

Brisbane Cairns land transport

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Abstract

This paper outlines the AusLink Brisbane - Cairns corridor strategy (final version released in 2008) and the ongoing upgrading of the Bruce Highway which for much of its length is a two lane highway. The Brisbane - Cairns railway is also outlined with its former severe speed-weight constraints and the subsequent track straightening and strengthening to allow for faster and heavier freight trains. This includes the Main Line Upgrade of the 1990s and more recent upgrades. As a result, rail now has some 30 per cent of non-bulk freight on this corridor. This is opposed to less than 10 per cent on the Brisbane - Sydney and Sydney - Melbourne corridors. The paper also notes the introduction in 1998 of electric tilt train services between Brisbane and Rockhampton.

Some future corridor upgrade options are noted with particular attention to external costs and energy use. The paper finds that further rail track upgrading to improve rail freight efficiency and competitiveness could result in a saving of at least 30 million litres of diesel per year by 2014 (80,700 tonnes CO₂-e) with a reduction in external costs of at least \$40m per year.

1. Introduction

After noting the AusLink Brisbane - Cairns corridor strategy in Section 1, Section 2 briefly outlines the ongoing upgrading of the Bruce Highway. Section 3 comments on the Brisbane - Cairns railway whilst Section 4 outlines some 2009 - 2014 rail corridor upgrade options. Particular attention is given to external costs and energy use as opposed to intercity supply chain costs. The conclusions are given in Section 5. However, the paper will not consider the splitting of Queensland Rail into QR National with commercial operations including coal and freight with an impending sale, and the formation of a new Government Owned Corporation to own the passenger service business and assets, including the metropolitan rail network.

A draft Brisbane - Cairns strategy was placed on exhibition during 2006 by the Department of Transport and Regional Services (DOTARS - 2006). This was the first of 23 corridor strategies as part of the AusLink planning process. Following consultation, the Brisbane Cairns strategy was updated (DOTARS, 2007) and the revised version was released in 2008.

The revised version gives an overview (At a glance) that includes: "The Brisbane-Cairns Corridor is the main transport link between Brisbane and North Queensland and the corridor currently supports 58 per cent of Queensland's population (3.5 million people) - of whom two million live outside Brisbane. Brisbane-Cairns is a highly decentralised corridor with major urban areas; industry and agricultural production; and tourism spread along its 1,700 kilometre length. The corridor supports the transport needs of rapidly growing areas to the north of Brisbane (Caboolture, Sunshine Coast, Gympie, Maryborough/Hervey Bay),

important regional centres (Gladstone, Rockhampton, Mackay, Townsville, Cairns), tourism and major export industries (coal, minerals, aluminium, sugar)...."

"Road and rail transport activity is expected to grow strongly at around 2.5-3.0 per cent per year throughout the corridor. In the southern section of the corridor, south of Childers, road traffic is expected to grow at the higher rate of around 3.5 per cent per year and double in 20 years. This growth will be fuelled by rapid population and economic growth and tourism. Road and rail are expected to continue to compete strongly for long distance movement of general freight. Rail and coastal shipping will have important roles in movement of bulk cargo, and road is expected to continue to dominate local and intra-regional transport and specific niche markets. Air transport is expected to grow rapidly (average over 5 per cent per year.) and expand its dominance of the long distance passenger travel market."

The draft Auslink strategy (p10) notes that there is about 6 million tonnes pa of intermodal freight on the corridor, and the final strategy noted (page 6) that about 14 million tonnes of bulk and non-bulk freight are transported along the Brisbane Cairns corridor each year, also "The key trade where road and rail compete is the intermodal/container transport to destinations such as Mackay, Townsville and Cairns. It is estimated that currently rail has 25-30 per cent of this market." By 2013, the total inter-regional freight task on the average corridor segment was forecast to increase to 7.7 Mt. The draft corridor strategy noted (p26), inter alia, "current NCL infrastructure may not enable rail freight to grow at the same rate (3% per year), thereby resulting in the freight growth over 3% per annum 'spilling over' to road transport."

Seven strategic issues are stated (DOTARS, 2006, page ii and 18) in the final strategy (DOTARS, 2007) as follows:

1. the efficiency and safety of passenger and freight movement in the section between Brisbane and Gympie,
2. the safety and efficiency of passenger and freight movement on two-lane rural sections of the Bruce Highway
3. managing road and rail transport through growing regional centres, especially Rockhampton, Mackay, Townsville and Cairns and between Rockhampton and Gladstone,
4. the competitiveness of the North Coast Line and its capacity to handle long-term growth in freight,
5. the preservation of export corridors that form part of or are adjacent to the AusLink Network to maintain export efficiency,
6. the relatively poor condition of the road pavement, and,
- 7 flooding along the corridor.

The strategies considered three scenarios in future rail freight demand:

- Base case – rail captures 95% of its current mode share,
- Market defence – rail captures its current mode share, and
- Rail growth – rail captures 105% of its current mode share.

Coastal shipping on the Brisbane Cairns corridor was considered by both strategies, noting that in 2002-03 some 2.8 million tonnes was moved by this mode (mostly petroleum products and cement), but although playing "an important niche role" (DOTARS 2007 page 6) is unlikely to be competitive for small volumes of time-sensitive general freight such as agricultural products." Coastal shipping shall not be considered in the present paper.

The final strategy looks at foreseeable changes to the year 2025 (whilst the draft strategy looked at foreseeable changes to the year 2030). In common with almost all other AusLink corridor strategies the draft and final Brisbane - Cairns corridor strategy did not address either external costs or oil vulnerability.

2. The Bruce Highway

The Bruce Highway is noted in the 2007 Auslink strategy (p 3) as approximately 1640 kilometres in length and is a "divided multi-lane road for 100 kilometres north of Brisbane becoming an essentially two lane rural highway for the remaining distance to Cairns with sections of four lanes in the regional centres."

During the 1960s, the Bruce Highway was a basic two lane road with parts subject to flooding. In 1974, the Bruce Highway was declared as part of the National Highway System and was then for the next 35 years eligible for full Federal funding. The benefits to the road freight industry from the upgrading of parts of the Bruce Highway have included the use of faster and heavier trucks, a reduction in transit times, and heavier loads (under 36 tonnes Gross Vehicle Mass (GVM) to 42.5 tonnes GVM for an articulated truck with the option of 9 axle B-Doubles with a GVM of 65 tonnes).

On 4 October 2007, the Howard Government announced as part of a 2020 plan a \$2 billion upgrade package for the Bruce Highway. This had bipartisan support and "...builds on the \$800 million the Australian Government is investing to improve the Bruce Highway between 2004 to 2009."

In May 2008, the federal budget made further provision for upgrading the Bruce Highway, with work underway during 2007-08 as outlined in a Federal Ministerial media release (TRS04/Budget Joint) to include the Caboolture Motorway (upgrading intersections and widen the Bruce Highway north of Brisbane, to result in a six lane motorway for some 27 kilometres north from the Gateway Motorway intersection) and a Townsville to Cairns upgrade (with some funds from the Queensland Government to upgrade a congested section of the Bruce Highway in Townsville along with rehabilitation, additional overtaking lanes, widening, improved flood immunity, and improvements to intersections).

The 2009 federal budget saw the Bruce Highway gain Nation Building Program (NBP) funds including for Cooroy to Curra (Section B) duplication scheduled for completion by 2012. This was noted as part of a record investment program of \$12 billion "to upgrade Australia's key road freight route Network 1 (N1) - which stretches from Melbourne to Cairns."

A media release of Minister Albanese (16 March 2010, AA0129) noted an investment of \$2.6 billion by the Rudd Government in the Bruce Highway, including a \$250 million Bruce Highway Safety Package. This complemented NBP allocations from 2008-09 to 2013-14 of \$502.38 million plus a further \$2073 million under NBP (New) projects. Some of the Australian government contributions are part funding and most allocations on Bruce Highway projects have a cap. These new funds comprise \$718m for the Caboolture to Curra section (including \$488m for Cooroy to Curra), \$445m for the Curra to Sarina section, and \$910m for the Sarina to Cairns section.

The full upgrade of the Bruce Highway from Cooroy to Gympie was estimated in the South East Queensland Infrastructure Plan and Program 2008–2026 (SEQUIPP, available via <http://www.dip.qld.gov.au>) to cost \$3.3 billion, with timing subject to federal contributions.

2.1 Related issues

There is ongoing debate on recovery of road system costs from heavy trucks with under-recovery from 9 axle B-Doubles moving long distances (227,500 km) each year being \$23,000 per year (Productivity Commission, 2006, Table 5.3, page 125) under recent National Transport Commission charges. These subsidies are due to be reduced but not

eliminated over the next three years. In addition, vehicle use on the Bruce Highway continues to be subsidized by the Queensland Fuel Subsidy Scheme, amounting to 8.1 cents per litre for fuel excise.

Data provided by the Queensland Department of Main Roads in 2004 shows that for the four calendar years to 2003, there was a total of 46 fatal injuries from road crashes on the Bruce Highway involving articulated trucks; also for these four years, this number was about 25 per cent of the number of all lives lost in road crashes on the Bruce Highway.

Further research in 2004 showed that the average unit cost for road crashes in Queensland involving articulated trucks was about 0.66 cents per net tkm whilst for Queensland Rail, the average unit cost of accidents was 0.02 cents per net tonne km; a ratio of 33 to one (Laird, 2005). The corresponding unit accident figures for all of Australia were 0.6 cents per net tkm for road and 0.03 cents per net tonne km for rail; a ratio of 20 to one.

3. The Brisbane Cairns rail corridor

As noted by Kerr (1998, p127) *"The North Coast line was constructed on a piecemeal basis, but it was completed."* By 1900, railways extended from Brisbane to Gladstone, and small isolated sections included a line built from Cairns to Gordonvale and operated by the Cairns Shire Council as a tramway. This tramway (and its extension to Babinda by 1910 - nearly 60 km in all) was taken over by Queensland Rail in 1911, who in 1917 also took over the operations (61 km) of the Bowen Proserpine Joint Tramway Board (Quinlan and Newland, 2000). On completion of the Mackay to Proserpine section in December 1923, Brisbane was linked to Townsville. Twelve months later, with the official opening of a major bridge near Innisfail (Burke, 2009), Cairns was linked to Townsville by rail.

Much of the line was built to basic standards. Over the years, some wooden bridges were replaced by steel bridges, and the Rockhampton - Gladstone section was upgraded from the 1960s to accommodate coal exports from Blackwater. Following electrification (at 25,000 volts AC) of the Brisbane suburban lines from 1979, Main Line Electrification (MLE) design work was underway to electrify the main Central Queensland coal railways. The first stage to be announced in August 1983 was the Rockhampton - Gladstone system.

Even up to 1986, the Brisbane -Townsville line was characterized by having low axle loads (15.75 tonnes) with numerous speed-weight restrictions. As part of the civil works carried out in association with Brisbane - Rockhampton electrification during the 1980s, four major deviations (Eumundi, Gympie, Maryborough and south of Gladstone with combined length of 42.5 km) were completed along with selected tight radius curve easing. As a result of these works, the transit times for freight trains between Brisbane and Rockhampton were reduced from an average of about 15 hours to 12 hours whilst freight train gross loads were lifted from 760 to 1200 tonnes.

In 1992, Queensland Rail commenced its Mainline Upgrade or MLU at an initial cost of \$526 million. The MLU program had many aspects and included the acquisition of 250 new container wagons in 1995 and 40 new generation 3000hp locomotives along with upgrading of bridges and rail deviations and for heavier axle loads and faster trains. Some 672 old timber bridges between Brisbane and Cairns were replaced with concrete box culverts or concrete bridges in order to achieve a minimum axle loading of at least 20 tonnes (all designed to allow for future increases). A further 157 bridges were strengthened. In addition, MLU included no fewer than 45 rail deviations between Nambour and Townsville.

All MLU deviations south of Rockhampton were completed in October 1996 when the 8.3 km **Tandur - Meadvale** deviation (151 - 160.6 km) was commissioned. The new track was 0.9 km shorter than the old 9.2 km section it replaced. The new track also eliminated 4.4 km of curves of radius less than 800 metres and improved flood mitigation. Two other major MLU deviations are of note, each with ruling grades of 1 in 90 and no curve tighter than 2200 metres are those of **Gunalda** (where an 8km deviation replaced a 10 km section) and **Watalgan** where a 12.5 km deviation (at a cost of \$17.4 million plus rails) and (Queensland Rail, 1996) "...significantly eased the grade restrictions between Brisbane and Rockhampton and permits trailing loads to be significantly increased."

Over 95 per cent of the Brisbane and Rockhampton track following MLU was laid on concrete sleepers. This was subsequently extended to Rockhampton - Townsville. The original length of track between Roma Street in Brisbane and Townsville was approximately 1341 km. Following MLE and MLU track upgrades, and track changes for new stations at Bowen and Mackay point-to-point distance was reduced by 26 km. Aspects of track geometry are given in Table 1.

Table 1 Aggregate lengths of Caboolture - Townsville and interstate rail track with tight curves, number of circles traversed, and steep grades on tight curves

Section of Track	Length km	Tight curves km	Number of circles	Circles per 100 km	Steep grades on tight curves km
Caboolture - Townsville					
Caboolture - MBW	206	62	32	15	7
MBW - Rockhampton	367	25	19	5	4
Rockhampton - Mackay	320	26	16	4	1
Mackay - Townsville	371	21	15	4	1
Total	1264	133	82	6	13
North South corridor					
Melbourne - Glenlee	900	149	72	8	20
Strathfield - Acacia Ridge	962	396	177	18	28
Total	1862	545	249	13	48
East West corridor					
Melbourne - Adelaide	835	49	42	5	26
Adelaide - Perth	2641	50	70	2.6	0
Total	3476	99	112	8	26

Notes. 1. Extended from Laird (1998) with the use of computer track file data at 10 metre intervals. The radius of any curve is used to calculate the angle subtended by each curve on the track. Tight curves are those less than 800 metres radius and steep grades are those steeper than 1 in 66.

2. Aggregate track data rounded to 100 metres. Data is qualified with Bethungra Spiral excluded on the Main South line and is post Main Line Upgrade and the Mackay deviation for Queensland.

3. MBW denotes Maryborough West. Glenlee is 53 km south of Sydney and Caboolture is 50.54 north of Brisbane. There are 61 km of grades steeper than 1 in 66 between Caboolture and Townsville.

4. Data is rounded, so columns may not add.

In addition to track upgrading with deviations, and concrete resleepering, other work was necessary to accommodate faster freight trains and tilt trains. This includes, at a cost of some \$27 million, changes to signals, level crossing protection (including provision of double boom gates at 10 locations where the tilt train may travel at 160 km/hr) and the Automatic Train Protection (ATP) system.

3.1 The benefits of MLU - freight and passengers

The reasons for the MLU project as seen by Project Manager Mr Ross Hunter (1994) were: *"Without substantial upgrading, the quality of rail freight services possible could not keep pace with the quantum improvements enjoyed by our major competitor, road transport. Rail would continue to lose market share, compounding the losses from having to retain services. The Mainline Upgrade Project is targeted at improving services and picking up market share, and reducing the costs of providing these services to enable rail to compete more effectively on price."*

In fact, without MLU, and with the upgrading of the Bruce Highway to date, it is probable that rail's market share would have fallen as it has on the Brisbane - Sydney (from 24 per cent in 1996 to below 10 per cent now) and the Sydney - Melbourne corridor (also now less than 10 per cent).

Track upgrading work under MLE and MLU allowed the maximum weight of a freight train behind a locomotive to be progressively increased, in various stages, from 760 tonnes to 1500 tonnes for a 2800 class locomotive. Brisbane - Cairns axle loads increased from a low 15.75 tonnes to 20 tonnes and freight transit times fell from 40 hours to 27 hours.

As a result of the improved train operations, QR was able to maintain freight tonnages and live stock traffic on its North Coast Line (NCL). This was at a time when rail freight operations came under increased competition from road freight. Moreover, the upgrading of the North Coast Line allowed QR and the former National Rail Corporation to introduce, in 1997, a premium NQ Direct Service.

Along with faster and heavier trains, and as noted by the former Chief Executive of QR Mr Bob Schueber at AusRail 2005, the completion of MLU resulted in an improvement in reliability of freight train movements. In addition, MLU provided track infrastructure of sufficient quality to support rail - rail competition on the Brisbane - Cairns corridor.

In summary, MLU and the preceding civil work with MLE has allowed intermodal rail freight to grow to over 3 mtpa during the current decade. Whilst most of this freight will not get as far north as Cairns, MLU has allowed rail to provide lower costs of moving freight to Cairns. However, as noted below, further investment is now required in the NCL.

3.2 The Caboolture - Landsborough upgrade

After considerable planning (Engineers Australia, 2004), and delays that included a Premier's intervention in January 2004, work started in July 2006 on straightening and duplicating 14km of rail line between Caboolture and Beerburrum. The work was completed in early 2009 and (<http://www.qr.com.au/seqip>) included 4.8 km of road realignments, as well as upgrades to two stations and the construction of two rail bridges. This project, along with four other SEQIPRAIL infrastructure projects, was delivered by QR via a program alliance (TrackStar) with the private sector.

The single track line between Beerburrum and Landsborough (17km) is planned to be straightened and duplicated, with environmental assessment completed and the Queensland Government in 2005 approving the outcomes of the Caboolture to Landsborough Rail Upgrade Study (pers. comm. 2010). Under SEQUIPP this rail duplication is due by 2019.

Duplication on an improved alignment between Landsborough and Nambour was under environmental assessment in 2009 with a view to completion under SEQUIPP by 2026. An additional line between Beerwah and Maroochydore is also envisaged by 2026.

3.3 Other recent upgrades

Work in recent years on the North Coast line north of Nambour includes (Personal communication, 2010):

- Design for 5 new structures south of Townsville,
- Three new bridges on improved alignment near Innisfail,
- A new 250metre \$28 million St Lawrence Creek bridge on improved alignment and flood immunity commissioned February 2010,
- The Tully Bridge approaches project completed 2009 replacing timber structures with steel girders, culverts and embankments,
- Reviews for improved alignment south of Cairns at Frenchman's and Harvey's Creeks, and,
- Investigation for improved alignment and the structural adequacy of the monorail bridges over the Burnett, Kolan and Boyne rivers.

As part of the 2008 national infrastructure audit, and amongst other proposals, the Queensland Government identified four North Coast line projects. These were the operation of 1500m trains, and three major track upgrades south of Nambour. However, these projects were not selected in Infrastructure Australia's 2008 projects for prioritisation/further analysis.

4. Brisbane Cairns 2009 - 2014 rail options

As noted above, there is bipartisan support for federal funding of Bruce Highway upgrades. However, the situation regarding federal funding of the Queensland North Coast Line is yet to be clarified, although appreciable federal and well as Australian Rail Track Corporation (ARTC) funds are being applied to upgrading of the New South Wales North Coast and Main South interstate lines.

As noted by the House of Representatives Standing Committee on Transport and Regional Services (the Neville Committee - 2007, page 103), a submission by the Railway Technical Society of Australasia (RTSA) also indicated that there is a "*demonstrable need to expedite Caboolture-Landsborough duplication and re-alignment and to start planning for other rail deviations and bridges...*" on the Brisbane - Townsville route. As an example, the RTSA referred to the bridge on the Burnett River near Bundaberg "*...which is now subject to a 15 km/h 'flat' speed restriction (i.e. no acceleration or braking).*"

Any failure of this rail bridge would have significant consequences for Central and Far North Queensland. The Neville Report (2007, p 128) also found that "*... the greatest need for Australia is the reconstruction and realignment of the main freight networks. This would: allow faster speeds and greater axle loads; clear the way for longer trains and double stacked containers; make it possible to reduce the steepness of grades, straighten lines and remove loops; and allow for the elimination of many level crossings.*"

Further benefits of rail deviations include:

1. Reduced point to point distance, and reduced track maintenance costs
2. Improved reliability of freight train operations,
3. Improved rail passenger services,
4. Appreciable savings in fuel and brake wear to train operators,
5. The potential for improved flood mitigation,
6. Reduced road accidents involving heavy trucks due to rail's expected increase in modal share,
7. Reduced diesel use and greenhouse gas emissions due to rail's superior energy efficiency in line haul freight (a factor of about 3 to one), and,
8. The ability of an upgraded rail system to defer considerable expenditure on the augmentation of road capacity.

Most Queensland NCL 'permanent' speed restrictions are now due to tight radius curves. There are approximately 300 curves of radius less than 800 metres between Landsborough and Rockhampton and 250 such curves between Rockhampton and Townsville. A minimum curve radius of 800 metres is necessary to sustain normal train running operations at 90 km/h on narrow gauge track. However some locations have speed restrictions for special reasons including just north of Rockhampton station where trains move along the centre of Denison St at 25 km/h.

Currently, the tilt train averages only 55 km/h between Landsborough and Nambour, and 66 km/h between Gympie and Maryborough West. This compares unfavourably with average speeds of about 94 km/h between Maryborough West and Bundaberg and 107 km/h between Bundaberg and Rockhampton. Freight train operations are adversely affected south of Maryborough West.

The speed restrictions currently in force partly reflects the fact that MLU did not meet the full extent of upgrading recommended in a report (Maunsells, 1992) for Queensland Rail that outlined four basic investment options. A full investment programme (\$912 million) included easing all necessary curves to allow 100km/h through running, and, grade easing to 1:75 south of Rockhampton and 1:100 north.

The former National Transport Planning Taskforce (NTPT, 1994, p63) re Brisbane - Cairns noted *"There are deficiencies in curvature, track structure, and clearances and, in the long term, in passing loop lengths. Average speeds and transit times are currently deficient and will become more so by 2014-15. Congestion currently occurs north of Brisbane (Caboolture – Nambour) where freight trains encounter large numbers of commuter passenger trains. Queensland's Main Line Upgrade program of investments will substantially remedy this."*

Although MLU made many gains in track quality, it was envisaged by the NTPT report that further upgrading would be required after MLU.

The draft AusLink Brisbane - Cairns corridor strategy notes reports including a Brisbane-Cairns Corridor Study Report (Economic Associates 2005) North Coast Line Corridor Study (PricewaterhouseCoopers, unpublished 2005). Of interest is 2007 an unpublished Brisbane -Cairns Freight Development Plan circulating within Queensland Rail which included a first stage proposal to be funded under AusLink during the period 2009-10 to 2013-14 to provide the significant outcomes and benefits.

This paper is not able to address the cost benefit analysis of improvements such as rail deviations and major bridge replacements. Clearly the proposals would need to be subject to the normal cost benefit and triple bottom line assessments expected in decisions to allocate funds (Australian Transport Council, 2006).

4.1 Potential new deviation sites

In 1998, Queensland Rail produced a Straight Line Diagram (S24480) identifying 237 deviation sites between Brisbane and Cairns. Of these, 174 rail deviation sites were between Landsborough and Townsville. The deviations indicated in this diagram were on the basis that the desired maximum speed for trains between Caboolture and Rockhampton is 160 km/h, and, that the desired maximum speed for trains between Rockhampton and Townsville is 120 km/h.

As part of a 2002 study for Queensland Transport, a study was done for those 135 sites between Landsborough and Townsville where the indicated speed restrictions are less than 100 km/h for freight trains. By application of a simple model from a "Smooth Running Study" for Queensland Transport (2003) (see also Laird et al (2003), and, Laird and Michell, 2004) indicative estimates were given for the savings in train transit time, train operator costs and track owner maintenance costs that would result from replacing sections of poorly aligned track with modern alignments.

For a 'standard' heavy freight train with a 1500 tonne trailing load hauled by a 2800 class locomotive, the aggregate reduction in train transit time is about 135 minutes, whilst the cost saving to the train operator amounts to approximately \$2600 for a freight train haul (Laird and Michell, 2004). The estimate of \$2600 for additional train operating costs compares with a broad estimate of total train operator costs of at least \$13,000 (including about \$5000 for fuel costs) for moving a 1500 tonne freight train with a single 2800 class locomotive from Nambour to Townsville. These estimates are now conservative, as for the 2002 study, it was assumed that diesel fuel was costing 50 cents per litre. This cost is now over \$1 per litre.

The reduction in track owner maintenance costs for the passage of this train over the upgraded track as compared with the current track was estimated at about \$200 (Laird and Michell, 2004). There are also reductions in external costs for rail line haul, and where rail improves its competitiveness with road, appreciable further reductions in external costs.

As part of a former Rail CRC project, further analysis was undertaken for five potential NCL rail deviations between Landsborough and Maryborough West that would give a total reduction in point to point distance of 5.4 km. With Simtrain computer simulation by Mr M Michell of Samrom Pty Ltd a freight train with one QR 4000 class (or PNQ PN loco) with a 2000 tonne trailing load would have an average time (both directions) saving of 41 minutes and a fuel saving of 173 litres (Laird, 2008). The average time saving for the electric tilt train traversing the new track in either direction was found to be 57 minutes.

As noted by former Queensland Transport Minister, the Hon Paul Lucas MP, there is a need to "...reserve rail corridor land before it becomes a costly issue" (Lucas, 2005).

4.2 Freight modal shares and external costs

As noted above, scenario analysis was used for the Brisbane - Cairns corridor strategy. The Bureau of Transport and Regional Economics (2006, page 59) gives past data and forward projections for road and rail freight on various intercapital city corridors with caveats, but not for the Brisbane - Cairns corridor. By 2014, rails modal share of intercapital city intermodal freight would be less than 10 per cent on the Melbourne - Sydney and Sydney - Brisbane corridors and 33 per cent on Melbourne-Brisbane, although the current ARTC work due for completion in 2009 may improve this.

Elsewhere, this writer (Laird 2007) has argued that the resulting improvement in rail freight efficiency from construction of a 'fit for purpose' railway combined with improvements in intermodal terminals and the application of 'user pays' and 'polluter pays' road and rail track pricing could well see rail win 50 per cent on such corridors. Toll's Managing Director Paul Little (2007) commented that rail's share "... *should really be in excess of 50 per cent*" and this was adopted as a 2017 goal by the Australasian Railway Association (2007).

External costs are a required part of National Building Program project assessment (Australian Transport Council, 2004, 2006) and were addressed in the ARTC (2001) Track Audit. The Track Audit gave unit estimates for '*... noise pollution, air pollution, greenhouse gas emissions, congestion costs, accident costs, and incremental road damage costs*' for road and rail freight in both urban and non-urban areas.

The ARTC (2001) Track Audit unit estimates were revised as 2000 costs of 2.75 cents per ntkm for road haulage in urban areas, 1.98 for road haulage in non - urban areas, 0.43 for rail haulage in urban areas, and 0.17 for rail haulage in non - urban areas (Laird, 2005). These costs, adjusted to March 2010 values (using a CPI multiplier of 1.366 found from rba.gov.au) are approximately 3.76 cents per ntkm for road haulage in urban areas, 2.7 for road haulage in non - urban areas, 0.59 for rail haulage in urban areas, and 0.23 for rail haulage in non - urban areas.

The draft Auslink report notes a Brisbane - Cairns road distance of 1640 km and a rail distance of 1669 km (DOTARS, 2006, p11). Assuming urban hauls of 40 km for each line haul mode, the external cost for each tonne of road hauled intercity freight is about \$45.20 as against \$4.00 per tonne for rail line haul. If a total of 40 km is assumed for urban road pick up and delivery for each rail line haul the estimated external cost is an extra \$1.50 per tonne. This suggests that, for intercity freight moving between Brisbane and Cairns by line haul rail and road pick up and delivery diverted to road line haul, with road pick up and delivery, there is a net increase of external costs (2010) of about \$39.70 per tonne.

Assuming an average payload of 750 tonnes per standard freight train, this equates to a saving in transport externalities of nearly \$33,000 per train movement between Brisbane and Cairns for each train load of freight that was previously moved by line haul road transport.

From the draft Auslink report (p10), there is about 6 mtpa of intermodal freight on the corridor, "and approximately 25-30% of this is carried by rail", also by 2013 the total inter-regional freight task on the average corridor segment was forecast to increase to 7.7 Mt. If we assume that the track was further upgraded, and rail was then to gain a 50 per cent mode share instead of 25 per cent, the diversion of line haul road freight to intermodal would be 2 mtpa by 2013. If we were to assume (which is not the case) that all such freight would be moving from Brisbane to Cairns, the reduction in external costs (2010 terms using the above unit values) would be about \$80m per year.

An accurate quantification would require data on the origin and destination of rail and road freight on the Brisbane - Cairns corridor. In the absence of such data, a saving of at least \$40m per year is expected if the NCL was further upgraded and rail was to win an average of 50 per cent of corridor freight and say 70 per cent of the longer haul freight.

4.3 Oil vulnerability and emissions

Rail is approximately three times more energy efficient than road for line haulage of non-bulk freight. Rail's energy efficiency can be improved further by track straightening.

Rail also has the option of using electric traction. This is used by Queensland Rail for coal haulage in Central Queensland and this is now saving an estimated 200 million litres of diesel per year (Laird, 2008). In the event that QR was to acquire more electric locomotives and revert to the use of electric traction for Brisbane - Rockhampton freight trains, further savings of at least 20m litres of diesel per year would be possible. Rail electrification was also proposed for Sydney Melbourne by the Federal Government during 1980 at a time of high oil prices (see, for example, Laird, 2006).

Based on road line haul using 36.9 litres per tonne (from 1.15 net tonne km (ntk) per Megajoule (MJ) end use (38.6 MJ per litres) with increasing energy efficiency on an open road balanced out over time by increasing road congestion), 12.6 litres per tonne for line haul rail freight using rail (3.5 ntk/MJ on the current track) and one litre per tonne for road pick up and delivery, the difference between road and rail line haul is about 23.3 litres per tonne. A saving of at least 30 million litres per year by 2014 (80,700 tonnes CO₂-e) is expected if the Queensland NCL was further upgraded and rail was to win an average of 50 per cent of corridor freight and say 70 per cent of the longer haul freight.

The Senate Rural and Regional Affairs and Transport Committee (2007) when considering oil questions made recommendations including: ... *that corridor strategy planning take into account the goal of reducing oil dependence* ...

A response to this 2007 Senate Committee report as of July 2010 is still due. Meantime, Infrastructure Australia (2009) as listed as one of nine challenges "Climate change: in addition to requiring a shift to a low carbon economy, climate change is increasing the demand for improved infrastructure, such as efficient public transport systems and low carbon intensive methods of power generation." However, Infrastructure Australia (2008) whilst identifying the Mt Isa-Townsville Rail Corridor and North - South Rail Freight Corridors (including the Northern Sydney Freight Line and various NSW rail deviations projects) a Freight Rail (priority) projects and the Bruce Highway as a Freight Road (Priority) project, has not listed the Queensland North Coast line.

5. Conclusions

The Brisbane - Cairns corridor is a major contributor to Queensland's economic activity. For most of its length, the Bruce Highway is a two lane highway. The Queensland North Coast railway line plays an important role in moving freight and passengers within the corridor, and now moves more non-bulk freight (over 1.5 million tonnes per annum (mtpa)) than either on the Sydney - Melbourne corridor (1 mtpa by rail as against 11 mtpa by line haul road) or the Sydney - Brisbane corridor (1 mtpa by rail as against over 6 mtpa by line haul road). Rail's superior performance on the Queensland North Coast line was only made possible the by track upgrades of the 1980s in connection with Main Line Electrification, the Queensland Main Line Upgrade program of the 1990s and subsequent track upgrades.

Work was completed in 2009 in straightening and duplicating 14km of rail line between Caboolture and Beerburrum. It is yet to proceed to Landsborough.

Further upgrading of the Queensland North Coast line including track straightening would also reduce operating costs, fuel use, greenhouse gas emissions and external costs. Attention is also needed to replacing older bridges (including the Burnett River near Bundaberg) and bypassing Rockhampton. The paper suggests such upgrading could result in saving of at least 30 million litres of diesel per year by 2014 (80,700 tonnes CO₂-e) with a reduction in external costs of at least \$40m per year. Use of electric traction between Brisbane and Rockhampton could save an additional 20 million litres of diesel per year.

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