TRANSPORT ENGINEERING RESEARCH NEW ZEALAND LIMITED

The contestability of New Zealand's road freight task by rail

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Executive Summary

New Zealand's freight task is expected to almost double between 2005 and 2020. Like many countries, the New Zealand government proposes to promote the use of rail freight transport where it is appropriate. However, there is currently very little information available on what proportion of this rapidly growing freight transport task is contestable by rail, which types of freight are suited to rail transport and which regions are able to make greater use of rail to transport freight. The aim of this study is to provide an estimate of the proportion of the freight task currently transported by road that is contestable by rail and how much of the expected freight growth is contestable by rail.

New Zealand's rail infrastructure and freight transport was compared with a number of other countries and three scenarios were used to estimate the proportion of the current freight task that is contestable by rail:

- **Scenario 1:** Maximum use of 'economically and practically viable' rail links
- **Scenario 2:** Growth in major commodity and freight forwarding rail transport
- **Scenario 3:** Growth in the payload of current rail operations

A further Scenario was used to investigate the likely modal share of the 2020 freight task using current growth rates.

Sixty-two out of New Zealand's 74 districts (84%) have a functioning railway line running through them and 41% of New Zealand's population has access to suitable rail connections. When compared with other countries, New Zealand makes relatively good use of its railway network. On a tonnage basis, it is estimated that approximately 13% of New Zealand's land freight task is transported by rail (21% on tonne kilometre basis). Some countries have implemented or are in the process of implementing rail freight promotion strategies. Early indications suggest that significant changes to the freight modal share, based on these initiatives, are difficult. In the UK, following rail promotion strategies, a modal share change of approximately 4% in favour of rail has occurred from a relatively low base.

Based on the three rail growth scenarios, it is estimated that a 3-7% share of the current road freight task is currently contestable by rail. It would be unlikely that rail could transport more than 20% of the current freight task without revolutionary changes to the way freight is transported. However, some recent rail initiatives such as the Fonterra dry storage facility in Hamilton, indicates that rail can have a significant affect on regional freight transport in specific cases.

If current rates of growth were to continue, by 2020 rail would transport 14.8% and road would transport 85.2% of the freight task. In absolute terms this equates to a tonnage increase (from 2005) of 18.6 million tonnes for rail and 95.7 million tonnes for road. This demonstrates that if current trends persist, the bulk of the future freight growth will still need to be accommodated by trucks.

Although outside the scope of this study, it should also be considered that most freight that currently travels on rail is contestable by road. Coal transport (for example West Coast to Lyttelton) is likely to be an exception to this as trucks are unlikely to be able to transport such large volumes of a relatively heavy, low cost commodity over the Southern Alps as effectively as rail.

Some other countries have very good road and rail freight movement statistics, which provides a solid basis for research projects. Better freight transport information would reduce the assumptions and estimates that need to be made and increase the effectiveness of future freight transport studies. Also, more detailed analyses at a regional level are required as factors such as accessibility to rail infrastructure, freight type and volume, and existing road congestion will differ between regions, and when these factors are combined, some regions will be more suited to rail investment than others.

Acknowledgement

The authors would like to thank Peter Morris from Toll Rail for his contribution to this report.

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Introduction

In many countries there has recently been a focus on promoting the use of rail as a means of reducing the amount of freight transported by road. New Zealand is no exception and in the National Rail Strategy to 2015 (Ministry of Transport 2005) one of the strategic priorities is to "encourage more freight to be carried by rail". The Rail Strategy also states that "There is potential to significantly increase the rail transport share of existing freight volumes". However, the Rail strategy also acknowledges that a proportion of the freight task will be unsuited to rail through lack of accessibility to railway lines, short distances, or low freight volumes. A report recently completed by TERNZ titled *Prediction of New Zealand's freight growth* by 2020 (Mackie et al. 2006) found that if current trends persist, then New Zealand's freight task would almost double by 2020 (Figure 1). The lower estimate is a 70-80% growth in freight. This is similar to the expected freight growth in Australia[1]

There is currently very little information available on what proportion of this rapidly growing freight transport task is contestable by rail, which types of freight are suited to rail transport and which regions are able to make greater use of rail to transport freight. This information is needed so that transport planners can develop realistic strategies for the effective transportation of freight in the future.

The aim of this study is to provide an estimate of the proportion of the freight task currently transported by road that is contestable by rail and how much of the expected freight growth is contestable by rail. Although specific examples are given, the findings should not be used for assessing the economic viability of individual freight corridors or for creating business cases for rail or road on individual corridors or for specific examples. There are many complex factors that determine the viability of a rail freight route and only a very detailed investigation of all of these factors in partnership with relevant industry participants would be effective in providing information for such purposes. This level of detail and complexity is outside the scope of this report.

The size and growth of New Zealand's freight task

There appears to be little agreement on the actual amount of freight that is transported within New Zealand. According to the findings of Bolland et al. (2005), the estimated 2002 land freight was approximately 103 million tonnes. From this it is estimated that the 2005 freight task is 127 million tonnes. Toll gives an estimate for the proportion of the major commodity markets that are served by rail and puts the total freight task at 111 million tonnes, excluding local freight within cities[2]. Toll estimate that less than half will move within cities. This would make the freight task approximately 200 million tonne, which is considerably higher than that estimated by Bolland et al. Bolland et al. (2005) estimate that approximately 15 million tonnes of freight moved with the Auckland region by road in 2002, yet in a report prepared for Auckland City by Beca Infrastructure Ltd (Beca Infrastructure Ltd 2005) this figure is estimated to be 250 million tonnes. Also, Bolland et al. (2005) estimate that the total land transport task in 2002 was approximately 16 billion tonne kilometres. This is considerably different to the 2003 estimate of

[1] 'Twice the tasks' A review of Australia's freight transport tasks. National Transport Commission
[2] Toll New Zealand. 2005 Overview.
http://www.tollnz.co.nz/docs/Toll%20NZ%20Overview%20November%202005.ppt Accessed 3rd April 2006

approximately 27 billion tonne kilometres, which is quoted by the Ministry of Transport in their National Rail Strategy to 2015 (source: Energy Efficiency Conservation Authority). Although the estimates provided by Bolland et al. result from modelling rather than direct measurements, their methodology is the most systematic that has been used to date. For this reason, the estimates presented by Bolland et al. are used within this study.

There is much more certainty surrounding estimates for the growth in the freight task. Road User Charges (RUC) information allows the calculation of the number of vehicles, the kilometres travelled and the payload carried by each vehicle. Because the number of heavy vehicles and their kilometres travelled will grow in order to service a growing freight task, they can be used as a surrogate for the overall road freight task. Overall RUC revenue, which includes gross vehicle weight, can also be used to estimate the growth of the road freight task. However, RUC information does not give information regarding the number of trips made by vehicles and so estimates of the magnitude of the overall freight task in terms of tonnes lifted cannot be calculated from this data. Figure 1 shows that if current trends persist, growth in the road freight task of approximately 85-95% is expected.

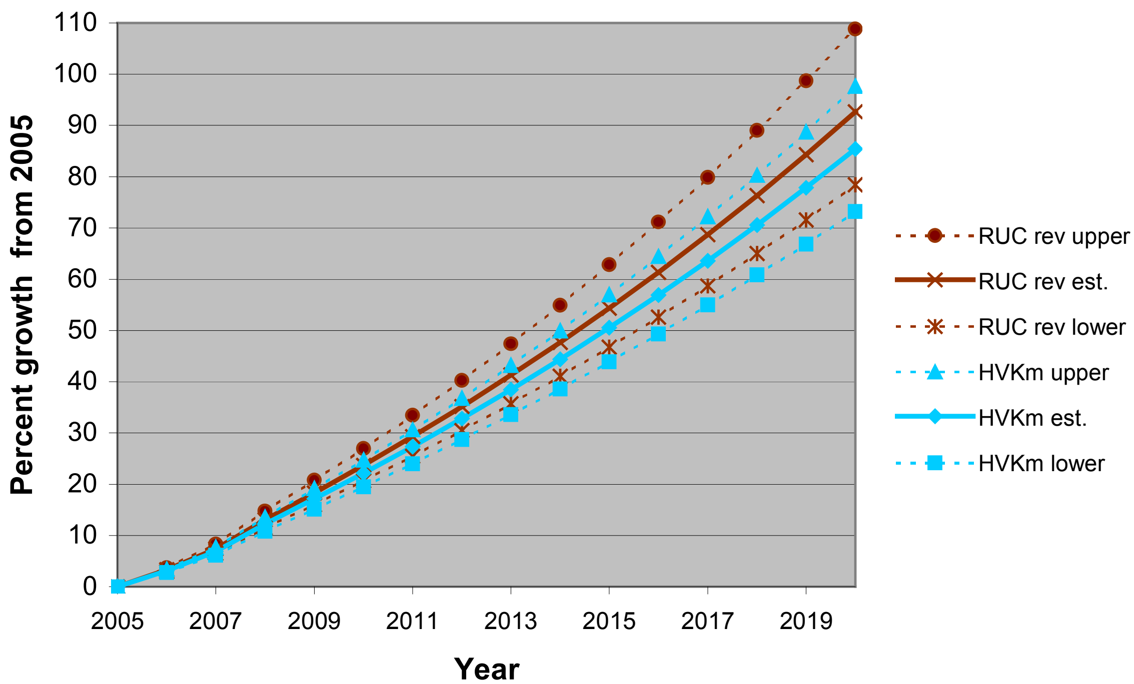


Figure 1. Estimated HVKm and RUC revenue growth between 2005 and 2020. The solid lines represent the predicted growth from the models and the dotted lines represent the upper and lower bounds for the confidence intervals.

Figure 2 shows that a significant amount of New Zealand's future road freight growth will occur around a triangle formed by Auckland, Hamilton and Tauranga as well as the Canturbury region. Determining how this freight growth will be managed will therefore be especially important in these areas.

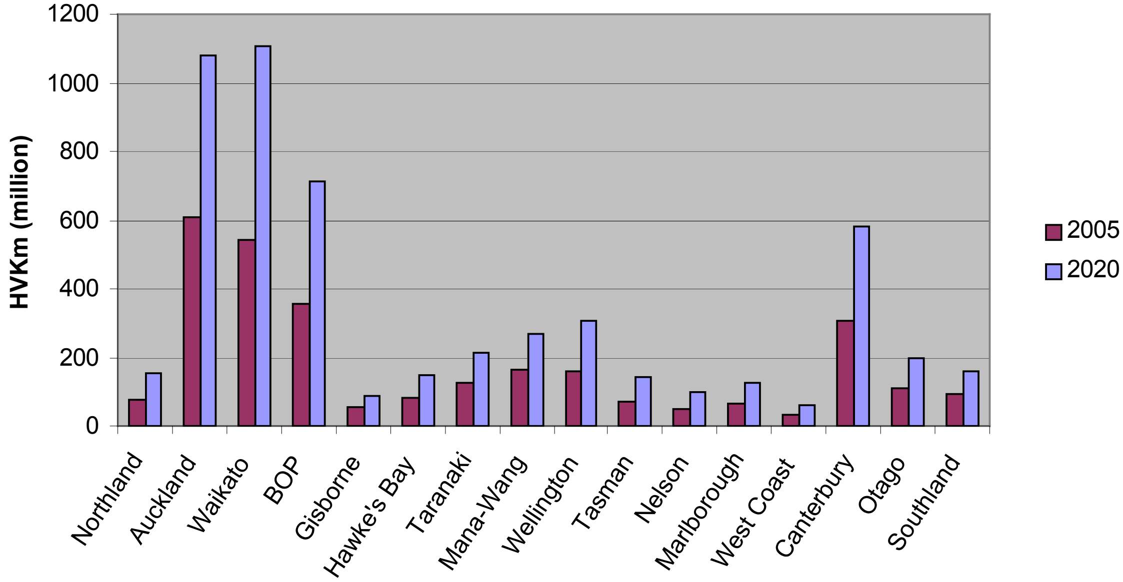


Figure 2. Regional heavy vehicle travel growth (HVkm) between 2005 and 2020.

It must be remembered that these forecasts only apply to road freight growth. However, because trucks carry a large proportion of the country's freight task (see next section), it can be assumed that the growth in road freight transport gives a reasonable indication of growth in the overall freight task. In the past, Tranz Rail released figures on the tonnages of freight transported by rail each year. However, new rail freight operators Toll Rail do not publish these figures, and so the amount of freight transported by rail each year can only be estimated.

New Zealand's freight transport modal share

Currently, it is generally accepted that trucks transport (on a tonnage basis) approximately 83% of the countries freight task per year while approximately 13% travels by rail and 4% by sea (Bolland et al. 2005). On a tonne-km basis, trucks transport approximately 67% of the freight task while the longer distance modes, rail and sea transport approximately 18% and 15% respectively. Because these numbers represent general estimates for the entire country, it is also important to understand the transport modes at a regional level, as this information could assist in the planning of local transport initiatives that may not have a large impact on a national level but could significantly affect the way goods are transported into, out of and around a specific region. Table 1. shows the modal share for land freight within and between regions. The information was created directly from the final road matrix and final rail matrix that was calculated by Bolland et al. (2005). For regional links, rail freight in tonnes was expressed as a percentage of the total road and rail tonnage for the link.

From / To	Nthlnd	Acklnd	Wkto	BOP	Gsbrn	HwksB	Trnki	Mnwtu	Wngtn	Tsmn	Nlsn	Mrlbrgh	Wstcst	Cntbry	Otgo	Sthlnd
Northland	**18**	**33**	2	**40**												
Auckland	**14**	**0**	**1**	**18**	0	27	27	29	45			94		83		
Waikato	3	**2**	**9**	**34**	0	0	1	1	**1**	0				45		
Bay of Plenty	2	**22**	**3**	**31**	0	8	6	2	25							
Gisborne		0	0	0	**0**	0		0	0							
Hawke's Bay		62	2	3	11	**10**	37	**24**	16					72		
Taranaki		21	**4**	56		5	**9**	**2**	15							
Mana-Wanga		26	**1**	**3**	0	12	**63**	**3**	15					50		
Wellington		15	1	5	0	9	1	**6**	**4**	0	2	5		9		
Tasman									0	**0**	**0**	0		0	0	
Nelson										0	17	2	0	5	0	
Marlborough									10	**0**	7	3		**4**	10	
West Coast											0		4	**82**		
Canterbury		98	60	51			27	44	44	0	5	**2**	**3**	**4**	**21**	**19**
Otago														**15**	3	4
Southland														**33**	**22**	5

Higher than the National average modal share for rail of 13% (tonnes)
At least twice the National average modal share for rail (26%)
Rail the dominant mode of freight transport (greater than 50%)
Bold Greater than 400,000 tonnes of total freight per year

Table 1. Inter and Intra regional rail share (%) of land freight. Note: a) Only links with a minimum of 10,000 tonnes have been shown. b) although 17% rail share has been shown for intra-regional Nelson freight (Bolland et al. 2005), this is unlikely as there is no functional railway line that is used for freight in Nelson.

In general, Table 1 shows that rail links with high modal share are associated with long distance inter-regional links. There are high rail shares for links between Christchurch and the North Island. There are only two links that have a total freight volume of at least 400,000 tonnes where rail is the dominant mode of transport. One is the West Coast to Canterbury link, where coal is the major commodity that is transported and the other is the Manawatu to Taranaki milk train. Other significant rail routes are found within the Northland, Auckland, Bay of Plenty and Waikato areas as well as the milk train route between the Hawkes bay and Manawatu.

Other countries such as the USA (Bureau of Transportation Statistics) the member states of the EU (EuroStat, Department for Transport) have comprehensive transport statistics and information including the modal share of freight transport over time. This information allows trends in transport mode to be analysed, which helps with policy development and planning. New Zealand does not have this information and so an estimate of how the magnitude of the modal share of freight transport has changed over time is not possible.

New Zealand's transport network

New Zealand has 3898 km of railway line. Per capita New Zealand has a relatively high length of railway line and per square kilometre a relatively low length of railway line compared with many other developed countries (Table 2). In comparison, we have approximately 90,000 km of road, or approximately 23 km of road for every km of railway line. Immediately this demonstrates a major advantage road has over rail – road can access a much greater proportion of New Zealand's land area than rail. However, rail still covers New Zealand's regions relatively effectively as 62 of New Zealand's 74 districts (84%) from Far North District to Invercargill City have a functioning railway line running through them. A map of New Zealand's rail network is shown by Figure 3. Most of the North Island is well covered by rail, whereas there are large parts of the South Island where no rail exits. However, these regions are generally sparsely populated and mountainous.

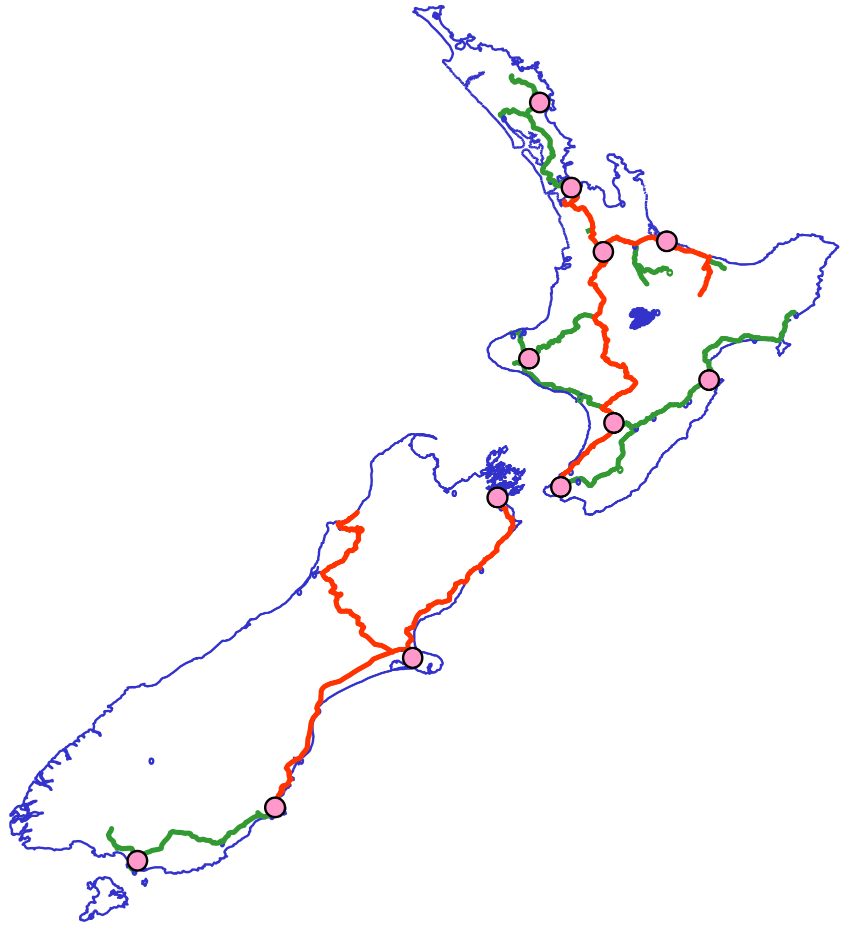


Figure 3. Map of New Zealand's rail network. Note. The red and green lines hold no significance. Source: Toll Rail.

Comparison of New Zealand with other countries.

Comparison of New Zealand's transport infrastructure with a selection of countries

By comparing New Zealand's freight transport situation with other countries the effectiveness of our freight transport system can be assessed. These comparisons can serve to highlight the areas of our freight sector that are working well and areas where New Zealand can learn from overseas. It is possible that some parts of the world freight sector have resolved issues that we are currently encountering. Mackie et al. (2006) presented an expanded form of the following table where New Zealand's freight transport related statistics were compared with other countries using figures from a number of government agencies and organisations such as the World Bank and the OECD (Table 2).

	NZ	EU-25	UK	Germany	France	Ireland	Czech Rep	Austria	Australia	USA	Japan	Largest	lowest
Population (Mill)	4.1	454.6	59.3	82.5	59.8	4.0	10.2	8.1	19.9	290.8	127.6	**USA**	**NZ, IRE**
Surface area (1000 sq km)	271	3900	243	357	552	70	79	84	7700	9600	378	**USA, ASTRL**	**IRE, AUS**
Total road length (km)	90000	5224000	412847	628792	987014	95611	127210	104986	810200[1]	7173000	1172000	**USA, EU-25**	**NZ**
Total motorway length (km)	170	55957	3609	11786	10068	125	517	1645	1819	89996	5568	**USA, EU-25**	**IRE**
Total railway length (km)	3898	204230	16994	35986	31385	1919	9523	5980	41286	157485	30178	**EU-25, USA**	**IRE**
Inland Freight Transport Total (Mill tkm) (Coastal Shipping not included)	16386	2123324	185700	442900	266200	16300	64700	45000	259800	5464400	334000	**USA**	**IRE, NZ**
Freight Transport Road (Mill tkm)	12923	1525452	157000	290900	189200	15900	46600	18100	88400	1534400	312000	**USA, EU-25**	**NZ, IRE**
Freight Transport Rail (Mill tkm)	3463	355055	18900	78500	46800	400	15800	16900	134100	2200200	23000	**USA**	**IRE, NZ**
Freight Transport Coastal Shipping (Mill tkm)	3200	-	65900	0	10500	1600	0	0	-	384900	236000	**USA**	**-**
Tkm road per capita	3231	3356	2648	3526	3164	3975	4569	2235	4442	5276	2445	**USA, CZE**	**AUS, JAP**
Tkm rail per capita	866	781	319	952	783	100	1549	2086	6739	7566	180	**USA, ASTRL***	**IRE**
Mill tkm rail per km rail	0.89	1.74	1.11	2.18	1.49	0.21	1.66	2.83	3.25	13.97	0.76	**USA**	**IRE, JAP, NZ**
Mill tkm road per km motorway	76	27	44	25	19	127	90	11	49	17	56	**IRE, CZE**	**AUS, USA**

Table 2. Demographic and freight transport comparisons between countries

	NZ	EU-25	UK	Germany	France	Ireland	Czech Rep	Austria	Australia [1]	USA	Japan	Largest	lowest
Mill tkm road per km road	0.14	0.29	0.38	0.46	0.19	0.17	0.37	0.17	0.11	0.21	0.27	**GER, UK**	**ASTRL, NZ**
km motorway per 1 mill inhabitants	43	123	61	143	168	31	51	203	91	309	44	**USA**	**IRE, NZ**
km motorway per 1000 sqkm	0.6	14.3	14.9	33.0	18.3	1.8	6.6	19.6	0.2	9.4	14.7	**GER**	**ASTRL, NZ**
km total road per 1 mill inhabitants	22500	11491	6962	7622	16505	23903	12472	12961	40714	24666	9185	**ASTRL**	**UK, GER**
km total road per 1000 sqkm	333	1339	1700	1761	1790	1361	1613	1252	105	747	3101	**JAP**	**AUS, NZ**
km railway per 1 mill inhabitants	975	449	287	436	525	480	934	738	2075	542	237	**ASTRL**	**JAP, UK**
km railway per 1000 sqkm	14	52	70	101	57	27	121	71	5	16	80	**CZE, GER**	**AUSTR, NZ**

Table 2. (continued). Demographic and freight transport comparisons between countries

Note: ASTRL = Australia, EU-25 = All members of European Union as of 1 May 2004
[1] includes approx. 67000km forestry roads in Vic. & WA, [2] EU 25: 2001, rest 2003

References:

population, surface area, GNI per capita, RGDP:

www.worldbank.org/data -> data -> key statistics on 13 Jan 2006 12.20 pm NZDT (2003) (except EU 25)

www.europe.eu.int on 13 Jan 2006 5.20 pm NZDT (EU 25) (2001)

Freight transport total, road, rail, costal shipping:

OECD in Figures - 2005 edition (except NZ)
NZ data calculated from:
Development of a New Zealand National Freight Matrix (Booz Allen Hamilton (NZ) Ltd, Wellington).

Total length of railway:

epp.eurostat.cec.eu.int on 12 Jan 12.40 pm NZDT (2001, Japan 1994); (except Australia, NZ)

www.abs.gov.au on 13 Jan 5.20 pm NZDT (Australia)

www.tollrail.co.nz on 25 Jan 06 4.20 pm NZDT (NZ)

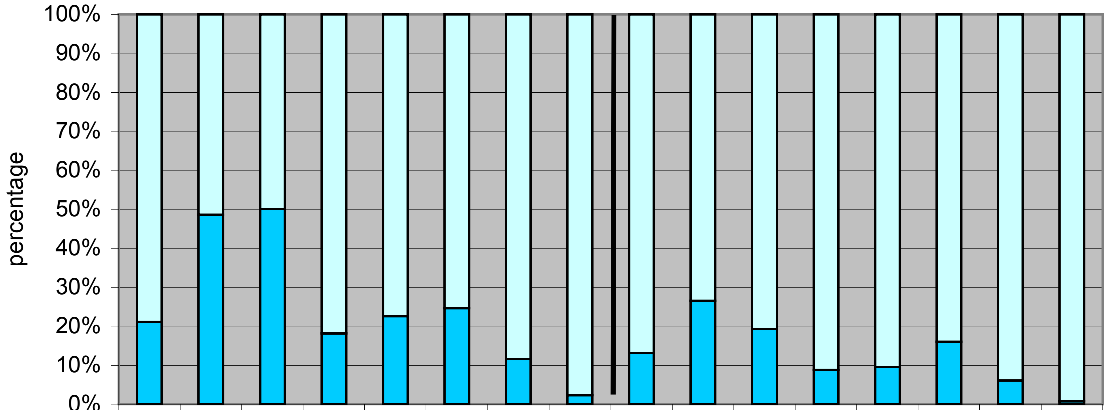
Apart from obvious differences due to the size of our country, in general, New Zealand's freight transport sector is similar to those in other developed countries around the world. The Czech republic has been included in the country comparisons as it represents a developing country following its relatively recent independence status. Also, comparison with Irish transport statistics allows a comparison with a country that is of a similar scale (in terms of population) to New Zealand.

There are some areas where our freight transport sector differs from most other countries:

- New Zealand has a similar amount of rail freight to many other countries on a per capita basis (and in some cases more). However, the outstanding countries for the amount of rail freight per capita are Australia and the USA. This is probably due to the large geographical size of these countries and therefore the large distances goods, particularly primary commodities, must be transported.
- New Zealand has a relatively low amount of motorway. By comparison, Australia has more than twice, and Europe approximately three times the distance of motorway per million inhabitants. The USA has a staggering 7.2 times greater length of motorway per million inhabitants. New Zealand also has a very low length of motorway per square km land area compared with other countries.
- New Zealand has a relatively high total length of road per million inhabitants, but a relatively low length of road per square kilometre, which reflects New Zealand's low and widespread population and possibly the difficult terrain that exists.
- Coastal shipping is used to transport approximately 41% of Japans freight. This is much greater than the coastal shipping that is used by New Zealand. Japan is similar in land area and shape to New Zealand, but has a much larger population.

Comparison of New Zealand's modal share for freight transport with other countries

The following graphical representation of the relative amounts of freight that is carried by road and rail in New Zealand compared with other countries is presented (Figure 4). Figure 4 shows that if the countries with large continents (Australia and USA) are omitted (as they are more suited to rail than other countries), the proportion of freight carried by rail in New Zealand compares well with the proportion carried by rail in other countries. A closer look at the proportion for specific commodity groups that are carried by rail are shown by Figures 5-9. Commodity groups wool, cement, produce, oil products and fertilisers are separate for New Zealand, but not separately available for USA and Europe so no comparison is possible for these commodities. There is a large difference in rail modal share between countries such as the USA and the UK. In the USA the railroad is primarily a freight system with access to the network controlled by the large freight operators, whilst the UK is used mainly for urban and intercity passenger transport. Rail freight operators in the UK must run services around government imposed passenger rail schedules.



	NZ (tkm)	AUS (tkm)	USA (tkm)	EU-25 (tkm)	GER (tkm)	CZ (tkm)	UK (tkm)	IRE (tkm)	NZ (t)	AUS (t)	USA (t)	EU-25 (t)	GER (t)	CZ (t)	UK (t)	IRE (t)
road	78.9	51.4	49.9	81.9	77.4	75.3	88.4	97.7	86.8	73.5	80.7	91.2	90.5	84.0	93.9	99.2
rail	21.1	48.6	50.1	18.1	22.6	24.7	11.6	2.3%	13.2	26.5	19.3	8.8%	9.5%	16.0	6.1%	0.8%

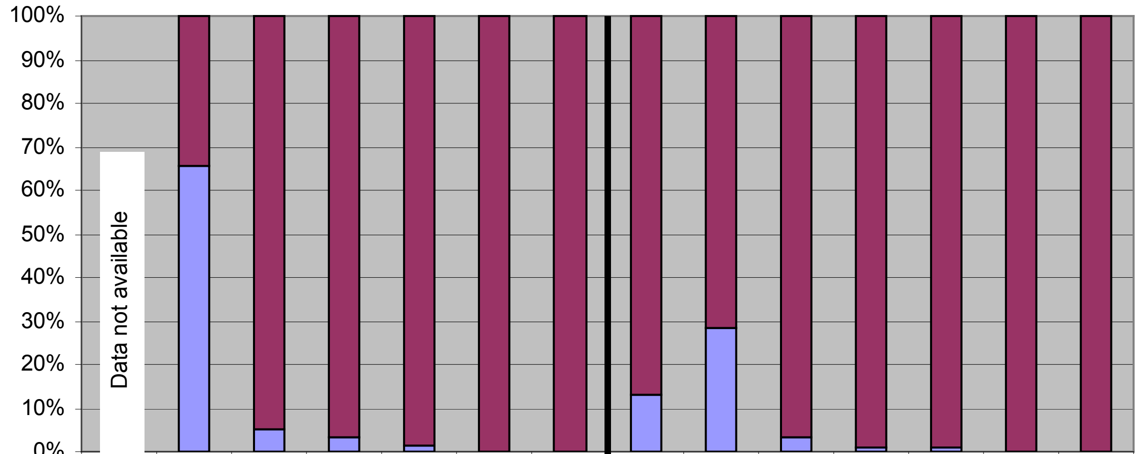
Figure 4. Road and rail modal share of land freight task transported for a selection of countries.

Notes:
Excluding intermodal transport road/rail in the USA
References:
epp.eurostat.cec.eu.int on 12 Jan 06 1.10 pm NZDT;
United States 2002 Economic Census - Transportation Commodity Flow Survey, issued 2004;
Green Paper Auslink (Department of transport and regional service) 2002;
Development of a New Zealand National Freight Matrix (Booz Allen Hamilton (NZ) Ltd, Wellington)

Explanations/notes:
Countries:
NZ: New Zealand
AUS: Australia
USA: United States of America
EU-25: all current countries of European Union: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, United Kingdom
GER: Germany
CZ: Czech Republic
UK: United Kingdom
IRE: Ireland

Abbreviations:
tkm: Tonne-kilometres
t: tons
NZDT: New Zealand Daylight Saving Time

Figure 5 shows that the USA transports a high proportion of its agricultural products by rail compared with other countries. The relatively higher tkm measurement suggests that these commodities must travel long distances, which suits train travel. Although the overall proportion (13.2%) of agricultural products travelling by train in New Zealand are small, the proportion is still greater than most other countries. It is interesting to note that the UK and Ireland, which have strong agricultural industries, do not use rail at all to transport agricultural products.

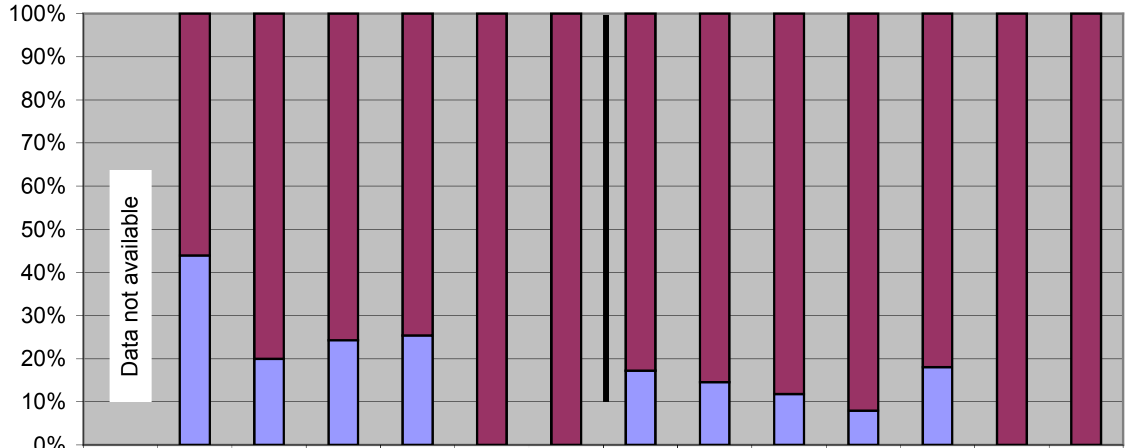


	NZ (tkm)	USA (tkm)	EU-25 (tkm)	GER (tkm)	CZ (tkm)	UK (tkm)	IRE (tkm)	NZ (t)	USA (t)	EU-25 (t)	GER (t)	CZ (t)	UK (t)	IRE (t)
road	0	34.3%	94.7%	96.9%	98.5%	100.0%	100.0%	86.8%	71.8%	96.7%	98.9%	98.9%	100.0%	100%
rail	0	65.7%	5.3%	3.1%	1.5%	0.0%	0.0%	13.2%	28.3%	3.3%	1.1%	1.1%	0.0%	0.0%

Figure 5. Comparison between countries of modal share for the transport of **agricultural products**.

Notes:
Commodities by mode of transport in tonnes only for NZ. Tonne km not available for different modes in NZ.
Excludes inter-modal transport road/rail in the USA
References:
epp.eurostat.cec.eu.int on 12 Jan 06 1.10 pm NZDT;
United States 2002 Economic Census - Transportation Commodity Flow Survey, issued 2004;
Development of a New Zealand National Freight Matrix (Booz Allen Hamilton (NZ) Ltd, Wellington)
Agricultural commodity group includes:
For all European countries: Cereals, Potatoes, other fresh or frozen fruits and vegetables
For USA: Cereal grains, other agricultural products, animal feed and products of animal origin.
For NZ: Milk, livestock, dairy, meat.

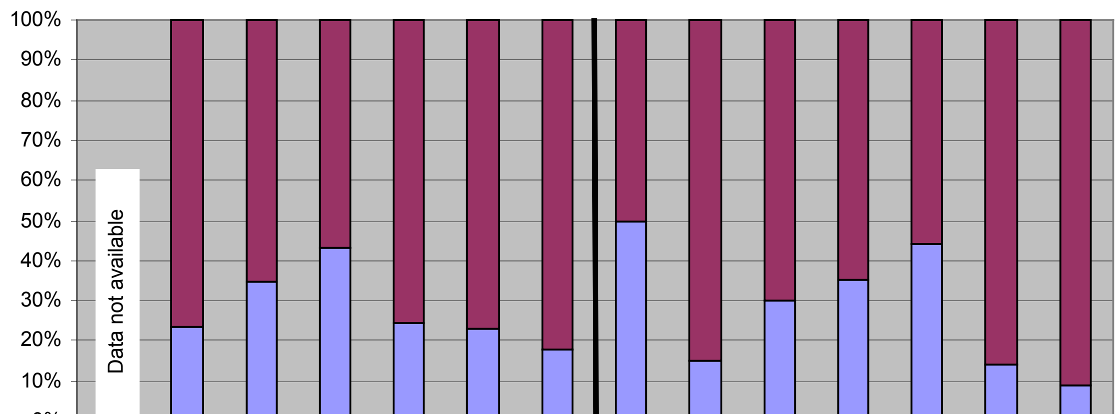
New Zealand also transports a good proportion of its wood products by rail compared with other countries (Figure 6). Much of this is due to well established Bay of Plenty / Waikato rail routes between the Kaingaroa forest wood processing facilities and the Port of Tauranga. Rail is not used to transport wood products in the UK or Ireland. However, this is partly because these countries do not harvest their own wood and wood is used much less in their construction industries. The proportion of wood products carried by rail in New Zealand (17.2%) is slightly higher than the average share for rail across all freight. Apart from the central North Island where rail infrastructure is in place and a good rail service is present, it may not be cost effective to introduce rail to the more numerous but faster growing forests around the country. This may mean that it could be difficult to significantly change the modal share for wood products.



	NZ (tkm)	USA (tkm)	EU-25 (tkm)	GER (tkm)	CZ (tkm)	UK (tkm)	IRE (tkm)	NZ (t)	USA (t)	EU-25 (t)	GER (t)	CZ (t)	UK (t)	IRE (t)
road	0	56.0%	80%	76%	75%	100%	100%	82.8%	85%	88%	92%	82%	100%	100%
rail	0	44.0%	20%	24%	25%	0%	0%	17.2%	15%	12%	8%	18%	0%	0%

Figure 6. Comparison between countries of modal share for the transport of **wood products**.

Notes:
Commodities by mode of transport in tonnes only for NZ. Tonne km not available for different modes in NZ
Excluding intermodal transport road/rail in the USA
References:
epp.eurostat.cec.eu.int on 12 Jan
United States 2002 Economic Census - Transportation Commodity Flow Survey, issued 2004;
Development of a New Zealand National Freight Matrix (Booz Allen Hamilton (NZ) Ltd, Wellington)
Commodity groups wood & wood products includes:
For all European countries: Wood and cork
For USA: logs and other wood in the rough, wood products
For NZ: logs, sawn timber, wood products

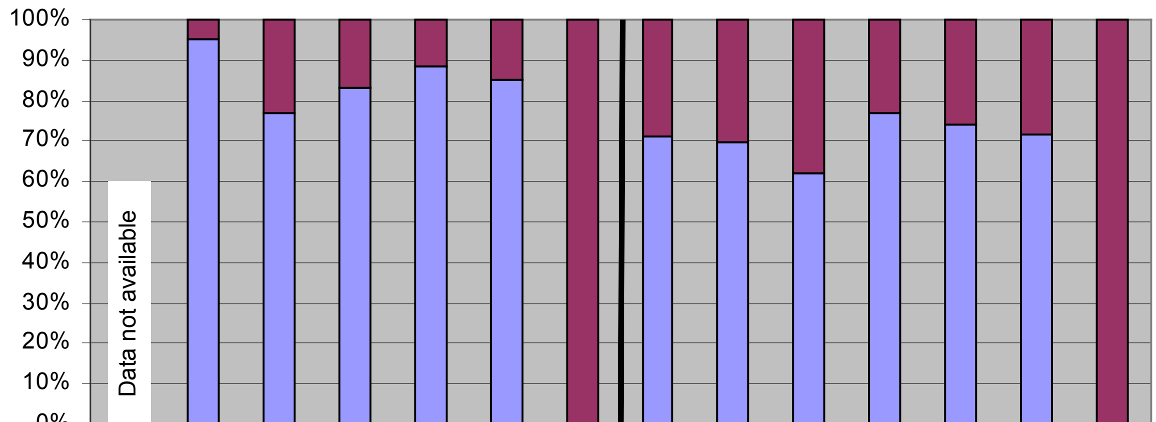


	NZ (tkm)	USA (tkm)	EU-25 (tkm)	GER (tkm)	CZ (tkm)	UK (tkm)	IRE (tkm)	NZ (t)	USA (t)	EU-25 (t)	GER (t)	CZ (t)	UK (t)	IRE (t)
road	0	76.5%	65.1%	56.7%	75.7%	76.8%	82.1%	50.0%	84.8%	69.8%	64.8%	55.7%	86.0%	91.1%
rail	0	23.5%	34.9%	43.3%	24.3%	23.2%	17.9%	50.0%	15.2%	30.2%	35.2%	44.3%	14.0%	8.9%

Figure 7. Comparison between countries of modal share for **metal** transport

Notes:
Commodities by mode of transport in tonnes only for NZ. Tonne km not available for different modes in NZ
Excluding intermodal transport road/rail in the USA
References:
epp.eurostat.cec.eu.int on 12 Jan 06
United States 2002 Economic Census - Transportation Commodity Flow Survey, issued 2004;
Development of a New Zealand National Freight Matrix (Booz Allen Hamilton (NZ) Ltd, Wellington)
Commodity group metal includes:
For all European countries: Iron ore, iron and steel waste and blast furnace dust, metal products, manufactures of metal
For USA: metallic ores and concentrates, base metal in primary or semifinished forms and in finished basic shapes, articles of base material, machinery, electronic and other electrical equipment and components and office equipment, precision instruments and apparatus
For NZ: Steel and aluminium moving from manufacturing plants to local consumption and export

The relatively high proportion of steel (approximately 55%) and aluminium (approximately 90%) produced in New Zealand is exported, and therefore either travels by rail directly to Tauranga port from Glenbrook steel mill or is shipped directly off-shore from Tiwai Aluminium smelter. Trucks are primary used to deliver to local manufacturers and users, although rail transports large volumes of inter island domestic steel due to recent investment in specialised rail wagons. Again, the UK and Ireland have a relatively low usage of rail for the transportation of steel.



	NZ (tkm)	USA (tkm)	EU-25 (tkm)	GER (tkm)	CZ (tkm)	UK (tkm)	IRE (tkm)	NZ (t)	USA (t)	EU-25 (t)	GER (t)	CZ (t)	UK (t)	IRE (t)
road	0	5.0%	22.9%	16.8%	11.7%	14.8%	100.0	28.9%	30.4%	37.9%	22.9%	26.0%	28.1%	100.0
rail	0	95.0%	77.1%	83.2%	88.3%	85.2%	0.0%	71.1%	69.6%	62.1%	77.1%	74.0%	71.9%	0.0%

Figure 8. Comparison between countries of modal share for **coal** transport

Notes:
Commodities by mode of transport in tonnes only for NZ. Tonne km not available for different modes in NZ
Excluding intermodal transport road/rail in the USA
References:
epp.eurostat.cec.eu.int on 12 Jan 06
United States 2002 Economic Census - Transportation Commodity Flow Survey, issued 2004;
Development of a New Zealand National Freight Matrix (Booz Allen Hamilton (NZ) Ltd, Wellington)

Commodity groups coal:
For all European countries: Solid minerals fuels, Coal chemicals, tar
For USA: coal, coal and petroleum products
For NZ: coal

Rail is heavily used for transporting coal in almost all countries. Rail transports approximately 70% of the coal in most countries including New Zealand. There are plans to increase New Zealand's coal production and rail is investing in rail track and rolling stock, which will be in place before the coal comes on line.

Mineral transport does not represent a large component of New Zealand's freight task, and much of it is transported on barges and then trucked, which might be why proportionally less is carried by rail than other countries, particularly in Western Europe. Nevertheless, the modal share for the transport of minerals in New Zealand (20% rail) is still greater than the average for all freight in New Zealand.

Figure 9. Comparison between countries of modal share for **minerals** transport

Notes:
Commodities by mode of transport in tkm for NZ and AUS, in t for AUS not available
Excluding intermodal transport road/rail in the USA
References:
epp.eurostat.cec.eu.int on 12 Jan 06 1.10 pm NZDT;
United States 2002 Economic Census - Transportation Commodity Flow Survey, issued 2004;
Development of a New Zealand National Freight Matrix (Booz Allen Hamilton (NZ) Ltd, Wellington)
Commodity groups minerals include:
For all European countries: Non-ferrous ores and waste, Crude and manufactured minerals
For USA: nonmetallic minerals n.e.c., nonmetalic mineral products
For NZ: Non-coal minerals, principally lime or marble moving from points of extraction to manufacturing/distribution

Freight transport modal share over time in the UK

Of interest is the difference in freight growth in the UK versus NZ and the impact on modal share. When the growth of road freight transport is plotted against RGDP growth for the UK (Figure 10), a similar trend to the graph of all modes of freight transport vs RGDP (Figure 11) is found. The main difference is that when all modes of transport are considered, there has been a relatively higher growth in transport over a similar time period, than truck-only transport. This would indicate that the rate of growth of alternatives to truck transport has been greater than that of truck transport in recent years. Between 1997 and 2004 there was a 27% increase in rail-km travelled and a 35% increase in freight-km shipped by water, whereas road HVkms have decreased by 3.4%. When measured using tonne-kilometres (Tkm) rail has increased by 24% between 1997 and 2004, water has increased by 27%, while road has only increased by approximately 2%. However, because road has such a large portion of the freight share, the change in modal share for land freight has only been 3% in favour of rail in the UK. Also, it should be noted that between 1953 and 1997 truck transport HVkm travelled grew by approximately 250% while rail km travelled only grew by approximately 28% (Figure 12). When measured in tonne-kilometres, in 1953 road and rail had approximately equal modal shares. Between 1953 and 1997, road tkm grew by almost 400% while rail Tkm shrank by almost 50%. The result of this is that in the UK road transport now has approximately 88% of the freight share.

One of the most obvious trends from figures 10 and 11 is that increasingly the UK economy is growing faster than freight travel. In New Zealand heavy vehicle travel is growing faster than the economy. The phenomenon that is occurring in the UK is sometimes referred to as 'decoupling' and although it is generally considered that encouraging a greater proportion of the freight task to travel by rail assists in reducing a country's reliance on road freight transport, the relative growth in the service sector of a country's economy relative to the primary and secondary sectors, appears to be the main cause of decoupling.

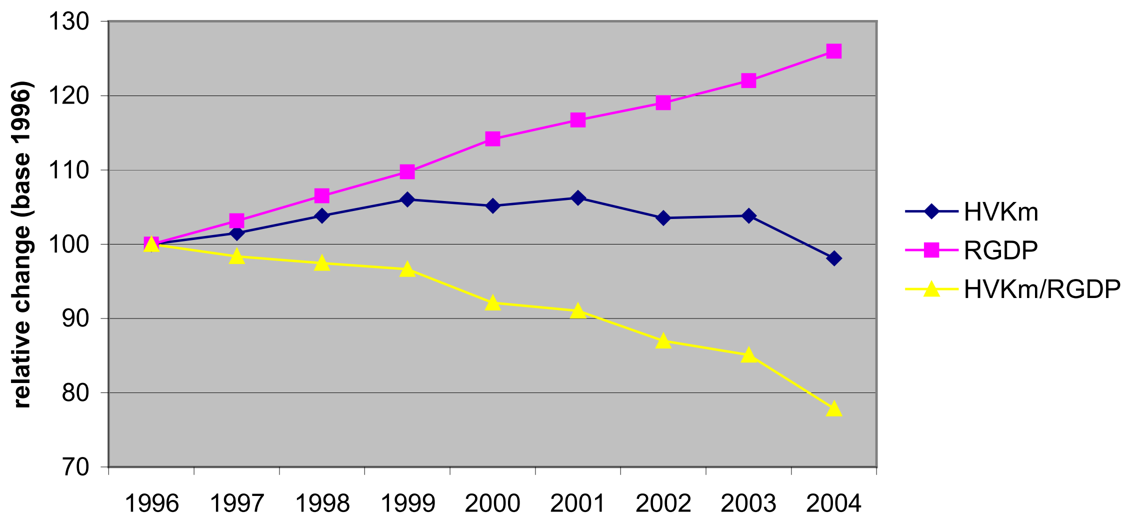


Figure 10. Relative change in heavy road vehicle km (HVkm), RGDP and the ratio HVKm/RGDP for the UK between 1996 and 2004.

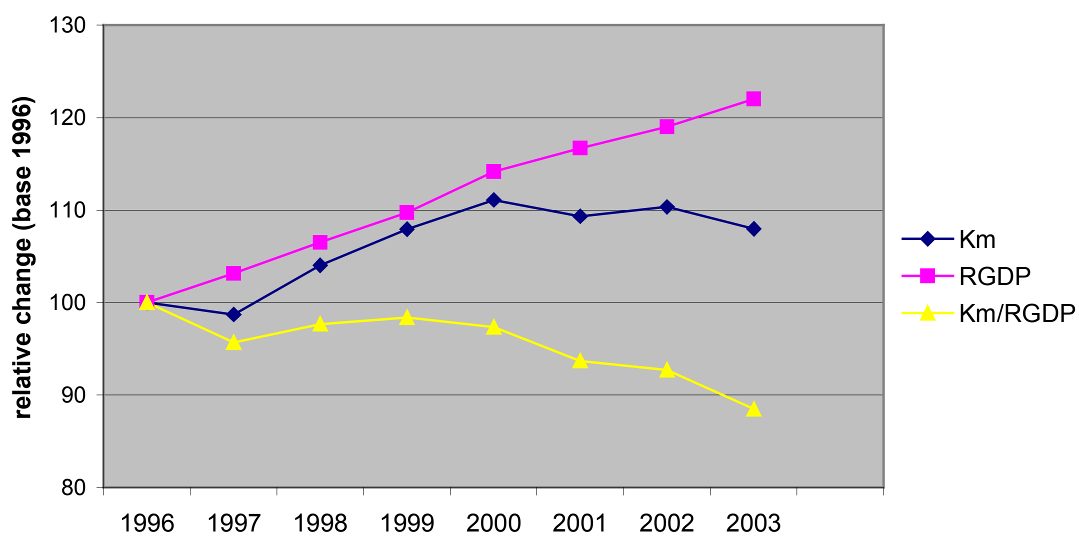


Figure 11. Relative change in all modes of freight transport (km), RGDP and the ratio Km/RGDP for the UK between 1996 and 2003.

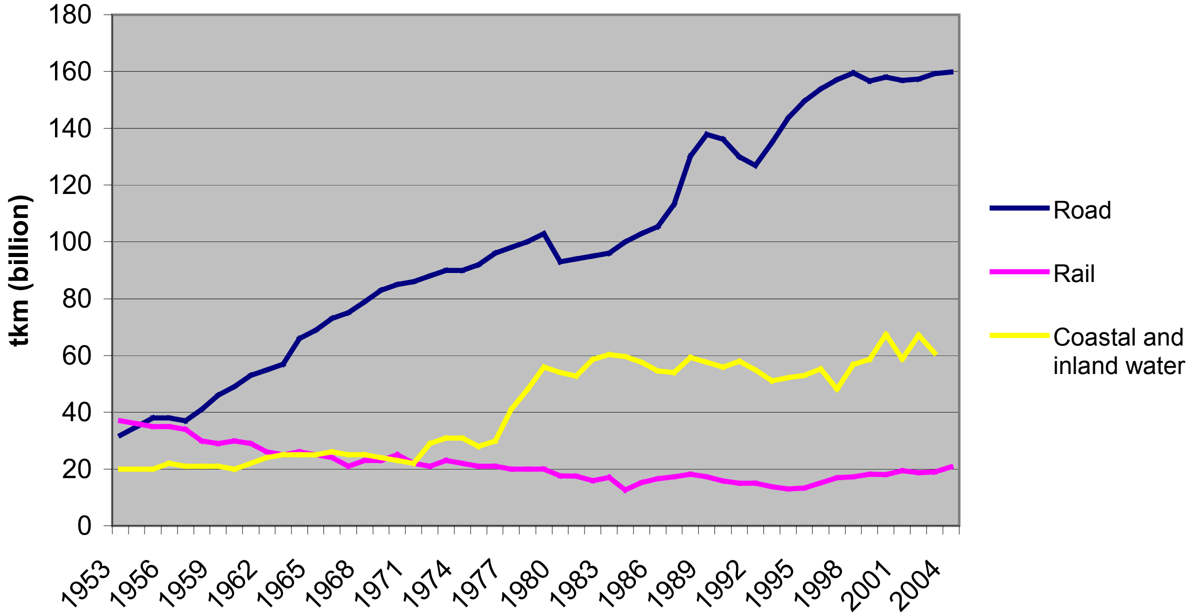


Figure 12. Domestic freight moved by mode in the UK 1953-2004[3].

The UK government has recently introduced measures to promote rail freight. These measures appear to be having the desired effect, although it is suggested that the growth of rail has not been as strong as was hoped. A description of rail promotion initiatives in other countries follows in the next section.

Overseas rail freight promotion initiatives

The concept of increasing the proportion of freight transported by rail is not unique to New Zealand. A number of countries have investigated the potential for rail to transport a growing share of their freight task and some have implemented measures to actively promote rail freight transport. However, there appears to be a shift in the approach used by countries such as Australia and the UK, where rather than competition between modes of freight transport, the focus is on markets choosing the best mode for their transport tasks. Overseas initiatives have usually been part of a wider transport review or strategy covering a number of transport related issues. In order to attempt to achieve impartiality, only documents released by neutral organisations (such as the government) are included in this review. Appendix A provides a summary table of the major freight transport strategies and documents that have been released recently in a number of countries.

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[3] Department for Transport, UK.
http://www.dft.gov.uk/stellent/groups/dft_transstats/documents/page/dft_transstats_041597.xls#'4.1'!A1

Australia

In 1994 the Australian Federal Government released a White Paper titled: AusLink: Building Our National Transport Future (Commonwealth of Australia 2004)[4]. This is the Australian government's formal policy statement on land transport. Apart from recognising that the domestic freight task is predicted to almost double within the next 20 years, the paper acknowledges that one of the major changes needed is more planned national transport development rather than the ad hoc measures that have taken place to date. AusLink is a government initiative to create "*a single integrated network of land transport linkages of strategic national importance",* and also incorporates the National Land Transport Plan. The paper mentions that the rail system in Australia has been under-funded for a long time and that its freight share has been declining over that time. In order to change this trend, the government plans to spend $1.8 billion on rail system improvements between 2004 and 2009 as the government believes that rail has the potential to substantially increase its share of the freight task if significant improvements are made to rail infrastructure and operational practices are modernised. The Auslink White Paper also proposes spending $6.7 billion on road projects between 2004 and 2009. The focus appears to be neutral and lets the most cost effective mode of travel to be used on a planned national transport network.

It appears that interstate non-bulk freight is the area of greatest competition between road and rail transport. As in many countries, road transport has the greatest share of this freight task and the trend does not appear to be changing. Two reports - *Reforming and restoring Australia's infrastructure* (Port Jackson Partners Ltd 2005) and *Competitive Neutrality between road and rail* – (Commonwealth of Australia 1999) suggest that long-distance, fully laden trucks in Australia are undercharged for their use of the roading system and that if road and rail paid competitively neutral charges then rail would increase its modal share on interstate freight routes.

Australia already has one of the highest rail freight modal shares in the world (almost 50% on tkm basis). However, like the USA, much of this is due to the large distances goods need to travel over such a large landmass, which suits rail. Also, Australia has a large mineral resources industry.

Recently, the National Transport Commission (NTC)[5] has released information that suggests that road and rail freight travel will almost double between 2000 and 2020 and that the freight task will grow by over 80%. This is consistent with the New Zealand findings of Mackie et al. (2006), The NTC also outline measures and initiatives that could be considered for implementation, including criteria for assessing the costs and effectiveness of possible initiatives. It is concluded that realistically trucks are likely to carry the largest share of the freight task in the future and so investments in truck technology and infrastructure need to be implemented. However, the reports also suggests that there are some opportunities for modal shifts in the future, but these are mainly restricted to longer distance routes and in port related freight operations. Overall in Australia, there is not expected to be any significant modal shift in the future, if anything road freight modal share may be expected to grow slightly overall. Nevertheless, on some corridors (i.e. Brisbane / Melbourne), rail is expected to increase its

[4] Commonwealth of Australia (2004). Auslink: Building Our National Transport Future. http://www.auslink.gov.au/policy/overview/background/whitepaper/whitepaper.pdf Last accessed 18th April 2006.

[5] The National Transport Commission. http://www.ntc.gov.au/ViewPage.aspx?page=A02312403400540020. Accessed 3rd April 2006.

market share. It is estimated that approximately 10-20% of the current road freight task is contestable by other transport modes.

United Kingdom

In 2004 the UK Department for Transport released a White Paper titled *The Future of Transport A Network for 2030* (Department for Transport 2004). Regarding the achievements in the rail freight sector, the UK government claims that they have "*actively engaged with the rail freight industry to promote freight on rail, supported by targeted investment".* Freight improvement measures that are proposed for the future include:

- Giving rail freight operators greater certainty about their rights on the existing network, and a group of key rail routes will be identified on which freight will enjoy and pay for more assured rights of access.
- Modal shift programmes for rail and water. The government plans to continue to encourage freight traffic to be shifted from road to rail or water where this makes sense, and where appropriate they intend to offer financial support.
- Taxation of the haulage industry. Delivering truck road user charging by 2007-08 for all trucks using UK roads. This is designed to ensure that haulers make a fair contribution towards the costs of using the UK road network.

In 2000, the UK government released its Transport 10 year plan. One of the targets in the plan was for a significant increase in rail's share in the freight market, and for a more efficient and competitive service from rail freight. It appears that the UK hasn't achieved the growth in rail freight that it had hoped, although there have still been significant advances over the last 10 years. In 1995 rail transported 8.0% of the land freight transport task. By 2004 this had grown to 11.6%. However, although strong growth has occurred in the rail freight sector, it still represents a small proportion of the overall land freight task in the UK, and the modal share for rail freight is lower than many other countries including New Zealand.

A major difference between the UK and New Zealand is that the UK has the Freight Transport Association (FTA)[6], which represents the transport interests of companies moving goods by road, rail, sea and air. By representing different transport modes, the FTA is able to work towards promoting the best solutions for the transport of freight without needing to favour any one mode. The structure of the FTA reflects the overall approach that has been adopted by the UK (which was emphasised in the Department for Transportation Green paper in 1999), where matching the best mode of transport for a freight task has replaced the traditional competition between road and rail. However, all modes of freight transport in the UK operate on a commercial basis, so the reality is that there is still likely to be competition between freight modes at an operator level. In addition the commercial rail freight operation must share rail space with the government run passenger rail services, making it difficult to expand services.

In 2004 the FTA released an industry review to accompany their annual accounts records. *Freight Transport – Moving the Economy Forward*[7] provides an overview of the freight transport industry performance to 2004, including the recent successes of rail freight. While 64% of rail freight in the UK is comprised of bulk or heavy products, rail has increasingly been transporting time-sensitive freight such as parcels and retail goods. The attraction of using rail

[6] Freight Transport Association. http://www.fta.co.uk
[7] Freight Transport Association (2004) Freight Transport – Moving the Economy Forward. http://www.fta.co.uk/information/solutions/transportsolutions/report_2005.pdf

for these goods is that it can offer superior reliability due to the increasing road congestion that often causes delays to trucks. Likewise, rail has offered improved service to ports as a result of increasing land-side port congestion on roads. New Zealand does not have the same nationwide congestion that is present in the UK and traditionally rail in New Zealand has provided a less reliable service. There is probably some way to go before rail in New Zealand is able to offer superior reliability to road at a nationwide level. This may be different in congested places like Auckland, where rail is being considered for container movements due to the increasing motorway congestion that is being experienced by road transport.

Transport for London (the local government department responsible for transport in London) has released a document that describes the increased need for rail to be able to transport freight into and out of London[8]. The problem London faces is that there is an increasing demand for freight to be shifted by rail, especially to and from ports, the channel tunnel and to and from the North of England. However, passenger rail dominates the railways in and around London and container transfer and inter-modal facilities have been under-funded for some time. Plans are also proposed for the improvement of the freight routes north from the south eastern ports and the channel tunnel.

Europe (EU 25)

Although the 25 member states of the European Union together have a rail freight modal share that is greater than that of the UK alone (18.9% of land transport tkm), they have not yet been able to reverse the trend of a declining amount of freight travelling by rail and initiatives that promote rail freight have not yet been established. Mainland Europe is more complex than the UK as there are many borders between countries. In many cases trucks can pass freely through these borders, whereas trains are often delayed by administrative and practical requirements. Europe does not have a standardised railway network that runs through all of its member countries.

Plans to increase the amount of freight travelling by rail have been drafted, and it is hoped that rail will transport an increasing share of rail freight transport in the future. These plans are documented in a White Paper released by the European Commission in 2001 called *European Transport Policy for 2010: time to decide*[9]. In this report, plans for upgrading Europe's railways include: Implementing regulated competition between transport modes and linking modes for successful inter-modality by 2010. There are also plans to create a single European Railway system by 2020, which would eliminate problems at borders. The vision calls for a significant increase in rail's market share along with other non-road based modes. Already in Europe inland waterways and costal shipping transport a significant amount of goods. The creation of 'motorways of the seas' is presented as an option to improve the effectiveness of the freight transport sector.

A consistent problem that is highlighted by European transport documents is that, like the UK, it is difficult for freight trains to compete for space with the large number of passenger trains that run on European railways. It would seem that this is something that would work in New Zealand's favour when attempting to transport more freight on rail. Over recent years, many of New Zealand's intercity rail passenger services have been terminated as they have not been profitable. Even before this, New Zealand's railway lines were relatively uncongested. In

[8] Freight on rail in London: London's need – Britain's benefit. Transport for London http://www.tfl.gov.uk/rail/initiatives/freight.shtml

[9] European Commission (2001). European Transport Policy for 2010: time to decide. http://europa.eu.int/comm/transport/white_paper/index_en.htm. Accessed 18th April 2006.

general New Zealand's railway lines are under-utilised, which means that, other factors permitting, the rail corridors would allow an increase in freight.

What types of freight are not contestable by rail?

There are some rail tasks that cannot economically be transported by rail. This is usually related to freight that must be transported between points where there is no direct rail link and the transport task is not on a large scale. For example, any freight between Gisborne and Tauranga or milk collections from farms in close proximity to the milk processing facilities. In these cases, no amount of support for rail (apart from building new railway lines) will enable the freight to be transported by rail. Livestock generally cannot be transported by rail due to restrictions on the amount of time animals may be kept in transit and the effluent damage caused to rolling stock.

There are other freight tasks that are currently not contestable by rail because they are not economically viable, there are infrastructure constraints or there are specific requirements of the transport task. For example, time sensitive general freight and parcel deliveries from Auckland to Wellington. If freight leaving Auckland at the end of the day needs to be received by customers for the start of business the next day, trucks are currently capable of meeting this demand whereas trains are not. By the time goods have been collected and packed, the earliest freight can leave Auckland is approximately 8pm. A truck leaving Auckland at 8pm will be able to arrive at Wellington by approximately 5am the next day, whereas a train leaving Auckland at the same time will not arrive until approximately 9am, which is too late for the start of business as a further period is required to allow for unloading and the transfer of freight to customers. Also, there are a lack of customer sidings in Wellington. In this example, the Auckland to Wellington trip may become contestable by rail if the speed of the trip increases or if the freight requirements change. In order to increase the speed of the trip, large investments in capital would be required for potentially relatively little return. What is more likely is that the requirements of some freight may be able to be changed in order to allow for rail transport. For example, if the freight travelling from Auckland to Wellington is currently required by the start of business the next day, but the customer was able to re-organise their systems so that the freight is not required until the early afternoon on the next day, then this freight would become contestable by rail. The longer loading and unloading times for rail must also be factored into the overall freight trip when comparing the two modes. However, in order for this to realistically happen, there would need to be cost incentives for the customer and there would need to be an assurance of reliability that at least matches truck travel. It appears that these have both been issues for customers in the past.

In other cases, there might be a direct and relatively fast rail link (for example Hamilton to Tauranga), but the relatively short distance between them (108 km between central Hamilton and Tauranga port) means that smaller freight consignments are not cost effective by rail. This may be overcome by creating larger volumes of freight. Fonterra has recently made rail a cost effective option for transporting milk powder from factories to its storage shed in Te Rapa and on to Auckland and/or Tauranga for export because of the volumes they transport. This initiative required long-term contracts and significant investments by both Toll and Fonterra in order to ensure its success.

Cabotage (domestic sea freight restricted to local vessels) was removed in New Zealand in the early nineties, and meant that a significant amount of freight that was previously contestable by rail now travels between New Zealand Ports by overseas ships. This is quite different to the USA which has strict cabotage and Australia which also offers some protection to local vessels.

Other physical constraints include height restrictions (e.g. Manawatu Gorge and North of Auckland) due to tunnels that cannot accommodate high cube containers and gradient restrictions (National Park, Paekakeriki, south of Blenheim, Oamaru). These are all factors that may currently reduce the viability of existing rail links but can be overcome if infrastructure investments are made.

Evaluation of freight movement contestability

There are a number of factors that must be considered when attempting to evaluate whether current road freight can travel by rail. Firstly, a functioning railway line must be present between the start and end point of the trip. Secondly, sufficient rolling stock of the correct type needs to be available to carry the goods. After these two fundamental factors are considered, there are a number of more complicated factors that determine freight contestability. These include:

- **The transport costs, and therefore the pricing structure, of each mode (including capital costs and contributions to infrastructure):** The pricing structure for rail makes it more suited to large tonnage, longer trips. This will be examined in scenario 1, later in the report.
- **The location and capability of loading and unloading facilities:** This has a large effect on the contestability of rail as loading costs make up a significant proportion of rail's costs.
- **The size of the freight task:** Bigger freight tasks are advantageous for rail.
- **Length of the journey:** Longer journeys are advantageous for rail.
- **Availability of backloads:** This appears to be more important for rail than road.
- **Time and frequency requirements:** In general trucks are faster and more frequent.
- **Reliability and quality of service:** Historically, rail in New Zealand has been perceived to offer a poor service and has been unreliable, although this appears to be changing in the major commodity sectors. In some countries where congestion is a problem, rail often offers a more reliable service.
- **Congestion on road and railway lines:** In general trucks are more affected by congestion, although commuter services in Auckland and Wellington causes some restrictions to track access.
- **Availability and price of sea freight:** This mode offers more competition for rail than road.
- **Port rationalisation:** A trend towards a greater amount of freight moving through fewer and larger ports would be positive for rail.
- **Environmental and safety considerations:** Rail freight transport is considered to be more environmentally friendly and involves fewer injuries per tonne than road freight transport, although the fuel efficiency of rail may not be so great on short trips.
- **Physical restrictions** (i.e. tunnel heights, gradients)**:** This has a greater affect on rail as trucks can travel on almost any road.

Because there are so many factors that need to be considered, and the public information available regarding road and rail freight in New Zealand is generally poor, the methodology used to estimate the contestable freight share will involve a series of stages and scenarios.

Firstly, the infrastructure that is available for rail freight transport will be considered in order to determine the areas of the country that are accessible by rail. Following this a number of conditions will be applied in order to identify rail links between regions that would be suitable for rail freight. Following this, the proportion of freight that is likely to be transported on these rail links will be estimated in order to determine the proportion of the freight task that is suitable to be carried by rail.

By using a number of scenarios, a degree of validation of the estimate for future modal share will be achieved. This will include consideration of the projected growth in road and rail freight under current conditions, an analysis of the current rail freight services that exist, predicted growth in primary commodities, expected growth in general freight carried by rail and expected growth given infrastructure developments. A much larger investigation would be required to evaluate all of the factors on specific routes. This report will focus on the most significant factors, which are accessibility to rail infrastructure, the length of journey, size of the freight task (which are the main factors that determine cost competitiveness) and the proportion of freight that is not suitable for rail transport.

Estimate of the population's access to New Zealand's existing rail links

There appears to be a good relationship between the amount of freight moving within or between centres and the population of that centre (Figures 13 and 14). This is logical as a greater population of people produce and consume more goods. The regions that do not fit well with this model are the Waikato and Bay of Plenty regions. These regions have been left out of the inter-regional freight vs population analysis (Figure 14) as they both have a disproportionate amount of freight moving into (Bay of Plenty) and leaving (Waikato) then relative to their population. This is largely due to Mt Maunganui being a major export port and the Waikato being a major dairy and wood production area. Interestingly, the trend-line for intra regional freight vs. population passes approximately through the origin of the graph, whereas the trend-line for inter-regional freight does not. The equation for inter-regional freight vs. population suggests that when there is a population of zero, an average of 1836 tonnes of freight still moves through a region.

By knowing the populations of each of New Zealand's Territorial Local Authorities (TLA's), along with the rail connections that link these areas it is calculated that 41% of New Zealand's population has access to suitable rail freight connections. For this exercise a minimum distance between centres of 150km (straight line) was used, no connections between adjoining districts were allowed and no intra-regional movements were allowed. A straight-line distance of 150 km was used as although a minimum route distance of approximately 250 km is generally required for general freight on rail, there are many rail trips that occur that are much less. For example, within the Bay of Plenty and between the Waikato and Bay of Plenty, train loads of wood and milk products are transported distances of just over 100 km cost effectively.

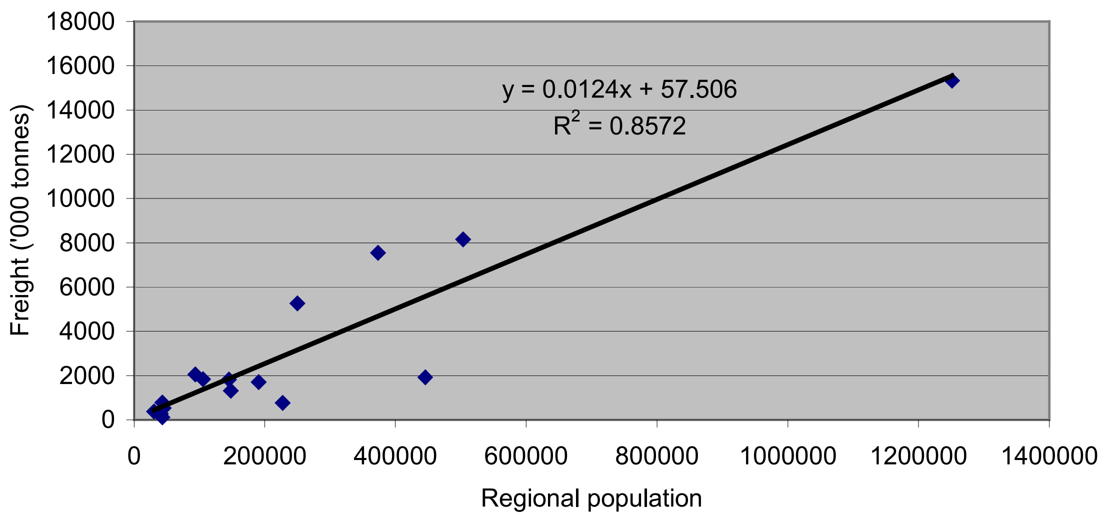

Figure 13. Intra-regional freight vs population for all of New Zealand's regions

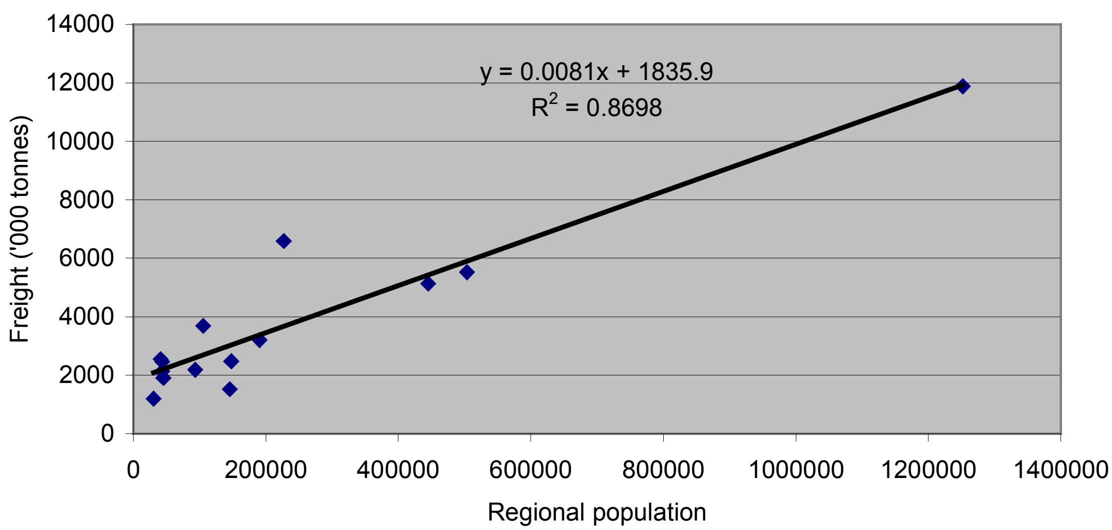

Figure 14. Inter-regional freight vs population for all of New Zealand's regions except the Waikato and Bay of Plenty

Earlier it was demonstrated that a significant amount of New Zealand's future freight growth will occur around a triangle formed by Auckland, Hamilton and Tauranga as well as the Canturbury region (Figure 2). These are also regions that are well served by rail, so it might be that increasingly, cases for transporting freight by rail in these areas becomes more attractive in the future. However, this is only likely to occur if freight volumes are able to be consolidated into the magnitudes that make rail transport economically viable. Currently the opposite trend is occurring. Increasing trends toward 'Just in time' deliveries and outsourcing of transport and distribution operations, means that smaller (often partial) loads are being transported using more truck trips. This is especially the case in larger centres.

Scenario 1. Estimate of freight contestability based on 'economically and practically viable' rail links

Despite the relatively good coverage rail has of our regions, more than just the presence of a railway line is required to make freight travel by rail feasible. Because loading and unloading is much more expensive for rail compared with trucks but the distance hauled is relatively cheaper for rail, rail is more suited to longer journeys. In order to be more realistic about the freight that can be transported by rail, factors that determine economic viability were added to the calculations. A detailed analysis of the economics of running trucks vs trains is outside the scope of this report, however a review of the basic running costs and charges is presented:

A report prepared for Auckland City (Beca Infrastructure Ltd 2005) that examined the potential for freight to be carried by rail within the Auckland region summarised the average costs of road and rail (Table 3) that were originally reported in a report titled *Surface Transport Costs and Charges* (Ministry of Transport 2005).

Mode	Rate per tonne km	Pick up/handling charge per tonne
Rail	$0.088	$7.00 (containerised)
Truck	$0.129	Costs covered within tkm rate
Difference	$0.041	$7.00

Table 3. Comparison of operational costs for rail and road freight transport. Source: Surface Transport Costs and Charges, Ministry of Transport 2005

Further to these costs, a transfer fee must be included for rail when freight needs to be transferred from its origin by road to the railhead. Within the Auckland region this charge is typically $120-$140 per container regardless of the km's travelled. From these figures it is obvious that rail incurs considerable costs at the loading and unloading stage, but then is cheaper once the freight is being transported. For this reason, rail is suited to large, heavy, long distance freight transport and less suited to short partial load trips.

As a generalisation, it is considered that if good back-loading is achieved, then a round trip of 500km would make freight movement economically viable by rail.[10] This assumes a target net train-load of approximately 700 tonnes for intra-island freight and 1400 tonnes for inter island freight. In addition, in order to service the markets that utilise freight transport, a round trip needs to be achieved daily (intra island), preferably for six days per week. This means that for a route to be economically viable for rail, the freight volume on that route must be at least 500,000 tpa and the yearly freight transport must be at least 250,000,000 tkm.

[10] Personal communication Peter Morris, Toll NZ

Currently, the only estimate of the amount of freight that is transported between regions is that reported by Bolland et al. (2005), who developed a freight matrix for all freight (Table 4) and for road and rail modes.

From / To	NthInd	AckInd	Wkto	BOP	Gsbrn	HwksB	Trnki	Mnwtu	Wngtn	Tsmn	Nlsn	Mrlbrgh	Wstcst	Cntbry	Otgo	SthInd
Northland	***18***	***33***	2	***40***												
Auckland	***14***	***0***	***1***	***18***	0	27	27	29	45			94		83		
Waikato	3	***2***	***9***	***34***	0	0	1	1	***1***	0				45		
Bay of Plenty	2	***22***	***3***	***31***	0	8	6	2	25							
Gisborne		0	0	0	***0***	0		0	0							
Hawke's Bay		62	2	3	11	***10***	37	***24***	16					72		
Taranaki		21	***4***	56		5	***9***	***2***	15							
Mana-Wanga		26	***1***	***3***	0	12	***63***	***3***	15					50		
Wellington		15	1	5	0	9	1	***6***	***4***	0	2	5		9		
Tasman									0	***0***	***0***	0		0	0	
Nelson										0	17	2	0	5	0	
Marlborough									10	***0***	7	3		***4***	10	
West Coast											0		4	***82***		
Canterbury		98	60	51			27	44	44	0	5	***2***	***3***	***4***	***21***	***19***
Otago														***15***	3	4
Southland														***33***	***22***	5

(yellow)	Higher than the National average modal share for rail of 13% (tonnes)
(green)	At least twice the National average modal share for rail (26%)
(magenta)	Rail the dominant mode of freight transport (greater than 50%)
Bold	Greater than 400,000 tonnes of total freight per year

Table 4. Total (road and rail) freight ('000 tonnes per year) that is transported between regions. Source: Bolland et al. (2005)

The freight movements that are provided in this matrix have been modelled from an incomplete matrix of actual data. The figures represent a 'best estimate of the volumes of freight' moving within and between regions. For the purpose of this report, the overall magnitude of the freight movements will be one of the factors that determine whether a link is 'rail suitable' or not. There are also other factors that contribute to the viability of a rail link. In order to qualify as being 'rail viable' the following criteria needed to be met:

- There must be a reasonably direct link between the major centres of the two regions. In some cases major rail centres rather than population centres were used (i.e. Northland, where much of the logging freight comes from Otiria rather than Wangarei)
- A minimum of 500km round trip between centres must be present
- A minimum of 500,000 tpa of freight on the round trip must be present
- If both 500km round trip and 500,000 tpa of freight is not present, then a minimum of 250,000,000 tkm of freight movement must be present on the link.
- No intra-regional links are allowed, with the exception of the Bay of Plenty where a large amount of intra-regional log and wood transfer occurs on rail.
- The Auckland / Manawatu and Manuwatu / Wellington routes are included as they represent sections of the Auckland / Wellington route which has been classified as a 'rail suitable link'

Using these criteria, the following matrix (Table 5) was developed:

From / To	Nthlnd	Acklnd	Wkto	BOP	Gsbrn	HwksB	Trnki	Mnwtu	Wngtn	Tsmn	Nlsn	Mrlbrgh	Wstcst	Cntbry	Otgo	Sthlnd
Northland	no	yes	no	no	no	no	no	yes	yes	no	no	no	no	no	no	no
Auckland	yes	no	yes	yes	no	no	no	yes	yes	no	no	no	no	yes	no	no
Waikato	no	yes	no	yes	no	no	yes	yes	yes	no	no	no	no	no	no	no
Bay of Plenty	no	yes	yes	yes	no	no	no	yes	no	no	no	no	no	no	no	no
Gisborne	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no
Hawke's Bay	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Taranaki	no	no	yes	no	yes	no	no	yes	yes	no	no	no	no	no	no	no
Mana-Wanga	no	no	yes	yes	no	no	yes	no	yes	no	no	no	no	no	no	no
Wellington	no	yes	yes	no	no	no	yes	no	no	no	no	no	no	no	no	no
Tasman	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Nelson	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Marlborough	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no
West Coast	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no
Canterbury	no	yes	no	no	no	no	no	no	no	no	no	yes	yes	no	yes	yes
Otago	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	yes

Table 5. Presence of 'rail suitable links' between regions

This matrix does not allow for infrastructure restrictions such as height and gradient restrictions. Also, it is based solely on single trips between regions. In reality train trips are likely to be more complicated, with freight joining and leaving the train at various points on a longer journey (especially general freight). Because some small quantities of freight on shorter trips that would normally be part of a larger consignment on a longer trip have been omitted, the matrix represents a conservative estimate of the viable rail links between New Zealand's regions.

Using the 'rail suitable links' and the freight matrix tables above, the following matrix (Table 6) is determined:

From / To	Nthlnd	Acklnd	Wkto	BOP	Gsbrn	HwksB	Trnki	Mnwtu	Wngtn	Tsmn	Nlsn	Mrlbrgh	Wstcst	Cntbry	Otgo	Sthlnd
Northland	0	469	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Auckland	567	0	2961	1591	0	0	0	167	179	0	0	0	0	340	0	0
Waikato	0	4090	0	5400	0	0	759	777	450	0	0	0	0	0	0	0
Bay of Plenty	0	2211	1692	7589	0	0	0	289	0	0	0	0	0	0	0	0
Gisborne	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0
Hawke's Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taranaki	0	0	518	0	29	0	0	465	318	0	0	0	0	0	0	0
Mana-Wanga	0	0	479	589	0	0	1156	0	1109	0	0	0	0	0	0	0
Wellington	0	140	186	0	0	0	327	0	0	0	0	0	0	0	0	0
Tasman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nelson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marlborough	0	0	0	0	0	0	0	0	0	0	0	0	0	509	0	0
West Coast	0	0	0	0	0	0	0	0	0	0	0	0	0	2438	0	0
Canterbury	0	142	0	0	0	0	0	0	0	0	0	745	462	0	1182	442
Otago	0	0	0	0	0	0	0	0	0	0	0	0	0	624	0	759
Southland	0	0	0	0	0	0	0	0	0	0	0	0	0	529	858	0

Table 6. Freight ('000 tonnes) that is currently transported by road and rail, on rail suitable routes.

Using this method, it is estimated that approximately 43,398,000 tonnes of freight could be transported on rail suitable routes. This represents approximately 42% of the total freight task (at 2002 levels). Interestingly, this figure is very similar to the percentage of the population that has access to rail routes, which was calculated earlier in this report.

However, before an estimate of the contestable freight task can be determined, we must also consider the proportion of freight on these rail suitable routes that cannot travel by rail for practical reasons.

- The analysis assumes that most freight travels between the main centres of each region. In most cases there are good rail connections between these centres. However, in some cases the distances of rail from the centres means that it is not viable to use rail for the inter-regional part of the trip. For example, although the volume of freight and the distance between Otago and Southland means that this link is a good rail route, freight transport between Invercargill and Queenstown cannot realistically use rail for its transport as Queenstown is a long distance from a railway line.

  Using this example, of the Otago/Southland link, Invercargill City, Gore, Clutha and Dunedin City districts are serviceable by rail. This accounts for 70% of the Otago and Southland population, meaning that, apart from major commodity transport, 30% of the region (by population) does not have access to convenient rail freight links. Similarly, approximately 73% of the population within the Waikato / Bay of Plenty regions have good access to the rail link between the regions.

- Time sensitive freight. Because in almost all cases, trucks can transport freight more quickly than trains (Table 7), freight that must be delivered between the distribution point and the client as quickly as possible is most likely to travel by truck. For example, a service that provides overnight delivery by the start of business the next day between Auckland and Wellington can only be achieved by truck.

Route		Approximate best travel time (nearest half hour)		
From	**To**	**Road**	**Rail**	**difference**
Auckland	Wellington	8.5	12.5	4.0
Hamilton	Tauranga	2.0	3.0	1.0
Picton	Christchurch	5.5	6.5	1.0
Christchurch	Dunedin	5.5	8.0	2.5

Table 7. Travel times between major centres for road and rail freight.

Although there is much discussion in transport documents about the increasing amount of 'time sensitive freight' that is being transported, there appear to be no sources of information that quantifies the proportion of the freight task that is actually time sensitive in New Zealand. In order to provide an estimate, the proportion of time sensitive freight was calculated for the USA, EU 25, Germany, Czech Republic, the UK and Ireland (Appendix B). For these countries, building materials, food and drink were classed as time sensitive. In addition, for the categories "other" and "mixed freight" (no further detail is provided) it was assumed that 50% of this freight is time sensitive. Using this rather crude analysis, a mean of 30% of freight for all of the countries was categorised as 'time sensitive'. In reality, time sensitive might mean a reliable transport time rather than simply a fast transport time. Because trains do not have to compete with other vehicles (apart from some commuter trains in large centres), and as long as the infrastructure is reliable, then rail has the potential to be more reliable (but not faster) than road when routes are inherently congested. In the UK widespread congestion is a problem, whereas in New Zealand apart from freight moving into and out of Auckland and a few other areas, freight routes are generally not congested. Because of the previous poor service that rail has offered and the relatively low congestion, it would currently be considered that at a nationwide level, road is more reliable than rail from a time perspective.

The only source of information that New Zealand has that quantifies the amount of freight that is transported between regions and by type is the information provided by Bolland et al. (1995). However, in this report 60% of freight is described as 'Other' because it could not be put into the major commodity categories.

In summary, 42% of freight travels between rail compatible regions. Of this proportion, 70% of this freight is estimated to be accessible to a suitable railway line. Of this proportion, 70% of freight is considered not to be 'time sensitive'. When all of these factors are combined, 20.6% of all freight could potentially travel by rail within New Zealand. Currently approximately 13% of freight travels by rail, which means that the contestable share of freight that is currently being transported by truck is approximately 7%. This 'theoretical' estimate of freight contestability would suggest that rail is not yet realising its full potential in assisting with transporting the nation's freight. However, although potential growth for the rail industry appears positive, it would also suggest that it is unlikely that rail is going to transport more than 20% of the nation's freight task. The realistic modal shift may even be less, as it is unlikely that rail would win all contestable freight. Nevertheless, rail may be able to offer substantial benefits in specific areas of the country. Some of these specific examples are given in Appendix C.

Scenario 2. Estimate of freight contestability based on growth in major commodity and freight forwarding transport

The previous estimate of freight contestability assumes that rail is able to compete for all inter-regional freight regardless of type as long as it is not time sensitive. This would include an increased share of the line-haul general freight market. Moving more into this market may mean greater competition with trucks and therefore involves more risk. Traditionally, rail is best suited to carrying large consignments of bulk goods where speed of delivery is not critical (although time-sensitive deliveries between Auckland and Christchurch are made using rail). A more conservative estimate of freight contestability might take the approach that growth in traditional rail markets is the most likely outcome. Certainly, the recent increase in demand for coal is to the benefit of rail. The following scenario assumes that rail growth will come primarily from the major commodity sectors and from long distance freight forwarding.

Because of the uncertainty surrounding the magnitude of New Zealand's freight task, any detailed analysis of the effect of growing the proportion of commodities and general freight that are transported by rail would result in unacceptable amounts of error and uncertainty. However, a crude estimate of the effects of growing rail's share of commodity transport can at least provide an idea of the magnitude of change to modal share that might be expected.

According to the figures published by Toll,[11] commodities where Toll has a significant market share include forestry (21%), coal (60%), dairy products (46%), steel (17%) - although according to Bolland et al. (2005) and Bolitho et al. (2003), this could be closer to 50%, and other bulk commodities such as aggregates and cement (14%). Toll also has a small (4%) market share of milk transport, and although not a commodity, Toll also has 7% share of the inter-modal and freight forwarding market. According to Toll Rail in their 2005 Overview, a total of 13.5 million tonnes was transported by rail using an average of three years (which years was not stated). This is in agreement with the 2002 modal share reported by Bolland et al. (2005). Using Bolland et al.'s results, it is estimated that in 2005 the freight carried by rail would be approximately 15.9 million tonnes (18% higher than the three year average given by Toll).

Potentially, the major rail distribution project that Fonterra and Toll are setting up in Hamilton could result in approximately 60-70% of processed dairy products (mostly milk powder) being transported by rail[12]. This represents a modal share for dairy products of 15-25%. Although, this is a large-scale project that is unlikely to be repeated across all commodities in the near future, it demonstrates the effect that specific projects can have on the modal share of some sectors. Coal is another area where rail is increasingly being used. Approximately 1 million tonnes of coal is being imported into Tauranga and moved by rail to Huntly. Previously, trucks transported much of this freight, and again, this shift required substantial investments from both Solid Energy and Toll along with a long-term contract.

If Toll were able to grow their market share in the dairy products and coal sectors by 20%, where theoretically no truck involvement is required, and by 5% in the other sectors, not including the freight-forwarding sector, then an overall rail modal share of approximately 16% (3% modal share change) would result on a tonnage basis. If Toll were also able to take 5% of the general freight market from trucks, then an overall modal share of approximately 19% (6% modal share change) would result. It must be noted that the figures that have been used for this scenario are estimates based on conversations with industry personnel and transport professionals. Although most people are willing to share their views on modal growth, they are almost always unwilling to share expected numbers on modal shift or growth. Because of this, 20% growth for coal and dairy and 5% for others are realistic estimates based on reports from the relevant sectors and are not calculated from actual or forecast data.

Detail on possible modal share changes for rail's largest commodity group customers

Forestry

The cost of double handling logs along with a short line-haul makes significant growth in this sector difficult. Also, in areas such as Northland, there is significant local government investment in logging roads. Logs are transported directly to port for export, to local sawmills, or to large pulp and paper mills. Processed wood products (pulp, paper, timber, woodchips) are then transported within New Zealand to end users, or to ports for export. Kinleith pulp and paper mill transports approximately 130,000 tonnes of processed wood products by rail to Tauranga and approximately 35,000 tonnes by road[13]. In some cases logs are also transported by train within New Zealand or to ports (for example from Murapara to Mt Maunganui). The largest

[11] Toll New Zealand. 2005 Overview. http://www.tollnz.co.nz/docs/Toll%20NZ%20Overview%20November%202005.ppt Accessed 3rd April 2006

[12] Personal communication Tony Smith, Procurement Development Manager, Fonterra.

[13] Personal communication with Phil Shattock, recent Carter Holt Harvey executive.

wood producing area (central North Island) is well serviced by rail infrastructure. Given the current supply chain structure for forest products, log truck driver shortages and increasing fuel prices, a 5% increase in forest products moved by train should be feasible. This is considered a conservative estimate and future growth in forest products may mean that even more rail transport is viable. However, growth in the central North Island area is expected to slow and is highly cyclical. This means that a greater proportion of harvested wood will come from other areas of the country in the future. Many of these places are not served by rail and so longer truck trips will be used for these forests. Although many high growth forests are not as well served by rail as the central north island area and the forests are smaller, there may be a small number of places that may warrant the construction of a rail-head.

Coal

Toll Rail has recently increased its coal freight movement from Tauranga to Huntly and Glenbrook. Trucks are often used to keep up with demand and so re-organising this load onto trains should be possible in the future. Also, Solid Energy plans to increase coal production on the West Coast of the South Island and all of this growth is expected to be transported by rail. Ontrack is currently undertaking rail upgrades on this route so that the increased capacity can be accommodated. Coal is particularly suited to rail transport so there appears to be scope for increases. More rolling stock is currently being made available for coal transport. An increase to 80% rail transport for coal should therefore be reasonable. There are some logistics issues surrounding the Otira tunnel, as purging of the tunnel is required to be carried out after every train passes through it, which in turn limits the number of trains that can pass through it in a 24 hour period. The tunnel does not currently cause a bottleneck, although further growth on this route may mean that electrification or extraction improvements are required in the future. Interestingly, while Toll reports that 60% of the coal market is moved by rail, the Solid Energy Annual Report for 2005 states that over 75% of its coal is transported by rail[14]. Bolland et al. (2005) report that approximately 70% of the coal freight task is transported by rail.

Trucks also carry a small proportion of the country's coal. A small amount of coal travels from West Coast mines to Westport by truck, which is then barged to various locations around New Zealand. Trucks are also used to transport some coal between Ngakawau and Reefton, before being transported by train to Llyttleton. Although not yet operational, in the future large amounts of coal are expected to be transported 46 km by truck between Pike River and Greymouth, before being barged to New Plymouth for export. Production is expected to begin in November 2006.

Dairy

Large growth in milk transport by rail is probably limited due to the requirement for a truck to pick up milk from farms in the first instance. However, in some cases milk is transferred to a rail-head before travelling to factories for processing. There is a limited bulk milk train service between the Hawkes Bay and Taranaki. This will also be highlighted as a successful rail initiative later in the report. This may be an option for more widespread milk transport, although Fonterra's planned filtering technology may reduce the overall volumes that require transporting to factories, which would make large volume train trips less likely. There is a lot of scope for rail transport growth in processed dairy products. This is currently being demonstrated by the new Fonterra dry store facility that has been built in Hamilton and will be discussed in more detail later in this report.

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[14] Solid Energy Annual Report 2005. http://solidenergy.co.nz/download/AR_05.pdf Accessed 3rd April 2006.

Scenario 3. Growth in the payload of current rail operations

According to the Toll Master Train / Ferry Plan[15] there are 687 train services that run in the North Island per week. Of these, 603 are freight trains (275 bulk). In the South Island there are 346 train services per week, of which 300 are freight services (98 bulk). If a standard full train of 700 tonnes is assumed for general freight and 1200 tonnes is assumed for bulk trains, and no back-loading is assumed for bulk trains, a theoretical maximum capacity of 30.9 million tpa is calculated. The amount of yearly rail freight shifted, for 2006 extrapolated from Bolland et al. (2005) and previously reported Trans-Rail tonnages is 16.7 million tonnes (the actual figures are not available), which means that the current train fleet is working at approximately 54% of time-tabled capacity. Although there are some operations such as bulk commodity transport that generally only achieve a maximum of 50% (such as coal from West Coast to Canterbury), other general freight operations should be able to achieve greater than this through back-loading. It is generally accepted that general freight utilisation should be at least 65%[16]. This suggests that rail has the capacity and infrastructure to be able to shift more of the country's freight, and therefore the issue is more of service, pricing and attracting market share rather than the availability of services and rolling stock. Running fewer, more heavily laden trains would be more profitable for rail and would assist with productivity, but this may not be acceptable to the freight market, which may expect a more frequent service.

If rail were able to increase its freight transport by 11% of current timetabled capacity and was able to keep up with the expected overall growth in freight volumes, then this would lead to a rail modal share of approximately 16% (3% higher than present) on a tonnage basis. However, in order to better appreciate the effectiveness of rail operations, a more detailed look at a selection of rail viable routes is useful.

Otago – Southland

Currently there are 40 rail freight services running between Dunedin and Invercargill per week. At an assumed maximum size of 700 tonnes per train this represents a capacity of 28,000 tonnes per week or approximately 1.46 million tonnes per year. Currently, the rail freight task between Otago and Southland is estimated to be 270,600[17] tonnes per year, which equals approximately 130 tonnes per train or just 19% of maximum capacity. However, it is possible that the figures used in this example, underestimate the rail freight task. Toll Rail estimates the Otago / Southland rail freight task to be between 1.5 – 2 million tonnes. This would mean that utilisation is closer to 100%, which is very different to the estimate using modelled data. Although a reasonable proportion of the overall freight between these regions cannot use a rail suitable link (for example Invercargill / Queenstown), it would still appear this rail service is under-utilised. However, the modal share for the Otago / Southland link (13.6%) is approximately equal to the national average. The balance of the overall freight task (road and rail) for the return journey on this link is good (Otago to Southland 759,000 tpa, Southland to Otago 858,000 tpa - 2002 figures) and the train services are mostly block freight or container transfer.

[15] Toll Rail. Toll Master Train / Ferry Plan as of 0001 hours Sunday 12 Feb 2006.
[16] Personal communication Peter Morris, Strategy and Planning, Toll Rail.
[17] Extrapolated from 2002 figures reported from Bolland et al. (2005)

West Coast - Canterbury
This is primarily a coal route and rail has approximately 82% modal share from the West Coast to Canterbury, however approximately 84% of the freight on this link travels in this direction and rail only has a 2.6% of the modal share of the small amount of freight that travels in the opposite direction. This situation is typical for a route that is dominated by large volumes of a bulk commodity. There are 60 freight services (49 bulk) that run from the West Coast to Canterbury per week. At average train loads of 700 tonnes for general freight and 1200 tonnes for bulk freight, the capacity of these trains is approximately 3.46 million tpa on this route and train utilisation is approximately 71%. The return journey for bulk commodity trains is generally not considered 'capacity' as there is generally no opportunity to back-load commodities. In some cases small amounts of back-loading of aggregates can be achieved on the West Coast route for customers and for rail construction and maintenance.

Waikato to Bay of Plenty
From Waikato to the Bay of Plenty rail transports 34% of the freight task but only 2.5% in the opposite direction. Again, this is an example of a route that is dominated by the transport of bulk commodities. Wood and dairy products travelling to Mt Maunganui Port are mostly responsible for these movements. There are 21 freight train services per week that run return journeys between Hamilton and Mt Maunganui and 33 services that run return journeys between Kinleith and Mt Maunganui. The total Waikato to Bay of Plenty rail task is estimated to be approximately 2.3 million tpa, which are served by 25 trains per week. This means that the average trainload must be approximately 1760 tonnes, and that the services are running to full capacity. The return trips give an average utilisation of approximately 48%.

Auckland - Wellington
There are 33 freight train services from Auckland to Wellington and 24 from Wellington to Auckland. The imbalance is due to that fact that more freight moves from Auckland to Wellington than the return journey and so a greater number of empty carriages are transported North per train. Because Hamilton and Palmerston North are stops between Auckland and Wellington and some of the freight on this route would continue on to Canterbury, Otago and Southland, these links from and to Auckland have also been included in the Auckland / Wellington freight task estimation. For Hamilton and Palmerston North, their contributions were weighted depending on their proportion of the Auckland / Wellington distance. Trips from Auckland to the Hawkes Bay and Taranaki were also included (re-marshalled at Palmerston North), weighted by the distance of their turn-off from the main trunk line from either Auckland or Wellington. Auckland / Bay of Plenty links were not included as much of this freight are unit trains transporting containers. Using this methodology it can be estimated that the Auckland / Wellington rail freight task is approximately 1,023,000 tpa. The capacity of the scheduled train services equals approximately 2.1 million tpa (using net train weights of 700 tonnes), which means that this service is running at approximately 49% of maximum utilisation.

This approach alone should be treated with caution as in reality there are a number of factors that determine the realistic capacity of a train on a particular route. Also, this analysis has assumed standard maximum train capacities and modelled freight tasks between regions. The detail required to assess routes this accurately is outside the scope of this study, and would require the disclosure of commercially sensitive information by Toll Rail. The main point of this analysis is to determine whether there is any room for increased freight transport within the current rail services.

Summary of the three rail growth scenarios

The three scenarios that have been carried out (Table 8) suggest that the contestable proportion of freight that is currently being transported by road is approximately 3-7%, which means that rail may be able to grow its share of the freight transport task from approximately 13% to 16-20%. A change in modal share of this magnitude is consistent with what has been experienced, or is expected overseas. Earlier it was reported that on some corridors in Australia, (i.e. Brisbane / Melbourne), rail is expected to increase its market share and that approximately 10-20% of the current and future road freight task faces competitive pressure from other transport modes. When non-rail suitable corridors and growth in other modes such as sea and air are considered, a national rail modal share increase of 4-5% would be a reasonable estimate. In the UK, following the introduction of rail promotion initiatives, rail freight modal share has risen from approximately 8% to almost 12%.

However, of the 3-7% that has been calculated as contestable by rail, not all of this freight may realistically travel by rail. In a contestable marketplace, it is unusual for one party to attract all of the contestable business. Although, some freight will be suited to rail transport, it may still get transported by truck for a number of reasons.

Scenario	Conditions	Outcome
1	Estimate of freight contestability based on 'economically and practically viable' rail links	Possible 20.6% modal share
2	Estimate of freight contestability based on growth in major commodity and freight forwarding transport	Growth in commodity transport only: 16% modal share Including possible general freight growth: 19% modal share
3	Growth in the payload of current rail operations (increasing freight carried as % of maximum capacity by 11%)	Possible 16% modal share
	Overall estimate for possible modal share	**Approximately 16-20%**

Table 8. Summary of possible rail freight transport modal share based on three scenarios using different approaches

Although, there have been many estimates and assumptions associated with the analyses in this report, it is clear that the modal share that is possible is likely to be in the vicinity of 13-20% of tonnes carried for rail, as opposed to magnitudes that would see rail being a dominant mode of freight transport. Furthermore, the estimates that are shown in Table 8 would require active promotion of rail as an alternative to road freight. In order to estimate the modal share changes that are likely to occur if no intervention occurs, the current modal growth rates and overall growth of the freight task need to be considered.

Transporting New Zealand's growing freight task on road or rail?

In the report titled *Prediction of New Zealand's Freight Growth by 2020* (Mackie et al. 2006), it was reported that New Zealand's freight task is expected to grow by approximately 85-93%

between 2005 and 2020. Using the 2002 freight task of 103 million tpa reported by Bolland et al. (2005), it can be estimated that by 2020 New Zealand's freight task might be in the vicinity of 230 million tpa. Earlier in this report it was estimated that the maximum capacity of the current scheduled rail services is approximately 30.9 million tonnes. This means that if no extra rail services were added to the current schedule, in theory, the rail system could transport approximately 13.4% of the nation's freight task. This means the current rail services will need to run to full capacity by 2020 in order to maintain modal share. In reality, greater amounts of freight moving through rail suitable routes might mean that rail becomes a more viable option for marginal markets, and so extra services would be offered to cater for the extra demand.

Scenario 4. Modal share of the 2020 freight task using current growth rates

Rail has experienced strong growth in recent years. Between 1996 and 2005 it is estimated that the freight carried by rail grew by an average of 5.3% per annum[18]. Although road freight transport in New Zealand is one of the fastest growing in the developed world, it was still slightly less than rail growth over a similar period. Between 1997 and 2004 road freight transport grew by an average of 4.5%.

If these rates of growth were to continue until 2020, then at this point rail would transport 14.8% of the freight task while road would transport 85.2% of the market. In absolute terms this equates to a tonnage increase (from 2005) of 18.6 million tonnes for rail and 95.7 million tonnes for road (Figure 15). This demonstrates that if current trends persist, the bulk of the future freight growth will still need to be accommodated by trucks.

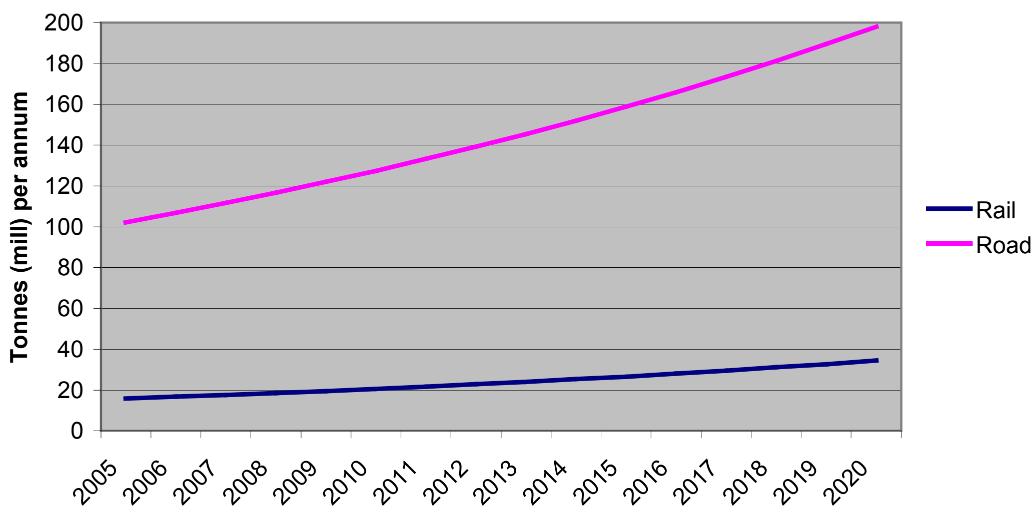

Figure 15. Growth in expected tonnage of freight carried by road and rail, based on recent growth rates

[18] Calculated from New Zealand Official Yearbook 2004 (growth in tonnage 1996-2003) and Toll Rail website (tonnage estimated from freight revenue 2003-2005).

In order for rail to achieve a 20% share of the freight market it would need to grow its freight carried by 7.1% per annum and road freight by 4.1% per annum every year until 2020. This would mean that the volume of freight transported by rail will be 2.94 times current volumes.

However, these estimates do not represent a negative view of the potential of rail freight transport in New Zealand, as annual growth of 5.3% represents excellent performance for any sector. In addition, congestion, environmental issues, truck driver shortages, increasing freight tasks and strong public support for rail are all positive for future rail growth. However, the fact remains that in the future the bulk of the country's freight growth will need to be transported by trucks.

What proportion of the rail freight task is contestable by road

The scope of this project was to provide an estimate of the proportion of the freight task currently transported by road that is contestable by rail and how much of the expected freight growth is contestable by rail. However, it is also possible that road transport may be able to take a proportion of the freight task from rail. Coal transport (for example West Coast to Llyttelton) is likely to be an exception to this as trucks are unlikely to be able to transport such large volumes of a relatively heavy, low cost commodity over the Southern Alps as effectively as rail.

In the past rail was regulated and there was a requirement for freight that travelled long distances to be carried on rail. When the rail industry was privatised, much of the freight shifted to truck transport as it proved to be more cost effective. This is unlikely to happen again as road and rail freight are now operating on a fully competitive basis. Quality of service is also important under the competitive model for freight transport. Poor service from either mode may lead to market share losses.

Future research

A need for better quality information

One of the main impediments to this project has been the lack of information that exists about freight volumes and modal share of different freight types. Apart from quantifying commodity production (Bolitho et al. 2003), the freight matrix that was developed by Bolland et al. (2005) represents the first attempt to quantify some of these areas. However, the authors of this report also found that the accuracy of reporting was compromised by lack of access to good information. In Australia, the Department of Transportation and Regional services provide comprehensive statistics regarding the transport of freight. This is also the case in the USA by the Bureau of Transportation Statistics, the UK by the Department for Transportation and the European Union by Eurostat. The quality of future transport modelling and research projects depends on access to good quality data.

A need for regional analyses

Although the modal share of freight transport within and between regions has been investigated, there is a need to investigate the role of road and rail freight transport in much more detail at a regional level. The Fonterra dry store and rail facility in Hamilton is an example where specific rail projects may be able to make a significant difference to how freight is transported within, into and out of a region. Although the effects of this facility on the national modal share are likely to be small, the initiative might have a large local effect. Factors such as accessibility to rail infrastructure, freight type and volume, and existing road congestion will differ between regions, and when these factors are combined, some regions will be more suited to rail investment than others.

Conclusions

To date no country appears to have significantly grown the share of freight that is transported by rail, which suggests that the reality of achieving this is difficult. However, many countries are still at the strategy and policy stage and so potential increases in rail freight may yet to be realised. The UK, Germany and Japan now have economies that grow faster than their freight transport sectors and in recent years the USA has also experienced faster GDP growth than freight transport growth. Some of this is probably due to the increasing role of service industries in these countries, but a contribution may also come from an increasingly efficient freight transport systems.

Using a number of different approaches, it appears that the contestable proportion of freight that is currently being transported by road is approximately 3-7%, which means that rail may be able to grow its share of the freight transport task from approximately 13% to 16-20%. However, unless there were strong incentives for using rail, not all of the contestable freight would move to rail as trucks would win some of this freight. This estimate assumes a realistic capture of the bulk commodities market, an increased utilisation of the rail network or an increased utilisation of its current services. If current rail and road growth were to continue, then by 2020, rail would have a slightly improved modal share and the actual freight transported by rail would have grown from 15.9 million tpa in 2005 to 34.5 million tpa in 2020. Between 2005 and 2020, road freight transport would have grown from 102.3 tpa to 197.9 tpa. There are some specific regional cases where rail may have a significant role in transporting the future freight task. However, based on current trends and neglecting any revolutionary changes to the way freight is transported, significant provision will need to be made for road freight transport in the future.

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Mackie, H.W., Baas, P. H. and Manz, H. (2006). Prediction of New Zealand's freight growth by 2020. Prepared by TERNZ for the E. J. Brenan Memorial Trust.

Ministry of Transport (2005). National Rail Strategy to 2015. http://www.transport.govt.nz/business/land/land-transport/nrs/index.php. Last accessed 18th April 2006.

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Appendix A - Overseas websites and documents relating to freight transport policy

Country	Activities	Reference
EU-25	White Paper - European Transport Policy for 2010: time to decide - Central document for Europe's transport strategy - Target: Shifting the balance between the modes of transport - Improving quality on roads, revitalising railways, linking up the modes of transport, common infrastructure charging for users	http://europa.eu.int/comm/transport/white_paper/documents/doc/lb_texte_complet_en.pdf
	TEN (Trans European Network) -14 cross-boarder priority-projects to be completed by 2010 (transport routes for all modes of transport)	http://europa.eu.int/comm/ten/transport/projects/doc/2005_ten_t_en.pdf europa.eu.int/comm/ten/transport/index_en.htm, www.ten-t.com
	Strategy for sustainability - Get freight traffic to switch from road to rail, short sea and inland waterway	
	EU program Marco Polo - Funds project for new non-road freight services - Marco Polo I (2003-2006) budget 100 Mill Euro - Marco Polo II (2007-2013) budget 740 Mill Euro Target: -Reduce road congestion, improve environmental performance of the freight transport system and enhance intermodality	www.eu.int/comm/transport/marcopolo/index_en.htm
	UNECE Agreement on Main International Railway Lines (1987) - Minimum speed, definition of a main network - TER - Trans European Railway (1993) - Develop a coherent and efficient network of rail and combined transport in the countries of central and eastern Europe and to link this to western and southern Europe	http://www.unece.org/trans/conventn/legalinst.html http://www.unece.org/trans/conventn/AGC_e.pdf www.unece.org/trans/main/ter/ter.html
	4-axis-project Germany, Poland, Belarus, Russia - Transport-time for Russia-Express Berlin-Moscow from 21 to 3.5 days	http://www.db.de/site/bahn/en/db__group/press/press__information/db__group/berlin__moscow.html

Australia	AUSLINK White Paper - Need for change. - Target: rail should handle more non-bulk freight on suitable links - Integration of road and rail needed - Private sector: Expanded role in infrastructure - Development of a National Land Transport Plan	http://www.dotars.gov.au/auslink/downloads/dotars_auslink.pdf
	National Land Transport Plan - National Network of important (road & rail) infrastructure and their intermodal connections - Intergovernmental and institutional approach - Sustainable national economic growth - Heavy vehicles with road-friendly suspension will be allowed to carry heavier loads, up to 10%	www.acea.com.au/MO/assets/pdfs/AusLink%20Submission.pdf
	Requirements of Australasian Railway Association: - Equal infrastructure charging - Reduce track costs to an efficient level - Better coordination, better costumer service - Structured and closer cooperation between rail operators, states and government - Main focus on inter-capital freight-corridors	www.pjpl.com.au/FutureOfFreight.pdf
	National Transport Commission. Twice the task: A review of Australias freight transport tasks - Land freight task to double between 2000 and 2020 - Includes evaluation of possible initiatives for dealing with growth - Trucks likely to carry largest share of freight task in future - Some opportunities for rail on long distance and port freight operations	http://www.ntc.gov.au/DocView.aspx?page=A02312400400570020

UK	White paper: The Future of Transport: A Network for 2030 (Department for Transport 2004) Giving rail freight operators better access to tracks Actively encouraging shift of freight off roads Taxation of haulage industry. Road user charging by 2007-08	
	Freight Transport Association – Freight Transport – Moving the Economy Forward - Highlights UK transport trends - Rail more reliable than road in UK	http://www.fta.co.uk/information/solutions/transportsolutions/report_2005.pdf
	Transport for London - Need to increase use of rail freigh into and out of London - Plans to improve freight routes to/from North and Southwest / channel tunnel	http://www.tfl.gov.uk/rail/initiatives/freight.shtml

Appendix B – Calculation of the proportion of ‘time sensitive freight for other countries

		USA (1000 t)	USA (1000 Mio tkm)	USA average length (km)	EU-25 (1000 t)	EU-25 (1000 Mio tkm)	Germany (1000 t)	Germany (1000 Mio tkm)	Czech Rep (1000 t)	Czech Rep (1000 Mio tkm)	UK (1000 t)	UK (1000 Mio tkm)	Ireland (1000 t)	Ireland (1000 Mio tkm)
food / drink	rail	62658	96	1667	33203	12	2653	1	1081	0	964	0	502	0
	road	650062	323	158	1784741	285	379324	54	44472	5	301743	37	35318	4
	road & rail	5649	16	2931										
	total	738293	449	359	1817944	297	381977	55	45553	6	302707	38	35820	4
agricultural products	rail	225668	293	1304	18265	6	689	0	191	0	0	0	0	0
	road	573171	153	163	542754	103	60193	10	16770	2	64504	8	4935	1
	road & rail	2370	5	3319										
	total	1048258	683	422	561019	109	60882	10	16961	2	64504	8	4935	1
food, drinks, agricultural products	rail	288326	390	2971	51468	17	3342	2	1272	0	964	0	502	0
	road	1223233	476	321	2327495	388	439517	64	61242	8	366247	46	40253	4
	total	1511559	866	3292	2378963	406	442859	66	62514	8	367211	46	40755	5
building materials	rail	108265	57	492	59049	10	7450	1	4372	1	22833	3	443	0
	road	2084351	118	77	1624652	115	201940	20	64158	3	182607	11	43540	2
	road & rail	650	1	1780										
	total	2361913	221	131	1683701	125	209390	21	68530	4	205440	14	43983	2
metals	rail	88377	82	1271	306457	75	87252	20	19625	2	11200	2	519	0
	road	491299	267	401	707435	140	160345	27	24643	7	68820	8	5327	0
	road & rail	1980	6	2663										
	total	674101	476	844	1013892	216	247597	47	44268	10	80020	11	5846	1
coal	rail	917136	1009	874	274470	55	53692	8	31791	6	44670	9	0	0
	road	401245	53	132	167296	16	15936	2	11188	1	17481	2	4738	0
	road & rail	4880	5	904										
	total	1687837	1254	179	441766	71	69628	10	42979	6	62151	10	4738	0
fuel	rail	13001	11	872	162985	42	32410	9	3839	1	6798	1	17	0
	road	879815	90	65	565583	52	115106	8	7045	1	69007	6	12081	1
	road & rail	0	0	904										
	total	1612576	278	68	728568	94	147516	17	10884	2	75805	7	12098	1

		USA (1000 t)	USA (1000 Mio tkm)	USA average length (km)	EU-25 (1000 t)	EU-25 (1000 Mio tkm)	Germany (1000 t)	Germany (1000 Mio tkm)	Czech Rep (1000 t)	Czech Rep (1000 Mio tkm)	UK (1000 t)	UK (1000 Mio tkm)	Ireland (1000 t)	Ireland (1000 Mio tkm)
chemical products	rail	206277	198	1259	95655	27	29779	10	3592	1	712	0	0	0
	road	504793	286	331	720015	117	218682	28	15898	2	56442	9	9589	1
	road & rail	3279	7	2310										
	total	882194	562	668	815670	145	248461	37	19490	3	57154	9	9589	1
wood / wood products	rail	48604	81	822	64849	16	5660	3	3957	1	0	0	0	0
	road	285863	103	242	483061	64	65619	8	17954	2	43894	5	7494	1
	road & rail	1738	4	1322										
	total	347403	194	342	547910	80	71279	10	21911	3	43894	5	7494	1
paper / paper products	rail	38513	52	1554	15233	6	15233	2	577	0	953	0	0	0
	road	188739	124	303	110073	19	31066	3	5843	2	13141	2	303	0
	road & rail	2016	5	2435										
	total	240279	191	699	125306	25	46299	5	6420	2	14094	2	303	0
textiles	rail	0	1	2225	33141	13	7793	4	16	0	0	0	0	0
	road	43882	39	1327	754974	184	173705	37	7145	1	128033	20	11062	1
	road & rail	0	0	0										
	total	51232	51	1512	788115	197	181498	41	7161	1	128033	20	11062	1
minerals	rail	70385	85	1180	119096	24	29924	6	5289	1	6995	0	0	0
	road	1032052	205	239	754974	184	173705	37	7145	1	128033	20	11062	1
	road & rail	2981	4	1664										
	total	1152610	310	436	874070	208	203629	43	12434	2	135028	20	11062	1
mixed freight	rail	859	2	2642										
	road	289468	76	174										
	road & rail	508	1	1902										
	total	299926	85	529										
transport equipment	rail	13426	19	1920	41236	15	11081	5	1612	0	0	0	0	0
	road	113925	71	558	482861	113	118866	24	12032	4	73845	12	6035	1
	road & rail	3100	6	2051										
	total	151440	112	1182	524097	128	129947	29	13644	4	73845	12	6035	1

		USA (1000 t)	USA (1000 Mio tkm)	USA average length (km)	EU-25 (1000 t)	EU-25 (1000 Mio tkm)	Germany (1000 t)	Germany (1000 Mio tkm)	Czech Rep (1000 t)	Czech Rep (1000 Mio tkm)	UK (1000 t)	UK (1000 Mio tkm)	Ireland (1000 t)	Ireland (1000 Mio tkm)
	rail	71948	32	1741	221256	70	39024	17	12900	3	23391	6	660	0
	road	245554	94	334	1733959	296	246147	41	53523	11	403556	37	18416	2
	road & rail	353	6	3165										
others	total	357624	171	161	1955215	366	285171	59	66423	13	426947	43	19076	2
	rail	1873884	2030	1298	1444882	371	310261	86	88843	15	118515	23	2140	0
	road	7842836	2021	278	14966068	1677	2945036	295	466034	46	1832043	172	278037	17
total														
difference: small amounts not stated														
Time sensitive		3428981			4479253		733953		147294.5		721621		89341	
50% other, mixed, building materials and food and drink														
TOTAL FREIGHT TASK		9716720			16410950		3255297		554877		1950558		280177	
% time sensitive		35.29			27.29		22.55		26.55		37.00		31.89	

Average for all countries **30.09**

Appendix C – New Zealand rail freight and overseas freight transport initiatives

The following are examples of rail freight initiatives in New Zealand and freight transport alternatives to conventional road transport that have been developed overseas. They are not limited to moving freight from road to rail, but all focus on moving freight away from, or improving the efficiency of truck transport.

New Zealand Rail freight Case studies

Fonterra - Hamilton dry-store facility

Fonterra has recently completed the construction of a 468 x 75m dry-store facility at Crawford street in Hamilton (approximately 7km from the Te Rapa factory)[19]. The facility has a capacity of 50,000 tonnes and is expected to receive approximately 650,000 tonnes of product per year. Fonterra believes that this will reduce truck movements on the region's roads by 45,000 per year. Freight operations at the Te Awamutu, Morrinsville, Waitoa, Hautapu, Waharoa, Lichfield and Tirau manufacturing sites will be linked by rail to the new store. The Te Rapa and Canpac operations will also be serviced through the site, with Te Rapa product being trucked to the freight village for transfer to rail. It is envisaged that a rail link between the Te Rapa factory and the Crawford street storage facility will eventually allow a short distance rail-link that will replace truck transport. Establishing this network has involved reopening a rail link between Morrinsville and Waitoa, the first new piece of track commissioned in 14 years. Fonterra believes that the increasing traffic congestion on roads to the ports of Auckland and Tauranga made rail a competitive, sustainable, long-term transport option.

Fonterra - Hawkes Bay - Taranaki Bulk Milk Shuttle

A bulk milk rail service between the Hawkes Bay and Taranaki transports up to 3.2 million litres of milk per day in the peak milking season[20]. Milk is collected by milk tankers from Hawkes Bay farms, off-loaded into milk silos at Oringi and Pahiatua then pumped into trains (up to 800,000 litre capacity per train) and railed to Palmerston North where they are joined to form one train. This train then transports the milk to the processing plant in Whareroa (Taranaki). This trip is made four times per day during peak milking. Milk tankers transport the milk at the beginning and end of the milking season when the volumes of milk produced are not sufficient to warrant running a train. If each milk tanker carries approximately 28 tonnes of milk then the milk train effectively replaces 118 milk tanker trips per day between the Hawkes Bay and Taranaki (assuming milk has a density of 1.030).

Clandeboye – Timaru Port rail link

Construction of a rail link into the Fonterra Clandeboye site and improvements to rail access at Stirling and Edendale in Southland has been considered as it would open up the opportunity for

[19] Personal communication, Tony Smith, Procurement and Development Manager, Fonterra.
[20] Personal communication, Peter Morris, Toll Rail.

similar bulk milk haul as the Hawkes Bay / Taranaki operation in the North Island as well as for inter factory transfers of bulk milk and other products. This project has the potential to remove over 24,000 heavy commercial vehicle trips (HCVs) from the region's roads each year, however this project appears to have stalled and does not look like going ahead in the immediate future. Currently, about 25% of milk products are transported to Temuka by truck and then railed to Timaru Port and Christchurch.

Port Freight

Currently container growth is approximately twice that of GDP growth. It is considered that this is probably sustainable over five years but perhaps not in the long term[21]. There also appears to be a major trend towards increased containerisation and less bulk commodities. The Ports of Auckland receive 36% of New Zealand's total container movements, approximately 80% of all imports and nearly half of all import containers (of which approximately 80% are for local use).

Also, there are increasing 'spikes' of large import volumes as large manufacturing centres in China consolidate shipments of relatively small freight volumes to New Zealand. Through the Ports of Auckland, major export commodities include dairy, wood products, meat and other horticultural products. The two largest import products are goods destined for the Warehouse and second hand cars.

As part of the the development of the Wiri inland port, it is intended to increasingly use rail to shuttle containers and other products between the waterfront and the Wiri terminal. Currently trucks are transporting most of this freight as volumes are not yet large enough. It is also expected that large improvements in back-loading will occur as the facility develops. This will help to make the train shuttle more viable. The Wiri inland port is strategically located as it is close to importers south of Auckland, the airport, freight routes south, State Highway 20 and many large distribution centres in the Manukau region. Also, a reduced number of empty containers on return trips is being planned.

The Port of Tauranga is also a significant user of rail. Prior to the Ports of Auckland inland facitilies, the Port of Tauranga established its Auckland Metroport. This facility enables the Port of Tauranga to contest Ports of Auckland's freight market. Part of the attraction of this facility is that exporters and importers can transport their goods to and from Tauranga on a dedicated rail service without needing to deal with the congestion associated with central Auckland.

Mainfreight

Mainfreight operate a multi-modal freight forwarding service and have stated that they prefer to use rail when it is practically possible, although in the past poor service often prevented this from occurring[22]. Inter-island freight is particularly attractive for rail, which is often the preferred mode of freight transport. It is difficult to obtain more information about the use of rail by freight forwarding companies, as they are often unwilling to disclose any information regarding their operations.

[21] Personal communication Scott Patterson Ports of Auckland Wiri terminal
[22] Personal Communication Brian Curtis, Mainfreight.

Overseas freight transport initiatives

CarGoTram Dresden

Transporting inner city cargo by tram in Germany is not new – a century ago trams were used for freight distribution. However, in the past the projects were minor and short-lived. Now in Dresden – an historical city located in the federal State of Saxony, the tram has been rediscovered for cargo transport.

Volkswagen needed an efficient way to supply its new factory in the city centre of Dresden. The newly built logistics centre and the plant are both located next to existing light rail tracks used by passenger trams. Now the parts used in the factory are delivered by train and truck to the logistics centre and forwarded 'just-in-time' by the CarGo Tram to the plant. Trucks are not able to deliver 'just-in-time' due to inner city congestion. With the trams having priority in the network running scheduled every 40 minutes, 21 hours a day, an efficient delivery to the factory with less storage space has been achieved. Each of the two trams in service is 60 metres long and carries three truck-loads. In Zurich trams are used for collecting of bulky waste.

References:

www.cargotram.de
www.glaesernemanufaktur.de
www.mobility-and-sustainability.com
www.apta.com (Dresden)
www.gueterbim.at; www.wien-vienna.at (Vienna)
www.vbz.ch; www.stzh.ch (Zurich)

Parcel Inter City Germany

Normally freight trains need a relatively long time for loading and unloading compared with trucks. This is one of the reasons why they have often been replaced by trucks for time-critical deliveries. This trend also applies to postal deliverers. In Germany, parcel deliveries were completely moved from rail to truck and plane in 1995.

Due to increasing transport congestion, trucks are becoming increasingly unreliable and on short distances planes are too expensive. For these reasons along with ecological concerns and a new toll for trucks, Deutsche Post (DHL) have re-introduced parcel freight by rail. Since 2000 the ParcelInterCity, is running at a speed of 160 kph every weekday through Germany connecting economic centres. It is loaded at 9 pm and unloaded at 5 am.

In addition to DHL using rail, warehouses and department stores use rail for time-critical deliveries. Because of the success of this project DHL wants to deliver courier-items from its new freight cargo centre for Europe in Leipzig, Germany to final destinations by train. The first connection is planned to Hamburg, and the 400 km should be done at a speed of 200 kph in 2.5 hours.
Other similar projects exist in France. Three modified TGV-high speed trains are operated by "La Poste" to deliver mail within France. The UK also wants to use this technology, first of all for the delivery of mail from Continental Europe to Britain by Eurostar.

References:

www.regionalverband-neckar-alb.de
www.dpwn.de
www.mylogistics.net

www.dhl.de
morgenpost.berlin1.de

BahnExpress Austria
RailCargo Austria offers a door-to-door delivery for general cargo (non-containerised freight) within Austria in 24 hours. Within Europe the freight take two to eight days. The freight is picked up by truck from the customer and carried to one of 14 logistics centres. The logistics centres are connected by train and the delivery to the final destination is completed by rail also. With this method 75 percent of all freight on these routes are transported by rail. In total 1.4 Million tonnes are transported with this system in Austria annually.

References:
www.railcargo.at/vip8/rca/german/News/Meldungen/Presse/LogistikAward/index.jsp
www.railcargo.at/vip8/rca/german/Logistik-Loesungen/BEX/index.jsp

Quadracycles used by DHL in London
Due to traffic congestion and the resulting congestion charging in London, DHL has been searching for new ways to deliver and collect parcels and courier-items from its customers. One concept was simply to equip the vehicles with an LPG-engine for which congestion charging is not applicable, although they are still affected by congestion. In order to run an efficient service, DHL has been running 10 bikes (quadracycles) in London since April 2001. This award-winning service runs lightweight courier-items in the city-centre. The bikes cover a route of eight miles and deliver 250 items daily. DHL has tried to adapt this service to other city's where parcel delivery is problematic. In Amsterdam they deliver parcels by canal boat through the small canals of the city, with the delivery to the costumer completed by bike or directly from the boat.
Since 1997 UPS has used tricycles to deliver items in city-centres. They are used in some German towns as well as in Vienna, Madrid, Stockholm, Copenhagen and Oslo. Their bikes can carry up to 200 kg.

The bikes help both worldwide operating companies to private a more fast and efficient service and give work to more drivers.

References
www.cityoflondon.gov.uk
www.dpwn.de
www.kretschmer.de
www.m21-portal.de
wx.toronto.ca
www.livingtomorrow.nl

Modalohr – Combining road and rail freight
In France a logistics company has combined the advantages of train and truck transport in order to provide flexible freight transport over longer distances. Generally, trucks are used for short distances and rail for the long distances in between. However, long transfer times and the labour required for lifting the trailers or containers has lead to the development of an alternative system. Using a unique swivelling carriage platform, trucks can drive straight onto railway carriages. No special trailer is needed and trailer only or truck / trailer combinations can be carried. The major requirement is a terminal with enough space to allow the trucks to drive onto the carriage.

This system is used in the eastern part of France as well as for border-crossings into Italy. It is planned to be extended to other parts of France as well as to Austria and Germany. In March 2007 it is planned to run a daily connection with 40 unaccompanied trailers between Bettembourg (Luxembourg) and Perpignan (South of France).

Reference
www.modalohr.com

Toll-Collect
Germany has a toll-collecting system based on GPS, GSM and infrared, which is aimed at encouraging hauliers to use more environmentally friendly trucks. Trucks emitting more are charged more and in some cases has provided an incentive for companies to use rail for freight transport. German Rail has detected a slight increase in rail freight since the introduction of this system. The route of the truck is identified by GPS and the kilometres travelled are transmitted by GSM to a central server, which provides the bill. The trucks don't need to check in, reduce speed or drive on special lanes. They are supervised by camera-equipped bridges (10 per cent of 300 bridges run at one time) and the roads are supervised by a team of 300 staff who operate on the road network..

References
www.bgl-ev.de
www.bmvbw.de
www.bag.bund.de
www.toll-collect.de

Cargocap
This research-project aims to improve the function of inner city freight transport in the future. The Ruhr-university Bochum has built a test track where they run their system. Underground pipelines with a diameter of 1.6 metres shall be built to let small vehicles run in automatically. The system is designed to work 24 hours a day with a maximum length of 150 km. In the States a similar project exists.

References
www.et3.com
www.cargocap.de

SystemCargo
Often the classification of freight as time-critical is reason enough for transporting it by road and not by rail. Deutsche Bahn Logistics have cooperated with Hellmann International Logistics to prove that time-critical items are suitable for rail. The project was funded by the Ministry for Education and Research of Germany. The services operate every workday between certain centres in Germany. The freight is transported in containers and a high speed is achieved with well-scheduled services.

http://www.db.de/site/bahn/de/unternehmen/presse/presseinformationen/ubl/l20060222.html
http://www.hellmann.net/de/globalnews/systemcargohatmarktreifeerreicht
http://www.schiene2010.de/index.php4?content=projekt&projekt_id=30