Submission to

Infrastructure Australia

on the

National Freight Network Plan

By

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The Infrastructure Coordinator
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Dear Coordinator

Thank you for the opportunity to provide a submission to Infrastructure Australia on augmenting the Australian rail network so that rail freight can be transported more efficiently.

This submission reasons that standards gauge must be used for all national tracks and that all regional track networks must phase out of non-standard tracks by at say 2020. Although private interests would love to get 'involved' with rail freight, this must be avoided at all costs as it is not good for the countries' economy, and it is imperative that Infrastructure Australia fosters a sub-government commission to manage and operate the national rail freight grid, with everybody on contracts and everybody fully accountable for their actions. The Board must be federally based and have traffic volume proportionate representation from all states and territories.

This submission then has identified several missing rail links that would make many existing rail freight services able to run on a loop mode (and with long-haul bypasses) so that the rail infrastructure will be able to operate well into the future and replace long-haul road freight with short haul road freight distribution – before the expense of oil becomes too prohibitive for road freight to remain viable.

To get a grasp of the relative ineffiencies of both road and rail transport, a couple of simple physical conditions (drag coefficient and wheel road friction) were considered separately and in a systemic comparison. Even though these figures were estimated (by experience), the resultant answers in the systematic examples clearly showed that rail (freight) transport have a very significantly lower fuel requirement to transport, and that directly relates back as a significantly lower carbon pollution / emission footprint that road freight.

The results clearly showed why the oil industry lobby and car manufacturing, together with government funded continual road appropriation is very big business for the oil industries, and why the oil industry lobby (OIL) is so intense and so covert – and why rail infrastructure has been so short-changed for so many decades at the expense of road infrastructure.

Please do not hesitate to contact me for further information.

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Freight Network Scope

Geographic Coverage

The Appendix clearly shows that a very significant reduction in Australia's dependency on oil can be easily and quickly put in place if and when long-distance road transport is replaced by rail transport infrastructure.

It therefore follows that for these national business efficiencies to happen then all long-distance freight transport should be optioned onto rail as the first choice, and road as the second choice, and the costing is to be based on oil usage as the primary factor.

Freight trains are significantly more fuel-efficient than road transport – but road transport can deliver to the door, so the compromise is that regional interchange stations need to be located so that container interchange between road and rail is both efficient and effective.

This strategy then places the National Rail Freight Network as a grid that has regional centres (and sub-regional centres on capital cities). In this strategy, all regions would be nominally at least 50 km apart, and the rail freight should operate as a shuttle service with a regular and frequent timetable such that road freight couriers can operate locally with a minimum of delay at regional interchange points.

Freight Use and Priorities

Rail Track Physics

Rail tracks are engineered for long life and heavy loads, most roads are engineered for light traffic, and only the most used highways are somewhat engineered for heavy traffic – but these roads are horrendously expensive to both build and maintain. Rail tracks can be expensive in geographies that are hilly and/or require extensive banking and or tunnels, or deep culverts to keep the gradients minimised.

In the longer term because the gradients are minimised, the energy expenditure in rail transport is greatly minimised, and this life-cycle consideration must not be omitted in the overall business case accounting.

Heavy Loads

It therefore makes logical sense that all road traffic vehicles with a laden gross weight of say over 5 tonnes should not be allowed to use the road network beyond regional areas, and if they do then they incur a very heavy tax.

Minimising the Transfer Times

Rail-based Freight Trains can be 'shuttled' on a 30-minute arrangement so that regional centres can load and unload containers as required. What is required is a container cantilever arrangement that can transfer a container off (or on) a rail car in under 20 seconds, (and simultaneously load another container on (or off) in the same movement. With some good Aussie engineering a simple cantilever system should be able to operate on every car simultaneously, and that way a complete trains load can be transferred in well under a minute.

Just like passenger trains, long distance inter-regional services can go straight through and shorter distance inter-regional trains can pick up and set down to major centres.

Operating and Infrastructure Standards

Multiple Rail Gauges

Australia still has a number of rail gauges, and although this may be efficient at a local level, the problems if bogie changing or container changing for long distance travel is highly inefficient, so it makes sense that for any national infrastructure consideration, then the standard 4’ 8.5” be the assumed standard.

This mans that all future purchases of all rolling stock should be limited to standard gauge, and all non-standard existing tracks should have a “transfer to standard” strategy put in place such that all tracks are converted into standard gauge by say 2020.

Making Infrastructures Efficient

The inherent issue is that infrastructures are the essential services, and because they are essential, then commercially any price can be put on them. As the essential services prices rise, the commercial reality looks brilliant, but commercial businesses and the community that together use the essential services (infrastructures) suffer because their profits are squeezed out and the communities exist at a lower standard of living. It is for this reason that essential services must never be allowed to be operated in commercial hands.

Free market economists would have us believe that competition will self-regulate the end user prices, but Professor Sharon Beder [12] has clearly demonstrated that all commercially operated infrastructures do so at a considerably higher cost to the end user than equivalent infrastructures operated by sub-government commissions.

The problem is that government jobs have a protection clause in them that effectively prevents the staff from being dismissed / fired/ let go/ etc. The second problem is that government jobs inherently dissipate accountability. These two issues have to be addressed concurrently so that all sub-government commission workers at all levels are fully accountable for their actions (or inactions), and that all or any staff can be dismissed / let go.

With this direct accountability and with the understanding that all jobs are contractual, then the sub-government infrastructure regime will have business efficiencies that will show just how highly inefficient commercial infrastructure businesses really are.

Ownership and Control

If the national Freight Network is to be efficient, then it must be a Federal Sub-Government Commission, attached to the Transport portfolio. All States and Territories must have freight volume proportional representation on the Board, and the Chair must be a Federal nomination – not aligned to any state or territory (much like a “permanent” head), but on a contractual arrangement.

Planning Regimes

From my decades of experience at most levels in Telstra (particularly as an Engineer), it was clear to me that here must be a national grid engineering team and regionalised network planning and maintenance teams. This same philosophy worked extremely well in Telecom Australia / Telstra, and I am sure that the same engineering planning business strategy focus would work extremely well for rail freight planing and management.

The National Freight Network

Rail Infrastructure Map

The reference at [2] (www.railmaps.com.au) has a very much-simplified map of the main tracks in Australia, and that freely downloadable map is shown here to diagrammatically show where the main rail infrastructure between centres exists.

This map shows that the main routes are capital city centric – just like the telecommunications infrastructure, and again the missing link is an inland rail track between Brisbane and Melbourne.

Connecting the Capitals

Like the transport of telecommunications messages, freight transport is also "capital city centric" and every capital city has a number of radial spurs leading from it. When I developed a plan for the NBN inland backbone backhaul [13] to be structured, I realised that there is a missing inland east-continental north-south main optical fibre bearer to link the capital cities with spurs that are some hundreds of kilometres long– and the national freight infrastructure would follow a similar – though not so inland proposal.

Identifying the Missing Links

Considering the main population centres of Brisbane, Sydney, Melbourne, Adelaide and Perth, there is a scant mesh that is fundamentally star networks based on major cities. The missing links are where non-adjacent inter-city links change this multi-star structure into an efficient mesh infrastructure.

Because of the comparatively massive distances involved (compared to most other countries), and that much of the Australian population density is in the south and east of Australia, this infrastructure will be naturally 'skewed' towards the south-east of the continent.

Sydney - Brisbane

In my opinion the coastal link between Brisbane and Sydney is vital and this rail link must be four separate sets of rails all the way with a number of offset points so that passenger trains can be moved to the side to allow freight trains to run un-impeded (they do that in Canada – so why not here in Australia). Such a track could be laid at a very small fraction of the coast of the motorway, and a very small fraction of the time that the motorway has taken.

Brisbane - Melbourne

For several years, a main rail link directly between Brisbane and Melbourne has been considered so that it totally bypasses the coastal route and it totally bypasses Sydney. Most of the inland route between Melbourne and Brisbane is essentially flat and the rail track can be substantially straight, meaning that relatively high-speed and high fuel-efficiency transport can then operate between these two major capital centres, substantially reducing freight road traffic on the Pacific Highway, the Princes Highway, the Great Western Highway, the Newell Highway, and the Hume Highway.

There are many existing radial spurs from Brisbane, Sydney and Melbourne that can be utilised to make the major link, but some hundreds of kilometres of rail track will have to be laid to cross-connect through the middle of NSW to make the missing link functional.

My suggested route would be: Brisbane, Warwick, Goondiwindi, Moree, **Narrabri**, Coonabarabran, Narromine, Parkes, Condobolin, Lake Cargelligo, Griffith, Deniliquin, Shepparton, Seymour, Melbourne.

This link would cross connect at Parkes / Condobolin with the main East-West National Link, and this link will become the main freight link to and from central NSW (west of the Great Dividing Range).

Narrabri – Maitland – Sydney

Because the main inland Brisbane – Melbourne route bypasses Sydney and Newcastle, and Newcastle is a major shipping port, it makes sense that there should be a spur from **Narrabri** to Sydney via Gunnedah – Werris Creek – Quirindi – Scone – Muswellbrook – Singleton – Maitland – (Newcastle) – Gosford – Hornsby.

This link will provide the coast rail bypass in time when the NSW north coast has freight haulage problems – and/or this provides a circular loop for trains to loop between Brisbane and Newcastle, as looping is far more efficient than reversing and re-connecting in shunting yards.

Western Sydney Bypass

Traditionally all trains in NSW have centred on Sydney (Central) and that has caused considerable congestion in the Sydney metropolitan area. The associated problem is that one of the ‘distributed’ shunting / warehouse distribution point is at Chullora (which is south of Strathfield but is still too ‘coastal’ for much of the sprawling industries in Western Sydney.

Although Parramatta appears built out – there is a rail track extending from Clyde (a few km east of Parramatta), going north to Carlingford – where it terminates; and south of Parramatta there is another rail track pair from Liverpool that goes north through to Guildford / Merrylands (just south of Parramatta) and then goes east through Granville towards Strathfield. On the Northern suburbs of Sydney the rail track extends from Hornsby through Beecroft to Strathfield and Sydney (Central – again).

My proposal here is that the line from Hornsby be doubled (specifically for freight transport) as an extra two sets of tracks from Hornsby to Beecroft where it branches from the existing track alignment and connects with about 4 km of new tracks (probably underground) into the alignment at Carlingford; then the new double track to follow the Carlingford – Clyde route and split north-east of Grandville then be an overhead bridge for about 4 km (or at the second resort an underground tunnel) to connect to the Guildford / Merrylands alignment and new double tracks run alongside the existing tracks to Liverpool and Campbelltown.

This rail freight bypass would remove north-south rail freight traffic from Sydney’s passenger lines and let the metropolitan passenger lines operate without freight interference in this area. The warehouse road interface could be located between Merrylands and Liverpool, and inter-train container transfers could be located at Asquith and Warwick Farm. A shuttle could operate to the Chullora train yards for a secondary warehouse road interface.

The NSW government might also see the light and jointly construct some of the link between Beecroft and Carlingford, because the NSW government has a program to extend the rail link from Epping to the outer north-western suburbs of Sydney, and this rail link will probably be branching out from between Cheltenham and Beecroft – very close to where the proposed freight line will also split just south of Beecroft station and go south to Carlingford.

Melbourne – Swan Hill – Port Augusta

Although there is an Adelaide – Melbourne rail link, I believe that there needs to be a second link through inland Victoria via Melbourne – Bendigo – Swan Hill – Mildura – Renmark – Burra – Peterborough – Port Augusta.

The purpose of this link is to provide a freight bypass to the coastal Melbourne – Adelaide route, and provide road transit points throughout western Victoria and eastern South Australia. This rail link is in effect a spur at Port Augusta towards Melbourne from the main east-west rail link. This link makes the possibility of a loop service between Melbourne and Port Augusta so that efficient rail freight transport hubs can run on a virtually continuous basis.

Melbourne – Bairnsdale – Eden – Bombaderry – Sydney

The current South Coast rail track extends from just out of Sydney (Central) to as far south as Bomaderry (which is about 153 km south of Sydney), and that is where it stops. From Melbourne, there is a rail track to Bairnsdale and that is about 275 km in length, so what is missing here is the freight track between Bombaderry and Bairnsdale, which is about 650 km in round figures.

This rail track is not a new suggestion and there have been many earlier submissions that cover this same territory and these references in 2005, 2006, 2008, [9] is the basis of but one (even so that submission was primarily for passenger traffic).

Although the existing inland 950 km Sydney – Albury/Wodonga – Melbourne link, this proposed line is about 100 km longer but it covers a very different geographic path, and apart from some of the south coast of NSW being rather hilly, most of the path is on a nearly level track, providing an alternate bypass for the inland track, and allows the trains to loop forming an efficient freight ring with the inland Sydney – Melbourne path.

Yass – Canberra Spur

The difference in altitude between Yass and Canberra is about 28 metres and they are about 55 km apart; that is about 0.51 m/km. The current rail Canberra – Melbourne trip includes turnaround at Goulburn, making the total distance about 770 km and a 20-minute turnaround. If a medium fast (150 – 180 km/h) train was to run this route then the time taken at an average 150 km/h would be 5:28 hh:mm including the 20-minute turnaround. With the Yass – Canberra spur in place the trip from Melbourne to Canberra would be 661 km and at an average of 150 km/h this is 4:24 hh:mm; as saving of more than an hour, and placing it well inside the realm of everyday business travel.

From the Sydney side; freight trains (and passenger trains) could loop through Canberra via Yass with the distances to Sydney being 334 km and 287 km respectively, and at an average speed of 150 km/h, the travel time would be 2:17 hh:mm and 1:55 hh:mm respectively, and trains could run hourly, or at say 30 or 15 minute intervals, and this would readily replace rather expensive airline traffic at a comparable transit timeframe.

Tennant Creek – Mount Isa

Because Darwin has a very deep and large port, (and it is by far nearest Capital city to Asia) Darwin will become one of the major shipping ports in Australia in the near future. Unfortunately Darwin has only one railway link to Adelaide, and that is effectively a couple of thousand kilometres away – in a virtual single hop. Much like the missing inland telecommunications infrastructure – this main rail link from Darwin, via Tennant Creek will tie the east coast of Queensland (ie Townsville) to Darwin in Australia's North Coast.

By extending the existing rail link in Mount Isa to Tennant Creek this then provides the relatively high-speed freight connection on a rail track that is specifically made for heavy vehicles (the current roads in this area are not engineered for heavy vehicles like cattle road trains).

Conclusion

The Appendix shows that simple physical modelling of oil usage for equivalent transport modes of road freight and rail freight showed that to move 1000 equivalent containers over say 1000 km, then rail-based transport would use much less than 20% oil-based fuel used by road-based freight transport.

Put another way around, the oil industry stands to lose about 80% of the freight sales-based diesel sales if the road freight industry is removed from the roads and rail transport totally replaces road-based freight transport. Even if rail freight was mandatory for all transport exceeding say 80 km, then at the best, the oil industry would be about to lose about 50% of the diesel fuel sales – and the Oil Industry Lobby (OIL) is in no way going to take a loss in sales by just sitting down and accepting the rail freight regime.

What has to be understood is that the world's oil supply is not everlasting, and Economist Professor Jeff Ruben through his in-depth studies [10] has shown that the world's oil will virtually cease by about 2025, and before that (about 2020) the oil price will well exceed $100/barrel, making road transport extremely expensive, international flight only for the very wealthy and rail freight will be the much cheaper alternative to road freight.

Australia has a series of star structured rail networks that (like the telecomms transmission bearer structure, also) is capital city centric, and this needs to change into a spatial mesh that has inter regional loops so that trains do not have to stop and reverse their driving structures.

This submission has provided several suggestions to construct a number of dual track standard gauge rail tracks that currently are missing links and these links will join existing spurs, and make these spurs into inter-regional connections and/or the ability to loop the rail so that freight trains can operate with an added degree of efficiency by not having to reverse their carriages and engines.

The suggestions included in this submission include: **Sydney – Brisbane** (straightening, dual carriageway and wayside areas for passenger trains); **Brisbane – Warwick – Narrabri – Dubbo – Griffith – Shepparton – Melbourne** (inland route of dual carriageway); **Narrabri – Maitland – Sydney** (dual carriageway as a north-east NSW bypass); **Western Sydney Bypass** (to keep the freight trains away from Sydney's rail passenger traffic, and provide a straight-through north-south run past Sydney); **Yass – Canberra** (spur to male a loop of the Goulburn – Queanbeyan – Canberra spur, and connect Melbourne into Canberra directly); **Melbourne – Bairnsdale – Eden – Bombaderry – Sydney** (to provide a coastal link through south-east NSW and south-east Victoria, and loop for the inland Sydney – Albury – Melbourne link); **Melbourne – Swan Hill – Port Augusta** (to provide a loop efficient path between Melbourne and Adelaide/Perth/Darwin); **Tennant Creek – Mount Isa** (to provide a direct connection to Darwin from Australia's east coast) .

No costings have been provided as this submission is merely an overview of augmenting the existing rail infrastructure so as to get efficiencies through regional looping and bypassing congested areas so that the massive efficiencies of rail freight over road freight can be realised to benefit the Australian economy and its people, and minimise the carbon pollution footprint with this augmentation.

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Appendix

Simple Land Transport Physics

When it comes to moving freight anywhere on land in the world, there are two simple physical (energy sapping) constraints and these are:

- Wind Drag Coefficient, and
- Wheel Friction.

These two physical phenomenons both follow similar physical laws in that as the velocity of the vehicle is increased these two constraints serve to reduce the speed.

Drag Coefficient

With the Drag Coefficient, the maths is slightly complex, but basically the retarding force caused by the drag coefficient is proportional to the square of the velocity. To explain this with figures, assume a vehicle is travelling on a frictionless road and the wind Drag Coefficient at say 100 km/h is 1.0, then at 120 km/h the relative drag will be 1.44, and at 160 km/h the relative drag will be 2.56. If the vehicle were consuming 10 litres per 100 km at 100 km/h, then at 141 km/h this same vehicle would be consuming 20 litres per 100 km at 100 km/h.

For efficient freight haulage – the Drag Coefficient of the containing vehicle must be very low, and/or the velocity of the containing vehicle must be well controlled to minimise fuel consumption and minimise the carbon pollution footprint.

Systematic Example

Assume that 200 containers are to be moved between two major centres spaced 1000 km apart at a nominal speed of 100 km/hand the 18-wheel road freight vehicle has a nominal Drag Coefficient of say 0.7.

With road freight, assume that each vehicle carries two containers, so there are 100 separate vehicles, each with a drag coefficient of 0.7, and these vehicles are spaced at least 30 m apart for safety; so in this case the total systemic drag coefficient is 100 * 0.7 = 70 units.

With rail freight, assume that there are four trains each carrying two containers in each car, and each train has an engine and 25 slipstreaming cars. As the baseline drag coefficient is 70, so each train has an allowance drag coefficient of 17.5, which is 25 times that of one road freight vehicle. Reference [11] estimates a typical train to have a drag coefficient of 2 for a 50 car train, so even if this were doubled for a 25 car train then the systemic drag coefficient for 4 trains is 4 * 4 = 16 units which is 0.228 that of the systemic road freight solution. That is the road freight solution is 339% more carbon polluting than the rail freight solution.

It is therefore a no-brainer that systematic rail transport has a far lower overall wind drag coefficient than systematic road freight and the simple evidence speaks for itself. .

Wheel Friction

With wheel friction the retarding force is proportional to the rotational speed of the wheels, and in effect it is as though the wheel were 'climbing' up a constant gradient slope as it rolls.

A typical unloaded freight road vehicle tyre will depress the concrete highway about say 0.1 mm and have a tyre depression of about 10 mm in about say 500 mm radius (3142 mm circumference). Looking at this in another way, each road vehicle tyre is 'climbing' 10.1 mm in every revolution, or climb 3.21 km every 1000 km. If the road freight vehicle were loaded then the tyres would be depressed about say 20 mm, so each tyre will 'climb' 20.2 mm in every revolution, or climb 6.43 km every 1000 km.

With rail freight transport, assuming the wheel diameter is also 1000 mm; but steel tyre depression is in the order of 0.1 mm, and the track depression is in the order of 3.0 mm (for a well-packed sleeper system engineered for heavy transport). If total depression is say 3.1 mm, then the frictional gradient climb is 0.99 km every 1000 km for each wheel.

If the freight rail cars were loaded then the steel wheel depression would be in the order of 0.2 mm and the track depression would be in the order of 6 mm, totalling 6.2 mm, then the frictional gradient climb is 1.97 km every 1000 km for each wheel.

Systematic Example

Assume that 200 containers are to be moved between two major centres spaced 1000 km apart. Let each road freight vehicle have 18 wheels and each rail car has 8 wheels (2 * 4-wheel bogies), all wheels are 1000 mm diameter. Each road freight vehicle carries two containers, and each rail car carries two containers.

With the unloaded road freight vehicle scenario there are 18 wheels per vehicle so the wheel friction per road freighter is equivalent to climbing 18 * 3.21 = 57.9 km / 1,000 km, so with 100 road freight vehicles the total frictional climb is 5,790 km for the 1,000 km journey. With the loaded road freight vehicle scenario there are 18 wheels per vehicle so the unloaded wheel friction per freighter is equivalent to climbing 18 * 6.43 = 116 km / 1,000 km, so with 100 road freight vehicles the total frictional climb is 11,600 km for the 1,000 km journey.

With the unloaded rail freight vehicle scenario there are 8 wheels per car so the wheel friction per car is equivalent to climbing 8 * 1.97 = 35.5 km / 1,000 km, so with 100 cars and 4 engines the total frictional climb is 821 km for the 1,000 km journey. With the loaded rail freight vehicle scenario, there are 8 wheels per car so the wheel friction per car is equivalent to climbing 8 * 0.987 = 7.89 km / 1000 km, so with 100 cars and 4 engines the total frictional climb is 1,640 km for the 1,000 km journey.

So in just comparing wheel friction alone, the carbon emission / pollution footprint in excess fuel used for equivalent long distance road freight is about (11600 – 1640)/1640 = 607% greater than for the equivalent systematic rail freight scenario. This systematic example of comparative long-distance freight transport shows that it is a no-brainer that road freight vehicles should never be used for long-haul applications – and rail freight is imperative.

Reducing Carbon Emission Pollution

The above systematic examples showed very clearly that rail freight transport has a far less carbon emission / pollution footprint than equivalent load road freight transport. Typical inter-urban freight transport wheel friction of road transport is in the order of 610% greater than rail transport, while the comparative drag coefficient for road freight is about 150% greater than the equivalent rail freight transport.

Systemic Example

Using the above systematic example, assume that a road freight vehicle used 10 litres per 100 km, and it travels 1000 km between city distribution centres, then it would have consumed 100 litres. In the examples there were 100 road freight vehicles – so the total fuel consumption would have been 10,000 litres for the 1000 km trip.

In comparison, four trains of 25 cars, now have a fuel allowance of 2,500 litres per train for the equivalent journey (or about 250 litres per 100 km per train). Considering systemic road freight wheel friction is 600% greater then the rail freight systemic wheel friction, then each train would consume about 250 / 7 = 35.7 litres, or four trains in total would allow 143 litres of fuel in wheel friction. Considering the drag coefficient is systematically about 339% greater for road freight than rail freight then the four trains would be allowed 2500 / 4.39 = 570 litres. Even adding these two rail-based fuel consumptions (570 + 143) = 713 litres, this is about 14% that used by the road freight vehicles, and this clearly demonstrates just how fuel inefficient that road freight vehicles are in systematic comparison with rail freight trains.

In carbon emission pollution terms, the use of rail transport to replace road freight would reduce the pollution caused by freight transport by about 86%.

Road freight has its place at the local distribution terminals to the warehouses, so this figure will drop to about say 50% but even then it is a very substantial drop in carbon pollution.

Simple Physics Conclusions

In both instances above the systematic application of simplified physics on wind drag coefficient, and wheel friction shows that for a typical equivalent freight transport situation (say between major cities), rail freight transport is very significantly far more energy-efficient than road freight transport and the figures speak in volumes for themselves.

From the simple and practical example above, with road freight transport the comparative wind drag (of 100 road freight vehicles) is about 339% that of four, 25 car trains, and the comparative wheel friction with road freight vehicles is about 600% greater than for rail freight transport.

It therefore stands to reason that wherever considered, rail transport must be put in place as an urgent priority, and road freight must be used at the major terminals for local distribution. In direct association with this strategy, long-haul road freight must be removed from Australian main roads, as it is a major source of carbon pollution.

It is now more than obvious why the Oil Industry Lobby (OIL) is paranoid about losing road freight transport to rail infrastructure – and this explains why there is a continual and very dirty political fight going on at all levels to keep polluting with oil at any cost!

The Oil Industry Lobby Problem

Covert Removal of Electric Street Cars

In the mid 1920s General Motors (USA) realised that they could have declining vehicle sales if people had alternative means of transport to road vehicles, so General motors went on a crusade [3, 4] to eliminate alternative transport in urban areas in the USA.

The short-term result was a resounding win for General Motors, as they successfully bought-up and closed down almost every electric street-car (tram) service in the USA, and as a testament; there are very few electric tram services left in the USA, and almost everybody started to rely on road vehicles. By about 1935, the USA Federal Government [5] got wise to the covert business tactics used by General Motors (GM) to wipe out the urban transport opposition, General Motors were ordered to stop the practice of closing down electric tram services – but by then the damage was done!

During this period, the vehicle manufacturers and the oil producers formed a very tight synergy where the oil producers realised that they could maximise their profits if the vehicle production and distribution could be maximised; this tight covert synergy is now even tighter.

It a strange twist of history, because the tracks for the street cars have literally been removed almost everywhere in the USA, and the push is to have much less polluting vehicles, overhead electric powered rubber-wheeled trolley-busses are now making a comeback [5] in Philadelphia (USA), and other USA cities, and in Canada.

Covert Removal of Sydney Trams

In 1957-1961, [6] trams in Sydney were replaced by busses in almost overnight raids, where as the last tram ran a street, the tracks were immediately covered with tar/bitumen (rendering the tracks too expensive to changing back to trams); and the overhead power wiring was removed the following days (ensuring that the trams would never run again).

This activity had all the covert operative marks of GM – who in the USA had been told about 20 years before [5] to stop removing electric trolley-bus services; but one thing was assured and that was that petrol (oil) powered busses had immediately replaced the electric powered trams in Sydney and its suburbs!

Even though the ‘decision’ to make a short-term profit by not replacing tram tracks and unify the road surface was a NSW government committee [7] decision, like all committees, there are always covert stooges with their agendas. With a continuing shortage of funding following WW2, and the swell in car usage – replacing electric powered trams by oil-powered busses was yet another short-term almost quick-fix for Sydney urban transport. But car transport is inherently highly inefficient (as far as energy usage is concerned), as car pooling in Sydney is almost non-existent and most commuters that use cars travel alone.

Covert Removal of Rail Infrastructure

From about 1980 Australia has ‘lost’ a significant number of non-urban rail infrastructure as this infrastructure has been classified as unprofitable (or whatever reason) as to get it removed. Detailed information of all rail track infrastructure usage in NSW [1] is provided via the reference area.

With the knowledge that road freight transport is extremely polluting and physically inefficient in comparison to rail freight transport, and that the oil producing companies were destined to receive a huge boost in demand, the consideration that there was a very heavy lobbying group to ‘ensure’ that a considerable number of rail lines in Australia cannot be discounted. Only the most inept of business people would fail to comprehend that the Oil Industry Lobby group must have had a steering hand to close as many rail tracks as possible. Only the most inept of business people would consider that the OIL group is a dead issue.

Oil Industry = Road Industry

Again the oil lobby has to be active here with road construction as one of the big ‘by-products’ of oil refining is bitumen / tar, and it is extremely fortunate that this bitumen can be utilised for road surfacing. So the oil lobby / business has a win-win synergy here: Refine the crude oil locally and produce petrol and diesel fuel for internal combustion engines, and with the major waste product – sell that as bitumen for road surfaces to run the cars and freight vehicles on! Even the least astute business person would realise that the oil producing companies have an awful lot of their business riding on the continuance of manufacturing road freight vehicles and roadways – at the expense of railways and rail freight vehicles!

The Oil Supply Dilemma

In professor Jeff Rubin’s book “Why your World is going to get a Whole Lot Smaller”[10], he goes into considerable detail to show where each existing oil source is located and the life expectancy of every source, and his predictions point that by about 2025 the world’s oil resources as we know it will to a large degree have dried up.

Rubin also explains that the growing economies of India and China are already buying up big time in oil resources, and in layman's terms this means that he price for oil is going to rocket – just like it did when hurricane Katrina damaged the Texas and offshore oil rigs, and fuel supplies became temporarily scarce. So road-based freight using oil-based fuel will become far too expensive within a decade and by then we must have extensive rail-based freight infrastructure in Australia for all long distance routes (say greater than 50 km).

Road and Rail Technologies

Rail Sleepers

It is a fair call that many of the rail sleepers that were cut from hardwood had rotted through being in service for more than 100 years, and although many sleepers had not rotted through, it is a fair call that the pins that lock the rails to the sleepers were unable to be held in and in that condition, a tough choice had to be made – either replace the sleepers (and probably the rails), or close the rail lines and use the existing roads.

Since the 1980s, there has been a significant development in the manufacture of re-enforced concrete rail sleepers that are not prone to rotting, and a rail fastening system that locks the rails in with lateral pins, as opposed the earlier vertical pins that were prone to riding out with rail use and ageing / sleeper rot. Virtually all rail systems in Australia now use concrete sleepers to replace the hardwood sleepers (and in any case the immense inland forests that provided the hardwood rail sleepers are now long gone).

In this same time period, significant mechanical aids have been introduced to level and pack the sleepers so that the rail transport is much smoother than it ever was, and with the improvements of sleeper technology, rail lengths can now be joined as much longer rail strips, and the expansion / contraction with temperature is taken up with lateral movements over the sleepers. These mechanical aids have significantly improved the Quality standards (reduced the systemic variations), and consequently the overhead costs of construction and maintenance should have considerably reduced on pre-1980 overhead costs.

Road Engineering Issues

The problem with road engineering is that roads (particularly in non-metropolitan areas, and off major highways) are bitumen-covered road-base, and this structure is only useful for light traffic loads (like family cars). These surfaces have a typical life of about 20 years with light vehicles, and after that, these roads need to be re-graded and re-surfaced. If heavy vehicles (for example freight vehicles) use these roads than the sheer point loads cause the bitumen to break up under the load stress and these roads are lucky to last more than two years before major maintenance is required.

It is no wonder that major highways have to be constructed from re-enforced concrete at least 100 mm thick, and then over-surfaced with bitumen to minimise the road noise (near built-up areas). Highway construction is far more expensive and time consuming than heavy-duty rail.

The Sydney – Brisbane road highway has taken decades to rebuild from the earlier bitumen construction, it has cost many $Billions and still it is not near completion! The Sydney – Melbourne road link is complete to a large degree and it too cost many $Billions, meanwhile the inter city rail tracks remains backwaters that are capable of carrying far more freight but somehow the funding never gets there – as this funding goes to the roads thanks to the continually compromising and relentless efforts of the Oil Industry Lobby group.

Acronyms

GM	General Motors
hh:mm	Hours : Minutes
Km	kilo metres
km/h	kilometres per hour
Mm	milli-metres
OIL	Oil Industry Lobby
USA	United States of America

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