SUBMISSION

Inquiry into the investment of Commonwealth and State funds in public passenger transport infrastructure and services.

TO:

The Secretary
Senate Rural & Regional Affairs & Transport Committee
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Contents

Global Warming? Bad times?

The problem?
It appears to me that the giving of monies to those that have caused the economic problem (ie, banks, car companies and retailers) is only exasperating the situation. This action is only a bandaid and could lead the Government into economic dire straights if this direction is continued. Funds could be used instead to give us a sustainable future.

The solution?
We have economic and environmental problems. There is no particular solution. Being part of a global strategy is most important. In the past, we have had wars of attrition with other countries but now we are involved in a war of survival with the very planet that has sustained us for eons. We must realise that the problems of global warming (commonly mellowed to climate change) are now accelerating far in excess of the predictions of professionals in their fields.

The causes?

- Carbon dioxide
- Industry and fuel producers making the decisions
- People chopping down the lungs of the earth giving it emphysema.
- Governments supporting the decision makers.

The answers?

- Reduce carbon dioxide production
- Plant more trees to sequestrate carbon
- The Government to accelerate new non-carbon energy sources
- Get industry out of the carbon fuel cycle as much as possible.

Too hard?
Which is harder to do? Change the habits of the country **or** survive on a desolate planet? I would like all of Parliament to view the motion picture "Soylent Green" with Burt Lancaster and incidentally was Edward G. Robinson's last picture. Would you like our planet like this? The world was once looking at us as the great experiment. Women's votes, unions, the Sunshine Harvester etc. Why can't that happen again? Why can't we be leaders and not followers in this war? If we do not win, what is there for our children and grandchildren? We got lead and arsenic out of paints that were harming our children. Why can't we get rid of carbon dioxide that is harming the planet?

Some suggestions.

- **Harness the power of the constant wind from the Southern Ocean** falling on the coast of Victoria and South Australia. Many coal fired stations could be closed down with 15,000 megawatts of windmills. I would prefer see the aesthetics of windmills ensuring our survival. This is 150 wind farms of 100x1.5 megawatt windmills or 30 wind farms of 500 generators. The cost of installation to producing electricity is about $2.10/watthour or $2.1 million/megawatt. This is less than the cost of a coal fired generator installation with no fuel costs for 50 years! Electricity should be cheaper.
- **Build a factory for producing windmills.** We as a country could be producing our own (or under licence) and exporting (or leasing) as well. I would like to see the steel and coal industry involved.
- **Electric rail is plugged into the future.** Why? Anything can be used to generate electricity besides oil, gas and coal. Electrify the inter-capital rail lines (Adelaide to Brisbane) with high voltage electrification at the international standard of 25KVAC. Since rail can use 10 times less energy for freight than road transport, this would be a sensible direction due to the possibility of using non-carbon means to generate electricity for transport. This would be a method of reducing our national carbon footprint in a big way. Since oil will not get cheaper (there are ups and downs), getting rail out of the oil fuel system will ensure our transport fuel diversity. How much electricity would be used? The equivalent of less than one turbine in Bayswater power

station (each of 660 megawatts) would power the entire inter-capital fleet!! The cost? For example, around $90 million between Sydney and Canberra.

- **Instigate a program similar to the Snowy Scheme for tidal power** in the northern part of Australia. There is one site in particular that could power the entire Northern Territory and Western Australia with only 5% of the water flow diverted for the generation of electricity. We could export electricity to Indonesia and New Guinea with undersea cables at high voltage.
- **Small electric cars for that second or third one in the family.** One million of them could be charged with the off-peak power that is presently "dumped" into off-peak hot water systems from the output of Bayswater Power Station alone! This would save 2 million tonnes of road fuel per year being imported!
- **Convert off**-peak electric hot water units to solar. This would free up off-peak power for other uses.
- **More peak re-generating power stations**. This is where water is elevated off-peak and returned to generate electricity in the peak period, similar to Bendeela or the Snowy Scheme. Wollongong would be an ideal site for a couple.
- **Electric public transport** can take many forms. It can be heavy rail, metro, light rail and even trolley buses. (See the attached section for a new type of cheap tracked system that could approach the carrying the capacity of light rail.)
- **Abandon geosequestration.** This locks away carbon **and oxygen**. By the time it doesn't work, we would be locked into replacing the existing coal fired stations with new ones..... and more!
- **Plant more trees.** We need about 20 billion trees planted urgently to replace the ones we have removed before our land becomes desert. These sequestrate carbon and reduce the salt water table on farm lands. Every person needs around 4 trees. A car needs 250 and a truck 8,000 merely for the fuel use let alone vehicle production!
- **Humus, mulch for farms.** Our farm soils are in urgent need of carbon replacement in the form of waste products and sewage from cities and the residue from the forest industry. This enriches the soil and increases its ability to retain moisture as well as reducing the need of trace elements and fertiliser. **This also sequesters carbon.**

When do we start?

How late is too late? How does the war cabinet propose to approach the problem? Is a 50% reduction too small to have a significant effect on carbon dioxide? How many jobs could be created? What is the improvement of non-arable land? How much fuel is reserved for the production of food and the military? Are we using our energy in a smart way?

- It took 70 years to use the first cubic mile of oil (4 cubic kilometres) and we are using it at the rate of 5.5 cubic kilometres per year in the world..... and 25 cubic kilometres of coal!
- Of the 200 million tonnes/year of coal we produce, how many cubic kilometres is that?
- Sydney uses 23,000 tonnes of road fuel per day.
- The M5 route between Campbelltown and Sydney uses 80 tonnes of road fuel per hour!
- The adjacent rail line uses 2.4 tonnes of coal to move the same number of passengers.

We are only a small country and a small energy user. **Per capita, we are the largest energy users and producers in the world!**

That makes us more responsible than any other country to do something about the situation.

Yours sincerely upset

What does all this have to do with Public Transport?

Up until now, most modern economies have relied on cheap and abundant energy. This resource is slowly disappearing (oil) or is causing enormous quantities of carbon dioxide (coal & oil). In essence, for us to have some sort of "business as usual," the world must learn to do a number of things very quickly. It must

- Learn to use less energy for the same transport task
- Reduce dependency on carbon based fuels
- Invest in non-carbon based energy systems
- Sequester carbon in soil and trees, improving our pasture and arable farmlands simultaneously.

Public transport, in the correct guise, can offer solutions to many of the problems we are having in our modern cities.

- What we do have is often under utilised or inadequate in the forms of availability or location.
- Most of the urban train systems we have are developed along freight corridors restricting freight operations in peak periods or priority of passenger over freight in the country.
- Buses are supposed to be the answer as many see but run infrequent services in the off-peak and often in the peak as well, especially on the fringes of our cities. They can get caught up in road traffic congestion adding to their already excessive travel times, especially on long urban journeys.
- Light rail in well planned corridors such as some of the new installations in the US or even Perth, attract very large patronage levels.
- New rail lines for example, planned in Sydney, will make an impact wherever they are placed because of the lack of whatever is not presently there.
- Conventional infrastructure for dedicated rail or bus paths becomes very expensive.

In the near future, fuel for road vehicles will become very expensive. The "alternate" technologies for support of the car are very expensive and will not appear for some foreseeable time – and definitely not tomorrow!

Dedicated public transport corridors are difficult to place into our "modern" suburbs with circuitous routes and narrow roads meaning that the only viable option on the surface is a bus. Main roads have a wide corridor but these roads are not particularly suitable for a passenger bus route because there are no houses along these paths. Urban housing estates extend for some distance away from these access roads and the whole roads system is designed merely for the motor vehicle to be used for transport. Some of these roads have wide footpaths for pedestrian/cycle use. Wollongong had planned cycle ways over decades and are now linked creating an acceptable transport method.

Ticketing systems are much to be desired. For the seasoned traveller, public transport is usually not bad. For the casual user or a visitor to our cities I presume is a nightmare! Sydney has separate rail systems, public and private buses to negotiate and soon to be private ferries. Sydney's integrated ticketing system failed because of different charge methods and operator vested interests.

For car drivers, there is one system wherever you go in the country, rules, signs, speeds, road markings. Not so for public transport users! Why are the car companies – ie – the foreign manufacturers, why are they catered for by authorities and not the people of this country? Surely if you do not want to use a car you should have the option not to? What about all the non-car drivers? These are children under 17, the elderly, disqualified drivers, the physically unable to drive and the many that do not have a driver's licence.

In the 1920's General motors in the US wanted to see why only 10% of the people in the cities drove a car. This is also the beginnings of market investigations. They found that the people did not need cars! They had the transit systems! A number of car, truck, bus and oil companies colluded with them and

one by one bought up the transit systems, closed them down, put on smelly diesel buses on circuitous routes and the public said they had had enough and went out and bought cars! (See a video called Taken for a Ride by Klein available through SBS marketing) Similarly, in Sydney, the trams were removed and burned to increase the need for cars and they also wanted the road space to run them on.

The motor car was to solve all our transport problems. But what enormous problems the car has created for our cities instead.

- Our cities are spreading out and sprawling into food producing land.
- Smog and greenhouse emissions are filling our lungs. The only way a clean set of lungs available for autopsy is a non-smoker from the country.
- Energy costs go up as available cheap energy is used up.
- We have the road fatality and injury statistics of a medium sized war!
- Our public areas are being consumed by road expansions – the roads we <u>have</u> to have!
- Social inequity is rife with many people not able to travel.
- Roaring traffic arteries create isolation which is unravelling the bonds of our communities.
- The future and indeed our present: a crisis of mobility. Gridlock is upon us!
  (Winning Back the Cities – Newman, Kenworthy & Robinson))

1/3rd of a city's land is dedicated to the motor car. Roads, expressways, garages, driveways, drive throughs, parking stations, repair and sales centres and much, much more.

Horses for courses!

- A dedicated bus corridors need 15 metres width, minimum.
- Light rail needs 9 metres.
- A heavy rail corridor needs 12 metres.
- An 8-lane road to do the same job as heavy rail needs a 60 metre corridor.
- A very light rail corridor needs 4.5 metres.

In a greenhouse world, we need to use less energy to transport people. Less energy means less carbon dioxide with our present energy systems.

- A 747 between Sydney and Melbourne uses between 7.5 and 10 tonnes of fuel, depending on the model.
- A car uses around 750 watt-hours from the fuel per kilometre. This is 6.5 litres/100 kilometres.
- An 8-car Tangara uses around 1 megawatt-hour of electricity per hour or 370 kilograms of coal. This is with a load of 1200 passengers, covering 50 kilometres and consuming around 17 watt-hours of electricity/passenger kilometre.
- 1200 cars for the same road trip from Campbelltown to Sydney (55 kilometres) as the train (42 kilometres, and say 1 megawatt and 370 kilograms of coal) needs 4,300 litres or 3.45 tonnes of petrol!

What makes Public Transport become attractive?

For a sustainable transport system, many aspects of the applications, energy, people's needs and locations of systems need to be reviewed and the fundamentals examined.

Looking at the car & roads system, it is very good to listen to the radio, have a cool space in hot weather and warm in the winter. But the cost of the system is enormous. It has tax incentives, Governments embrace the system for the taxes generated, manufacturers find it is the best consumer item ever produced and it needs large inputs of money and manpower to keep it going. For the consumer, money to buy a car, rego and 3rd party insurance, comprehensive insurance, petrol, cleaning, service, a garage, spare parts, tyres, brakes, rego checks, parking costs etc.

For a public transport system, operational needs for safety and performance are not seen by the public. The customer sees the presentation, ticketing systems and the vehicles. Part of a good system is the ability to get people on the travelling system quickly. Waiting around 30 minutes for a chance to

travel or waiting another half an hour for a connection to somewhere else can increase journey time by as much as 100%. The convenience and service quality and safety to a customer is not merely a pretty waiting or collection area, pleasant staff, clean vehicles but a frequent service. If public transport systems are to compete with the car then travel convenience is a must – and this means less inconvenience time!

In Sydney, if Cityrail is getting a patronage increase of 5% then it is loosing market share by around 5% To make inroads into this share, a patronage increase of 15% is needed to make an impact. The Sydney rail system is largely underutilised outside of the peak period. There is the opportunity for Cityrail to double its patronage in the off-peak and on weekends. Running 8-car trains with 50 people on board is a big drain on the state coffers where trains are costing an estimated $4,000/hour to run!

Tokyo has two suburban rail systems. One public and the other private. They are both using similar vehicles, have similar patronages, similar route lengths, costs and staff numbers. The private system runs at a profit and the public one does not. The answer is quite simple. Cityrail in Sydney and most of the other systems in Australia are also in the same boat as the Tokyo public systems. Privatising our systems will only make the treasury component bigger. The private operator wants to make a profit! To reduce the public money input, two things. They need to enterprise and they need more appropriate vehicles to do this.

Planners do not look at total journey times. They merely look at their component of a customer's trip. If the various components are not co-ordinated or synchronised, the customer's inconvenience from point A to point B is increased. If this is designed to be excessive, they will look at other options. This usually means driving a car! Conversely, reducing the transit time will create appeal.

How can Public Transport be made better?

There are various aspects.

- **Where business gets tax breaks to use cars,** public transport users are often charged large prices, take long times for the trips and are few people on the service for safety. There are no tax incentives to use public transport although many realise the environmental benefits. Electronic ticketing systems would lend themselves to do this with printouts of activity.
- **An injection of funds in the right places.** Rehabilitation of our present systems to be able to carry increased capacities with technologies or other means and appropriate vehicles for the task must first be considered before thinking about new systems. Questions should be asked like "Will the patronage of this service be increased with these funds?" or "Should the increased frequency mean a better service to the customer?" or "How does this improve networking with other modes and services?" or "Does the customer get a better deal with all this money spent?" Otherwise people will vote with their feet and still use cars!
- **For the present,** incorporating into the design of new systems and improvements to present ones, providing for the customer's needs and not merely making engineering solutions is half the battle towards gaining customer confidence again.
- **The conditions of travel** in the Western part of Sydney in many cases are ludicrous. For me to go to work by bus (if the services were available at the time I need to travel) is around 90 minutes with a change of bus. By car for these 20 kilometres is 20 minutes.
- **Bus and ferry support and extension services** could use the rail system as the core of a rapid transit system. Many people use the car because public transport does not meet their needs. It either takes too long, does not want to go where the customer wants, too many changes with long waits or is too expensive. Private operators want to cover costs and would prefer to make a profit to pay their shareholders. There are no incentives to use public transport.

Lets again look at the Sydney rail system. In the peak period, many services are above seating capacity and efforts are concentrated on the Sydney CBD.

- **The double-decker vehicles** are excellent for the longer urban journeys. They have lots of seats. The shorter or inner area routes can have faster, lighter, cheaper and consume less

energy single-decker trains with more standing capacity and more doors. This will allow them to load and unload quickly. This will reduce transit times between stops and dwell times at stations. Reducing 30 seconds per stop reduces end to end travel time to that of the limited stop services. The peak overlay services would not be held up with a slow all-stations service in front.

- **Off-peak services,** especially on the weekend, could have 10 minute services with smaller trains. An 8-car train costs around $4,000/hour to operate. Two 4-car trains would cost $4,200 to operate, the cost of a second driver and guard. With a 15 minute service, to get the extra $200/hour, only 40 more passengers at $5 will cover costs or 1.5 extra passengers on average per stop! Per hour per service route, 5 more passengers/stop would yield a revenue increase of around $13,500/day. (18 hours, $5/fare, 5 passengers, 30 stops/hour.) For 10 routes both ways, this is a revenue increase over costs of $27 million/year. Running at a 10 minute frequency could yield up to a 25% patronage increase or another $100 million.
- **Development targets should be specified** and all improvements and new paths should be designed around these specifications. For example, Straight platforms would allow more doors on the sides of future carriages. At present, the doors are over the bogies, the constant width from the platform. A missed opportunity was the quadruplication of the East Hills Line. If the local line and platforms were relocated to the outside, this could have begun to happen. Instead, 12 extra curves and 4 stations still have curved platforms, and soon to be 9 with the present amplification. 27 less curves would mean a more comfortable and faster trip.

Enthusiasm and not merely lip service from authorities and those in control would be helpful. Public transport is not merely for the masses but in many parts of the world is part of life. Japan has intriguing parts written in their movies where a crime is committed and the detectives find a solution that an alibi is false according to the train timetables. Lives run around these mass transport systems. Professionals and politicians rub shoulders with the masses just like we experience at the theatre or going to the coffee shop. There are various light rail fan information sites on the internet that display this. The US, the home of the motor car, is embracing light rail with fervour. Missing for 60 years, they are spending $billions on systems (that are only a shadow of what they had and ripped out) due to their environmental, fuel and traffic congestion problems. The few cities that kept theirs are now laughing with joy!

Back inside the square?

With the technology we have today, possibly putting the right components together could make a system that would be cheap to operate, have a low capital cost, have a small carbon footprint and be easily retrofitted to our modern cities. If operating costs are low, fares could also be low. On a video called “Locomotion,” a resident of Watts in Los Angeles was being interviewed about the removal of the transit systems there. With these systems gone, many of the poor and black members of the community were not able to get around and work without transport. He described the familiarity of the transit systems and loosing them was similar to “loosing your grandmother.”

Many Australians have not grown up with such systems and do not know what it is like to have them taken away or even knowing the convenience they give. Over the years, I have researched various systems and how to retrofit them to suburbia. Cost, land needed, houses to be knocked down, danger to the public, public space removed – all these things must be taken into account. Below is my idea of how the many in our cities could have the convenience of yesteryear at a fraction of the cost.

Very light rail

The time is coming when things like this will be needed. I decided to look at something new. The concept of an ultra light passenger rail vehicle is very interesting. It amazes me that governments and big businesses think that public transport things small are not able to perform. I became interested in a small people mover at a tiny cost compared to conventional rail systems or even light rail. In Queensland, the tiny cane trains are 600mm gauge and move millions of tonnes of sugar cane each year. I wondered if it was possible to transfer this concept to a people mover for cities.

Basic considerations

Examining componentry for the concept has taken a number of years. Nothing is new but merely placing all the elements together to come up with a product that will appeal on cost and performance for operators and governments alike has been interesting. There is a good opportunity here also for an export product to Southeast Asian countries for their crowded cities.

- **The axle load** must be as small as possible. This makes the necessary infrastructure such as bridges and rail weight less which reduces costs and reduces the engineering requirements making everything easier to construct. This can be done for a greatly reduced cost and move people around a city at reasonable speeds.
- **The vehicle size** is important. If it is too large, the loading gauge (the imaginary tunnel that the train travels in) can be cumbersome in retro fitting a system. Can you imagine a light rail system going into a shopping mall dropping people off right at the centre of activity? Making it the right size can make underpasses cheap and easy. Concrete drainage culverts can be used. Possibly, it can be constructed in a median strip or on a wide footpath and go into city parks, buildings, recreational areas etc delivering people right where they want to go.
- **Multiple doors** on only one side mean rapid loading and unloading. This means small dwell times at stops improving the overall transit time. Do buses have doors on both sides? Then why should rail vehicles if they only go in one direction?
- **Captive rail systems** have been developed to enable small and light vehicles to not leave the track. In the same way a roller coaster gives a thrill ride safely, these systems prevent the vehicles from tipping in winds, vandalism or from an unevenly loaded situation.
- **The speed of the vehicle** is important. The 80KPH maximum on a conventional 600mm gauge track profile would be a risk from tipping with passengers. **A captive track system would remove this danger.** A vehicle inside giving 1.5 metres wide for 3 passengers and 100mm for each wall totalling 1.7 metres wide on conventional track would need a considerable increase in stability for any real speed because of the vehicle width to track ratio of 2.8. The 1067mm gauge and a vehicle width of 1.7 metres would be quite reasonable with a ratio of 1.59. This would make possible a higher maximum speed. This would possibly be much cheaper than a monorail. Compare this ratio to a suburban 1435mm gauge vehicle with a vehicle width of 3 metres and a

ratio of 2.1. These stability concerns are not valid with one of the captive rail systems now available.

- **Negotiating small curves** means the train would need to have vehicles with a small length like the monorail in Sydney. This would predetermine seating arrangements and place constraints on wheel dynamics etc. Two compartments in each vehicle with seating facing each other would be reasonable meaning each portion would have 12 seats. Sliding external doors and a small 2 horsepower 240V air conditioner on a sliding tray and lighting per unit is all that would be needed. Possibly pre-recorded music and a public address system as well.
- **With the vehicle low to the ground**, the need for platforms is eliminated. Having the vehicle guided, the nearest thing to a platform would be a kerb height step at the same height as the floor. A vehicle length of 5 metres and a rail clearance of 200mm would be sufficient meaning a floor height of around 275-300mm.
- **A Vehicle height** consisting of 300mm ground to floor, 2-metre head height and 100mm roof thickness means an overall height of 2.4 metres. This could almost slip inside a standard living room!
- **Similar technology** is found in the TALGO system in Spain. Their trains are such that they are low, articulating, single axled and "tilting" for performance and comfort. Is it possible to utilise some aspects of this system in a manner that will not infringe on patents or possibly be manufactured under license?
- **A low centre of gravity** to help prevent tipping over. This would be needed to prevent side windage problems and minimise disturbances from passenger movements.
- **A tractive effort** of 10 horsepower per tonne (8 tonnes) and 2 horsepower per unit for comfort would need a peak energy input of around 125kilowatts of electrical energy requiring a 200 horsepower engine, powered by LPG or diesel. Possibly electrification by a third rail realising an energy consumption in the peak period is around 20 watt-hours/passenger kilometre compared with a car of 750 watt-hours/kilometre.

Vehicle outline

The basic vehicle as shown in the drawings is constructed in such a manner as to draw on existing engineering in transport.

- A pseudo monocoque vehicle construction utilising frame and sheet construction of a road bus.
- A chassis for load support with the vehicle parts constructed as a bridge supported at the ends.
- Single axle TALGO style weight saving system and suspension system. This system maintains the axle on the radius of a curve with a simple linkage.
- Truck type braking components.
- Sliding plywood doors on one side only. Does a bus have doors on both sides? So why should a rail vehicle? This is a weight, cost and complexity saving. Stops can be arranged to be on the left side.
- Fibreglass "pan" type seats for vehicles having short distance use. Padded seats can be optional.
- A conventional 2 horsepower air conditioner running from 240VAC in the middle of the vehicle under the seats on a roll in/roll out tray. Minimal ducting and control systems are required.
- Plywood bulkheads on the ends for stability.
- Foam filled walls and roof for insulation, sound proofing and panel stability.
- Tinted safety glass and this would be the heaviest component.
- The front vehicle would have a driver. Possibly future systems could be remote piloted.
- The last vehicle could have the power system consisting of alternatively a gas powered engine or power conditioning equipment if externally electrically powered. Any exhaust gases would be behind the vehicle.
- Each axle could have a small electric engine. If each portion weighed 1 tonne, 10 to 15 horsepower would be sufficient for each motor, depending on terrain. This would distribute tractive effort.
- Minimum road construction would be needed with a 2 tonne maximum capacity axle load. Lightweight rail, light steel, concrete or treated wooden sleepers and minimum road base would be needed.

- The electric motors could be 3 phase 415V induction motors giving long service.
- A train consisting of a drivers unit and 6 passenger seats, 5 intermediate units with 12 seats each and the last power unit having 6 seats gives a capacity of 72 passengers seated and 36 standing.

The impact of this small system

Such a system could be built quite cheaply. I was aiming at a train set costing $100,000 to $150,000 and a basic track cost of $100,000 per kilometre. At a maximum speed of 100KPH. I'm sure such a vehicle would attract quite a lot of attention.

I have included a map of St. Helens Park, Campbelltown to Narellan and on to Camden and Camden South in my part of Sydney. The route is around 30 kilometres passing 2 rail stations, 5 shopping centres, 16 suburbs, various schools and entertainment centres, a botanical garden, university and a TAFE. Several industrial sites and commercial centres are also on the route. There was once a branch line there until 1963. The line was obviously pulled out too soon as can be seen by the amount of development in recent times.

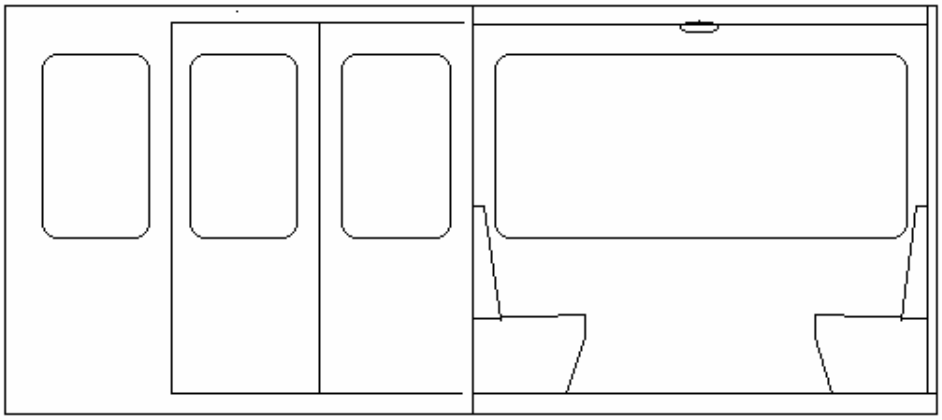
The meagre bus service is not adequate for the district. To place a conventional heavy rail or light rail system in would cost several hundred million dollars, as was the Northern Suburbs line in Perth. A very light rail system with a reasonable speed could deliver very frequent and excellent service along such a route.

- The capital cost for a 3-minute service would be 20 vehicles (and a couple of spares) and 60 kilometres of track.
- A round trip of 60 minutes would be possible with a transit speed of 60KPH.
- A balloon loop at each end would mean no turn around is necessary and doors on one side only.
- A dual track corridor would need a space 4.4 metres wide, a little wider than one road lane.
- If the example could be achieved for the above costs, less than $10 million would be very appealing (excluding bridges etc) for such a reasonable performance.
- Seating capacity per hour is 2880. Passenger capacity per hour if each trip has 2 passengers per part trip is 5760.
- Peak capacity of 2880 full trip passengers at say $1 per trip would yield $5760 per hour in the peak period for say 3 hours night and morning. For 6 peak hours per day for 7 days, this is around $240,000 income per week or $13 million per year
- With off peak average loading of 10% for 18 hours, off peak income would be $72,100 per week or $3.75 million per year.
- Total maximum income would be around $17 million per annum.
- 65 staff would have a wage bill of $2 million.
- Cost recovery could be quick.
- Participation by councils, road authorities, electricity providers, bus operators could make such a system be up and running very quickly.

The possibilities?

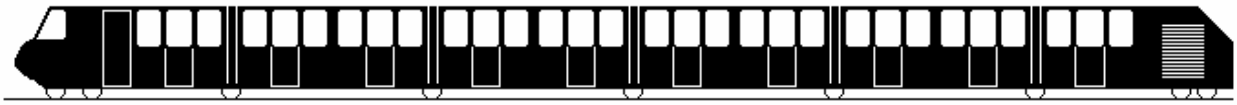
I am not an engineer but I am an avid observer of transport systems. I am interested in these things because all my children have Asthma and I would like them to have clean air to breathe! Our roads are congested, polluting and expensive to maintain. It is pretty obvious that the end of the oil age is approaching and this country is not prepared for such an event. Our carbon footprint could be reduced reducing our global warming component. The opportunity is there to get some of our transport out of the carbon fuel cycle if alternate energy generating systems are used. I am hoping that we as a country could take a leading role with innovations like we have in the past. I would be interested in our industry taking a world position again. With modern technology applied in the correct manner, I'm sure that such a system would be quite useful with a relatively insignificant cost.

Vehicle layout



Outside with door

Seating arrangements



Typical vehicle