share of the labour force into the truck driving industry is through higher wages, part of which are expected to be passed on to customers in the form of freight price hikes.

Each year ARTC commissions a survey of prices charged by the different modes. The survey is confidential to ARTC, but the study team have been provided with results for use in establishing the price of rail and road freight.

Road freight price increases have been significantly above those for rail, particularly in the 2007-08 financial year, and have been well above inflation. In that year 39% of increases in road freight prices were attributed to driver costs. When price increases across the three categories are averaged, this translates to a 4.7% nominal increase, or 1.1% real increase, in road freight prices caused by increased driver costs in 2007-08. Over-award payments in particular increased for long distance operations.

Three scenarios of road freight price increases directly related to driver shortages have been developed. It has been assumed that one third of road costs and prices are determined by labour costs, which is a reflection of an industry rule of thumb (the remaining determinants of price relate equally to fuel costs and capital costs). The scenarios have been created as a synthesis of literature on transport labour shortages from the US, some anecdotal evidence from the sources stated above and estimation based on recent trends in the economy. They are shown below:

Table 2 Movements in real labour costs for road

	2009	2010	2011	2012	2013	2014	2015	2020	2021 onwards
Low	1.50%	1.75%	2.25%	2.75%	3.25%	3.25%	1.75%	1.75%	1.75%
Medium	2.00%	2.25%	2.75%	3.75%	5.25%	5.25%	5.25%	5.25%	1.75%
High	2.50%	2.75%	3.25%	4.75%	7.25%	7.25%	7.25%	7.25%	1.75%

Although less labour intensive than road freight, rail is not immune from difficulties in attracting and retaining drivers. The model assumes that there will be increased labour costs in rail freight, albeit a smaller impact than for road. It has been assumed that 20% of rail's price is determined by labour costs – meaning that changes in labour cost have less of an impact on rail prices than they do for road prices.

Table 3 Movements in real labour costs for rail

	2009	2010	2011	2012	2013	2014	2015	2020	2021 onwards
Low	0.00%	0.00%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%
Medium	1.00%	1.17%	2.42%	3.08%	4.08%	4.08%	4.08%	4.08%	1.75%
High	1.33%	1.50%	2.75%	3.75%	5.42%	5.42%	5.42%	5.42%	1.75%

2.4 Fuel costs

2.4.1 Fuel costs as a proportion of total costs

Under the industry rule of thumb mentioned above, fuel accounts for one third of road freight costs. The ARTC survey is broadly consistent with this, at least for the long distances relevant to this study. In 2007-08 it found that fuel costs accounted for 18-32% of total road vehicle operation costs, the percentage being higher for long distance operations. Fuel accounts for approximately 15% of rail freight costs, about half the road freight level when considering long distance freight.

It follows that road freight costs are more sensitive than rail freight costs to fuel price increases. Rising fuel costs are recovered through rate increases and fuel surcharges, which are now standard practice among road and rail operators and these surcharges quickly adjust to the price of fuel. According to the survey, 47% of the road freight price increase in 2007-08 was attributed to fuel price increases. The mode share modelling in this appendix incorporates assumptions about future fuel prices and their impact on road and rail freight rates, and hence their impact on market shares and tonnages.

The modelling also incorporates carbon charges - see below.

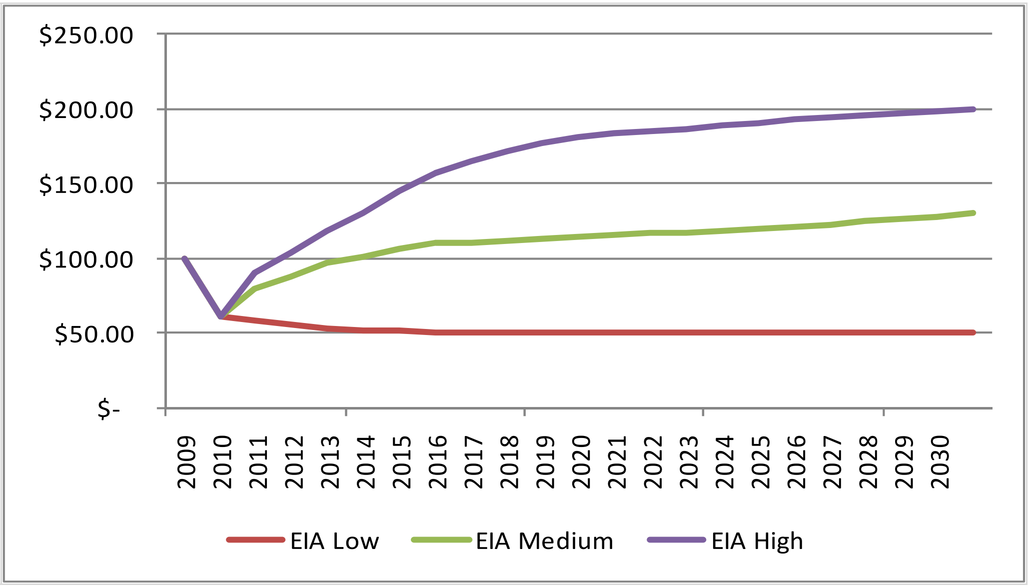
2.4.2 World oil prices

There is considerable uncertainty about the future price of diesel in Australia, which is a reflection of the uncertainty in markets for crude oil. Forecasts of future oil prices are published by the US Energy Information Administration (EIA) and the International Energy Agency (IEA).

As the EIA notes, four fundamental factors determine the price of oil in the long-term: growth in world liquids demand, high production costs for accessible non-OPEC conventional liquids resources, OPEC investment and production behaviour, and the cost and availability of unconventional liquids supply. Until 2009, fuel prices were rising strongly because of strong demand growth in Asia and the Middle East, no growth in production from OPEC members since 2005, increased costs of oil exploration and development, increases in commodity prices and a weaker US dollar.

However the recent economic slowdown in the world's top oil consuming countries led to a decline in the oil price by more than 60% since its peak in July 2008, but it has since recovered. In December 2009 the EIA's 'Early Release' of the 2010 Annual Energy Outlook published projections for crude oil prices in three cases, shown in the figure below, and these have been used in the ACIL Tasman model.

Figure 3 EIA forecasts of crude oil prices (in 2008 US$)



Data source: Energy Institute of America (EIA) *average real prices (delivered at refinery) in 2008 US dollars*

The considerable range between the high case and low case scenarios demonstrates the uncertainty in forecasting oil prices into the future – the EIA's range is between US$200 and US$50 per barrel, with a reference case of US$120 per barrel by 2030. In 2009 the oil price averaged $61 per barrel amidst a strong global recession and this seems to indicate that there is limited scope for further oil price falls.

The IEA published its World Energy Outlook in November 2009 with a reference case with gradual recovery in the oil price to US$100 per barrel between 2008 and 2020 with the price then rising to US$120 in 2030[5]. The EIA forecasts were consistent with the IEA forecasts.

To capture the wide range of credible oil price forecasts, sensitivities have been carried out for the price of crude oil in 2030. The chosen scenarios are US$50, US$120 and US$200 per

[5] In 2008 US Dollars

barrel in 2008 prices. The conclusion to this scenario analysis is that low oil prices both stimulate overall freight demand and road's share of that market whereas high oil prices increase rail's share of a smaller total market – meaning that rail sees only a small tonnage increase as a result of the US$200 oil price scenario.

2.4.3 Carbon price

It is assumed that the price of carbon will be $29 per tonne[6] emitted after 2013, rising in real terms by approximately 4% per annum. This estimate is in line with Treasury CPRS-5 modelling[7], rebased to 2008 prices. This has been modelled as being introduced from 2013 with a $10 per tonne introductory price in 2013 and the full carbon price thereafter. This is expected to increase the price of diesel by 3.1% in 2014, with a small ongoing price rise as carbon prices continue to increase in real terms.

2.5 Forecasts of the potential market

There are a number of elements of potential freight (i.e. total freight irrespective of mode) which could use an inland railway. These are:

- The Melbourne-Brisbane and Brisbane-Melbourne intercapital freight
- Regional freight which originates within the corridor
- Freight which originates outside the inland corridor, but would use the inland corridor for some or all or its journey. Such freight would include Adelaide-Brisbane, Perth-Brisbane and northern Queensland-Melbourne.

2.5.1 Melbourne-Brisbane intercapital freight

Looking at the Melbourne-Brisbane (M-B), and Brisbane-Melbourne (B-M) intercapital market, freight (total of all modes) in 2009-10 is estimated to be 3.6 mt M-B and 1.9 mt B-M, of which non-bulk goods represent approximately 3.1 mt and 1.7 mt respectively[8]. The medium and long-term forecasts show this category growing at 2.8% pa from 2017 onwards. The table below shows the forecasts of the market.

Table 4 Melbourne-Brisbane intercapital freight forecasts, 2010-2080

Thousand tonnes	2010	2020	2030	2040	2050	2060	2070	2080
M-B (and backhaul) total	**5,377**	**7,430**	**10,039**	**13,420**	**17,779**	**23,323**	**30,265**	**38,794**
Non-bulk	4,704	6,660	9,128	12,349	16,527	21,876	28,613	36,941
Agricultural products	-	-	-	-	-	-	-	-
Steel	331	371	441	518	600	682	757	812
Other bulk	-	-	-	-	-	-	-	-

Data source: ACIL Tasman forecasts

2.5.2 Freight from regions within the corridor

There is also a significant amount of freight which does not move end-to-end Brisbane-Melbourne. This regional freight originates within the corridor for delivery to Melbourne,

[6] In 2008 Australian Dollars

[7] Australia's Low Pollution Future, The Economics of Climate Change Mitigation, Commonwealth of Australia 2008

[8] Data have been adjusted to preserve confidentiality

Brisbane or some other location in the corridor. There are few data available on such regional freight.

The last concerted effort to obtain accurate data on regional freight was conducted by the BTRE in 1999. These data were far from perfect (road freight in particular being hard to measure), but it was the most comprehensive study of regional freight carried out. ACIL Tasman used these data in the previous (2006) North-South Rail Corridor Study and has updated and supplemented them on the basis of:

- Data from rail operators
- Discussions with stakeholders
- Relevant research carried out by other stakeholders. In particular: information has been provided in confidence to the study team by Australian Transport and Energy Corridor Ltd (ATEC), the Great Australian Trunk Rail System (GATR) and the Greater Shepparton Council/ Food Bowl Alliance
- Meetings with mining and grain organisations about the potential coal and grain freight tonnages on the inland railway.

On examination, some of the assumptions in the research material were more optimistic than ACIL Tasman can support, and there were problems of data inconsistency. The data set developed for this study was a combination of available numbers, analysis, and ACIL Tasman judgement. In future, more accurate regional freight data will be available once better means of estimating road freight tonnages are devised. This would be very useful, given the importance of trucks for regional freight other than coal and export grain.

Using this information and updating the forecasts for actual GDP, mining and agricultural activity to 2008, ACIL Tasman generated estimates of regional freight within the corridor in 2008. Freight which cannot be contested by rail (e.g. live animals) was excluded from this analysis.

The remaining commodities were manufactured (non-bulk) goods, agricultural products and grains, minerals, steel and other bulk. The same growth drivers that apply to the forecasts of the intercapital market were used to estimate regional freight to 2080.

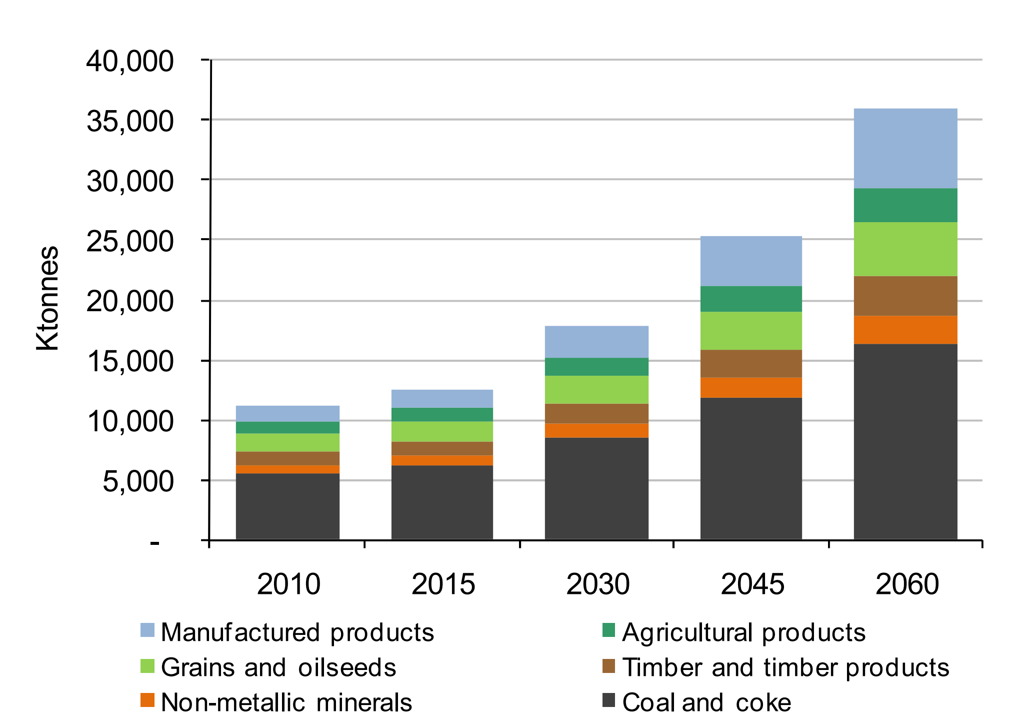
The regions of interest are:

- South-east Queensland
- Northern NSW
- Central NSW
- Southern NSW (Riverina)
- Northern Victoria.

South-east Queensland

This area is defined as south and west of Brisbane. The makeup of freight on the potential inland railway and its expected growth over time are shown in Figure 4.

Figure 4 Freight in south-east Queensland (thousand tonnes)



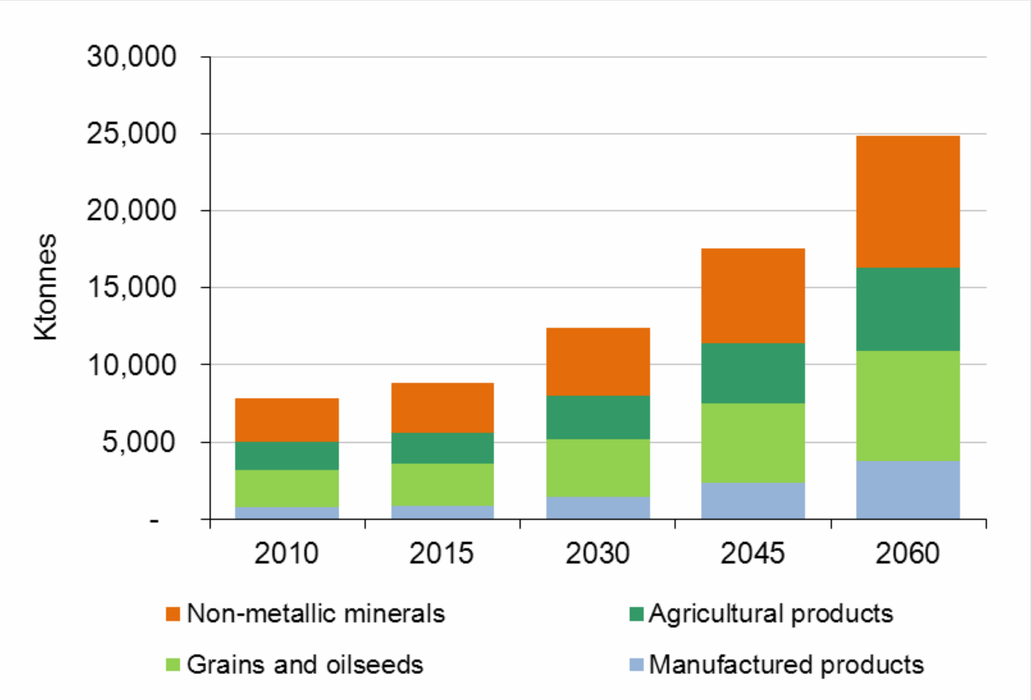
Data source: BITRE data used in the 2006 North-South Rail Corridor Study

The largest freight movements within the region relate to coal. The current tonnage of approximately 5.5 mtpa would divert to the inland railway and additional tonnage, assumed to be approximately 9.5 mtpa, would be induced (it is not mined at present because of capacity constraints on the old line) as discussed in section 3.3. Freight of grains and agricultural products is expected to grow, despite periodic droughts, in line with long-run output trends, reflecting improving farm productivity. In relation to freight volumes originating in south-east Queensland, 97% have their destination in Brisbane or its port.

Northern NSW

Northern NSW generates large tonnages of coal freight but they would not use the inland railway apart from a small deposit at Ashford that would use the Moree-Narrabri section on its way to Newcastle. Contestable non-coal freight in the region is estimated at 8.7 mt[9], and its makeup is shown in Figure 5 below.

Figure 5 Non-coal freight in northern NSW (thousand tonnes)



Data source: BITRE data used in the 2006 North-South Rail Corridor Study

Much of the freight is concentrated in coastal areas. Rail is estimated to have a 27% share of the manufactured (non-bulk) goods freight. Nearly all the freight tonnes to and from this region are to Sydney or Newcastle in the existing Sydney to Brisbane corridor, with very little northbound freight (less than 1% of non-coal freight).

The minerals segment of the market freight would not be materially affected by the presence of an inland railway, and would instead use the Hunter Valley network if rail were a viable option.

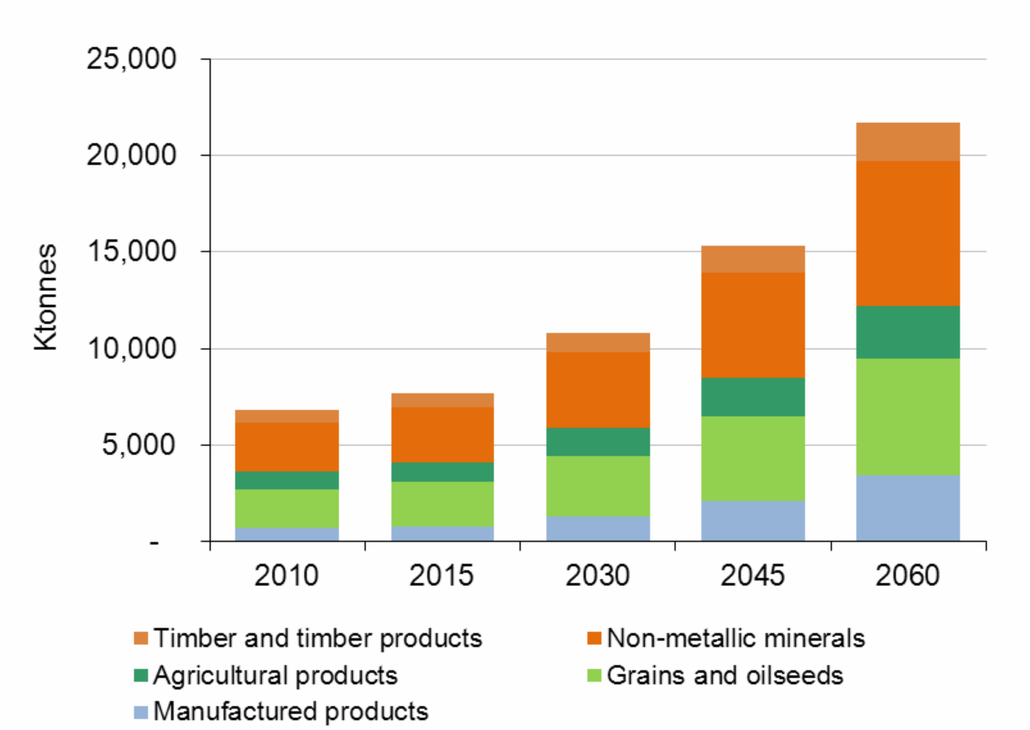
The result of this analysis is that only the potential coal movement of an assumed 750,000 tonnes a year from Ashford (whose total usable deposits are 10mt), using up to 130 km of track, would be contestable in this region.

Central NSW

In central NSW, 60% of the freight tonnes are coal freight to Port Kembla. After removing uncontestable items such as oil and live animals there were 6.8 mt of freight to and from central NSW in 2008.

[9] Excluding oil and petroleum and live animal freight

Figure 6 Non-coal freight in central NSW (thousand tonnes)



Data source: BITRE data used in the 2006 North-South Rail Corridor Study

In relation to non-coal freight, 60% currently travels less than 400 km to its destination; this includes all of the minerals freight and 80% of the agricultural freight, typically to Sydney or Port Kembla. The non-metallic minerals travel by road, as does 87% of the agricultural produce. The proposed inland railway might capture some of this freight for a small number of kilometres, particularly the 135,000 tonnes of agricultural produce which travels greater than 400 km to its destination.

For grain freight, 81% already travels by rail, over distances of 400-700 km to ports for export, and shorter distances are carried by road. Existence of an inland railway would divert some existing grain to alternative ports, using the inland railway, and this is discussed in section 3.3.1. This would represent a potential market estimated at up to 1.1 mtpa over an estimated 800 km of track.

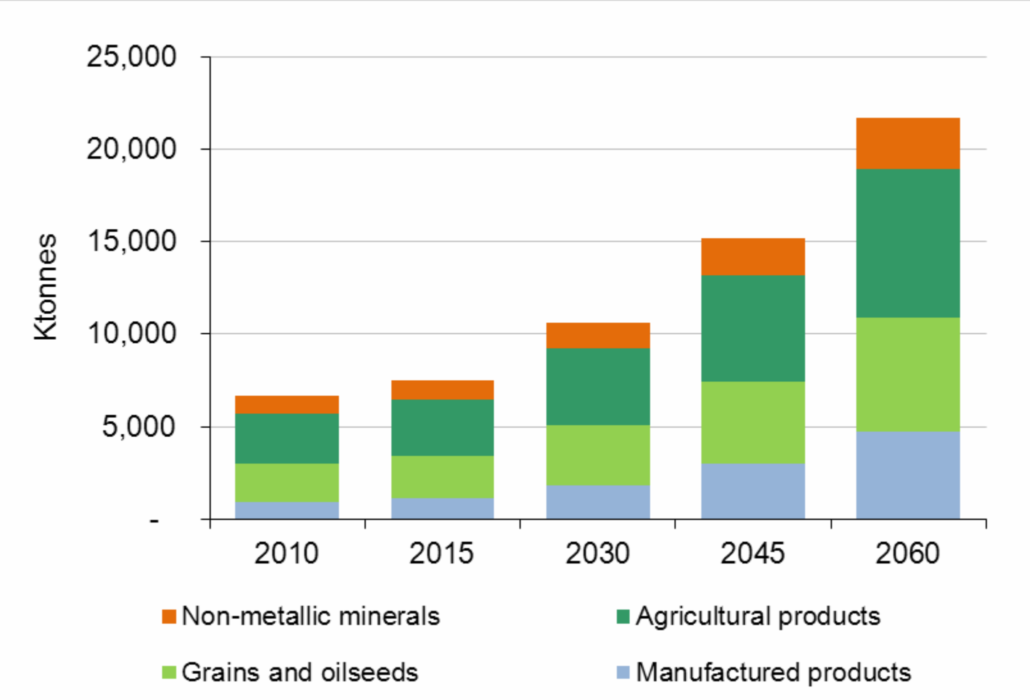
Timber freight typically travels by road, to avoid double handling and because forests have dispersed locations. It is possible that a specific rail alignment could lead to the capture of some of this freight. A total of 277,000 tonnes travels from the Central Tablelands to Brisbane.

There is only a small amount of manufactured goods and they move short distances to Sydney or Newcastle on the existing coastal railway with rail holding a 19% market share. This is not expected to be affected by the inland railway.

Southern NSW

Freight in southern NSW is dominated by agricultural products and grains from the Riverina; rail has a 43% and 76% market share in these two commodities.

Figure 7 Freight in southern NSW (thousand tonnes)



Data source: BITRE data used in the 2006 North-South Rail Corridor Study

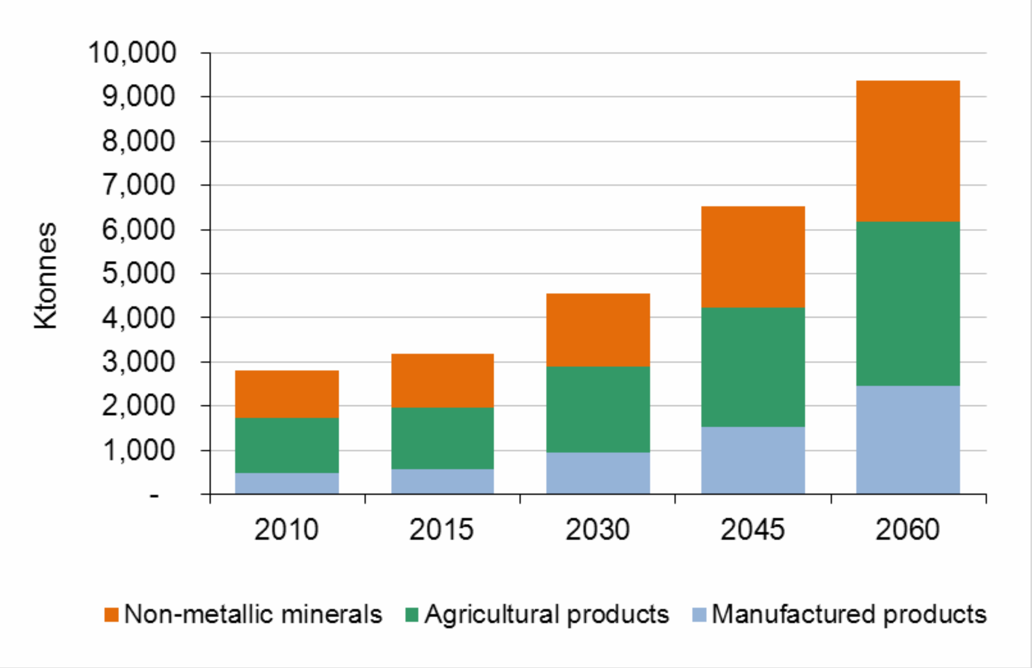
A large proportion of agricultural products move to Melbourne and Sydney, and grains travel to export facilities near those cities. Nearly all grain travelling more than 400 km to its destination moves by rail. Less than 3% of total freight to or from the region travels north to Brisbane. Section 3.3.1 of this report discusses the potential movements of grains that would be induced by an inland railway. The summary of this is a potential market of 339,000 tonnes by 2020, which could utilise 300 km of track.

The 19% of grain freight that does not use rail travels from the Central Murray region to Melbourne and is would be contested by an inland railway. This amounts to 0.5 mt tonnes in 2010.

Northern Victoria

The total freight task to and from northern Victoria consists mostly of agricultural products and some non-metallic minerals, with some manufactured goods also. The breakdown of this freight is shown below.

Figure 8 Freight in northern Victoria (thousand tonnes)



Data source: BITRE data used in the 2006 North-South Rail Corridor Study

The 1 mt of agricultural goods freighted from this region in 2010 mainly travel by road to Melbourne, with 9% travelling to the north. The freight of manufactured products (non-bulk) is almost entirely to Melbourne and rail has 41% of this market. Because the service characteristics of the rail link between Melbourne and northern Victoria will essentially remain unchanged it is not expected that there will be any change in this freight arising from the inland railway.

Some 970,000 tonnes of non-metallic minerals travel by road to Melbourne. The addition of an inland railway is not expected to significantly alter the characteristics of the southbound service. Although the inland railway would change the economics of sending these minerals north, the greater distance travelled to a port in NSW or Queensland is likely to make any such shift uneconomic. Therefore the flow of this minerals freight is not expected to change as a result of an inland railway.

In summary this report considers that the potential freight from northern Victoria which would use the inland railway is 140,000 tonnes of agricultural produce which is currently road freighted to Brisbane. Rail is expected to capture a similar share of this market as it does of agricultural products on regional routes where there is rail access (12%). The freight is expected to travel for 1,400 km of the inland railway.

Box 1 The 'Food Bowl' – submission from the Victorian Department of Transport

In its submission to this study the Victorian Department of Transport said that the Food Bowl area (comprising the Goulburn Valley, Riverina and Murrumbidgee areas) generated approximately 2.4 mt of freight in 2008. Of this, 42.6% was transported to destinations in Victoria, predominantly Melbourne; these destinations are already served by broad gauge rail and road links. The Department stated that the remaining 57.4% of freight (1.4 mt) travels to other destinations, predominantly north-east, and that this would be a candidate for a mode shift from road to an inland railway.

ACIL Tasman's analysis shows a higher volume of freight arising from the region than the DoT did (see box); this could be the result of the analysis covering a larger geographic area. Combining southern New South Wales with northern Victoria yields 1.6 mt of grains and 2.9 mt of agricultural products in 2008. 36% of grain and 60% of agricultural produce travel to Melbourne, and 76% of the grain and 29% of the agricultural produce travel by rail to their destinations (typically Melbourne, Sydney or Port Kembla) using existing infrastructure.

Regarding the southbound freight, it is unlikely that there would be a significant change to this freight flow resulting from the presence of a standard gauge inland railway via Shepparton.

Towns on the north-south 'coastal' route

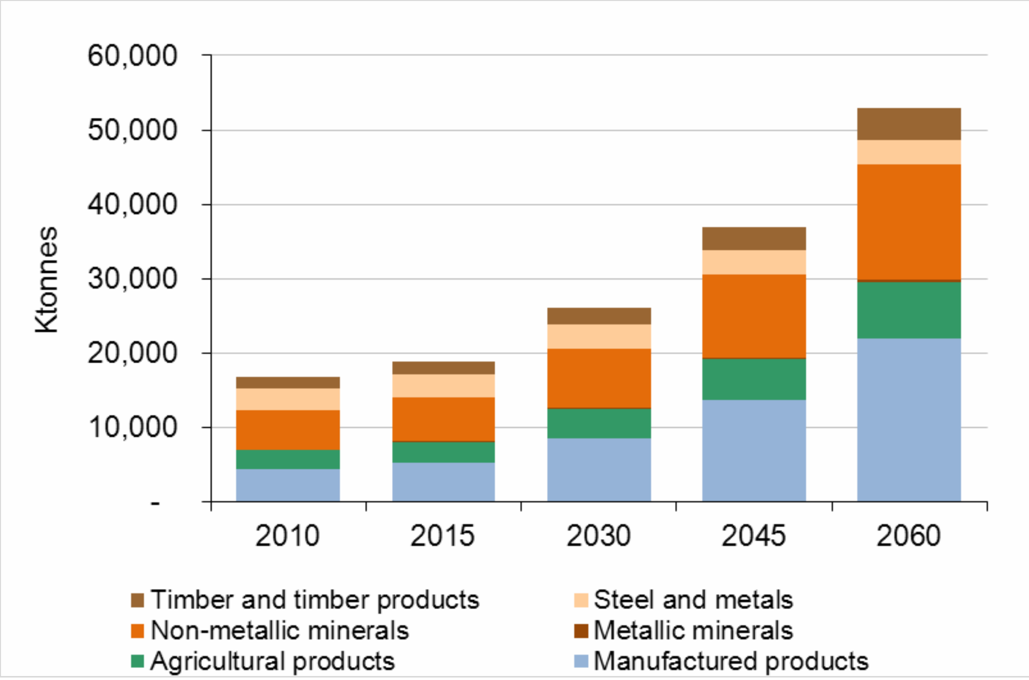
There are a number of cities and centres of industry which are located on and served by the existing coastal alignment. These cities would see no increase in freight as a result of the inland railway, but any shift of freight from coastal to inland would reduce capacity utilisation and improve reliability to these locations. The main centres along this region are:

- Melbourne (including Geelong)
- Sydney
- Brisbane
- Newcastle
- Albury/Wodonga.

There are other centres, notably Wollongong, which are near but not on the main coastal railway but feed or take traffic on or off it.

In analysing this region, intercapital freight movements between Melbourne, Sydney and Brisbane have been separated out from other traffic. The amount of freight between these regions is shown in Figure 9 below:

Figure 9 Freight along the coastal railway (thousand tonnes)



Data source: BITRE data used in the 2006 North-South Rail Corridor Study

Because of the proximity to the coast, coastal shipping competes with road and rail for market share - particularly in dense freight such as steel which moves between Hastings, Port Kembla and Newcastle.

There were 4.9 mt of steel freighted on this route, with sea capturing 1.4 mt, rail 1.7 mt, and road the remaining 1.9 mt. Because of improved service and a cheap price, coastal shipping has been making inroads into the steel freight market. Road has a larger share of the short distance market (79%), and rail has the highest market share of any mode for the remaining freight (36%) with road and sea each having 32% of the market. Since the logit model is designed to model land freight, the contestable market here is considered to be the 3.7 mt currently carried by road and rail.

About 6.3 mt of manufactured (non-bulk) goods are estimated to have been freighted in this region, but rail carries only 8% of these goods. The reason for this is partly definitional – the ACT is included in this analysis and accounts for 1.9 mt (31% of the market) which is not contested by rail. Of the remaining 4.3 mt, 2.9 mt travels less than 400 km. Given that there are excellent road links throughout this region, rail is not competitive with road over this distance because of the pickup and delivery time and cost. This suggests that the competitive market is closer to 1.5 mt, of which rail has a 23% market share.

There were 1.9 mt of agricultural products moving by land along this route, with a general trend showing movement of goods to the three state capitals; 98% of these goods travelled by road. Some 4.6 mt of non-metallic minerals were freighted by road along this corridor, mostly to Brisbane and the Gold Coast.

Summary – contestable regional freight

Putting together the story from the previous paragraphs, the potential tonnage that can be contested by an inland railway is shown in Table 6 below:

Table 5 Summary of contestable regional freight

Region	Commodity	Basis for quantity	Basis for mode share	Distance (km)	Thousand tonnes	ntk (million)
Central NSW	Timber and timber products	Trade from Central Tablelands to Brisbane	As intercapital	1,005	415	417
Southern NSW	Grains and oilseeds	Road freight from Central Murray to Melbourne	As intercapital	297	493	146
Northern Victoria	Agricultural products	10% of agricultural products are road freighted to Brisbane, this is contestable	As intercapital	1,400	137	192
Total contestable regional freight (2010 figures)					**1,045**	**755**

Data source: BITRE Data, ACIL Tasman forecasts

2.5.3 Freight to and from regions outside the corridor

A significant volume of freight originates or has its destination outside of the corridor, but would use the corridor for some of its journey. Of particular interest are Brisbane-Perth and Brisbane-Adelaide freight, which would use the inland railway between Brisbane and Parkes, (approximately 1,023 km) and freight originating in northern and far north Queensland which terminates in Melbourne, using the whole length of the corridor.

Our expectations for this freight are set out below.

Brisbane-Perth

Using data obtained as part of the previous North-South Rail Corridor Study an estimate of the total freight between Perth (and environs) and Brisbane was made. This was cross-checked with data supplied by ARTC. The estimate of the total freight shipped by rail was approximately 400 thousand tonnes of non-bulk freight whereas ARTC supplied a figure of approximately 300 thousand tonnes for 2007-08. It is thought that this difference is due to the growth of coastal shipping, which has increased market share.

The estimate of rail freight between Brisbane and Perth was adjusted to reflect the figures supplied by ARTC. The forecasts estimate that rail has an 84% share of the land freight between Brisbane and Perth. A major increase in the amount of land freight is not expected to result from bypassing Sydney, but it is expected that 100% of existing rail freight would move along the inland railway from Parkes to Brisbane. This would therefore provide 0.75 mt (in 2020) over 1,023 km.

Brisbane-Adelaide

Freight from Adelaide to Brisbane would be diverted from its current journey via Sydney. Freight to Brisbane, north Queensland and intermediate points along the inland railway are expected to use inland rail from Adelaide.

The total non-bulk freight currently carried by rail between Brisbane and Adelaide in 2008 was advised by ARTC to be approximately 150 thousand tonnes, and this would travel from Melbourne to Brisbane, 1,731 km. Combined with the forecast of total non-bulk freight between Brisbane and Adelaide this translates to a market share of 21%. In 2020 it is expected that this will generate 296,000 tonnes of freight for the inland railway.

Northern Queensland

The BITRE data suggest that the amount of manufactured goods flowing between Melbourne and northern Queensland, including intermediate points, is 400,000 tonnes. This is expected to be contested by the inland railway. Currently rail has a 44% share of this market along the existing coastal railway. There are 215,000 tonnes of non-bulk freight which are mostly transported by road between Sydney and northern Queensland, this non-bulk freight is already served by the coastal railway and would not be altered by the existence of the inland railway.

An estimated 2.1 mt of agricultural products move south, mainly to Sydney (923,000 tonnes) and Melbourne (1.2 mt). Road has 66% of this market, with the remainder travelling by sea. It is expected that rail will be able to contest the land freight element of this trade.

The following table summarises the estimates of current freight coming onto the inland railway from outside.

Table 6 Summary of contestable freight from outside the corridor (2010 estimate)

Region	Commodity	Basis for quantity	Basis for mode share	Distance (km)	Thousand tonnes	Million ntk
Northern Queensland - Melbourne	Manufactured goods	All identified land freight	As intercapital	1,731	401	694
Northern Queensland - Melbourne	Agricultural products	All identified land freight	As intercapital	1,731	638	1,105
Northern Queensland - Melbourne	Steel and metals	All identified land freight	As intercapital	1,731	123	213
Adelaide - Brisbane	Manufactured goods	All identified land freight	As intercapital	1,731	809	1,401
Adelaide - Brisbane	Agricultural products	All identified land freight	As intercapital	1,731	158	274
Adelaide - Brisbane	Other bulk	All identified land freight	As intercapital	1,731	69	119
Perth - Brisbane	Manufactured goods	All identified land freight	100% shift to IR	1,023	343	351
Perth - Brisbane	Agricultural products	All identified land freight	100% shift to IR	1,023	132	135
Perth - Brisbane	Steel and metals	All identified land freight	100% shift to IR	1,023	119	122
Total contestable freight					**2,793**	**4,414**

Data source: BITRE Data, ACIL Tasman forecasts

2.5.4 Summary estimate of the potential market

The table below summarises the total market for freight between Melbourne and Brisbane.

Table 7 Summary of contestable freight

Origin destination pair	Commodity	Distance	2010	2020	2040	2060	2080
		km	Thousand tonnes	Thousand tonnes	Thousand tonnes	Thousand tonnes	Thousand tonnes
Total intercapital freight			**5,335**	**7,095**	**12,627**	**21,776**	**36,543**
Brisbane-Melbourne	Non-bulk	1731	4,664	6,326	11,557	20,331	34,692
Brisbane-Melbourne	Agricultural products	1731	331	371	518	682	812
Brisbane-Melbourne	Steel	1731	66	67	65	61	56
Brisbane-Melbourne	Other bulk	1731	274	331	487	702	983
Total freight from outside the corridor			**2,793**	**3,694**	**6,390**	**11,062**	**19,105**
Northern Queensland - Melbourne	Non-bulk	1731	401	568	1,088	2,022	3,680
Northern Queensland - Melbourne	Agricultural products	1731	638	794	1,227	1,895	2,929
Northern Queensland - Melbourne	Steel	1731	123	129	131	134	136
Adelaide - Brisbane	Non-bulk	1731	809	1,147	2,196	4,083	7,429
Adelaide - Brisbane	Agricultural products	1731	158	197	304	469	725
Adelaide - Brisbane	Other bulk	1731	69	85	132	204	315
Perth - Brisbane	Non-bulk	1023	343	487	932	1,733	3,153
Perth - Brisbane	Agricultural products	1023	132	164	254	392	606
Perth - Brisbane	Steel	1023	119	125	127	129	132
Total contestable regional freight			**1,045**	**1,298**	**2,007**	**3,100**	**4,792**
Central NSW	Agricultural products	1005	415	516	798	1,232	1,904
Southern NSW	Agricultural products	297	493	612	946	1,462	2,260
Northern Victoria	Agricultural products	1650	137	170	263	406	628
Total market - Brisbane-Melbourne			**9,173**	**12,087**	**21,024**	**35,938**	**60,440**

Data source: BITRE Data, ACIL Tasman forecasts

3 Modal analysis – methodology

The first part of this section addresses the parts of the total freight market that have competition between road and rail, and in some cases sea freight, concentrating on the end-to-end (Melbourne-Brisbane) market. The end of the section addresses freight that is essentially rail only (coal and export grain). Freight to or from intermediate points is further addressed in the following chapter.

Most of the Melbourne-Brisbane market consists of non-bulk freight. This commodity class is the most contestable – the most able to switch between road or rail freight. Consumers, whether they are end-users or freight forwarders, make choices about which mode to use based on a number of characteristics of the transport alternatives.

Typically that choice can be characterised as a price-service trade-off. The sensitivity to price is enhanced when freight is a large proportion of costs or when the profit margins in the customers' businesses are low.

Some companies have been organised for efficiency or for customer service, requiring excellent integrated logistics management and high levels of just-in-time service from their freight service provider. ACIL Tasman has undertaken a survey using stated and revealed preference techniques to identify the relevant areas of competition, and has used discrete choice modelling to predict how different companies (dealing in different commodities) trade-off price and service, and how sensitive they are to movements in those attributes.

The attributes of consumers' modal choice decision which have been measured and modelled are:

- Price
- Reliability
- Availability
- Transit time.

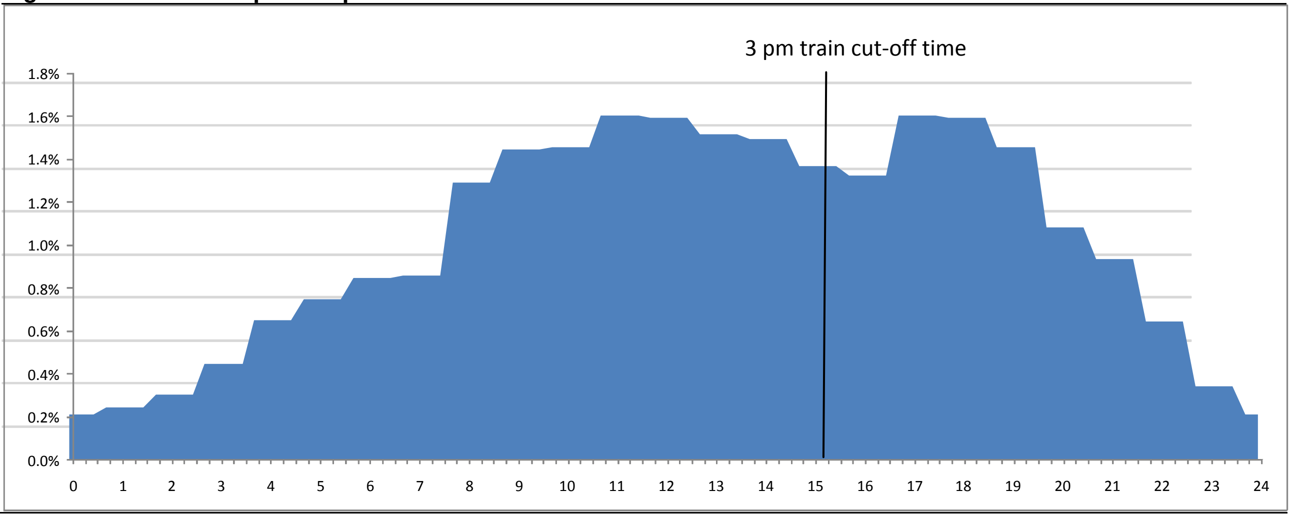
"Price" relates to the price faced by the customer, which includes any relevant pick-up and delivery costs incurred. The survey revealed that price has been the key determinant of mode choice.

Reliability relates to the percentage of trains which arrive at the terminal within 30 minutes of scheduled arrival time. The reality is that rail operators have slack built into their schedule so that a late train arrival does not necessarily translate into goods being delayed from the customer's point of view. This increases rail's reliability, but it also means that rail operators could choose to sacrifice some gains in transit time to improve the reliability of their services.

Availability relates to the cut off time which is imposed by the transit time. Many companies want to receive goods in the morning – typically by 9am. After allowing for pickup and delivery at each end of the journey this means that goods must be available at terminals around 6am to capture such 'availability sensitive' freight.

As trucks are usually available when customers want them, truck departures are a good indicator of customers' availability preferences. A VicRoads a histogram of northbound truck movements on the Hume Highway just north of Melbourne, shown below, provides an indication, (It was not possible to separately identify the Melbourne-Brisbane trucks, but ACIL Tasman also looked at the northbound movement of trucks on the Newell Highway as a cross check). It shows a fairly even spread throughout the day and early evening (though there is more of an end-of-day peak on Fridays). A train with a cut off time of say, 3pm, is not able to compete for any freight to the right of the vertical line.

Figure 10 Truck departure preferences from Melbourne



Data source: VicRoads truck count, weekdays

Transit time directly affects the availability measure, but some customers have a preference for a shorter transit time in its own right, e.g. perishable and other quick turnover consumer goods. Shorter transit times mean that stock forecasting needs to cover a shorter time period and as a result is more accurate. Such time sensitive freight currently travels via road because of its faster time as well as its greater reliability, but some of it remains a potential market for rail.

3.1 Customer survey

From December 2008 to July 2009, ACIL Tasman undertook a survey of approximately 30 current and former rail customers, both freight/logistics companies and end customers - many of the larger participants in the market and a sample of smaller ones.

The purpose of the survey was to understand the variables which affect customers' choices of freight mode, to gain a better understanding of their future and potential demand for rail, and determine their elasticities of demand for rail services.

The survey used stated preference techniques and consisted of a questionnaire plus an in-depth interview. The questionnaire commenced with scene-setting and understanding the customers' operations and also asked for general views about the road/rail choice, how logistics operations have been changing or adapting to customers' needs and information about the cost pressures being faced by the businesses that have their own freight vehicles. Finally the questionnaire asked scenario-based questions which assist in revealing the companies' sensitivity to price and service combinations. The questionnaire provided information about the amount of freight and the determinants of mode choice for companies. The interviews built on the questionnaire to gain a deeper understanding of the companies' perspectives and provide an opportunity for them to raise other aspects that they considered relevant.

3.1.1 Survey findings

This section sets out qualitative findings of the survey, and ACIL Tasman's conclusion as to how these aspects should be modelled. The survey showed that ll commodities respond to both price and service characteristics, but the extent of the response differs markedly between the commodity groups.

There was a broad consistency in the responses to the questionnaire, the main differences being those expected from the nature of different businesses, e.g. producers of bulk commodities such as steel and paper compared with firms with tight logistics requirements such as Australia Post and Woolworths.

The reasons given for the current choice of mode included:

- Grain: rail preferred to road for logistical efficiency reasons
- Coal: rail preferred to road for logistics and price reasons
- Coastal legs of international shipping sometimes used for bulk paper, because of price
- Rail preferred to road for transporting cars, in special containers, because there is less damage
- Non-bulk (containers and pallets): road often preferred to rail because the door-to-door price is lower and reliability higher, especially on shorter runs such as Melbourne-Sydney
- Time-sensitive non-bulk: road preferred to rail because of high reliability and ability to meet tight delivery windows (e.g. large retailers)
- Air and road preferred to rail for express freight, because of reliability and transit time
- Most non-bulk freight is contestable between road and rail, depending on price, and on-time availability for pickup. Freight forwarders offer customers a menu of different rates, transit times etc to customers who choose the mix they prefer (or sometimes their integrated logistics providers choose). The survey carried out by ACIL Tasman indicated that choices reflect those trade-offs rather than any residual prejudice in favour of a particular mode. However smaller truck firms tend to see themselves as truck-only.

The survey revealed some market changes in the three years since the previous study for the Department of Transport and Regional Services:

- The importance of price has further increased. This could reflect the improved reliability of rail services now that the upgrade by ARTC of the current route is almost complete, reducing the previous importance accorded to reliability (i.e. the gap has narrowed). It could also reflect increased cost pressures due to fuel price rises and to the impact of driver shortages on labour costs. Last time coastal shipping was only mentioned as a possibility on the east coast (although it was already significant on the run to Perth). Since then an Australian coastal shipping company (Pan) has entered the east coast route and then withdrawn. However international ships, stopping at two or more Australian ports before returning overseas, under single or multiple voyage permits issued by the Government, have now effectively established a regular weekly service in this corridor. Although the journey is slower than the other modes, reliability is good and the price is significantly lower – attracting bulk freight, notably paper
- As discussed earlier, land-bridging has almost disappeared because of improved shipping services
- One substantial customer has moved from a road/rail mix to road only as it tightened its logistics management and now works to narrow delivery 'windows'

- A greater number of companies mentioned, without prompting, that they now have corporate policies in favour of reducing their 'carbon footprint', and thus favour using rail or sea freight when competitive
- Anti-fatigue regulations and the associated chain-of-responsibility legislation has increased road freight costs
- Rail operators have increased freight rates where they were uneconomic, and have also begun changing the structure of rates (see below). This might help explain why rail market shares in the corridor appear to have declined since the previous report. In particular there is less operator interest in serving the Melbourne-Sydney run whose shortness gives trucks an inherent advantage. Both rail operators have said publicly that the shorter east coast runs, Melbourne-Sydney and Sydney-Brisbane, are uneconomic and not sustainable in the long term unless margins can be improved
- Increases in fuel prices did not feature prominently in the interviews. The increases were passed on with fuel surcharges in both road and rail modes, and although their impact is greater on road freight, whose consumption is said to be at least twice that of rail freight per net tonne kilometre, the impact (in terms of modal choice) did not seem large.
- Truck driver shortages have become more apparent, though these have eased with the slowing economy. The firms interviewed were coping, though they mentioned that sole operators were leaving the industry.

In all cases urgent deliveries, requiring high levels of customer service, are made by road (or air). Rail is disadvantaged by the time taken for pickup and delivery, and the consequent longer door-to-door transit times. However logistics operators are getting better at distinguishing urgent from other deliveries and this provides an opportunity for rail to focus on capturing the more price-sensitive and non-urgent freight. The modelling attributes 5% of the non-bulk market to express freight, and assumes that rail cannot expect to capture any of it unless there was a very high speed line potentially costing a multiple of the optimum alignment emerging from this study.

There are few customers and freight firms who want to take an all-or nothing approach to distribution channels. Customers see a benefit to strong competition between road and rail (and, where relevant, sea). Many use two or three modes; those who use only trucks remain interested in using rail freight if the price and service quality become more competitive. Several companies also told ACIL Tasman of an increased interest in rail freight because of corporate policy related to greenhouse emissions.

Price was the paramount determinant of market share, with nearly all customers and freight forwarders noting that price was a big influence on modal choice, although most customers and freight forwarders did look at price in the context of a price-service offering, noting that price needed to compensate for lower service levels on rail compared to road.

Some heavy users of rail maintain a strategic use of road to ensure that they retain the capability to efficiently use road as an overflow supplier, or when rail services become temporarily unavailable. This strategic use of more than one distribution channel is unlikely to change unless there are significant and non-transitory movements in the cost of road or rail.

Occasionally there was the potential for a step change in volumes where service or price could move sufficiently to entice a large customer from road freight. This is the case with some large potential fast moving consumer goods or postal customers, where a significant improvement in service levels and price could entice them to reorganise their tight logistics operations to accommodate rail freight. However this would require a sustained and significant improvement in cost or service, due to the one-off transitional cost that such a change would entail.

In general ACIL Tasman found that the existence of long-term contracts, sunk costs in delivery infrastructure and planning (e.g. software and systems) and a continuous inclination on the part of customers not to make decisions based on temporary movements in price and service characteristics, suggest that changes in modal choice would take some time to be reflected in the modal share. The modelling assumes that modal share changes are phased in over two years (the current year's service is weighted 33%, the prior year's service is weighted 66% and the service two years ago is fully incorporated in the current market share). This is confirmed by experience with recent track improvements on the coastal railway, which have improved reliability and transit times but have not yet increased rail freight's market share.

There are areas of the market where only rail can compete, although these have declined since the previous North-South Rail Corridor Study. One such area was land-bridging. A shortage of container ships in the early 2000s meant that rail captured an amount of freight which would have gone by sea to other capital cities, e.g. international freight destined for Sydney but unloaded at Brisbane. Such freight cannot easily travel by road because rail is cheaper and in this case does not suffer from the pickup and delivery problem.

This market has declined substantially over recent years with increasing availability of ships providing service between the main Asian ports and the three east coast capitals, and only 0.5% of the non-bulk freight market is attributed to land-bridging.

Current non-bulk rail freight between Melbourne and Sydney contains a high proportion of goods to or from Tasmania, which are most efficiently handled by rail.

3.2 Logit modelling within the study

The questionnaire responses were reflected in an economic model that was used to predict the effect of changes in "drivers" of mode share such as relative prices and reliability. The model used in the ACIL Tasman analysis is a nested multinomial logit model as recommended by recognised planning guidelines such as the *National Guidelines for Transport System Management in Australia (*Australian Transport Council, 2006).

The model begins with a forecast of all freight between the origin-destinations covered by the corridor. This includes inter-capital pairs between Melbourne and Brisbane, but also Adelaide and Perth-Brisbane and northern Queensland-Melbourne. These raw freight forecasts are then adjusted for the long-term price elasticity of freight and the prices of rail and road which are input into the model. Thus total freight is assumed to respond to changes in the weighted average price of road and rail freight, which in turn reflect assumptions about influences on future road and rail prices, such as fuel and labour costs. The price elasticity of freight was estimated at 0.36 as described in section 2.1.1. While rail is cheaper than road freight, greater use of rail freight would increase the total market through its effect on average freight rates. Similarly, increases in the price of road freight reduce the total market size through the price effect.

Forecasts are also made for freight which would use the route for a small part of its journey. Additional freight which would travel by rail if a line was built close to its origin ('induced freight') is also included – the main example is coal, which stays in the ground if suitable transport is not available (see section 3.3). There is also 'diverted freight' which uses the inland route instead of another one (e.g. grain from northern NSW via Cootamundra to Port Kembla instead of to Newcastle).

Forecast total freight is adjusted to remove freight in non-contestable sectors, for example it is appropriate to remove express freight from the total because this cannot be contested by rail. Similarly, road cannot compete with rail in the land-bridging sector, where rail's unit costs are significantly below road's. This way the logit model only determines competitive outcomes in markets where there is competition.

The logit model is then employed to calculate the road and rail mode shares for the contestable part of the market – excluding non-contestable freight. The detailed assumptions involved are provided in section 4. Non-contestable, induced and derived freight are then added (outside the logit model), to determine the amount of freight which would travel by rail and road.

ACIL Tasman has considered and, where appropriate, incorporated into the modelling the estimates made by ARTC in their recent submissions to Infrastructure Australia. Particularly relevant were the price, availability and reliability forecasts from ARTC. However the ARTC model itself was designed for different purposes, as a capacity planning tool, which estimates the possible high-case demand in order to avoid under-investing in infrastructure and rapidly encountering capacity constraints, and it was not used in this inland route study because:

- It assumes that the entire market is contestable – mathematically, there is no constant in the ARTC's utility function. (The constant term in the ACIL Tasman model can be adjusted for each commodity on the basis of available data to capture influences not covered by the model – and which help explain, for example, why some freight is not available to a certain mode – as well as to compensate for measurement errors)
- A number of service attributes have been aggregated into one composite measure using an arbitrary weighting
- The model has been fitted to a few observations from very different markets, some outside the east coast corridor, not to elasticities obtained by a survey
- The resulting elasticities are much higher than other published ranges for price and service elasticities.

The ACIL Tasman model is more conservative in terms of modal shift than the model developed by ARTC, and provides a good fit with experience in the Melbourne-Brisbane corridor.

ACIL Tasman's modelling has built in a two year lag in adjustment to change. There are many reasons for delays in adjusting mode share, and these are usually outside of the ability of a model to capture. Some customers are locked into long-term contracts and cannot adjust behaviour rapidly. Other customers have made a strategic investment in road receival and despatch infrastructure and would need to be sure that any changes in prices are long term in nature before switching to rail. Other businesses prefer to use a mix of modes, to ensure that there is active competition for their business, and also to maintain expertise and efficiency in using both types of mode. An example of lag is that changes in fuel price in the period until mid 2008 had little effect on mode choice the following year.

Typically, the effect of incorporating lag is merely to smooth adjustment to new service levels over a longer period. The most significant impact of lag in the model is when the inland railway commences and demand is phased in over the commencement year (2020) and the two following years. Subsequent changes to price and service are incremental and the impact of lag on these adjustments is small.

3.3 Additional freight

The logit model is used to analyse inter-capital freight movements because it is relatively easy to define the changes to price and service for freight passing the entire length of the corridor. However as indicated above there is additional freight which moves across and partly along the route and which will nearly all move by rail.

3.3.1 Export grain

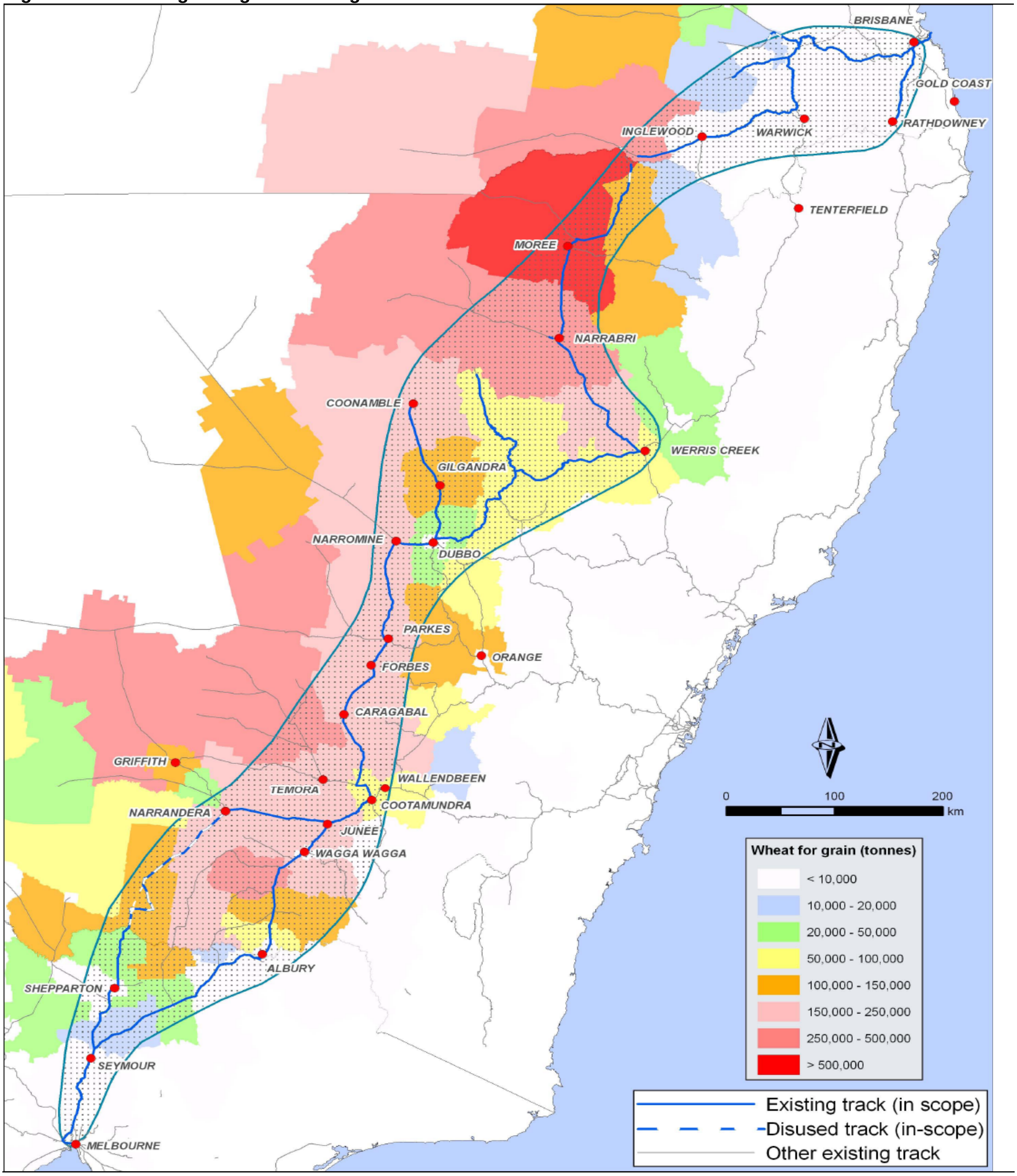
Rail is the preferred mode for export grain (mainly wheat, but also barley and other grains), as it is logistically more efficient than trucks. The 'pickup and delivery' problem for general freight (where rail freight suffers from double handling from/to trucks at the origin and destination terminals) is reversed with grain, as rail hopper wagons unload into specialised port facilities. Therefore rail is almost always used for export grain freighting for distances above two to three hundred kilometres, which effectively means nearly all export grain - in this corridor grain grows in locations well away from the coast.

The amount of grain carried is a function of production rather than demand, subject to some relatively small movements in stock levels each year – prices adjust to clear the market. Production is dependent on weather and on a long-term trend of gradually increasing farm productivity. As the potential inland railway is a long-term project, the forecasts ignore the large year-to-year fluctuations due to weather, instead being based on the long-term trend.

The amount of grain available for export also depends on domestic demand. Some domestic demand is served by rail, especially major customers in urban centres. Smaller customers, such as feedlots and small bakeries, are usually served by road.

Grain growing areas are shown in the map below:

Figure 11 Grain growing areas along the corridor



Source: Parsons Brinckerhoff

Grain in the inland corridor now moves to ports or cities on other rail routes, e.g. Hunter Valley. Although there is an inland railway of sorts between Moree and Melbourne, and grain trains sometimes do that trip, it is slow and tortuous. An improved inland route would:

- Divert grain from the difficult Hunter Valley corridor – which is congested with coal trains that pay higher rail infrastructure access fees – to Port Kembla via Cootamundra
- Capture grain that is now trucked from the Darling Downs to the Port of Brisbane because of poor capacity on the old line

- Allow greater movement north and south to balance supply and demand, which are affected by changing areas of drought/rain, and fluctuating supplies and demand of particular categories of grain
- Increase inter-port competition and potentially divert Riverina grain from Port Kembla to Melbourne, Coonamble grain from Newcastle to Port Kembla, Moree 'Golden Triangle' grain from Newcastle to Brisbane etc. The effectiveness of this outcome would depend on the route configuration.

The portion of grain freight that could end up on sections of the inland railway has been arrived at on the basis of production statistics, transport improvement and consultation with the grain industry. The resulting tonnages are added to those that were obtained from the logit analysis. They are likely to vary substantially from year to year depending on harvests.

3.3.2 Coal

Rail is usually the most economic means of transporting coal, except for short distances where trucks or conveyers are used. Trucks are also used where there are rail capacity constraints (e.g. between Toowoomba and Brisbane)

Drawing on experience in this sector, and discussions with coal industry participants, ACIL Tasman has reached conclusions about coal freight on the potential inland line. The conclusions for the Toowoomba-Queensland/NSW border area differ substantially from those of ATEC whose coal freight analysis, and supporting consulting work, has been examined.

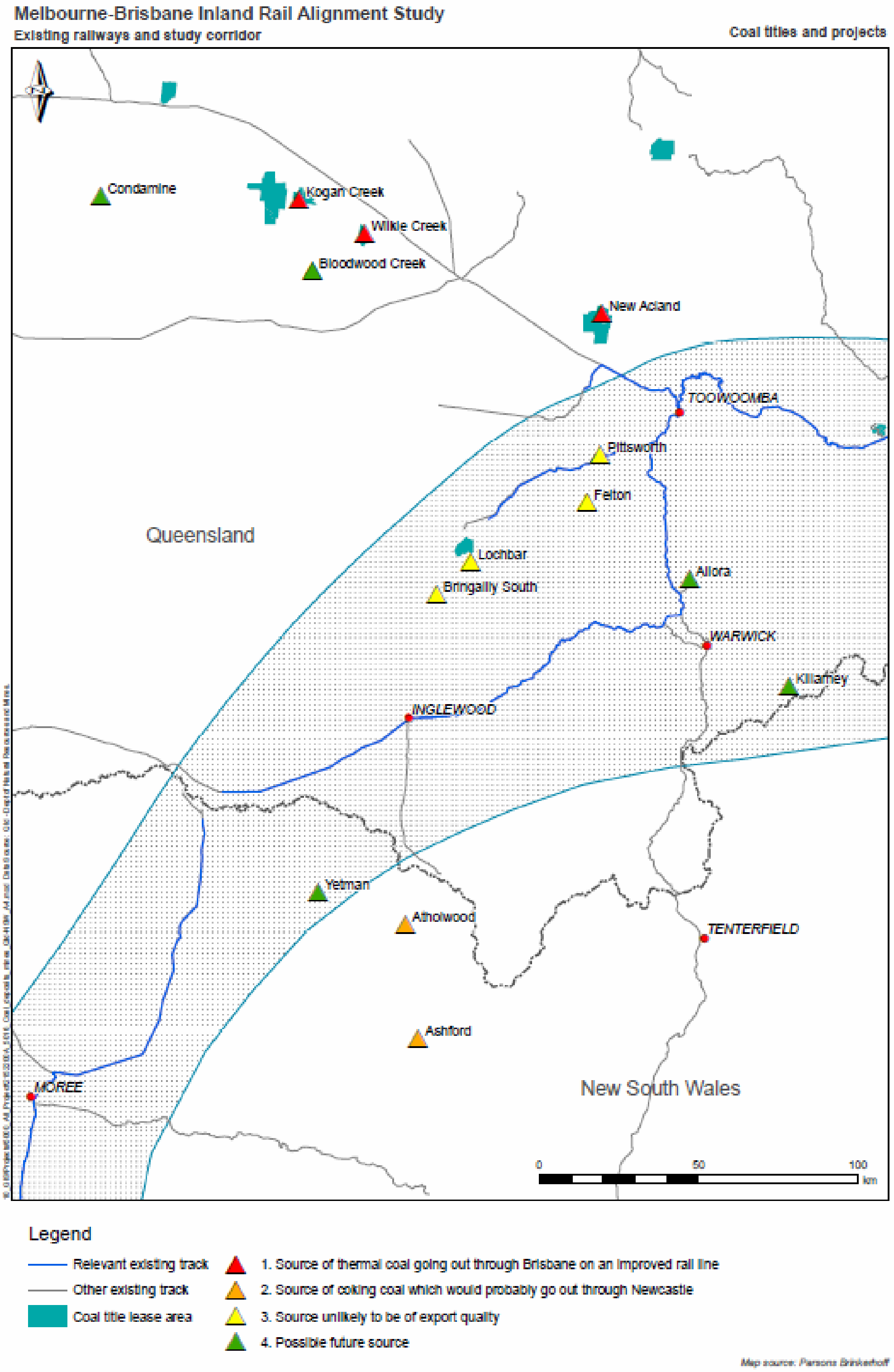
The most important source is the East Surat basin, Northwest of Toowoomba. The coal there is relatively low-grade thermal coal, used mainly for power generation, whose value is typically around half the value of coking coal used for steel manufacture. Because of layered deposits, East Surat coal is expensive to mine, and hence is uneconomic to transport by rail for long distances. It would not be economic to transport it to Newcastle (820km) or to Gladstone via a partially new line (530 km).

It is economically viable to transport the East Surat coal to Brisbane, the distance being around 220 km. (For reference, the weighted average haul in NSW is around 120 km and in Queensland is around 250 km for all export coal, although these averages will naturally increase as mines move further afield. Currently the longest thermal coal haul in Queensland is 420 km from Rolleston mine to Gladstone and in NSW 360 km from Boggabri to Newcastle). There are some other deposits to the south of Toowoomba, around Millmerran, which are not of export quality.

There is also a small (10mt) deposit of coking coal at Ashford in northern NSW which could be economically transported to Newcastle. It would be trucked 40 km to Moree and then carried by rail, the first section being Moree-Narrabri which would be upgraded if it became part of an inland route.

The main coal sources are shown on the following map. The most likely East Surat basin coalfields are shown in red Northwest of Toowoomba, and Ashford is shown East of Moree.

Figure 12 Coal mines and deposits



The tonnage transported between East Surat/Toowoomba and Brisbane, currently more than 5 mtpa, is constrained by the capacity of the existing railway. An inland railway would replace that railway and would have much greater capacity. The relevant section of the inland line, from a point near Oakey (north-west of Toowoomba) to Brisbane, would be dual gauge. Narrow gauge trains could operate between the mines and the port, or standard gauge lines could be constructed to the train loaders at the various mines.

Analysis of the size of the coal deposits suggests that large quantities are available. The binding constraints would then become suburban rail capacity; policies related to coal trains passing through suburbs near the port; and rail, storage, loading and ship capacity at the port. The study team has based its analysis on 15 mtpa being transported on the inland line from Oakey to Brisbane in the core scenario, compared with 5-6 mtpa now. This would need no more trains than at present, as the new trains would be larger.

The known export quality coal deposits in East Surat which could potentially use Brisbane as port are summarised in the following table. It suggests that if appropriate rail and port infrastructure was available then there is the potential for substantial quantities to be exported from the East Surat through the Port of Brisbane.

Table 8 Coal deposits in the East Surat Basin (mtpa)

Deposit/mine	Measured mt	Indicated mt	Total mt
Sabine		72	72
New Acland	242	271	513
Wilkie Creek	265	120	385
Kogan Creek	310	120	430
Total	**817**	**583**	**1,400**

Data source: Queensland Coals - Physical and Chemical properties, Colliery and Company Information 14th ed. 2003.

It is understood that the port could handle up to 12-15 mtpa with a moderate upgrade to present facilities, but would need a policy decision and investments to go beyond that. It is also understood that Queensland government policy does not favour an increase in the number of coal trains moving through Brisbane because of passenger train traffic and objections to the noise made by coal trains at night. These railway constraints would not change due to the coal arriving on standard gauge trains because part of the route to the port is dual gauged with suburban lines. (However the crowded Ipswich Valley would be avoided, as there would be a new deviation if the inland line went ahead.) ACIL Tasman has therefore modelled 15 mtpa but notes that there is a possibility of much higher tonnages if there were appropriate policies, suburban rail enhancements and port investments.

Although the coal forecasts are subject to international demand and broader energy policies, Australian exports are less likely to be affected by a market downturn than coal from higher cost sources in other countries.

The 15 mtpa coal tonnages have been added to the other tonnages estimated from the logit analysis and the grain analysis. Coal is important to the economics of an inland line because coal typically pays much higher rail access prices than grain and general freight.

3.4 Data sources and problems

The main data sources for the demand analysis were:

- Interviews and responses to questionnaires by freight companies and customers, especially for the weighting given to price and service attributes when making modal choices
- The main railway operators on the route, Pacific National and Queensland Rail, who were very helpful in providing detailed data including origin/destination/commodity tonnages, journey times, and variations in journey times. The data have not been presented in this report for confidentiality reasons, but were used in the modelling in order to produce future estimates
- ARTC provided information including current tonnages and service characteristics and forecasts of the coastal railway service levels and capacity
- SCT, which operates on the East Coast –Perth route and in early 2010 began to offer services on the Melbourne-Brisbane route
- Freight forwarding/ logistics companies
- Freight customers
- Regional interest groups
- Consultant reports commissioned by parties proposing an inland railway. Included in these reports provided by ATEC, a proponent of a north-south railway, and by GATR, a proponent of a high speed link. Some of this information cannot be presented in this report for confidentiality reasons, but has proved useful when considering the Study Team's estimates
- A report commissioned from SKM by the Greater Shepparton City Council on rail revenue potential from that region
- Confidential and draft reports by SAHA related to the north Sydney freight corridor
- Reports by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) and its predecessor the BTRE, which drew from ABS data, work commissioned from freight consultants and the Bureau's own databases. In particular:
    - BTRE Report 112, *Freight Measurement and Modelling in Australia,* (BTRE, 2006) had time-series data on non-bulk freight transport movements between Australian capital cities and forecasts from 2002 to 2020. It drew in part on the ABS Survey of Motor Vehicle Use which estimates kilometres travelled, fuel consumption and tonne-kilometres travelled by registered vehicles in Australia
    - Transit time, number of weekly intermodal direct city-to-city trains, total number of weekly intermodal trains on a line segment, numbers of weekly steel trains, train length, double-stacking capability, track quality, train flow patterns, dwell time, number of stops and average speed. It provides information on market indicators including access revenue yield indicators, total rail task, total interstate rail task by line segment, inter-capital city line segment share in total interstate rail task, and intermodal state-to-state market share.
- ABARE Australian Commodities Report, September 2008 - medium-term forecast commodity production.
- Literature on freight elasticities (especially M Starrs 2005, which drew on multiple sources)
- Australian Treasury, Reserve Bank, *The Economist* polls of forecasters' latest figures - short-term GDP forecasts. Treasury's Intergenerational Report (2007) - long-term growth forecasts.

The most significant data problem relates to road freight. It is much more difficult to measure activity for road freight than for the other modes because of the much larger number of operators, origins and destinations, and a lack of records about the commodities carried. The available data are an extrapolation from old data which were subject to error, with modifications to reflect more recent (but partial) information when available. Hence numbers on total freight, mode shares and regional freight are approximate only.

4 Modelling results

4.1 Introduction

The ACIL Tasman nested logit model enables predictions to be made about the probability that consumers will choose particular modes of transport given the price and service alternatives in the market place. The parameters to the model were derived from starting market shares and the stated preference study conducted by ACIL Tasman. Predictions of future service levels were determined for the inland railway through the Lead Technical Consultant. For the coastal railway these were sourced from ARTC with small adjustments, and for road were calculated from expectations of movements in fundamental cost drivers. Road capacity is expected to be increased incrementally with no increase in road user charges to accommodate growing freight volumes.

4.2 Assumptions of the model

There are many assumptions in the logit model and freight forecasts which need to be summarised. Section 2 detailed assumptions regarding commodity forecasts, GDP and contestable sections of the market. However, the key assumptions in the model relate to forecasts of price, reliability, availability and transit time.

Transit time

Estimates for transit time are based on the preliminary engineering findings of the technical consultants in the study team. The terminal-to-terminal transit time is assumed to be 20.5 hours on the inland railway and 27.5 hours on the coastal railway, with an inland railway becoming operational in 2020. A further five hours of pickup and delivery time are then added to this total to obtain a door-to-door time of 25.5 hours inland and 32.5 hours coastal.

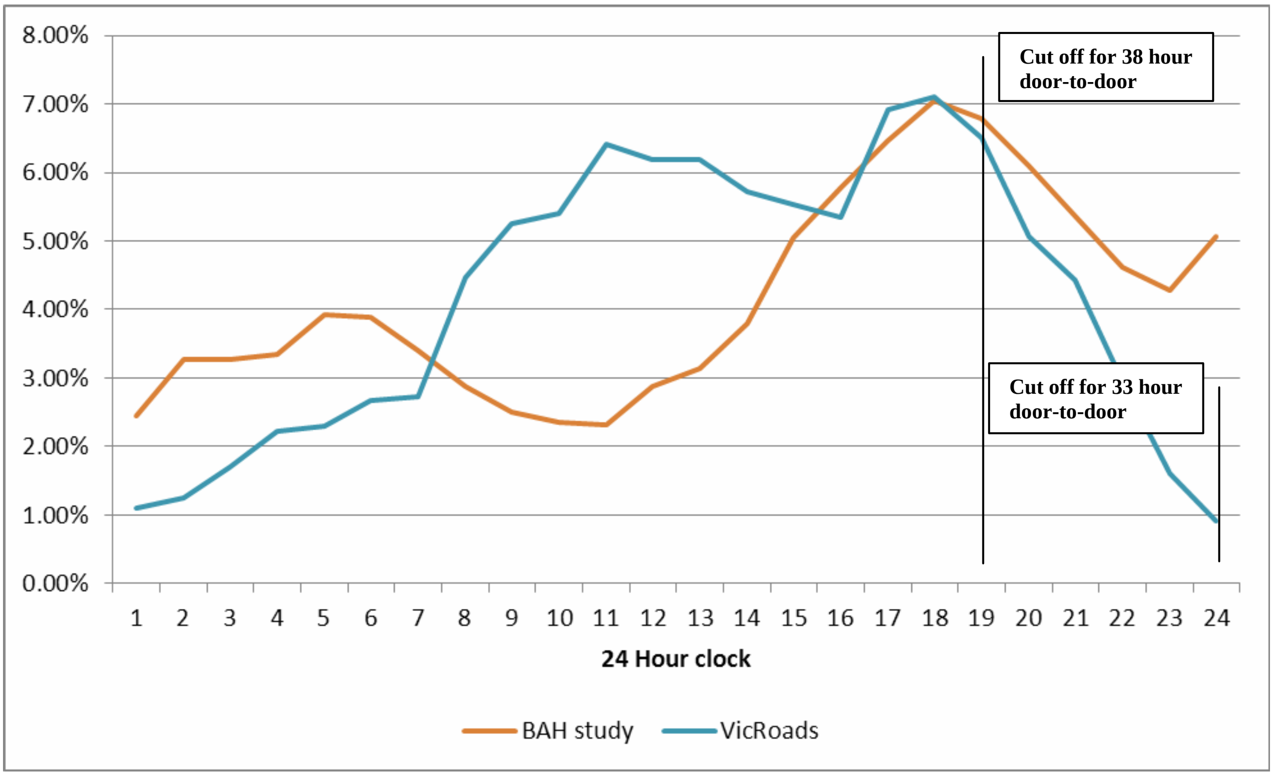
ARTC estimates of the coastal railway via Sydney indicate that they hope for a transit time of 26.5 hours linehaul after recent upgrades are completed in 2010 but this (together with substantially improved reliability) was considered optimistic by the study team, which instead opted for the more conservative estimate of 27.5 hours.

Availability

Transit time directly relates to 'availability' – this is the provision of services at times when customers want them, with a preference for goods to arrive at their ultimate destination by 9am. For example, some factories have a preference for dispatching their goods around 5-7pm to suit their working patterns, and a train departing earlier would not be able to compete for that traffic.

This preference was initially identified through work carried out by Booz Allen & Hamilton in its 2001 study and identified a histogram of truck movements along the Newell Highway as representing delivery time preferences. ACIL Tasman has updated this initial estimate of preferences using a count of truck types at various points along the Hume highway provided by VicRoads. By counting northbound articulated and B-Double truck movements at the closest point to Melbourne, and assuming a one-hour journey time to get to that location, ACIL Tasman has recreated a schedule of departure preferences. The revised schedule identified a more even flow during the day than in the 2001 study, with a peak at the end of the day that is more pronounced on Fridays (see the following figure).

Figure 13 Truck departure preferences



Data source: VicRoads Truck count, BAH 2001

The link between transit time and availability is clear. If transit time is reduced by one hour additional freight can be contested since availability-sensitive freight, which previously could only be served by road because of the preference for a later departure, could now be served by rail.

Reliability

Reliability is measured as the percentage of trains arriving within 30 minutes of scheduled arrival time. Road freight has been assumed to have reliability of 98% throughout. The coastal railway's reliability has until recently been poor – about 45% of arrivals are within 30 minutes of scheduled time, this is but increasing to an assumed 70% after current upgrades are completed in 2011 and 77% after upgrades are competed in 2015. Reliability on the inland railway is estimated to be 87.5%.

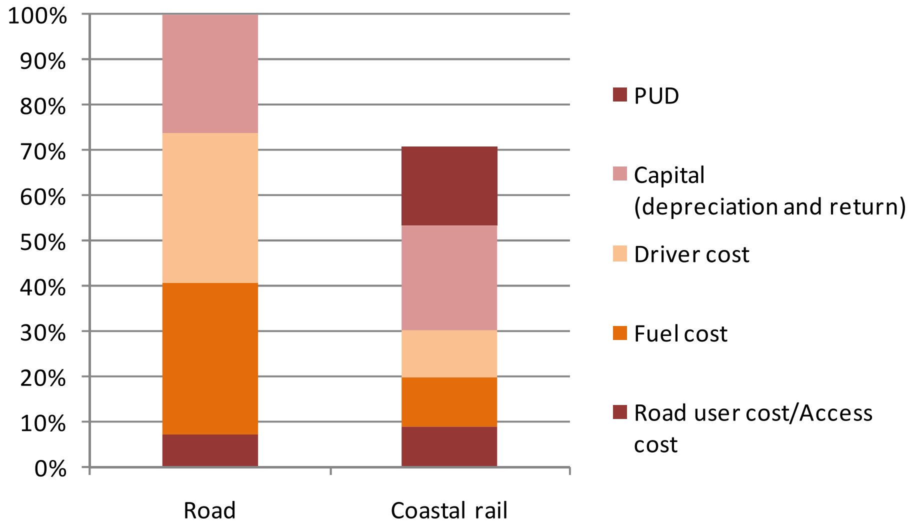
Price

Price was measured in dollars per tonne door-to-door. Prices for road reflect underlying costs, with changes in costs being swiftly passed through to prices as a result of a competitive market. Pick-up and delivery costs are already incorporated in the door-to-door road prices.

Rail freight's price is benchmarked to road freight's price, with a differential to account for differences in service levels between the two modes. Rail freight's price does move in response to changes in underlying costs, but not fully.

Estimates of actual prices for road and rail freight have been used in ACIL Tasman's analysis, but these are not published to preserve the confidentiality of responses. The chart below shows the makeup of road and rail freight prices in 2009 and the overall differential in prices between the two modes. As diesel prices increase and carbon trading or taxation is introduced, there is an increase in the price differential by the time the inland railway could be introduced in 2020.

Figure 14 Components of road and rail price per tonne (Melbourne-Brisbane)



Source: SKM survey provided by ARTC, ACIL Tasman calculations and estimates.
PUD = pickup and delivery

Recent falls in the price of diesel fuel and recent spare capacity in freight modes have put downward pressure on freight prices. Coastal shipping (by international ships) has established a semi-regular service on the east coast which competes for the most price sensitive freight. Some companies have become more conscious of carbon emissions, but still make little use of rail and less of sea because of their tight logistics arrangements. Also, excise arrangements relating to the prospective Carbon Pollution Reduction Scheme (CPRS) favour road freight over rail freight. The CPRS has been included in ACIL Tasman's modelling with an expected start date of 2013 and emissions price of $10 in 2013, and subsequently approximately $30 per tonne in 2009 dollars.

Relative door-to-door rail prices were sourced from a survey commissioned by ARTC. These prices are currently 67-79% of the road price depending on the commodity, with the difference expected to fall to around 60% by 2020. Some freight firms responding to the ACIL Tasman demand survey said that in practice freight rates are much closer because of the structure of rail tariffs, but the SKM survey remains the most comprehensive source of data related to freight rates on the corridor.

As part of train operations modelling for the inland railway, it was estimated that improved operating characteristics will result in train operating costs being 33% lower (per tonne) than on the coastal route. To incorporate this into the modelling of demand, it was assumed that only 50% of these train operating cost reductions will be passed on to customers in the form of reduced rail linehaul prices - with train operators taking the remaining gains as increased profit.

This 50% cost pass through assumption was made because the main competitive constraint on the rail freight rate is the road freight rate and it is understood that rail profit margins in the corridor are not high. Train operators would make a choice between passing on cost savings to their freight customers by way of a lower rail price and increasing their profit margins. For the purpose of the market share analysis, it was therefore considered that the pass through of cost savings would be less than 100%, with 50% being the working assumption (where cost savings are shared equally between train operators and customers). This reflects a balance between passing on all gains (unlikely if margins are low) and passing on none (unlikely due to road and other competition).

A higher degree of pass through would lower the inland railway freight rate and increase the forecast uptake of the railway. This would be in the order of 8-10% if a 100% cost pass through were assumed rather than 50%. In the economic appraisal presented in the main report, the full saving is captured to reflect that either the train operators or freight customers will benefit.

These characteristics are similar to those used in the previous North-South Rail Corridor Study, except for reliability which now focuses on whether goods are available for pickup when promised, rather than whether the train is on schedule.

The table below summarises the assumptions in the model:

Table 9 Key modelling assumptions

Melbourne-Brisbane	2010	2015	2020	2025	2030	2035	2040
Transit time (door to door)*							
Inland railway			25.5	25.5	25.5	25.5	25.5
Coastal railway	37.8	32.5	32.5	32.5	32.5	32.5	32.5
Road	23.5	23.5	23.5	23.5	23.5	23.5	23.5
Reliability							
Inland railway			88%	88%	88%	88%	88%
Coastal railway	59%	77%	77%	77%	77%	77%	77%
Road	98%	98%	98%	98%	98%	98%	98%
Availability							
Inland railway			95%	95%	95%	95%	95%
Coastal railway	85%	95%	95%	95%	95%	95%	95%
Road	95%	95%	95%	95%	95%	95%	95%
Relative price (rail/road):							
Non-bulk							
Inland railway			51.9%	51.3%	50.7%	50.1%	49.5%
Coastal railway	64.6%	59.5%	57.2%	56.6%	55.9%	55.1%	54.4%
Agricultural products							
Inland railway			46.0%	45.6%	45.1%	44.6%	44.0%
Coastal railway	56.7%	52.4%	50.5%	49.9%	49.4%	48.8%	48.2%
Coal and minerals							
Inland railway			55.1%	54.5%	53.9%	53.3%	52.7%
Coastal railway	68.1%	62.8%	60.5%	59.9%	59.2%	58.4%	57.7%
Steel							
Inland railway			50.7%	50.2%	49.7%	49.2%	48.7%
Coastal railway	61.1%	56.8%	55.0%	54.5%	53.9%	53.3%	52.7%
Other bulk							
Inland railway			59.2%	58.6%	57.9%	57.2%	56.5%
Coastal railway	73.7%	67.9%	65.3%	64.5%	63.7%	62.9%	62.1%

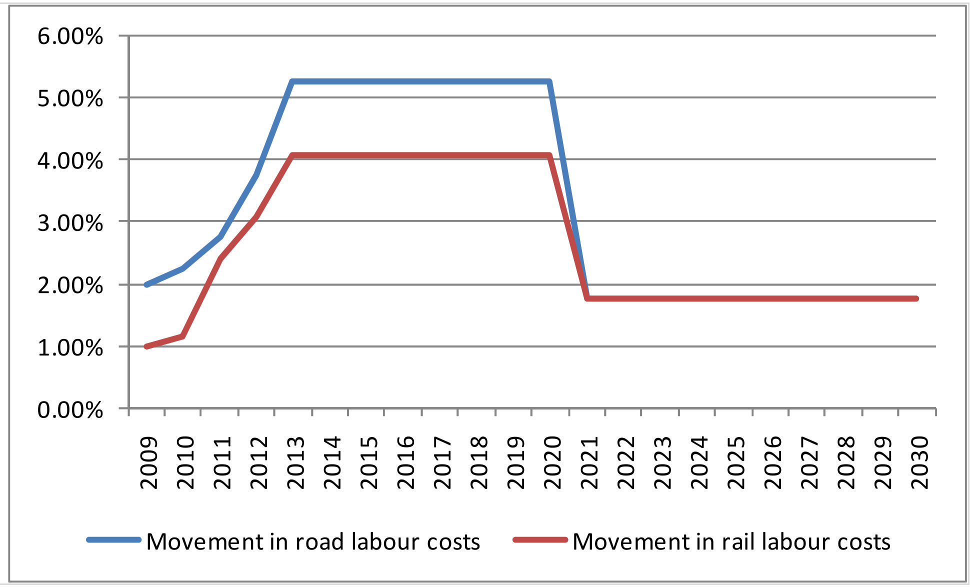
* Door-to-door transit time consists of the linehaul time plus an estimated five hours of pickup and delivery time

Whilst the model operated on the basis of price, relative price has been shown above to preserve confidentiality.

ACIL Tasman has adopted the same freight rate (price) forecasts for the coastal railway that ARTC did in its submission to Infrastructure Australia[10], but also included estimates of:

- A transition to a long-run fuel price of $120 per barrel in 2030 (2008 US dollars)
- An increase in fuel costs resulting from carbon trading. An estimated carbon price of $10 per tonne in 2013 and approximately $30 per tonne from 2014 is expected to increase fuel costs by approximately 3.1% for both rail and road
- A fluctuating market for drivers. After a two year hiatus due to weak economic conditions, shortages resume and lead to annual real wage rises of 3.5% above trend wage growth for road and a similar, but less pronounced trend for rail as shown below:

Figure 15 Annual change in labour costs of road and rail (%)



- Assumption that the truck freight rate comprises 33.3% labour, 33.3% fuel and 33.3% capital
- Assumption that the rail freight rate comprises 17% access price, 15% fuel costs, 20% labour costs, 48% capital.

Other key parameters to the model include the following elasticities for the Melbourne-Brisbane route:

Table 10 Elasticity estimates

	Price	Availability	Reliability	Transit Time
Non-bulk	-1.20	0.35	0.31	-0.18
Agricultural products	-0.75	0.25	0.10	-
Coal and minerals	-0.25	-	-	-
Steel	-0.92	-	-	-
Other bulk	-1.39	-	-	-

Note: These elasticities relate to the proportion of freight shipped by rail.

Data source: ACIL Tasman estimates – from survey evidence

[10] 2008-2024 Interstate and Hunter Valley Rail Infrastructure Strategy, ARTC, June 2008.

These elasticities were derived from the surveys and questionnaire responses and are used to calibrate the logit model to observed market shares in 2008 – yielding the parameters to the logit curve. As characteristics change within the logit model so do the elasticities generated by the logit curve.

4.2.1 Coastal railway capacity

Based on discussions with the team undertaking the Northern Sydney Freight Corridor Program ACIL Tasman has used the following assumptions in its analysis of the base case. Service levels are as stated in Section **Error! Reference source not found.** until a practical capacity of 18 train paths per direction per day is reached (based on averaging 15 weekday and 24 weekend paths). After this point, any surplus demand is transferred to road. The first market to sacrifice tonnages to road is assumed to be Sydney-Brisbane, with the second market being Melbourne-Brisbane. This is because operators would prefer to operate longer haul services where they are more profitable.

In the core demand forecasts it is estimated that the 'practical rail freight capacity' is reached on the coastal route in 2052. If however it was judged that if paths could be used somewhat beyond a 50% utilisation level, albeit with declining reliability, the capacity limit would be reached later.

4.2.2 Other assumptions

It has been assumed that it takes three years (including the current year) for the changes predicted by the logit model to be fully implemented. They are phased in over this period (that is, the current year represents full adjustment from service changes two years ago, 66% adjustment to the prior year's service level and 33% adjustment to the current year's service).

It is assumed that customers who are sensitive to availability (of convenient departure and arrival times) need their goods to be delivered at the door by 9am (implying, for rail customers, that trains are ready for unloading at 6.30am). While approximately 60% of the non-bulk freight was availability sensitive, the ability of rail operators to schedule convenient services has improved since the previous study because of increased track capacity (due to passing loops and other improvements under the ATRC's upgrade program). It was therefore determined that non-bulk freight would be aggregated and the availability characteristic removed from the analysis.

The logit model is calibrated to the following market shares on the corridor:

Table 11 2008 mode shares

	Melbourne-Brisbane		Brisbane-Melbourne	
	Rail	**Road**	**Rail**	**Road**
Non-bulk	25%	75%	23%	77%
Agricultural products	18%	82%	16%	84%
Coal and minerals	1%	99%	1%	99%
Steel	99%	1%	99%	1%
Other bulk	90%	10%	99%	1%

Data source: ACIL Tasman analysis, DOTARS North-South Rail Corridor Study

This calibration allows the elasticities derived from the surveys of customers to be related to the market shares observed and translated into coefficients for use in the logit model. As mentioned previously the elasticities are not fixed in the model: movements in characteristics cause movements along the logit curve and different elasticities are determined through the model in response to these movements.

These and the preceding assumptions are used in forecasts to 2080, but the longer the period the more uncertain the forecasts become – from past experience it may be assumed that the context will change in large but uncertain ways (e.g. demographics, technology) that in turn will change some of the assumed values. Caution should be exercised in relying upon forecasts which extend beyond 30 years.

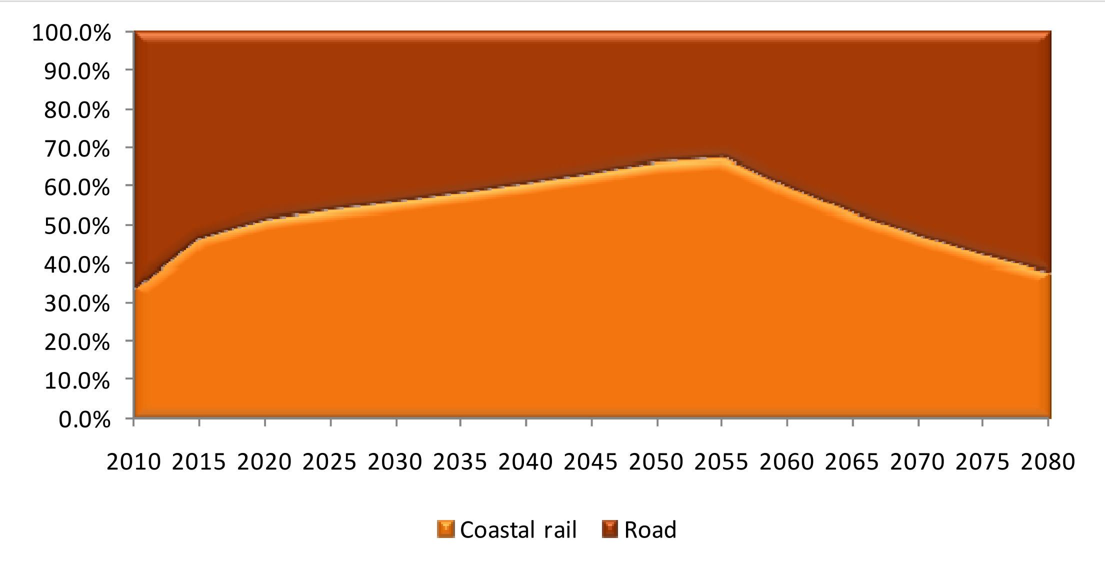
4.3 Results – mode share

Freight along the corridor is made up of Melbourne-Brisbane intercapital freight, freight from regions outside the corridor and freight from regional centres within the corridor. Each of these is analysed separately in the following section.

4.3.1 Base case

An important question to answer at the outset is how much market share and how many tonnes will rail achieve on the coastal railway, without any inland railway (the base case). The competitive interaction between road and the coastal railway has been modelled through the use of the logit model. Figure 16 below shows the aggregate market share of tonnes for all commodities on the Melbourne to Brisbane (and backhaul) route.

Figure 16 Modal share without the inland railway (based on tonnes, all commodities aggregated, intercapital freight only)



Data source: ACIL Tasman modal share modelling

The coastal railway gains almost 20 percentage points of market share between 2009 and 2020 as a result of the Sydney upgrades and the continued impact of labour and diesel costs. After 2020 the coastal railway continues to gain market share because of the assumptions of rising diesel cost, which increases the price of road relative to rail over time. The diesel price assumptions reflect a 2030 price of crude oil at US$120 per barrel (in 2008 dollars).

After 2052 the capacity constraint on the coastal railway becomes binding, with and the growing market being increasingly served by road freight.

Tonnes of freight estimated to be carried on the coastal railway is shown in Table 13 below.

Table 12 Melbourne-Brisbane (and backhaul) forecast freight tonnes on rail without the inland railway (intercapital freight only) -

	2020	2030	2040	2050	2060	2070	2080
Non-bulk	**6,326**	**8,604**	**11,557**	**15,387**	**20,331**	**26,668**	**34,692**
Coastal	3,272	4,872	7,133	10,378	12,252	12,531	12,844
Road	3,054	3,733	4,424	5,009	8,079	14,137	21,848
Agricultural products	**371**	**441**	**518**	**600**	**682**	**757**	**812**
Coastal	7	9	13	17	19	21	23
Road	364	432	505	583	662	736	789
Steel	**67**	**66**	**65**	**63**	**61**	**58**	**56**
Coastal	67	66	65	63	61	58	56
Road	0	0	0	0	0	0	0
Other bulk	**331**	**403**	**487**	**587**	**702**	**835**	**983**
Coastal	325	398	484	585	701	834	983
Road	6	4	3	2	1	1	0
All commodities							
Thousand tonnes	**7,095**	**9,514**	**12,627**	**16,636**	**21,776**	**28,318**	**36,543**
Coastal	**3,671**	**5,346**	**7,694**	**11,043**	**13,034**	**13,445**	**13,906**
Road	**3,424**	**4,169**	**4,933**	**5,594**	**8,742**	**14,873**	**22,637**
Net Tonne Kilometres	**12,502**	**16,889**	**22,591**	**30,031**	**38,892**	**49,545**	**62,922**
Coastal	**6,990**	**10,178**	**14,649**	**21,025**	**24,817**	**25,599**	**26,476**
Road	**5,512**	**6,712**	**7,941**	**9,006**	**14,075**	**23,946**	**36,445**

Data source: ACIL Tasman modal share model

Some data have been redacted for reasons of confidentiality

The above table represents rail's estimated share of intercapital freight. In addition there is a large amount of freight between Melbourne and Sydney, Sydney and Brisbane as well as freight from north Queensland to Melbourne, Adelaide to Brisbane, and Perth to Brisbane. There is a large amount of regional freight between locations along the coastal corridor, e.g. Newcastle, Port Kembla, and others. This coastal regional freight is not contestable by an inland railway, and is not shown in this analysis. When all these sources of freight are aggregated, total freight by road and rail along the coastal railway may be as high as 40 mt in 2010, with rail currently capturing approximately 6 mt of this.

The considerable amount of freight which travels along the coastal railway between Melbourne and Sydney, and Sydney and Brisbane is excluded from this analysis. It would not move on an inland railway, although the freeing up of capacity might lead to improvements in service. Also regional freight along the coastal railway is excluded from the following analysis as it would be relatively unchanged as a result of an inland railway.

ACIL Tasman's estimate of the tonnage and net tonne kilometres carried by rail from Melbourne to Brisbane are shown in Table 14 below.

Table 13 Coastal railway forecast contested rail freight without the inland railway

	Thousand tonnes						
	2020	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Intercapital[1]	3,671	5,346	7,694	11,043	13,034	13,445	13,906
Outside freight	1,328	1,760	2,355	3,176	4,312	5,879	8,030
Total (thousand tonnes)	**4,999**	**7,106**	**10,049**	**14,219**	**17,346**	**19,324**	**21,936**
Intercapital[1]	6,990	10,178	14,649	21,025	24,817	25,599	26,476
Outside freight	2,196	2,915	3,907	5,287	7,206	9,867	13,538
Total (million ntk)	**9,186**	**13,093**	**18,557**	**26,312**	**32,023**	**35,465**	**40,015**

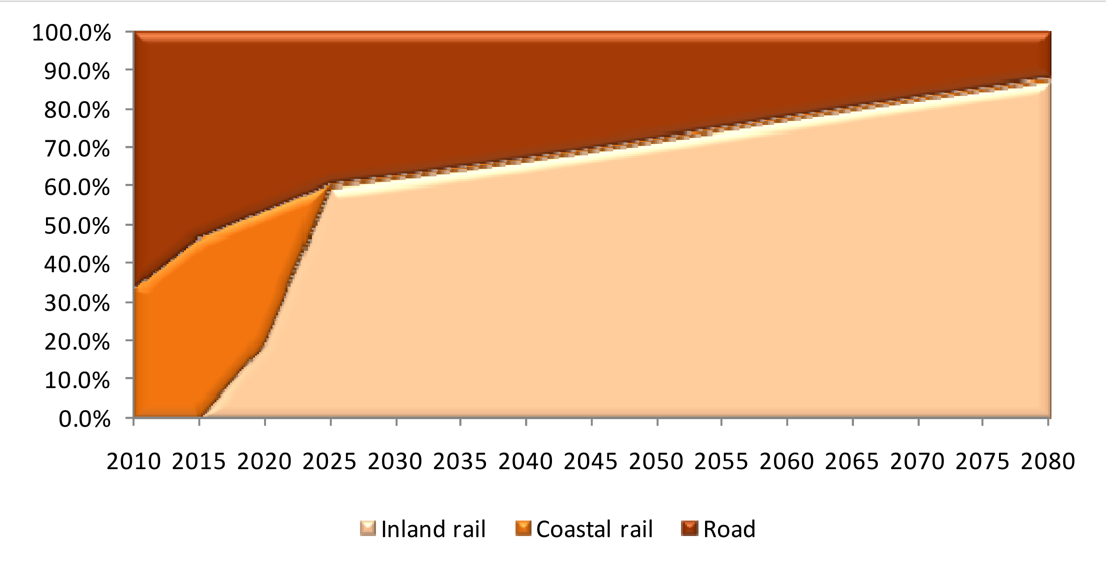
[1] Intercapital refers just to M-B and B-M, regional freight has been excluded because it is not contestable with the inland railway.

Data source: ACIL Tasman modal share model

4.3.2 Core scenario with the inland railway from 2020

The next scenario had the inland railway available in 2020, with the results shown below. In practice the coastal railway could get a larger share and the inland railway less, depending on choices made by train operators.

Figure 17 Modal share with the inland railway (all commodities aggregated, intercapital freight only)



Data source: ACIL Tasman modal share modelling, shares are derived from tonnage forecasts

Table 14 Melbourne-Brisbane (and backhaul) forecast tonnes (intercapital freight only)

Thousand tonnes, unless otherwise stated							
	2020	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Non-bulk	6,385	8,881	11,985	16,038	21,295	28,053	36,624
Inland	1,251	5,561	8,103	11,709	16,725	23,530	32,475
Coastal	2,205	105	133	165	199	233	262
Road	2,929	3,215	3,749	4,164	4,370	4,289	3,886
Agricultural products	371	442	519	601	684	761	820
Inland	2	8	11	16	21	30	41
Coastal	5	2	3	3	4	6	7
Road	364	431	505	582	658	726	772
Steel	68	68	67	65	63	61	58
Inland	22	68	67	65	63	61	58
Coastal	45	0	0	0	0	0	0
Road	0	0	0	0	0	0	0
Other bulk	334	416	505	611	734	877	1,039
Inland	110	414	503	609	733	876	1,038
Coastal	219	0	0	0	0	0	0
Road	5	3	2	1	1	0	0
All commodities							
Grand Total (thousand tonnes)	7,158	9,807	13,076	17,315	22,776	29,751	38,540
Inland	**1,386**	**6,051**	**8,684**	**12,399**	**17,543**	**24,497**	**33,613**
Coastal	**2,474**	**107**	**136**	**169**	**204**	**239**	**269**
Road	**3,298**	**3,649**	**4,256**	**4,747**	**5,030**	**5,016**	**4,658**
Grand Total (million ntk)	**12,419**	**16,553**	**22,143**	**29,427**	**38,852**	**50,934**	**66,196**
Inland	**2,399**	**10,474**	**15,033**	**21,462**	**30,367**	**42,405**	**58,184**
Coastal	**4,710**	**204**	**259**	**321**	**388**	**454**	**512**
Road	**5,311**	**5,875**	**6,852**	**7,643**	**8,098**	**8,075**	**7,500**

Data source: ACIL Tasman modal share model

An inland railway would also induce the following freight to move for short distances along the railway. Section 3.3 describes in detail the assumptions underpinning this freight:

Table 15 Induced and diverted freight (thousand tonnes)

		2020	2030	2040	2050	2060
Induced freight						
Coal and minerals	Toowoomba-Brisbane	9,500	9,500	9,500	9,500	9,500
Coal and minerals	Moree-Narrabri	500	750	-	-	-
Diverted freight						
Agricultural products	Toowoomba-Brisbane	339	421	523	651	809
Agricultural products	North Star-Brisbane	339	421	523	651	809
Agricultural products	Moree-Cootamundra	85	1,053	1,309	1,627	2,022
Coal and minerals	South-east Qld - Brisbane (existing freight)	5,500	5,500	5,500	5,500	5,500
Total		**16,262**	**17,645**	**17,356**	**17,928**	**18,640**

Data source: ACIL Tasman analysis

Table 16 Induced and diverted freight (million ntk)

		KMs	2020	2030	2040	2050	2060
Induced freight							
Coal and minerals	Toowoomba-Brisbane	174	1,648	1,648	1,648	1,648	1,648
Coal and minerals	Moree-Narrabri	106	53	79	-	-	-
Diverted freight							
Agricultural products	Toowoomba-Brisbane	174	59	73	91	113	140
Agricultural products	North Star-Brisbane	426	144	179	223	277	344
Agricultural products	Moree-Cootamundra	692	59	729	906	1,126	1,400
Coal and minerals	South-east Qld-Brisbane (existing freight)	174	954	954	954	954	954
Total			**2,917**	**3,663**	**3,822**	**4,119**	**4,487**

Data source: ACIL Tasman analysis

As described earlier there is freight from outside the corridor which would use the inland railway, if it were available. The amount of regional freight and freight from outside the corridor which would use the inland railway is shown below:

Table 17 Outside and regional freight (thousand tonnes)

O-D pair	Commodity	Distance	2020	2030	2040	2050	2060
		KMs	Thousand tonnes				
Outside the corridor							
Northern Queensland - Melbourne	Non-bulk	1731	98	436	649	964	1,422
Northern Queensland - Melbourne	Agricultural products	1731	5	20	28	42	63
Northern Queensland - Melbourne	Steel	1731	-	-	-	-	-
Adelaide - Brisbane	Non-bulk	1731	238	331	456	623	847
Adelaide - Brisbane	Agricultural products	1731	41	51	63	78	97
Adelaide - Brisbane	Other bulk	1731	18	22	27	34	42
Perth - Brisbane	Non-bulk	1023	411	571	787	1,077	1,463
Perth - Brisbane	Agricultural products	1023	139	172	214	266	331
Perth - Brisbane	Steel	1023	105	106	107	108	109
Inland railway freight from outside the corridor			**1,053**	**1,054**	**1,709**	**2,332**	**3,192**
Net tonne kilometres (millions)			**1,359**	**1,361**	**2,356**	**3,252**	**4,498**
Regions within the corridor							
Central NSW	Agricultural products	1005	62	77	96	119	148
Southern NSW	Agricultural products	297	73	91	114	141	175
Northern Victoria	Agricultural products	1400	20	25	32	39	49
Inland railway share of regional freight			**156**	**194**	**241**	**299**	**372**
Net tonne kilometres (million)			**113**	**140**	**174**	**216**	**269**

Data source: ACIL Tasman analysis

The presence of the inland railway gives a small boost to the freight of agricultural products on the Melbourne-Brisbane corridor. This freight is discussed in section 3.3.1. There is no intercapital coal freight, but the opening of an inland railway could have an impact on a regional basis as discussed in 3.3.2. A summary of tonnes carried over the inland railway in the core scenario is shown below:

Table 18 Summary of freight on the inland railway (thousand tonnes)

	2020	2030	2040	2050	2060	2070	2080
Intercapital (M-B)	1,386	6,051	8,684	12,399	17,543	24,497	33,613
Induced	10,000	10,250	9,500	9,500	9,500	9,500	9,500
Diverted from road	720	1,369	1,701	2,115	2,629	3,268	4,063
Diverted from Toowoomba	5,542	6,026	6,154	6,313	6,511	6,757	7,063
Extra-corridor	1,054	1,709	2,332	3,192	4,375	5,998	8,236
Regional	156	194	241	299	372	463	575
Total	**18,858**	**25,598**	**28,613**	**33,818**	**40,930**	**50,483**	**63,049**

Data source: ACIL Tasman analysis

The induced freight represents a potentially large (if uncertain) amount of tonnes, but travelling over relatively short distances. The freight involving Perth, Adelaide and north Queensland was found to be significant, using much of the railway, and carrying a significant volume. The related net tonne kilometres (in millions) for this freight are estimated to be:

Table 19 Summary of net tonne kilometres on the inland railway (million ntk)

	2020	2030	2040	2050	2060	2070	2080
Intercapital (M-B)	2,399	10,474	15,033	21,462	30,367	42,405	58,184
Induced	1,701	1,727	1,648	1,648	1,648	1,648	1,648
Diverted from road	232	617	767	953	1,185	1,473	1,831
Diverted from Toowoomba	984	1,319	1,407	1,517	1,654	1,825	2,036
Extra-corridor	1,361	2,356	3,252	4,498	6,225	8,612	11,930
Regional	113	140	174	216	269	334	416
Total ntk (million)	**6,790**	**16,633**	**22,281**	**30,295**	**41,348**	**56,296**	**76,045**

Data source: ACIL Tasman analysis

With this freight on the inland railway, the coastal railway would capture the following tonnage:

Table 20 Freight on the coastal railway with the inland railway (thousand tonnes)

O-D pair	2020	2030	2040	2050	2060	2070	2080
Intercapital	2,474	107	136	169	204	239	269
Extra-corridor	318	149	157	166	178	193	211
Total coastal	**2,792**	**256**	**293**	**335**	**382**	**431**	**480**

Data source: ACIL Tasman analysis

With a reference train carrying 2,730 net tonnes, and being operational for 350 days of the year, the number of train journeys undertaken per day is shown below. Note that the induced freight (coal) trains would operate only on part of the railway, and that grain trains would have a peak period of demand, rather than the assumed constant demand over the year.

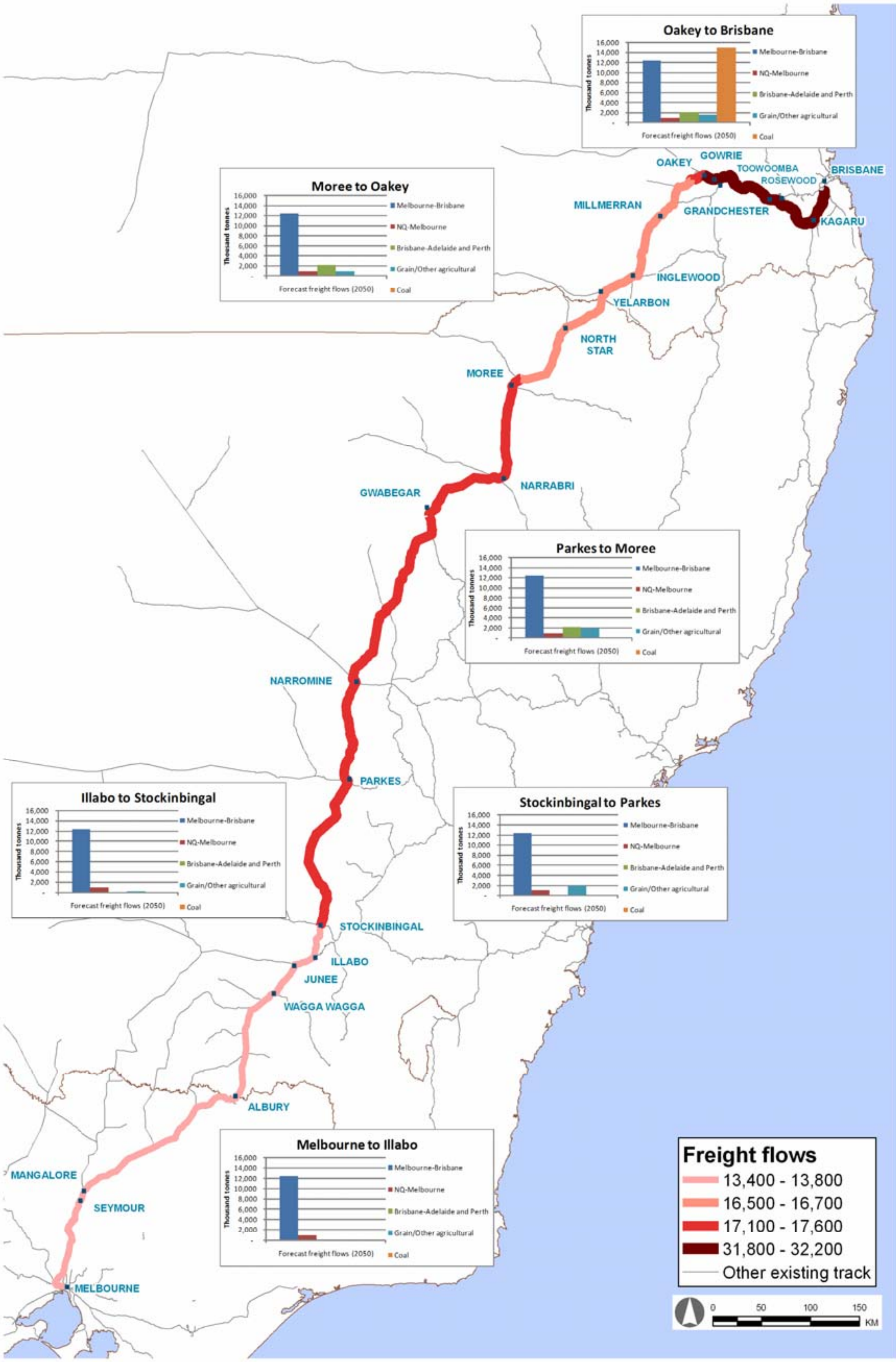
Table 21 Train departures per day

O-D pair	2020	2030	2040	2050	2060	2070	2080
Inland railway							
Intercapital (M-B)	1.0	4.5	6.5	9.3	13.1	18.3	25.0
Induced freight (coal)	6.2	6.3	6.0	6.0	6.0	6.0	6.0
Induced freight (grain)	0.9	2.3	2.8	3.5	4.3	5.4	6.7
Extra-corridor (M-B full length)	0.1	0.3	0.4	0.6	0.8	1.1	1.6
Extra-corridor (Parkes-Brisbane)	0.3	0.4	0.6	0.8	1.0	1.3	1.7
Regional	0.1	0.1	0.1	0.2	0.2	0.2	0.3
Total	**8.7**	**13.9**	**16.4**	**20.2**	**25.4**	**32.3**	**41.3**
Coastal railway							
Intercapital	3.6	0.2	0.2	0.3	0.3	0.4	0.4
Outside	0.5	0.3	0.3	0.3	0.3	0.3	0.4
Total	**4.1**	**0.5**	**0.5**	**0.6**	**0.6**	**0.7**	**0.8**

Data source: ACIL Tasman analysis

A representation of the tonnes expected to use the inland railway in 2050 is shown below. This figure excludes tonnages crossing the railway and only using it for short distances and tonnages unaffected by the railway (for example Melbourne-Sydney freight and Griffith to Port Kembla freight are not shown).

Figure 18 Freight flows along the corridor



Map generated by Parsons Brinckerhoff, data estimated by ACIL Tasman

4.3.3 Comparison of the inland railway with the base case

Table 22 Comparison of freight on rail with and without the inland railway (thousand tonnes)

Core scenario – with the inland railway							
O-D pair	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Inland railway							
Intercapital (M-B)	1,386	6,051	8,684	12,399	17,543	24,497	33,613
Induced and diverted freight	16,262	17,645	17,356	17,928	18,640	19,525	20,625
Outside corridor	1,054	1,709	2,332	3,192	4,375	5,998	8,236
Regional	156	194	241	299	372	463	575
Total inland	**18,858**	**25,598**	**28,613**	**33,818**	**40,930**	**50,483**	**63,049**
Coastal railway							
Intercapital	2,474	107	136	169	204	239	269
Extra-corridor	318	149	157	166	178	193	211
Total coastal	**2,792**	**256**	**293**	**335**	**382**	**431**	**480**
Total on rail (Inland + Coastal)							
Intercapital (M-B)	3,860	6,158	8,820	12,568	17,747	24,736	33,882
Induced freight	16,262	17,645	17,356	17,928	18,640	19,525	20,625
Outside corridor	1,372	1,858	2,489	3,358	4,553	6,191	8,447
Regional	156	194	241	299	372	463	575
Total rail	**21,650**	**25,855**	**28,906**	**34,153**	**41,312**	**50,915**	**63,529**
Base case - without the inland railway							
O-D pair	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Coastal railway							
Intercapital	3,671	5,346	7,694	11,043	13,034	13,445	13,906
Outside corridor	1,328	1,760	2,355	3,176	4,312	5,879	8,030
Total coastal	**4,999**	**7,106**	**10,049**	**14,219**	**17,346**	**19,324**	**21,936**

Data source: ACIL Tasman analysis

Table 23 Comparison of net tonne km between the base case and the core scenario (million ntk)

O-D pair	2020	2030	2040	2050	2060	2070	2080
Total rail with inland railway (coastal + inland railways)							
Intercapital (M-B)	7,109	10,677	15,292	21,783	30,755	42,859	58,696
Induced freight	2,917	3,663	3,822	4,119	4,487	4,946	5,515
Outside corridor	1,967	2,640	3,551	4,814	6,565	8,979	12,332
Regional	113	140	174	216	269	334	416
Total inland	**12,106**	**17,120**	**22,838**	**30,933**	**42,076**	**57,118**	**76,959**
Total without inland railway (coastal railway)							
Intercapital	6,990	10,178	14,649	21,025	24,817	25,599	26,476
Outside corridor	2,196	2,915	3,907	5,287	7,206	9,867	13,538
Total coastal	**9,186**	**13,093**	**18,557**	**26,312**	**32,023**	**35,465**	**40,015**

Data source: ACIL Tasman analysis

The inland railway would divert more freight from the coastal railway than from road, but would nonetheless increase tonnage and net tonne kilometres on rail.

4.3.4 Sensitivities

The analysis of the base case and inland railway (core scenario) is built on a number of assumptions, many of which are subject to considerable uncertainty. This section illustrates the sensitivity of the results with respect to several key variables, beginning with price and oil price assumptions.

The figures below show the total tonnage which would use the inland railway; this includes induced freight and regional freight. These items account for one third of the total demand in 2080, but these items are not assumed to be sensitive to price and service characteristics. If the inland railway is available, it is assumed to capture this demand.

Intermodal freight and freight originating and terminating outside the corridor are sensitive to price and service assumptions, and generate the movements in demand shown below:

Figure 19 Sensitivity of intermodal demand to price (thousand tonnes)

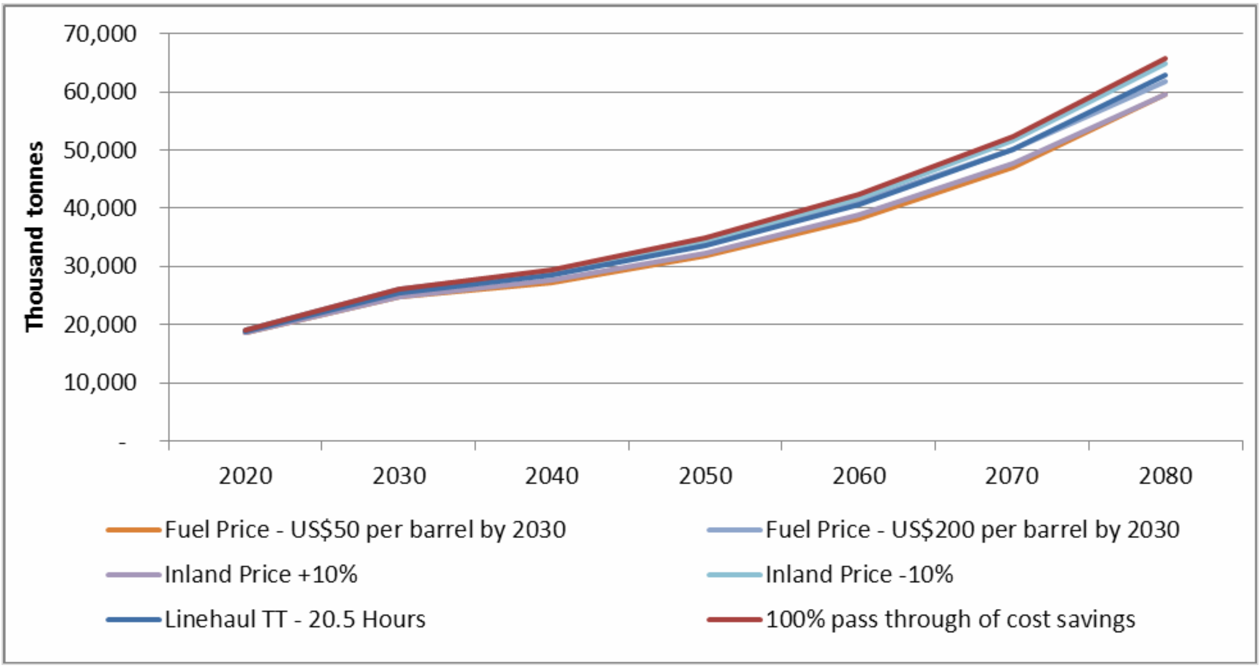


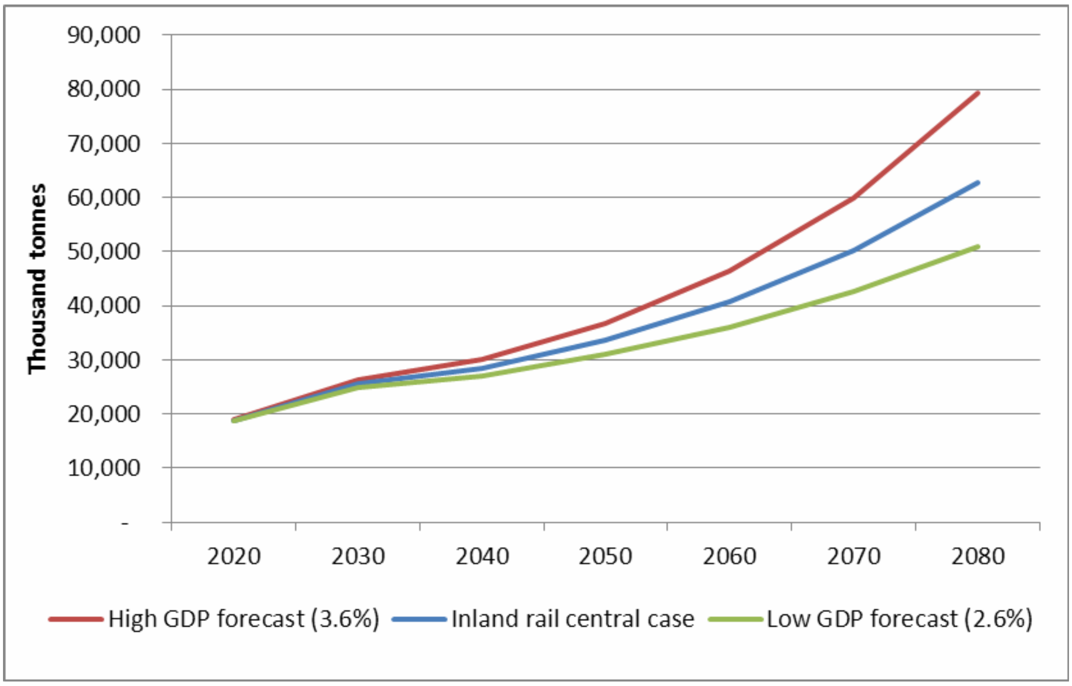
Figure 19 above shows that demand is sensitive to price with a 10% increase in price leading to a 12% fall in demand, and a 10% decrease in price leading to a 7% increase in demand. The impact of the assumption regarding the pass through of operating cost savings is also shown. A full pass through of all inland railway cost savings would increase the demand for inland railway by some 8-10%.

The high oil price scenario of $200 real US dollars per barrel in 2030 increases the price of both rail and road freight, although it affects road more strongly. This has the effect of reducing the total demand for freight, but increasing rail's market share, the net effect on tonnes carried on the inland railway is moderated by these two opposing forces. The resulting inland railway tonnage is similar to the scenario where the predicted inland railway price is reduced by 10%.

The situation is not symmetrical though. The low oil price scenario is much lower ($50 real US dollars per barrel in 2030) and this benefits road more than rail and rail gets proportionally an even smaller share of a larger market. The tonnage figures are similar to the scenario where the predicted inland railway price is increased by 10%.

The GDP assumption is a key determinant of the overall market size, and with the long life of the inland railway the compound effect of the GDP assumption has a large impact on total tonnage. The chart below shows the effect of different GDP scenarios on demand for the inland railway.

Figure 20 Sensitivity analysis of GDP (thousand tonnes)



4.3.5 ARTC alternative forecasts

ACIL Tasman's modelling of the demand for the inland railway is not as sensitive to changes in service characteristics as the response modelled in alternative forecasts published in ARTC's *2008-2024 Interstate and Hunter Valley Rail Infrastructure Strategy* (ARTC, 2008). This is the result of a number of factors.

A lower elasticity was revealed by the survey and questionnaire than ARTC's elasticity calculations. There is some degree of sample selection bias in determining ACIL Tasman's starting elasticities – the sample was predominantly from current and past customers of the railways. These customers may have a lower preference for transit time than potential customers who have always used road *because* of their transit time preference. ACIL Tasman therefore considers that the estimates could be considered a conservative demand estimate for the inland railway.

Also, ACIL Tasman's modelling of mode choice only applies to intercapital freight, freight from Northern Queensland and regional freight. Some categories of freight are automatically attributed to the inland railway, without requiring choice modelling. These categories are induced coal and diverted grain freight which would only use parts of the inland railway, and rail freight between Brisbane and Perth which would automatically use the inland railway to Parkes in preference to the coastal railway if it is available. Induced coal, diverted grain and Brisbane-Perth intermodal freight account for 62% of the tonnes forecast for the inland railway in 2050.

Thus a significant proportion of tonnes are dependent on the existence of the inland railway but not on its characteristics. For example, induced coal freight is created by the existence of the inland railway, but the tonnage and rail mode share of induced coal is invariant to the transit time or other service characteristics. Thus there is a significant shift in tonnes from opening an inland railway but a proportion (approximately 62% in 2050) of the total does not vary with characteristics.

Commentators expecting higher market share were often looking at ARTC's unlagged response that seemed to indicate that the rail share on the Melbourne to Brisbane route could be as high as 80% based on service levels in 2009/10. ARTC has commented to ACIL Tasman that it may take up to five years for that market share forecast to be achieved. This is also explained on page 26 of the *2008-2024 Interstate and Hunter Valley Rail Infrastructure Strategy*. ACIL Tasman modelling assumes there is a three year adjustment to service characteristics but regardless of the length of lag, ARTC's ultimate market share forecasts for rail are higher than the ACIL Tasman forecasts.

ARTC has produced more optimistic forecasts of the rail market share of intercapital freight, using a different methodology that interpolates from shares on eight intercapital routes (including Adelaide and Perth), rather than from survey information. Its forecasts were also developed for a different purpose (capacity planning on the coastal railway, with no reference to an inland railway). The ARTC modelling approach was used in its submission to Infrastructure Australia (*2008-2024 Interstate and Hunter Valley Rail Infrastructure Strategy*).

ARTC modelling for that document did not include a constant in the utility function, which has the effect of ensuring that if two modes have equal service characteristics that they would split the market equally. This is intuitively appealing but is not consistent with the survey responses that ACIL Tasman received, which indicated general preferences for one mode or another depending on product characteristics and logistics arrangements. This meant that the service characteristics of price, reliability, availability and transit time would be insufficient to explain the whole of the competitive decision.

Another difference is that the ACIL Tasman approach includes a constant term in its calculation of utility. The constant term in the utility function is used to balance the elasticities derived from the stated preference survey with the market shares observed and current (and lagged) service levels. The constant represents one or more of:

- Omitted variables. Factors in the mode choice that are not included as explanatory variables. For example: past experience, logistics arrangements, innate preference for a particular mode, and many other factors.
- Error in the measurement of observed market share. Because there are inadequate truck data the total market size must be estimated to derive starting market share estimates.
- Errors in the calculation of elasticities from stated preference methods. The answers to some questions varied significantly between respondents, giving a wide range of possible elasticities and there is no guarantee that the stated responses are the same as the actual decisions that lead to current market shares.
- Errors in the measurement of variables in the modelling. In particular, after talking with freight firms ACIL Tasman has some scepticism that the price difference between road and rail freight is as high as found in the SKM survey. If the road freight rates were lower than estimated by SKM this would mean the constant in the determination of utility for non-bulk freight would be smaller.

ACIL Tasman has discussed the forecasts with ARTC. ARTC considers that the ACIL Tasman Melbourne-Brisbane non-bulk forecasts are too conservative when compared with the market shares observed on the routes from the East Coast to Perth, and that the stated preference survey methodology may systematically underestimate true behaviour. ACIL Tasman considers its approach allows better calibration to observed Melbourne-Brisbane market shares, allows predictions which have been reasonably consistent with recent history, and also reflects the stated intentions of market participants.

Caution would be needed with either approach in extreme scenarios (e.g. very large changes in price).

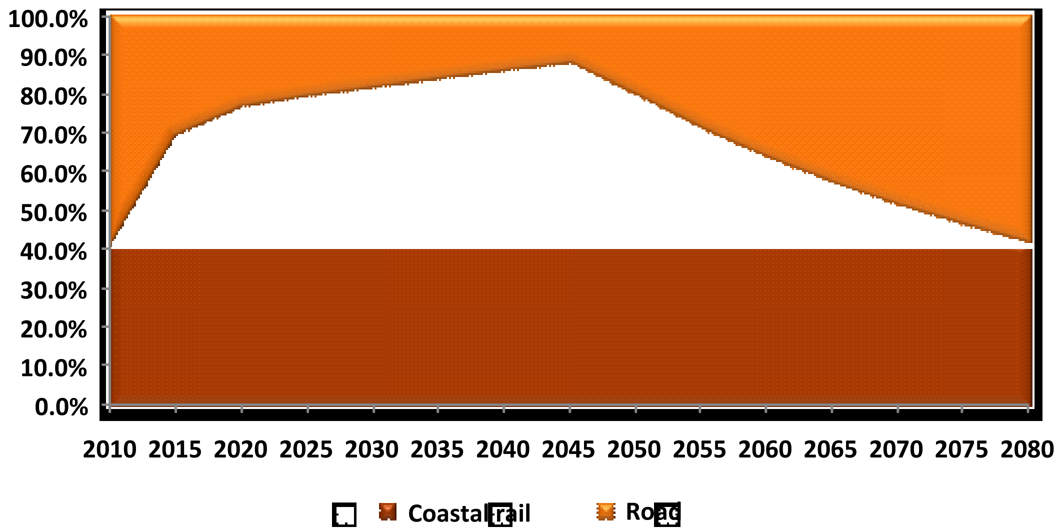
To test the sensitivity of the model to its specification, ACIL Tasman replaced its logit formulation with a version of ARTC's work and re-ran the base case (no inland railway) and the inland railway commencing in 2020. In this modelling ACIL Tasman forecasts incorporate a two year lag (that is, three years to adjust, including the current year) and ARTC forecasts incorporate five years lag.

ARTC-type forecasts: no inland railway

The Base Case (without an inland railway) market share for intercapital freight is shown below. The final market share in 2080 is 80%, although the market share is 90% in 2049 at which point the coastal railway reaches its capacity constraint and any additional tonnage demand must be serviced by road.

Most of the gains to the coastal railway arise from engineering works being carried out until 2015, with a lagged response. After 2015 no further capital works are assumed and further gains over time arise from movements in the price of rail and road freight.

Figure 21 Modal share without inland railway under ARTC assumptions (all commodities aggregated, intercapital freight only)

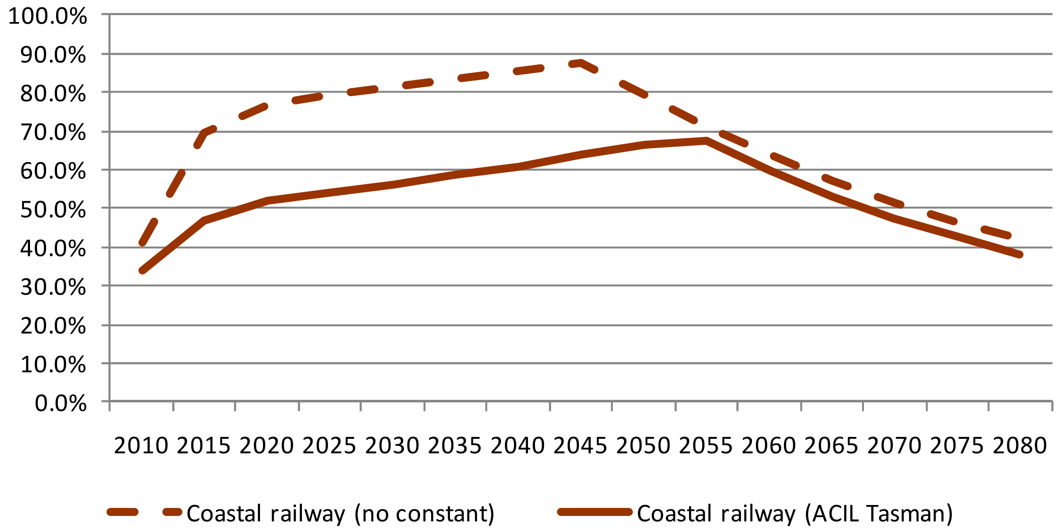


Data source: ACIL Tasman modal share modelling, shares are derived from tonnage forecasts

Note: All commodities aggregated, intercapital freight only

A comparison of the ACIL Tasman mode share forecasts and the result using ARTC's methodology is shown in Figure 22 below:

Figure 22 Comparison of ARTC and ACIL Tasman modelling (no inland railway)



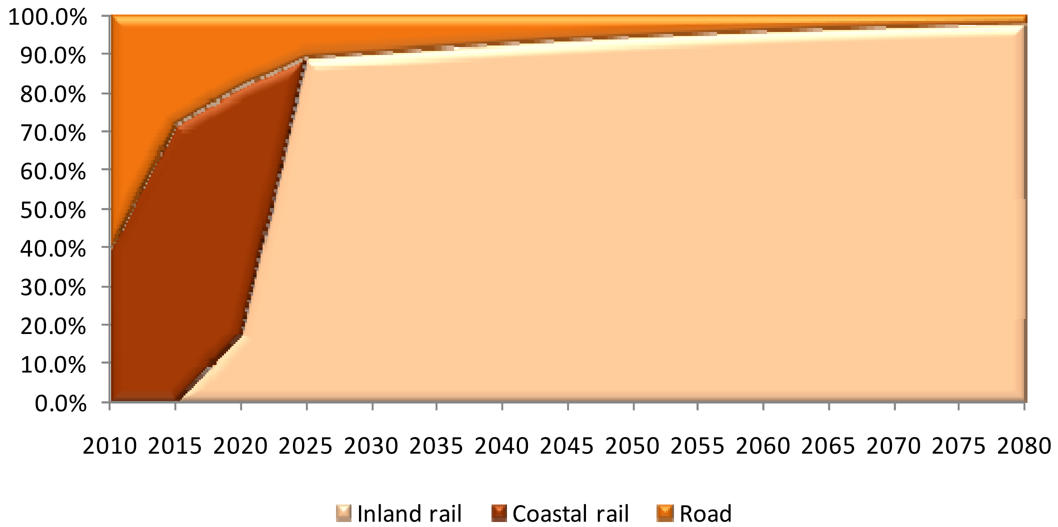
Data source: ACIL Tasman modal share modelling, shares are derived from tonnage forecasts

Note: (all commodities aggregated, intercapital freight only)

ARTC-type forecasts with an inland railway

ACIL Tasman ran the model of freight forecasts using ARTC's methodology, with an inland route. The following market shares were obtained for intercapital freight.

Figure 23 Modal share under ARTC assumptions (Inland railway from 2020)

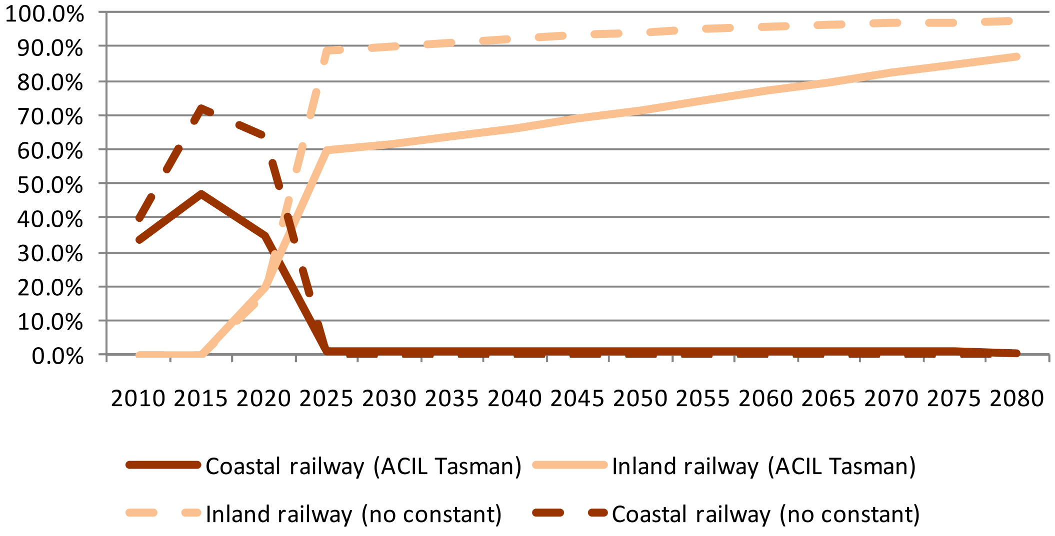


Data source: ACIL Tasman modal share modelling, shares are derived from tonnage forecasts

Note: (all commodities aggregated, intercapital freight only)

A comparison of the ACIL Tasman forecast mode shares and the forecast without a constant in the utility function is shown below:

Figure 24 Comparison of mode share forecasts (Inland railway from 2020)



Note: (all commodities aggregated, intercapital freight only)

As can be seen from the figure above, ARTC's methodology, which does not include a constant in the utility function, predicts much more responsiveness to service levels, predicting (with a 5 year lag) that the coastal railway would have 70% market share in 2015, and that with a lagged response the inland railway would have nearly 90% of the market by 2025.

5 Passenger services

No allowance has been made for passenger rail services on the inland railway. Existing Melbourne-Albury and Melbourne-Sydney services will presumably continue but are not related to investment in an inland route. End to end services (Melbourne-Brisbane) are unlikely because of airline competition including low-cost carriers. Tourist services of the Ghan type are unlikely on this route and, if operated, would be of low frequency. The towns along the route are of modest size and there would not be enough demand for rail passenger services between them; any services would naturally be provided by bus. Brisbane-Toowoomba passenger services would require consideration of additional safety-related tunnel investment beyond what has been covered in this study focussed on freight services, and of journey time competitiveness given that the proposed alignment goes outside Toowoomba.

However there would be no capacity problems in accommodating passenger services and if any were established, notwithstanding the demand and tunnel issues, basic demographics point to low frequency and current practice would see access charges set well below full cost recovery. It follows that the impact on track access revenues would be minor.