Submission to the

Productivity Commission inquiry into Progress in Rail Reform

Progress in Rail Reform
Productivity Commission
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Dear Committee Members,

We have been making comment on our transport systems for many years. We consider we will be in jeopardy in this corner of the world if some key operations are not completed. Rail systems appear to be the key to overcoming our predicament.

As you are aware, there is what we consider an enormous amount of money going into the improvement of the Pacific Highway north of Newcastle. Later, the paper will aim at presenting to you as an example, how a relatively small amount of money in comparison to that needed for the highway, would improve the rail line up to a reasonable standard. For less than 10% of the money intended to be spent on the highway project, the rail line could be improved to a level of performance enabling an economic and a practical operation. This action could save many lives, fuel, road maintenance costs, various imported transport needs as well as decreasing fuel emissions. Road improvements encourage increased fuel consumption.

On the point of fuel, we should be thinking how we can drastically reduce our oil fuel needs in this country because of the impending world oil crisis. If it doesn't happen, we will most certainly be in a better position!

We consider there has been a disproportionate distribution of funds towards road and air transport and not supplying adequate for a reasonable performance by rail. Funding has not been considered on the basis of

- Freight moved via tonne/kilometre/kilowatt statistics
- Benefits to the environment
- Known fuel saving performance
- Resources needed
- Materials consumed
- Balance of trade imports
- National economy
- Road congestion avoidance
- Cheap unsubsidised transport for manufacturing and rural exports.

Rail impediments are large such as no signalling or operational standards across State borders compared to a long term effort to standardise road regulations, markings and limitations. This means rail operators and their personnel require large amounts of "hands on" knowledge. Productivity of a transport system is inherently linked with the transport media. Poor track, poor performance. This can be seen on highways now with town bypasses and roads catering for larger freight vehicles with increased axle loads complimented by reduced tariffs.

Yours sincerely

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The Next Century

With the new century not too far away and the Olympic games here in Sydney at that time, there is much to do if the city is to be presented as the Green City. There is a coordinated effort needed to give the new century a "kick start". There have been many problems created with the over use of resources and land. How about giving our children and grandchildren at least some of the opportunities we have had. Our offspring will not benefit, if trends continue the way they are.

What I am proposing is that some operations can be carried out to repair damage done by us. These are presented below and could be done concurrently under the appropriate responsibility in government. Planning is not necessary in many areas because the results of pilot or evaluation processes are available and can be easily/directly applied.

LAND SALINITY

Usually, this has been caused from excessive removal of trees and/or using water containing salts and minerals. Some drainage programs for rehabilitation are expensive and continue over many years.

On the ABC Landline program, there was an article where the Department of Agriculture was reducing run-off effluent to rivers from dairy farms. One farmer was sceptical about the effluent being sprayed onto grazing paddocks and directed the sprays to be put onto a salted area of land. Returning in 12 months, the cattle were grazing in waste high grass on this once useless land!

Maybe investigations could see if the Murray Area would improve, where there is so much useless salted land. It also could be used West of the Great Divide in NSW where some areas have been incorrectly used and are useless.

CO-GENERATION

Power stations waste a tremendous amount of heat. 2/3rds of the heat is lost!! This is atmospheric heat pollution and water heat pollution. All energy produced finally ends up in the atmosphere as heat!! The aim of improving fuel performance is to use that heat and get as much work as possible before releasing it into the atmospheric sink.

Industries such as timber drying, fruit drying, plastics moulding, food processing etc. that use low temperature heat and steam could be relocated adjacent to power stations. This would easily double the fuel performance of coal fired power stations to about 70%. This reduces carbon dioxide emissions because the present locations of processing plants require their own energy sources. Some of these use electricity to generate their heat and steam for their processes!! Such "convenience" and inaction places economics above practicalities!! Economics should be the slave.... not the master!!

POWER STATION EMISSIONS

From coal fired power stations, there are many products exhausted into the atmosphere. Here is a summary of what can be done with some. In many cases, these are a valuable resource.

- **Fly Ash**, can be used in a non load bearing cement. This can be used for flower pots and ornaments. This can be trapped with a fabric filter.
- **Carbon dioxide**, this is the hardest to capture at the power station. The best way is to plant trees which are a factory in themselves to convert carbon dioxide into carbonaceous timber.
- **Sulphur dioxide**, can be removed with a water "scrubber". For us animals, we breathe this in which combines with water in our lungs and makes sulphurous acid. It produces "acid rain" which is harmful to plant and water animal life. When recovered, this can be used in industry for various processes.
- **Nitrous oxides**. During the Second World War, Germany recovered nitrogen compounds from their coal fired power stations for aircraft fuel and fertiliser.

URBAN EMISSIONS & TRANSPORT

Sydney's air is often foul smelling and full of toxic products as well as particles from vehicle engines. We lost our tram system in Sydney and other places because they fell out of favour as a transport system. Instead of rehabilitating them or privatising them, they were removed.

The prospect of cars giving unlimited mobility and moving cities away from public transport corridors was supported. But what was not realised was the enormous problems they would also bring.

- Reduced air quality resulting in lung and skin afflictions.
- Enormous greenhouse emissions.
- Enormous amounts of land for roads, parking lots and service areas dedicated to car use.
- The death and injury rate of a medium sized war.
- Isolation and loneliness of the elderly without a car.
- Social inequity with under 16 and over 60's generally left out of the car society.
- Roaring traffic arteries isolating communities.
- Congestion in peak periods increasing fuel consumption.
- I estimate that 1/2 of the State's budget is consumed directly and indirectly by road transport. This is stealing funds from schools, hospitals and social services.
- High purchase and overhead costs for car owners.
- Low density urban land consumption, the "sprawl".
- High energy costs for the Western Suburbs.
- The future is a crisis with a lack of mobility which we are already experiencing.

The prospects of the engine producers to improve the infernal combustion engine is maybe only another 10% over the past 100 years of development. Ralph Sarich's radical design change can offer an improvement of 250% at best. But in terms of energy consumption, trams are already 80 times better in peak periods!! This is 8000% better already!

With a new well tuned car, it requires 800 watt hours of energy to move one person one kilometre. This is about 6.5 litres per 100 kilometres or 42 miles per gallon for us old fogies. (The RTA say that car occupancy is 1.3 on average.) A tram can use as little as 10 watt hours per passenger kilometre, about the same power consumption as a ghetto blaster full volume for an hour!

When producing energy, the requirement is to get as much work done before releasing it into the atmospheric sink. An example.

- **One Tangara** each trip from Campbelltown to Sydney consumes about 1 Megawatt hour of energy for the trip. This is 370Kg of coal. Carrying 1600 people in the peak period, sav es 6000 litres of petrol per trip. Electricity consumed is 15 watts hours per passenger kilometre.
- This train can make 2 trips in the morning peak and out again for the evening peak period saving 24,000 litres of petrol being consumed per day!
- On a 250 day working year basis, this is 370 tonnes of coal burned and saving 4700 tonnes of petrol!!

To illustrate costs and capacities of rail versus roads,

- The fuel an 8 car Tangara saves in 6 years is equal to its own cost.
- An 8 car Tangar a costs 960 cars (at $25,000)and does the job of 3000 cars in the peak period. This is equivalent to a lane and a half full of cars from Campbelltown to Sydney!!
- A train lasts 50 years saving the cost of 30,000 cars in the same period.
- The 6 train sets From Campbelltown to Sydney **each hour** in the peak period save
- the construction of 6 road lanes each way and 18,000 cars per hour on the road.
- All of the people travelling on the 5 roads north from Camden and Campbelltown could fit on only another 10 trains per hour.

As one American car manufacturer said "Every railroad car on the tracks is a thousand cars I can't sell!"

As a result, rail systems' subsidies should NOT be seen as an operating subsidy but as a social and environmental reward. It is equally important to keep patronage high to reduce public monies for their support.

There is a great opportunity in the west of Sydney to place in some rail systems before the turn of the century. An attached energy map shows the consequences if 10% of NSW oil based transport is replaced with electricity.There are corridors reserved for widening as well as new roads. These will be cheap because of the "green fields" situation with minimum "on road" work. For funding, I propose no metropolitan major road construction west of Parramatta. This will release $2 billion of proposed funding from State and Federal sources. All of this will not be needed.

$1 Billion will produce 100 kilometres of 2 track light rail. The remainder can go to fund the urgently needed areas of schools, hospitals and community services. Light rail is adequate because they will not be used for freight or high speed trains.

TREES

There is always great debate between loggers and environmentalists. It will continue until plantation trees are provided for the logging industries. The quick and easy solution is to log old growth forests. But this endangers our heritage and animal diversity.

- Trees are the lungs of the earth. The world has emphysema at the moment.
- Animal and bio diversity ensures our security of existence. Most is in our forests.
- Trees soak up carbon dioxide and fix it as carbonaceous living timber.
- Trees ensure erosion control and not like clear felling around Bega.

The forest industry must ensure its own survival by enormous plantations. It must not be a parasite and consume the last remnant of ancient forests. This is being lazy!! The continued reluctance by timber cutters to provide for their job security in this way is an example of this world gone mad. Everybody wants to go on doing the same thing they have been doing and expect it to be so for ever.

Because of this attitude in this industry, the whole world is suffering. If they go out and plant trees, say initially, 10 for every one they cut down, there will be no problem in the future. With an initial accelerated planting, the future will be secure. Certainly, the product will not be available for cutting tomorrow. But planting different types that mature at different ages will provide a continued cutting. For example, Polonia is available for cutting in 5 to 6 years. It is a light hardwood but grows quickly.

This country is removing trees at about the same rate as Brazil. It must stop. Basically, the problems created are

- Erosion
- Ground level flora/fauna destruction
- Carbon dioxide
- Old forest removal
- Removal of bio diversity
- River siltation
- Top soil loss
- No alternatives sought.

It is not quite true that there are no alternatives sought. They are not being sought in great quantity. Take the straw board being manufactured in Victoria. This saves wood chipping and is probably even a better product. It is made from a waste product. The straw is usually turned into the paddocks after the wheat harvest. An estimated 5% of wheat straw would replace half the wood chip production in NSW. If made into a value added product here, we would not be buying the value added product from overseas but selling it! This would improve our trade balance.

SEWAGE

The tremendous amount of waste a city produces is an enormous strain on the surrounding environment. Sewage is probably the worst. Rather than a waste product, this can be considered as a valuable biological soup. At the moment it is useless because some industries producing heavy metals and other noxious substances discharge into the sewer. If this could be removed and disposed elsewhere, sewage could be used to rehabilitate our inland. A pipeline would be very expensive. But rail tankers could be used and deliver this "product" anywhere. Temporary pipes could be used for final site delivery.

- At Dubbo, the CSIRO produced a pilot plant to see if sewage could be consumed by trees and not let the effluent get down into the water table. It works well!
- There are various processes to concentrate and remove water. This could be concentrated 20 to 1 and placed in rail tankers. 100 million litres would be reduced to 5 million litres. This is only 150 tanker loads or 4 train loads.
- Partial reconstitution can be accomplished at the receiving end with waste water. If located near a city, this sewage could be used.

In the near future, a large portion of our old sewage system must be upgraded or replaced. This will be expensive!! Possibly, smaller "white water" treatment plants could be located around the city. If located near rail lines, effluent concentration could be accomplished and the remainder processed for re-use. This could be used on parks, and ovals. My children's school has a system that re-uses the "white water" on their grounds. This would reduce the need to replace some large mains.

GARBAGE

We are filling up valleys with the stuff! This leaches out and fills our rivers with toxic substances. We as a country must try to use things at least more than once.

The mayor of Seattle in the US woke up one morning to find their tips full! With a number of hastily organised programs, they reduced their disposable waste to 5%.

- Worm and biomass waste systems in back yards.
- Separating recyclables.
- "Barns" for short term degrading.
- Rail compression containers to sell the disposed portion.

The end system was half the cost of land fill. It was out of necessity for they needed to solve their problems fast. We have their results available to act on. Not too far away, we will be in the same situation in Sydney.

Our commercial distribution of food and other products via shops demands packaging. Consequently, this is a large waste problem. Collection and sorting on a grand scale will need to be organised if we are to be able to reduce our need for primary resources. Products such as car batteries should not be sent to 3rd world countries for disposal. We should solve our own problems.

I see the possibility of a whole new industry built on the re-using of many products we consider as "garbage". Sorting and selecting resources such as ferrous metals, non-ferrous metals, plastics, glass, paper products, building materials, etc. could once again save this country billions in foreign exchange. At the moment, it goes into the ground.

COUNTRY TRANSPORT

Recently, a series of articles have been appearing in the newspapers about rail. The Sun-Herald, 30/6/96 page 46 is one example. The new rail operator SCT operates a twice weekly service each way from Perth to Melbourne. Peter Mason (SCT) says that each train of 70 wagons and measuring 1.7KM long, costs $150,000 for track access. This may appear expensive. But it saves 135 trucks on the road and consequential expensive road damage. It also saves **one million litres of fuel!!** This saves $500,000 of fuel per trip after access costs. **This is equal to $100 Million off our trade deficit per year by this small company.** This is smart business, making a profit and trade improvement together!

Although a private company operating against the National Rail Corporation, the illustration is to show rail performance against road operations. This is especially important on our intercapital routes. Between Brisbane and Melbourne, we need to spend about $1 billion on the corridor. **With imported fuel savings alone, we have the possibility of wiping our national debt before 2010.** This does not include savings such as

- Imported trucks,
- Spare parts, tyres,

further reducing our import bill as well as saving expenditure on

- Resultant reduced road repairs.
- Reduced road construction.

The biggest benefit would be the dramatic reduction in greenhouse gases that we don't seem to be able to reduce because of our dependence on road freight.

If doubling rail freight on the eastern corridor, road freight will reduce by about 25%. This is about $5 billion per year saved from imported products and fuel to support our transport industry. There is a possibility that we could even make a "national profit" by improving our rail freight systems. What I mean is that we would be exporting transport systems and not importing them!

O There are 63 places that have extreme grade and curvature occurring together between Brisbane and Melbourne. (from Professor Laird of Wollongong University) This wastes fuel, increases wheel wear, rail wear, distance and time. For

about $180 Million these can be altered. By reducing the grade to 1 in 66 and curve radii to 1200 metres, these would become the best parts. Transit time could be reduced by 3 hours and operating expenses down 20%!

O Electrification at the international standard of 25KVAC is about $200,000 per kilometre for a "turnkey" operation. This is $160M to Brisbane and $270M to Melbourne beyond the present electrification. There are no major problems working with mixed electrical supplies. Examples that have these mixed systems are Japan, Eurostar, France and Germany. This will improve fuel efficiency and effect a reduction in carbon dioxide.

O Because the track is curvy and windy being built in the last century with pick and shovel, passenger transit time is excessive. To straighten all out would be very expensive. With recent "tilt" train trials by Countrylink, this borrowed train set was built for a wider loading gauge. (This is the imaginary tunnel that the train's profile makes.) Consequently, the only path to operate with safety was to Canberra. This operated within the manufacturers parameters to give a transit reduction of 25%. For example, Campbelltown to Moss Vale, the demonstration train consistently operated at 45 minutes for this extremely windy section. (an hour for the XPT and other trains) On my trip, a time of 6 1/2 minutes from Douglas Park to Campbelltown and as comfortable as any train (about 20 kilometres on wooden sleepers). Cost is not much more than a conventional train set. Tilt train transit time on existing track to Melbourne would be about 7 1/2 hours. Brisbane would be better because curving speed is 40% faster than a conventional train with comfort. This would mean 9 hours to Brisbane.

AIR TRAVEL

A jumbo between Sydney and Melbourne consumes 8.5 to 10 tonnes of fuel, depending on the model. This is about 300 Kilowatt hours of energy per passenger trip compared with 40 Kwh by rail. With the rail improvements outlined above, transit time would be reduced to about 1/2. This would be twice the time of air travel at 1/2 the cost of present rail travel for a $1 billion investment. Not everybody wants to fly. Those that wish to travel quickly can still fly. This could reduce Mascot aircraft movements by 50,000 per year.

We would not need another airport for Sydney. There has been very little time and effort given to the rehabilitation of our rail systems. For 1/3rd of the cost of the Hume Highway, the above rail improvements could be done before the turn of the century. For the cost of the 2 extra lanes of the Pacific Highway, we would have a transport system for the future. For 1/7th the cost of an international airport and its support we would have transport security and a better trade balance. All of this could be made here by us for us. I thought we were the "thinking" country.

THE PROBLEMS ALLEVIATED

Most of the environmental, urban and transport improvements involve rail in some way. This is because rail is usually left out of transport equations. As you can see, the improvements can be dramatic.

- Aiming to make our country better, we once again could be a force in providing solutions in this corner of the world.
- We are being chastised by world powers for not improving our greenhouse gas situation.
- We have an enormous trade balance problem.
- We have an enormous foreign debt problem.
- We need to create more value added produce.
- We need to look after our land.
- We need to plant more trees.
- We need to diversify fuel and transport systems.
- We need to support our rail systems.
- Carbon dioxide emissions will decrease dramatically. This is because
    - Electricity surplus capacity is used
    - Improved utilisation of electrical generating capacity
    - Dramatic savings in oil fuel
    - Power station wastes recovered giving better fuel efficiency
    - Increased efficiency of rail transport.

Brian Fley of ISTP Murdoch university was laughed at for predicting doom and gloom with his book The End of the Age of Oil. He is now supported by Campbell & Laherrere of Petroconsultants of Switzerland and Buzz Ivanhoe of the well respected US company Novum Corporation. 97% of our transport industry is dependant on oil and gas for fuel. Our own oil production will peak next year and be all gone by 2010. We import 55% of our needs at present.

We as a country could be prepared for this time or we could wait until the eleventh hour and hope everything will be all right.

Fuel

Our society, our economy and indeed our culture is dependant on cheap fuel for our transport systems. At present, 98% of our transport uses oil based fuels. We are highly dependant on fuel prices being kept low and the international value of our dollar for our trucking and domestic systems to be economically viable. If these rise significantly, there will be a great reflection in the cost of our manufactured and primary products. This will be untenable for our trade to overseas countries.

Performance increase

For this reason, it is imperative to find ways and means to reduce our fuel needs or find other sources of fuel. Rail systems can offer solutions to both of these at a reasonable cost. Most certainly, rail systems can not go everywhere but what we have can be enhanced to alleviate some of these problems. Some solutions can be provided by

- Alignment enhancements
- Electrification at 25KVAC
- Conversion of diesels to Natural Gas
- Conversion wagons to enable diesels to operate from the overhead supply. (mainly because there is not enough room on the diesel vehicles for hybrid operation.)

Rail fuel performance

It is important that all realise that not only do electric trains diversify our transport fuel and methods but also place them in a unique position. They can tap into any future energy generating method such as solar power or nuclear fusion.

A well aligned rail system uses 6 to 10 times less fuel than a good road system. Reconstruction of the Hume Highway was $3.3 billion, and that was before the town bypass program was commenced. There has been so much money placed into the Hume Highway so there is no comparison between trains and trucking on this route with the antiquated rail path. If 10% of the money that was spent on the Hume Highway was spent on the Hume Railway to remove the most difficult parts, then a comparison could be made. At best for the present, before the "One Nation money" of $80 million was spent on this line, road/rail fuel performance was at a ratio of 1.3. After this program, it had raised to a ratio of 2. This illustrates how poor the rail alignment is and how much scope is possible.

Electrification

A **BASIC** 25KVAC scheme could be constructed for $130,000 per track kilometre. There is the need of power conversion stations, fence immunity, signalling alterations, and could be wisely incorporated in the costs above. This means a minimum cost of $175 million between Campbelltown and the environs of Melbourne. If some track enhancements are done first, about 80 single track kilometres could be removed from this path, saving $11 million, which could be deployed electrifying sidings and yards. With the use of a power conversion van between 2 NR diesels as well as modifications to enable external power to energise the motors, costs of about $1.5 million per pair of diesels would be needed.

Likewise on the path north to Brisbane, $110 million would be needed after track improvements. Electrification could be done in sections with hybrid vehicles. Initially, sections that need extra effort to enable them to pass could be electrified in isolation. For example, the Border Loop area or Bethungra Spiral. This would extend the onboard fuel range. Take the situation whereby sections of the East Coast were possibly electrified.

- 25KVAC could be used between Brisbane and Maitland, single track

- Diesel between Maitland and Broadmeadow
- 1500VDC used between Broadmeadow and Glenlee
- 25KVAC Glenlee to Goulburn
- Diesel to the environs of Melbourne
- 1500VDC in passing through Melbourne
- Diesel to Adelaide.

The range of the fuel tank of diesel could be extended by utilising the other available energy systems.

High Speed Rail

The proponents of high speed rail say that it would be best to build a whole new rail system and abandon the old one. This is because conventional high speed trains are not capable of turning small radii at speed and providing comfort to the passengers. The alignment of these tracks are very precise and need constant critical attention. Freight can not be placed on these lines with heavy axle loads as this will degrade the track quality even quicker.

SPEEDRAIL use an example in their paper, "SPEEDRAIL, Fast Facts", page 4, "For the same reason, when the northern line to Newcastle was electrified in 1984, the fast schedule for the new electric trains was slower than had been achieved by steam in 1947, almost 40 years earlier." There is now an even slower alignment than in 1947 and the electric train makes extra stops to contribute to this situation. For example, the loop around the mountain at Boorigal was made in yesteryear when there were no powerful diesel or electric locomotives to clime the steep bank. This circuitous path was created to enable steam freight to have an easier path. (Likewise, the track alignment between Goulburn and Yass.)

Their conclusion is that trains need very gentle curves to perform well, and use the example of where country roads have been replaced with freeways, "it is not appropriate simply to upgrade the old route." The enormous amount of money (private or public funds) would be comparable to the cost of these freeways and not available for heavy freight, which is the portion that has the greatest potential to solve our transport problems. With later technology, trains can run up to 160kph around 800 metre curves of the fast freight model and still do speeds of 300kph down the straight! This enables a multi-functional line with accent on majority freight. At the completion of improvements, the length and complexity of the line would be removed enabling cheaper electrification. Even the French find extending their TGV lines expensive and are trialing "tilting" TGV’s for use on rural extremities.

Many of the places around the intercapital path from Adelaide to Brisbane that cause problems for the operators could be alleviated for a nominal fee. I do not mean a few dollars but small in comparison to the amount of money being freely spent on roads without question. Take the Adelaide Hills for example. The hundred or so million dollars being spent on a few kilometres of road to remove bends, make tunnels and fill in gorges to enable a reduction in road length by a kilometre and save a few minutes is by contrast a "gold plated project" compared with the near by rail line. I understand that freight trains take 3 hours to travel about 100 kilometres. A figure of $80 million was suggested to realign the track to fast freight standard and remove 2 hours of transit time. Would this not have been of greater benefit to the country?

A later part of this submission examines a portion of the intercapital route, the line north of Maitland to Brisbane. There are proposals for a new route to the west and also to Darwin in parallel with this poor route. The evaluation will attempt to display how much effort would be needed to rehabilitate this line to give economic recovery and a profitable concern to operators. As you will see, this

is considerably less than the cost of the adjacent Pacific Highway improvements and indeed high speed rail, to be able to give a reasonable transit time for the amount of money spent. This will enable the passenger service (with the assistance of later technology than the Very Fast Train) to reduce transit time to half and maintain the present fare structure. This can be done on a conventional freight track where passenger services share a single line with freight. It must be remembered that a large amount of the rail line needs some maintenance as well as windy track removed and this can be incorporated selectively as a "maintenance replacement" program. There is some equipment that can be recovered from these diversions and be redeployed elsewhere.

The main line upgrade in Queensland has shown similar results. With concrete sleepers and heavy rail as well as electrification and wooden bridge replacement, the way for minor alterations and deviations can be made to remove the worst parts. Incorporating the "tilting" train for intercity passenger services, the whole project has reduced passenger travel times between Brisbane and Rockhampton from 13.5 hours to under 7 hours, all for well under $1 billion!

A sensible upgrade realises

- Performance improvements and costs would be similar to the Main Line Upgrade performed in Queensland.
- The end result would be freight trains of 2 kilometres long using less than the energy required for the present shorter trains.
- Paths released for increased traffic capability.
- Transit time reduced in half.
- Diversification of fuel and transport methods.
- Operating costs dramatically reduced.
- Line complexity reduced (reduced sidings and loops)
- Line length reduced.

Rehabilitation.

If the improvement methods for roads was applied to railways, some dramatic improvements could be made at low cost. Some examples.

- In 1982 when my wife and I were married, we went to Laurieton for our honeymoon. The Pacific highway in some areas wound down the hillside, crossed a small bridge and wound up the other side of the ravine. At the same time, some high level bridges were being constructed bypassing these slow and dangerous sections.
- North of Milton, a slow and windy climbing path around a mountain as well as windy approaches have been bypassed with a 5 kilometre section of road containing a rising bridge. The new deviation probably reduced the road distance in half for this portion as well as supplying a faster alignment. It can easily be traversed in 3 minutes instead of about 10 minutes.

The North Coast rail line in NSW is in a similar situation to the road alignment of 30 years ago.

- There are some portions that could be completely bypassed removing wiggly sections of track.
- There are some portions that contain small curves between straight sections that remove the ability of freight trains to get to an economical running speed.
- There are some portions that have antiquated signalling systems that require the drivers to exchange signalling staffs to travel in the next section.
- There are some sections that have extreme grades and extreme curvature together creating excessive wear, fuel consumption and consuming excessive transit time.

Where the track has a poor wiggly and windy path mainly built in the last century with pick and shovel,

- Excessive fuel is consumed.
- Excessive rail wear is experienced on tight curves.
- Excessive wheel flange wear is experienced which adds to the frictional values.
- Excessive brake wear is made while traversing down steep grades and braking at the end of straight sections.
- This poor alignment reduces the vehicle's running gear's life such as wheel bearings, bogie frames, couplings etc.
- More wagons and engines are needed to perform the same transit task than does a better alignment.

Rail equipment can last 50 or 60 years and often 100 years if looked after. Road equipment has usually expired after 12 or 15 years. Vehicle viability is much better for rail equipment and is not usually taken into account when considering overall costs and economics.

North Coast Line

This line could be rehabilitated for a reasonable cost. With a selective alteration of the track in critical locations, this would be much cheaper than replacing the entire line on a new alignment. The spread sheet attached shows the time reduction required to bring this line up to a Fast Freight Standard. The vertical representation displays how much time would have to be removed from each section of the path. These columns are raising the line to a particular speed standard.

It would not be practical to do improvements in this manner. The best method would be to improve on the horizontal lines. This is for practical and operational considerations. For example, the spacings of the passing loops for crossing trains. Excessive time could be wasted if a passing loop is not in the right place for trains crossing each other.

Procedure

Take the first section for example, from **Maitland to Dungog**. The distance is 53km, the transit time is 52 minutes and the fastest average speed on the timetable is 61KPH for a freight train. To raise this to a speed of 115kph, 24.3 minutes would have to be removed from the path. A number of actions can be done to improve the alignment.

- Strategically replace short radius curves between straight sections effectively lengthening them.
- Small deviations around extremely windy sections.
- Flattening of extreme grades.
- Signalling upgrades.

For a guide line as an average over the project, alterations are estimated as

- One minute reduction costs an estimated $1 million. (as an average over the whole line)
- Each minute reduces the track length by 200 metres. (as an average over the whole line)
- Legal services to buy and release land for the alignment required.
- Recovered heavy materials such as concrete sleepers, rail, points, signalling equipment and bridge culverts could be moved forward to the next site dramatically reducing costs.
- Loop spacing increased and hence reduced in number because of increased transit speed.
- Loop equipment redeployed to increase loop lengths enabling longer trains.

Large deviations.

There are some opportunities available to remove large sections of poor track alignment. A deviation associated with some enhancements could be a very economical alternative, especially where the track wanders excessively from the mean direction of the path. The improvement of a circuitous part of track would need speed restrictions for trains, safety considerations for workers, access to the individual sites for earth moving equipment, track closures for track realignment. This may have to be done on some occasions.

An example is around Taree. For about 2 kilometre of new high speed track, 5 or so kilometres of circuitous poor quality track through a town could be bypassed. The old track could be used in this case for a long passing loop and access for passenger services to the city centre. Excess infrastructure could be removed realising reduced maintenance costs.

Another example, between Dungog and Craven. For 20 kilometres of new straighter track with small grades, 35 kilometres or so of wiggly track could be removed. If the old alignment had heavy rail and concrete sleepers, this could be redeployed on further alterations north to reduce costs, passing loops or duplication south of Dungog (after the alignment is improved).

Maitland to Dungog

A distance of 5 kilometres could be removed from this track section using the above guide lines. With the completed distance of 48 kilometres, a reduced average speed of 104kph would be all that is needed for the same time as a speed of 115kph over the original distance of 53 kilometres. Therefore the standard of track improvement could be compromised giving the same result.

At the completion of the entire line upgrade, there would be sufficient equipment left over to duplicate the line north to Craven! In fact, there would be enough equipment recovered from the Dungog Craven section to duplicate this section after single line improvements. Therefore, if this is the intention, initially the loops would not be removed from this section. Consequently there would be a net reduction in the amount of infrastructure along the line needing constant maintenance such as points on passing loops. Signalling would also be need to be improved but could be equipment recovered where upgrades have proceeded in other parts of the state or metropolitan area. The net result from the duplication would be a further reduction in transit time because there would not be any passing loops to negotiate as on a single track. This could possibly reduce a further hour in end to end time in congested periods.

If the Stratford coal mines on this line are to be expanded, this would be a viable option to reducing congestion on this portion of the line. There are also suburban and country passenger services as well as intermediate and long haul freight to contend with.

Dungog to Craven

If the terrain is suitable, a large portion of the wiggly track between these two centres could be replaced. The track distance is 45 kilometres but considerably smaller "as the crow flies". Between Dingalee and Ward’s River, the distance is 35 kilometres by rail. A bypass of about 20 kilometres could be placed in here. The remaining 10 kilometres could have curve easing to raise the line speed to 115kph.

The original transit time at an average of 46kph would take 58 minutes. The reduced distance of 29 kilometres at 115 kph would take 15 minutes, saving 44 minutes. The section between Dungog and Taree had an original transit time of 171 minutes averaging 46kph and now takes 126

minutes which equates to an average speed of 55kph. A cost of $40 million is estimated for this 20 kilometres allowing for rough terrain and bridges.

Further operational economies for the track authority and the vehicle operators would be realised. Only a passing loop 2 kilometres long would be required at Dungog and Craven, instead of the 5 existing, for a 15 minute spacing of loops for future completion of this section.

North of Gloucester

There appears to be a large number of curves in this 40 kilometre section to Mount George. It is going in the correct general direction but it is 10 kilometres more than the distance between the towns. This portion could have selective deviations as well as curve easing to increase the transit speed. The resultant reduction from one hour to 20 minutes is possible if the distance is reduced to 35 kilometres at about $30 million. Costs could be considerably less than a new track section which would cost $60 million for 30 kilometres of track to save another 5 minutes.

Mount George to Killawarra

This section is a large double "s" bend and could be reduced in length and operate at a higher line speed. It totals about 8 kilometres. Alternatively, the portion between Charity Creek and Killawarra follows the river and there is possibly a path to the north that would be of benefit. The distance of this portion could be reduced to 3 kilometres. This could be traversed in 1.6 minutes compared with about 9 kilometres taking 12 minutes at the slower speed on the original track.

The track could have a large deviation on the south side of the Manning River at Mount George. 4 kilometres of track could remove 6 kilometres of slow running and curves. One major new bridge would be needed.

Net result between Dungog and Taree

The combination of these deviations and alterations offer a speed increase and reduced distance by 31 kilometres (including the Taree bypass), raises this section to 63kph or 101 minutes. Cost would be about $86 million.

Taree bypass

The line "dips" down into Taree on the map through the town and back out again. About two kilometres of track across this "gap" for freight would remove several kilometres of slow running.

- Providing a 2 kilometre section of new **double** track joining the old rail ends would provide a long passing loop.
- Relocating the freight handling area out to this location is also a possibility.
- Possibly the station could remain in the town for passenger services relegated to a single line only.

Alternatively,

- 2 kilometres of **single** track and the original path rationalised to Taree could be the passing loop.
- Cost would be approximately $4 million, allowing forturnout points, signalling and new track.

Kundle Kundle towards Moorland

This section between Taree and Moorland is about 40 kilometres. A bypass between Kundle Kundle and Moorland removing the large swoop to the north would be about 12 kilometres long.

This could reduce the track length by about 8 kilometres. The remaining 20 kilometres could be altered to 115kph running by altering curves. This section reduced to 32 kilometres could be traversed in less than 20 minutes.

Rossglen towards Heron's Creek

A new section of about 6 kilometres could replace the circuitous path through Kendall. A new station at Kew could serve the Laurieton area. This section would not reduce track length by much, about 3 kilometres. There would be a flatter, straighter path enabling better fuel performance and a higher transit speed.

Net result between Taree and Wauchope.

I don't have topographical maps to examine all terrain, but I do know that the Kew site is relatively flat. Approximate costs for these three deviations from Taree would be about $40 million.

For the improved path between Taree and Wauchope, an average speed of 94kph would only be needed to cover the distance in the same time as the longer unimproved path at 115kph. This means that some sections can be left at the lower standard for the present.

Signalling North of Grafton.

An estimate of 20 million would improve the signalling to remove the time to negotiate unoccupied loops. Much time can be consumed with the antiquated systems as well as fuel for restarting and brake shoe wear for stopping. Drivers must be alert to impending danger. Anything to help avoid costly accidents is most essential. An estimate of 1 hour could be saved in transit time.

Red Sectors.

These are where extreme grades occur with extreme curvature. This wastes fuel, creates wheel wear, track wear, increases maintenance costs and causes problems when breakdowns occur. Several occur north of Grafton. Some remain after the "One Nation" upgrade began to address these several years ago.

Red Sector Locations are,

Distance from Sydney		**Length**
704.6-724.7km	7 isolated short sectors	2.8km
730.5-733.2km	Gurranang (Little Lawrence)	1.6km
741.5-771.0km	5 isolated short sectors	2.4km
782.1-786.8km	2 short sectors Coombell, south of Casino	0.5km
824.5-832.7km	2 short sectors, Casino to Kyogle	2.1km
885.5-970.3km	11 short sectors north of Border Loop	4.4km

According to Professor Laird and Associates in **Rail Track, the Elusive Playing Field**, the One Nation improvements at Rappville and Lawrence road was $1.3 million per kilometre. The remaining Red Sectors between Grafton and Border Loop totalling 9.4 kilometres would cost about $27 million, including some minor deviations to obtain maximum benefit. This would make the worst sections of track the best! An estimated 15 minutes less in track time and 500 litres of fuel would be saved each trip.

Cost summary

Section	Cost	KM less	Time saving
North of Hunter River to Dungog	$25M	5	25 m
Duplication this section	$40M	0	30 - 60m
Dungog to Craven	$40M	15	44m
North of Gloucester	$30M	5	40m
Mount George to Killawarra	$12M	7	14m
Taree Bypass	$ 4M	3	4 minutes minimum
Kundle Kundle to Moorland	$20M	8	16m
Rossglen to Heron's Creek	$12M	3	6m
Signalling north of Grafton	$20M	0	60m
Red Sectors	$27M	6	15m plus lots of fuel
TOTAL	**$235M**	**52**	**254m to 284m** **4h4M to 4h 44m**

There has been an over estimation of costs for signalling, rugged terrain, loop enhancements and removal, etc. Average costs for track improvements would be $1.25M per kilometre. These are the obvious parts that would need to be done first to begin economical operations.

Conclusion

There are enough examples for evaluation on performance of road versus rail and what amount of money is needed to raise the rail profile to out perform road operations. If merely 10% of the money going into road capital improvements were placed into the rail arena for intercity improvements (and this would be for only 10 years), the net improvements in performance would be enormous savings for business and indeed this country. For intercapital freight and country services,

- Subsidies are reduced every time capital improvements are made to increase vehicle efficiency.
- The "level playing field" at present is 30 degrees uphill and the goal posts are moving out 10 metres per year for rail.
- The savings possible for this country is in the order of 85% of the fuel needs of the trucked cargo on most intercapital routes. Estimated between Sydney and Melbourne for every train trip over rail on a good alignment, 200,000 litres of fuel saved, $60,000 less in road damage.
- Road fatalities, injuries and trauma would reduce dramatically. Serious injury is high with trucks involved in accidents.
- Accident time lost and money used for compensation of cargo and people not paid out.
- Environmental and land use benefits.
- Dramatic reduction in road improvements needed.
- Reduced import needs to sustain our transport system.

The amount of money needed to remove the worst parts on the Brisbane - Sydney - Melbourne - Adelaide route would be about $300 million. This would reduce rail fuel needs by 20% and transit time by 5 hours. A further estimation of $300 million would remove some operational hindrances to save a further 10% fuel reduction and transit time by a further 3 to 4 hours. This would be the minimum money needed to produce a profitable operation on this route for the operators. Why is road expenditure considered to be an "investment" and rail money a "subsidy"? If roads were not favoured as the optimal means for transport and a balanced expenditure given on the most appropriate method, then people like us would not be making submissions like this!

Whether rail is public or private, the track is of major concern. If the track is not in good condition and the alignment is not direct then much more effort must me placed into operations to approach viability. This can be seen with road operations. When the roads are improved, costs, driver fatigue, fuel, transit time, etc, all reduce. Likewise with rail. Until that happens or we as a country are forced to do so, peak productivity will not even be approached.

ENHANCED SYDNEY - MELBOURNE RAIL CORRIDOR

	TRANSIT SAVINGS	(Time consumed)	
	EXISTING/XPT	IMPROVED/XPT	TILTING
Sydney Terminal	8:43am	8:43am	8:43am
	(46)	(30)	(25)
Campbelltown	9:29	9:13	9:08
	(1:03)	(25)	(20)
Moss Vale	10:32	9:33	9:28
	(50)	(35)	(30)
Goulburn	11:22pm	10:13	9:58
	(4:33)	(4:33)	(3:30) **
Albury	3:53pm	2:46pm	1:28pm
(3:16)	(2:16)	(1:55)	
Melbourne	7:09pm	5:02pm	3:23pm
Total Time	10:26	8:19	6:40
Services/day/train	2	2	3

IMPROVEMENTS NEEDED
Via East Hills line, proposed quadruplication, $70 million
Campbelltown to Douglas Park 200KPH running
Douglas Park to Bargo Bypass beside expressway, $100 million
Curve easing Bargo to Goulburn, $30 million
Concrete sleepers and heavy rail in Victoria, $180 million.
Progressive level crossing removals (3 new bridges replacing 9 per year)

Ultimately tilting passenger vehicles, $17 million each. (5 car DMU)

Most of the capital is spent between Sydney and Goulburn for maximum benefit towards

- **Sydney to Canberra passenger services**
- **Sydney to Melbourne passenger services**
- **Possible services to proposed Goulburn Airport**
- **Enhancing freight services**
- **Removing some path restrictions for double stacked containers.**

EAST COAST RAIL IMPROVEMENTS

1. - **RED SECTORS**. Where extreme curvature and grades occur together. WASTES energy, time, wear wheels and rails. Eliminate the 30 between Goulburn and Albury, the same north of Newcastle.

- AV. SAVING of 3 minutes transit time, 100 litres of fuel per site.
- 3 hours less transit time between Melbourne and Brisbane.

2. - **SHORT RADII CURVES BETWEEN STRAIGHTS**. Trains must brake, curve and again accelerate to speed. Wastes energy, wheel wear, brake wear, rail wear and fuel accelerating again. A curve of 300 metres increased to 800 metres would need a small piece of land, 1KM of track, and about $1 million.

- SAVING 70 litres of fuel, 0.5KM less to travel, 3 minutes per site.
- 40 times to Brisbane saves 2 hours, 2500 litres of fuel, and about 20KM less to travel for $40 million.

3. - **IMPROVED SIGNALLING**. Soon, radio orders and remote controlling of loops will be done between Brisbane and the border.

- SAVING about 30 minutes for the XPT to negotiate loops.

4. - **CONCRETE SLEEPERS** for the standard gauge in Victoria will raise axle loads for freight and maximum speed for the XPT to 160KPH.

- SAVES one hour in transit time.

5. - **CONVERT THE BROAD GAUGE** in Victoria to standard gauge between Mangalore and Albury. Provides 170KM of dual track in this long single track section.

- SAVES 1 hour in congested times.