People for Ecologically Sustainable Transport

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Submission by PEST "People for Ecologically Sustainable Transport" in response to the National Road safety Strategy

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In Europe 250 watt pedelecs reduce pollution and improve the safety and mobility of young and elderly riders.

Summary

The 250 watt "pedelec" is the safest mass produced electric bicycle. Available in Europe, but banned in Australia since 2001, it offers a simple, healthy and viable alternative to much motor vehicle travel in urban areas. New EU safety regulations will apply in 2011 and Australia should adopt them for 7 reasons.

1. In 2008 pedelecs were considered safe and used in countries with overall low road death rates per 100,000 population: Netherlands and Sweden 4.0, Japan 4.7, Germany 5.4 and China 5.7. All lower than Australia with 6.8 in 2009.

2. pedelecs enlarge public transport catchment areas and make cross suburban travel much easier across radiating rail and express bus networks.

3. Riding a bicycle uses the ergonomic 'mechanical advantage' of pedalling over walking to go 3.5 times as far, making tenfold more homes accessible to railway stations. pedelecs are even better.

4. Millions of the elderly find walking and driving too stressful. In 1990 Japan conducted research which found that elderly cyclists needed bicycles with auxiliary motors that took 50% less effort to pedal, and contributed to their own overall wellness and mobility.

5. pedelecs look similar to bicycles with male, female, fold up and tricycle frames; have wheels 20 to 28 inches; weigh 15 kg to 25 kg.; have automatic start by ignition key; cutting out at 25 Km/hr; and use EU approved lithium batteries.

6 pedelec designs with regenerative braking when slowing or going down hill extend the life or range of batteries. They can also be charged during the day from solar cells.

7. At night pedelecs could be charged with off peak mains electricity or from “back up batteries” in pedelec 'stables' at places of work, study, shop or play,.
The “back up batteries” would be charged from roof top solar cells during the day. pedelecs have the potential to reduce peak hour loads on power stations.

1. History of electric bicycle legislation in Australia

The regulatory framework in Australia is complex. Due to having a Federation of States and Territories each of which had its own road traffic rules until the year 2001 when national uniform traffic laws were adopted by the Australian Federal Government, known as “The Model Australian Road Rules”. They were initially approved by the states’ Transport Ministers. By 2010 they had all failed to create uniform road rules for electric bicycles (E-bikes) and electric scooters (E-scooters) in their home states. At this time National Bicycle Committee is attempting to deal with this problem.

As the time of writing Australian consumers are constrained from buying the best and safest pedelecs on the world market. This is so because Australia does not manufacture electric bicycles and bans the importing of E-bikes and pedelecs with electric motors of 250 watts, which are fitted to nearly all potential imports. The States’ bicycle importers, assemblers, wholesalers, retailers, and some transport researchers have been advocating an upgrade of the road rules in 2011 by increasing the current 200 watt limit to 250 watts. Also needed in 2011 is compliance with EU safety standards for ion lithium batteries and E-bike parts.

In 2010 the European Twowheeler Retailers’ Association (ETRA) was given an opportunity to explain in detail to the European Parliament why the European Union’s (EU) new 2011 regulations for the review of the type-approval for two- and three-wheel motor vehicles is not well adapted to E-bikes and E-scooters and creates even more confusion than the previous legislation, In the individual EU countries. . Therefore a Member of European Parliament, Wim van de Camp, invited the ETRA to make a submission to the EU. The ETRA submitted a proposal based on two main principles applying to E-bikes and E-scooters.

1. Exclusion of all cycles with pedal assistance up to 25 km/h in order to allow the EU to amend EN 15194, the current standard. This would exempt these vehicles from the type-approval procedure and they would be classified as bicycles. As a result they could be used In the EU without helmets, drivers’ licences or insurance.
2. E-scooters with pedals, up to 45 km/h cycles that can be propelled by the motor itself, would still be subject to type-approval but the procedure would be adapted to suit so that unnecessary requirements would not apply. Australia has no mechanism of adapting to this EU requirement.

Clearly a planning opportunity exists for the Australian Commonwealth Government to give consumers and importers what they want by adopting EU E-bicycle and pedelec regulations except for compulsory helmet wearing. Indeed

China is a major Australian trading partner and can mass produce safe pedelecs to EU standards for the Australian market at low cost.

However there are some planning and political constraints to be overcome. Like the US government, the Australian government is holding office by the slimmest of margins. Furthermore, Australia has a new Federal Government with a reshuffle of government departments, new advisory groups and the need to implement new election promises. Added to this, like the rest of the world, Australia has been struggling to deal with the global financial crisis and the need to adapt to climate change and future oil shortages. pedelecs are a case where the devil is in the detail and may be ignored by the bigger issues even though pedelecs in the long term may contribute to dealing with these bigger issues

2. pedelecs are safe and used in countries with overall low road death rates.

pedelecs and electric bikes (E-bikes) were safer in road systems with lower road death rates for all vehicles per 10,000 vehicles and per 100,000 population

a. the death rate per 10,000 vehicles was 0.8 in Japan,1.2 In Australia, 08 in the Netherlands. and 0.5 in China;
b. the death rate per 100,000 population was 5.0 in Japan, 6.4 in Australia, 4.1 in the Netherlands and 6.2 in China (IRTAD 2009)

This section presents the performance of IRTAD countries in relation to the different various road safety rates.

2.1 How to measure risks?

The relative progress in road safety depends somewhat on what one uses as a measure of exposure to risk (i.e. population, registered vehicles, distance travelled). There has been considerable debate in the past about which measure is most appropriate as an exposure measure. Those in the health sector prefer the use of population as the denominator, since it permits comparisons with other causes of injury or with diseases. As the health and transport sector increase their level of cooperation, fatalities per 100 000 population are becoming more widely used. In the transport sector it has been common, where data are available, to use fatalities per distance travelled (e.g. fatalities per million vehicle kilometres) as a principal measure or fatalities per 10 000 vehicles. Fatalities per distance travelled has traditionally been favoured by road transport authorities, as it implicitly discounts fatality rates if travel is increased. (IRTAD 2009)

2.2 Fatalities per 100 000 population.

The number of inhabitants is the denominator the most often used, as it is easily available in most countries. This rate expresses the risk for an inhabitant to be killed in traffic. It can be compared with other death causes like heart diseases, HIV/aids etc. It is a useful indicator to compare risk in countries with the same level of motorisation; it is,(IRTAD 2009).

However, not all adapted to comparing safety levels between industrialised countries and countries where the level of motorisation is very low ; for example, in the rural areas of China with a population of 200 million, but not in the ten cities of more than 10 million population.

2.3 Fatalities per billion vehicle –kilometres.
This expresses the risk for vehicle occupants to be involved in a fatal crash. This is the most objective indicator to describe risk on the road network however, only a limited number of countries collect data on distance travelled (IRTAD 2009)

Only a few countries collect data on bicycle distance travelled. A measure of bicycle fatalities per 100,000 kilometres is needed in the Australian capital cities now that there is a resurgence in bicycle use.

2.4 Fatalities per 10 000 registered vehicles.
This rate can be seen as a replacement for the previous one, in that the annual distance travelled is unknown. However this indicator can only be used to compare the safety performance between countries with similar traffic and car use characteristics. It requires reliable statistics on the number of registered vehicles. In some countries scrapped vehicles are not systematically removed from the registration database.(IRTAD 2009)

3. It is reasonable to assume that pedelecs are as safe as bicycles.

Ideally, it would be desirable to analyse the three risks described above in order to compare the safety levels in the different countries now experiencing a large growth in both bicycle and pedelec usage. The death rates per billion vehicle–kilometres show that these countries are better than Australia.

Deaths per billion vehicle–kilometres: Japan - minus 6.6%, Germany - minus 6.3%, Netherlands - minus 5.7%,Sweden - minus 4.9%, UK - minus 3.7% and Australia only -minus 2.6 %.(IRTAD 2009)

Unfortunately the development of a comprehensive road accident data system was never fully integrated into Australia's national and state road safety plans. At the same time, objectives for investments in improving data collection systems need to be clearly established, particularly for walking, bicycling and pedelec use

In Australia. it would be reasonable to assume that pedelecs with a 250 watt rating and maximum speed of 25 km-hour would be as safe as bicycles in road systems with with low death rates for cyclists per 100,000 km ridden and going along with EU pedelec regulations. That assumption has to be made because of the neglect of the need to collect data on bicyclists exposure to risk on Australian roads which would have justified more provision of bicycle infrastructure and safe speed limits like they have in the Netherlands, Sweden, Denmark and the UK new towns. We also need to ban using Ibullbars in cities and dangerous mobile phone

4. This submission focuses on road safety in the Netherlands

In the Netherlands from 1990 to 1999 the bicycling death rate per 100 million passenger kms dropped from 2.4 to 1.4 and by 2008 to 1.0. Since 1970, the reduction in fatalities has benefited all age groups but the most impressive reduction concerned the youngest group (0 to 14) for which fatalities decreased by 95%, from 459 in 1970 to 23 in 2008. (IRTAD 2009)

In the Netherlands 70% of urban roads had speed limits of 30 km/h or less in 2008. A similar development took place on rural roads (excluding state roads): in 1998, 3% of the road length had a limit of 60 km/h. By 2008 the percentage had risen to 60%. These infrastructure developments have reduced driving speeds on these roads substantially. (IRTAD 2009)

Helmet wearing was compulsory on motorcycles since 1972 and on mopeds (up to 50 cc, maximum speed 45 km/h) since 1975. A helmet is not compulsory on mofas (up to 50 cc, maximum speed 25 km/h) and bicycles. The percentage of riders wearing a helmet depends on vehicle type: nearly all motorcycle riders wore helmets. In 2008, 96% of moped riders, but very few mofa riders, wore helmets. Although the use of moped helmets by passengers increased in 2008, only 75% wore them.(IRTAD 2009)

The 2005 Mobility Policy Document set ambitious goals, including reduction of annual fatalities to no more than 500 by 2020 and of hospitalised casualties to at most 12,250. These goals necessitate ambitious policies, which led to elaboration of the Road Safety Strategic Plan 2008 to 2020.(IRTAD 2009)

In Australia we cannot make valid international comparisons with Netherlands data because reliable data on the distance travelled by different categories of cyclist especially young children, are not collected in a uniform manner . That does not mean that bicycles and pedelecs are unsafe but that vulnerable road users have been neglected. Indeed the proposed EU pedelec regulations should be reinforced with the EU ban on the use of bull bars in urban areas. 2011 is the time to give vulnerable road user a fair go by adopting the EU regulations.

5. China is a major Australian trading partner and can mass produce safe pedelecs to EU regulations for the Australian market at less cost.

Action is needed to persuade the Commonwealth and states' transport ministers to adopt European Union electric bike regulations in 2011. Then Australians can buy the latest Chinese made pedelecs, many of which are made to European and Japanese designs. This is so because China is changing fast into a high value added manufacturing nation, like Japan's development in the 1960s and 1970s, and is making pedelecs with lithium batteries for export to the EU, Japan, the US and Canada. In 2010 China will produce 50 million electric bicycles, pedelecs and electric scooters. (Parker 2008).

China 60 y ears ago built bicycle friendly infrastructure in most of their large flat cities. The early petrol power assisted bicycles (PABs) and bicycles used bicycle lanes and parking infrastructure, improved travel speeds and safety, and enabled convenient parking . This extensive infrastructure partly explains the high demand for power assisted bicycles compared to other Asian cities without bicycle infrastructure. (Zang 2007)

Many millions of PABs were in use in China prior to 2004 and most of them are now banned in some large cities and replaced by e-bikes and now pedelecs. A specific example is Shanghai which has a population of 20 million people and a million licensed PABs so they decided not to issue new licenses and only to issue them for e-bikes as they did in Bejling and other big cities. (Parker 2008).

This happened because measures were introduced to reduce road accidents by reducing dense urban traffic speeds, providing more bicycle Infrastructure and banning polluting motorcycles in many cites in 2006.

In January 2010 China had a population of 1,336 million and just over 50% of them lived in cities that are expanding and creating a lot of problems for urban planners and developers that require energy efficient solutions. China needs to constrain the unsustainable demand of carbon intensive imports Including oil and cars mostly used by China's new rich. In 2009 air pollution killed around 400,000 people and there are 70,000 roads deaths of whom 40% are cyclists and pedestrians.

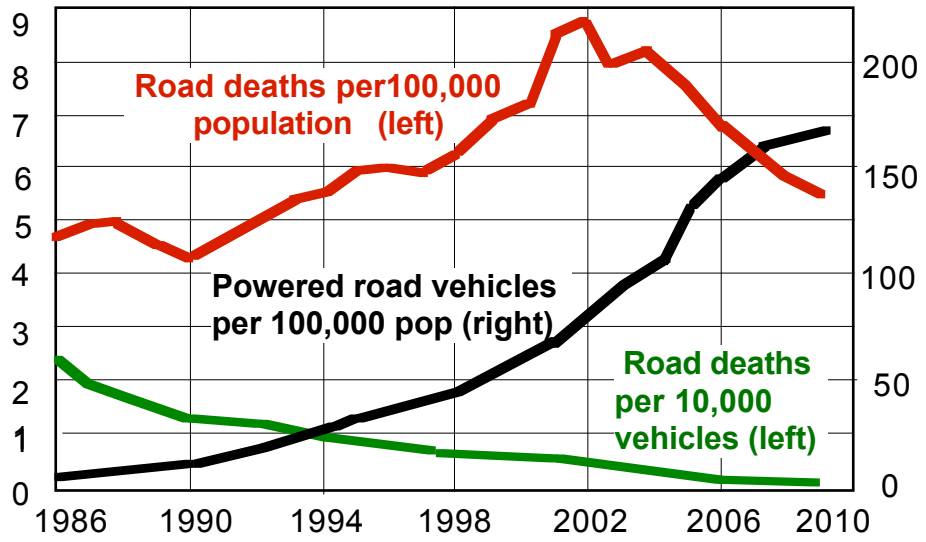

Figure 1. China: road death rates and growth of road vehicle population. Sources. Ministry Public Security for all road traffic data, and deaths within 7 days of an accident. Note that Ministry of Health data is for total deaths within 30 days as in most other countries and is around 100,000 more at the peak because of the extra 23 days

China, like the Netherlands, recognises the need for policies to reduce the road deaths of cyclists, electric bicyclists and pedestrians. The total road death rate per 100,000 population was 9.4 in 2002, but has now dropped to 6.2 (IRTAD 2009)

For 130 million Chinese over 65, people with less power in their legs, pedelecs provide welcome extra power assistance . For those with osteoarthritis in their hip, back, knee or ankle joints the pedelec can help some sufferers replace painful walking trips. (Wang et al, 2002).

China, is facing the same problems as Japan and several EU countries who are leading the way with introducing pedelecs, energy efficient hybrid cars, electric cars, trucks and railways. All are trying to deal with some combination of four serious future problems: Global warming, oil depletion, population growth, and economic recession, perhaps three of them and certainly two of them are imminent according to experts who understand these risks. Indeed China and US and EU are to take action by 2020 .(US Academy of Sciences 2007)(Xiong et all 2009) .

Australia does not have many pollution reduction policies in place to contain these four serious problems. Hopefully in 2011 the Australian National Road Rules banning the world best pedelecs and e-bikes will be removed and Chinese pedelecs confirming with EU regulations can be imported.

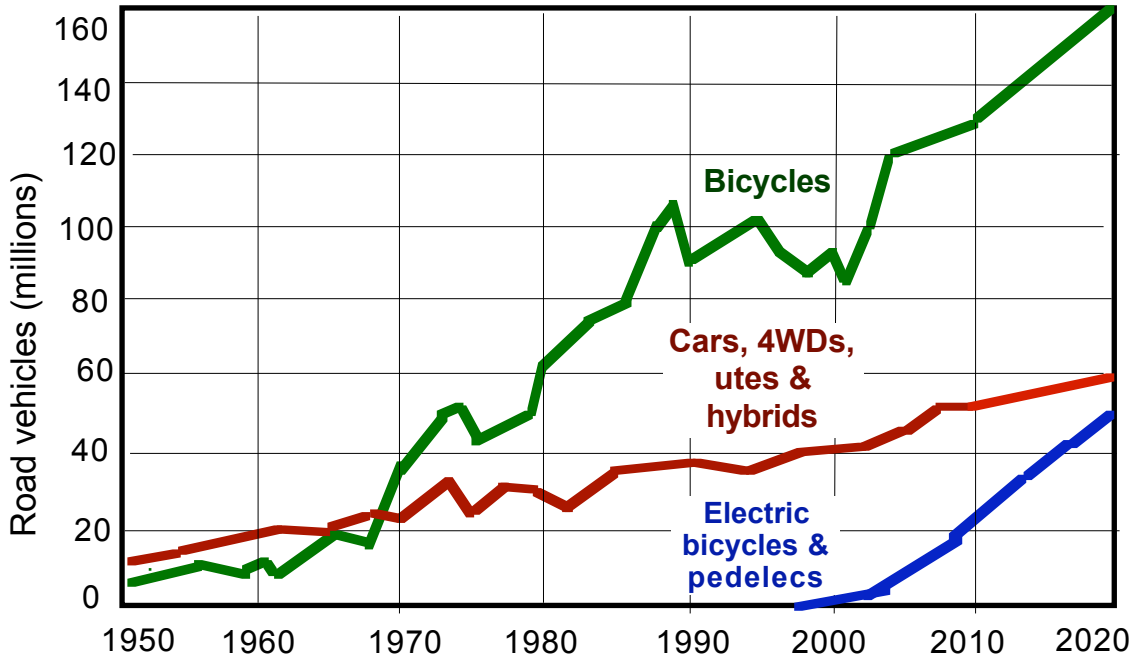

Figure 2. World production of road vehicles 1950 to 2010 (millions). Bicycles: Electric bicycles and pedelecs: cars, 4WDs,utes, and hybrids.

Source: Source: Worldwatch 2007, CyclePress 2010
Cycle Press (2008) *2008 China bicycle year book In English and Chinese Tokyo,* Cycle Press, Jamerson, F and Benjamin, E (2007) *Electric bikes worldwide reports 2007 update.* Electric Battery BicycleCompany, www.ebwr.com. Estimate 2010 to 2020 author Alan, A. Parker

Figure 2 shows the rapid growth of the electric bike and pedelec world market growth from around 1995 to 22 million by 2010 and it is hoped that by 2020 the world will produce at least 50 million. This would help alleviate some global

problems. It also shows the lower rate of growth of the car Industry world wide from 1950 to 2010. The the huge increase in the sales of bicycles world wide to 130 million a year is likely to increase to around 150 million by 2020 and as the world population ages more elderly cyclists will be buying E-Bikes. The E-bike and pedelec boom world wide is taking off and together can help alleviate some global problems which are seriously out of control.

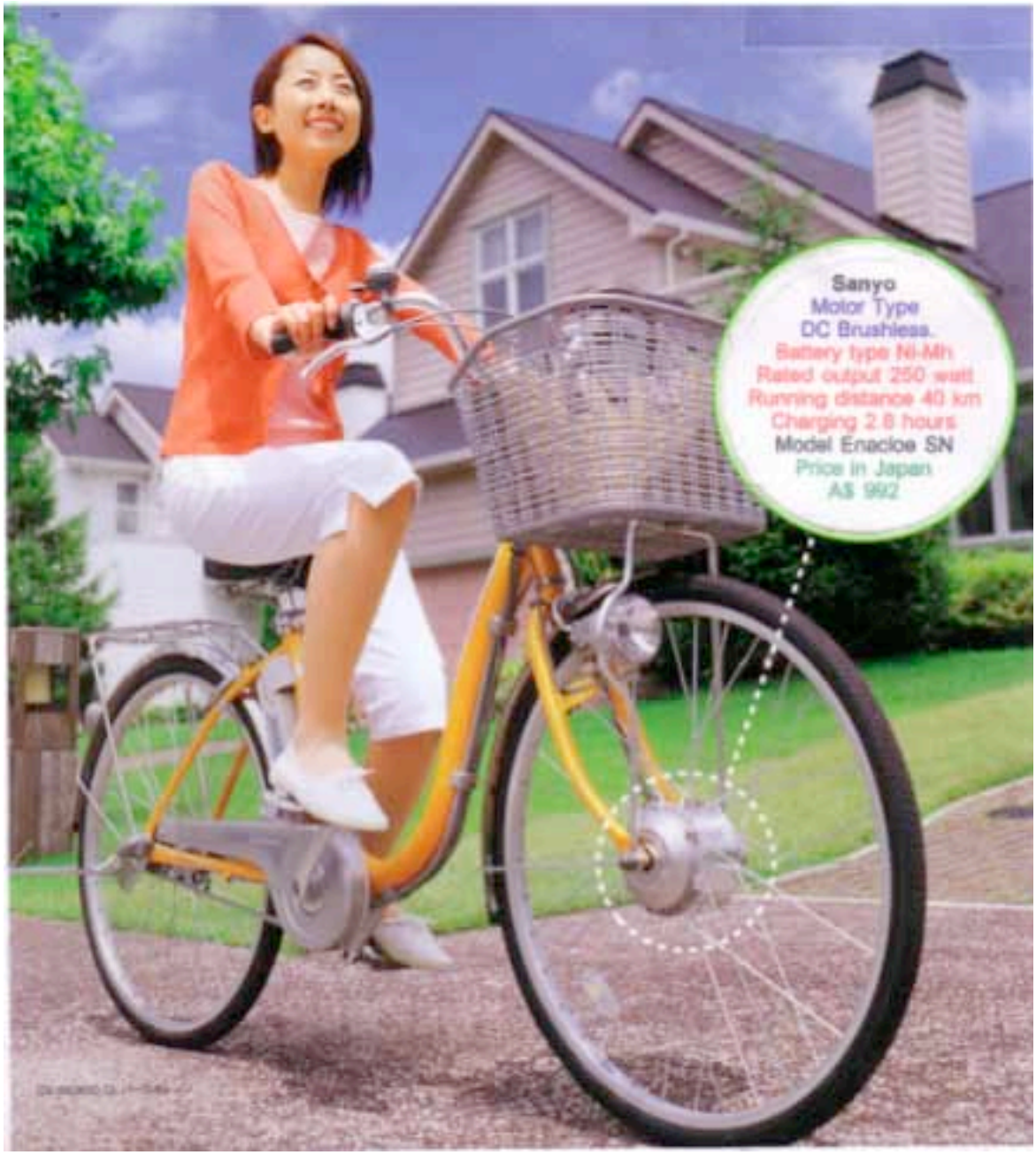

Figure 3. Japanese pedelec with ladies frame. Note the front wheel motor and small battery behind the riders right foot. It looks and rides like a bicycle as do most Japanese pedelecs sold in 2010 which also have Lithium batteries

6. Model Australia Road Rules enacted the ban on pedelecs

In 2001 the Model Australia Road Rules enacted the ban on pedelecs with the 200 watt rule. However early in 2011 there is some recognition of the need for EU regulations in Australia. The Australia e-bike rule has created a hidden restriction of free trade with major trading partners and denied consumers freedom to buy the safest 250 watt pedelecs. No state transport agency would dare ban the imports of Japan's other energy efficient and greenhouse friendly vehicles and enrage consumers. (Parker 2008).

Another fact that is certain is their are millions of Australians over 65 with less power in their legs for whom pedelecs and E-bikes will provides welcome extra power assistance.

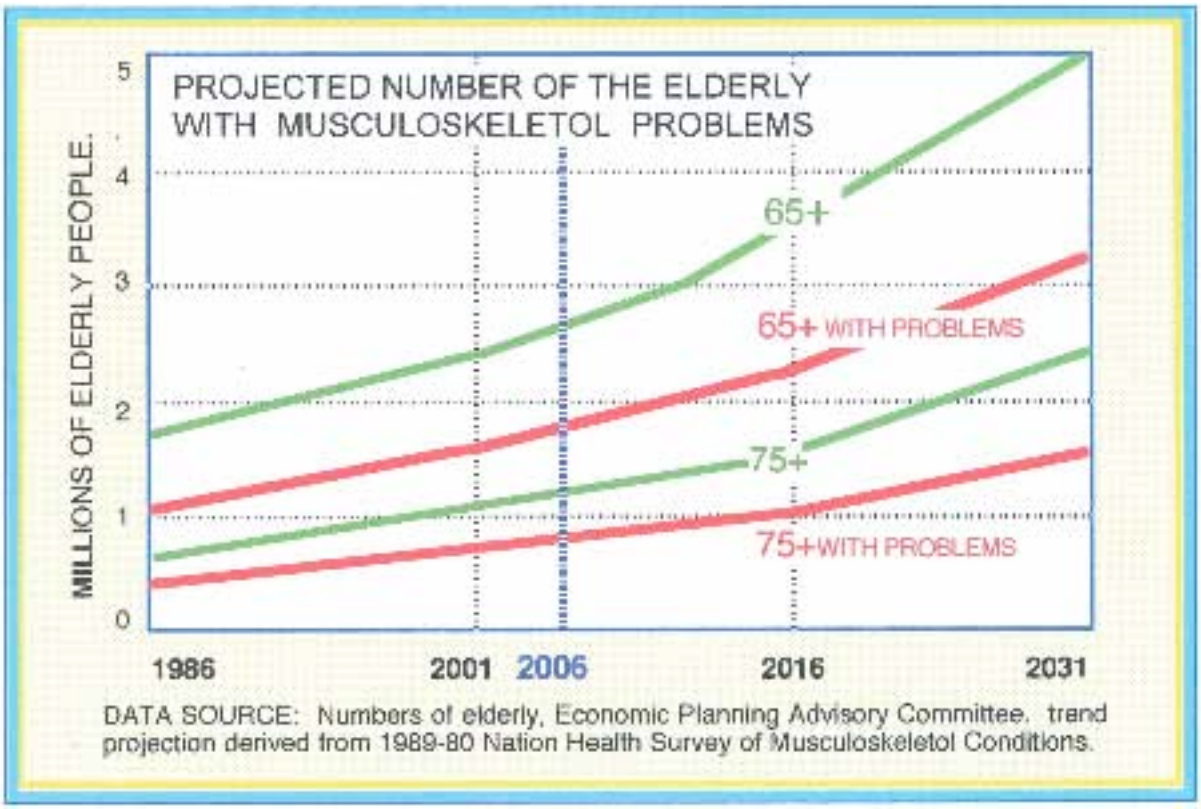

Figure 4

For the most part, it appears that most older drivers compensate for the changes associated with ageing in Australia by driving cars (Monash). The problem for those who do not have the choice of driving a car, or who prefer to exercise for health reasons and have difficulty with walking, is that they need power assistance in order to ride a bicycle effectively, particularly in hilly areas.

A submission made by this writer to the NSW RTA recommends that a 650 watt limit would be appropriate for E-bike users in hilly areas and with a proven medical need, as applied in New Zealand at at the discretion of the Minister for Transport

7. Solar power assisted pedelec in historical perspective 1900- 2006

To put today's high solar power assisted pedelec into historical perspective we need to look at the benefits of power assisted bicycles (PAB) with a petrol engine from 1900 to the 1990s and compare that with the technical innovations creating the rapid growth of the market for pedelecs from 2006 and beyond.

Consider the oldest British version of the 1900 model of Singer motorised back wheel that was very heavy and fitted into a heavy duty bicycle frame. Although cumbersome, motorised bicycles were popular for touring from 1906 until 1914. Their use slowly declined after World War 1 as cars took over. In the great Depression Australian car use declined but the use of bicycles enabled some of the poor and unemployed to survive.

With the introduction of the dole in the 1930s life was a little better but most were better off than most people in Europe and the US. (Potts2006). After World War 2 , the economic necessities of post war reconstruction in Europe encouraged a revival of the manufacture of bicycles and PABs, which were imported into Australia; most were driven by two stroke engines with a dirty exhaust . They were in use as a means of mass transport in the 1950s which reached a peak around 1965 and then steadily declined again as car, motor cycle, moped, and motor scooter sales increased.

The PAB was ergonomic to pedal with a high saddle and bicycle pedals. As mopeds and motor scooters became faster they were used on roads in most of Europe. Where bikeway networks existed In Dutch cites PABs and mopeds users rode on the bikeways. By 1990 cars and trucks dominated the roads of Europe, Australia and the US and PABs were rarely seen.

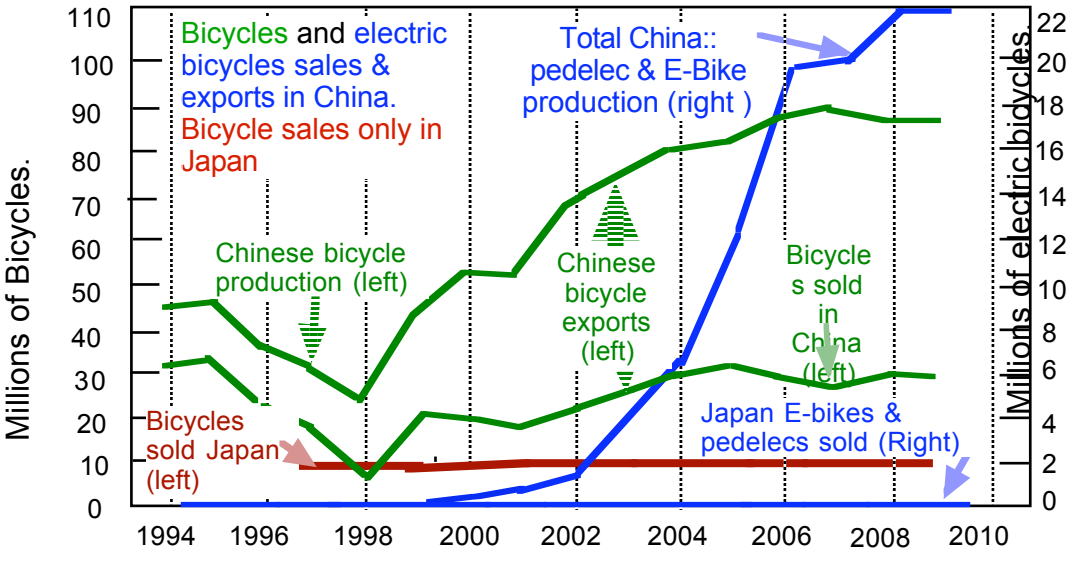

Figure 5 Bicycle and electric bicycle production in Japan and China
Data source Cycle Press (2009)

In Japan, India and China there were many types of motorised two wheelers, many were very unsafe. Several Taiwanese companies were making PABs with 30 cc petrol engines mainly for the domestic and Chinese markets. In 1984 Honda introduced the 'People,' a PAB with a 24 cc petrol engine weighing 26 kg that was used in Japan and exported to other Asian countries.

Public transport in the largest cities has become strained from the effects of the fast growth of car ownership (Weinert et al, 2008) National government support due to national energy efficiency and reduced air pollution goals will be backing up local and city governments and the polluting PAB will soon be scrapped in large cities. In the poor villages they may still be used until the PAB, its lead acid battery or engine wears out.

7. The mass production of electric-bikes then pedelecs 2000 to 2006.

Figure 3 shows Chinese power assisted vehicles but does not distinguish between pedelecs, e-bikes and e-scooters. Industry sources state that in the early years e-scooters and e-bikes had lead acid batteries and total product increased to 19.5 million units in 2007.

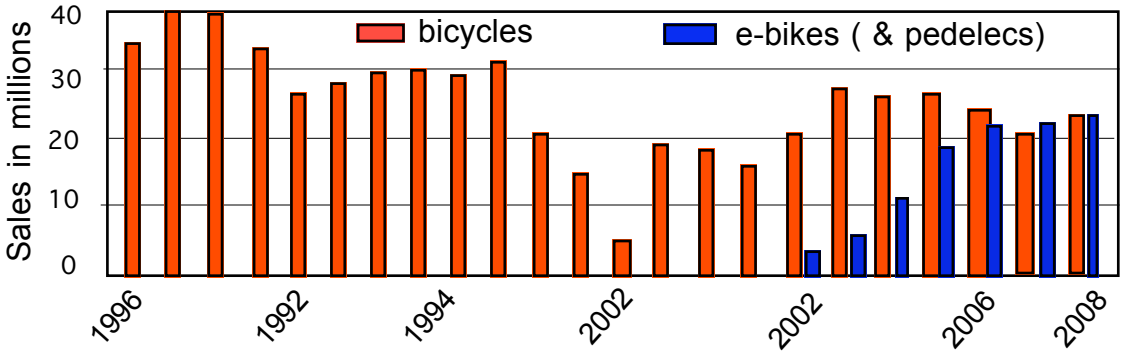

Figure 6 Bicycle and electric E-bike and pedelec production in China
Data source Cycle Press (2009)

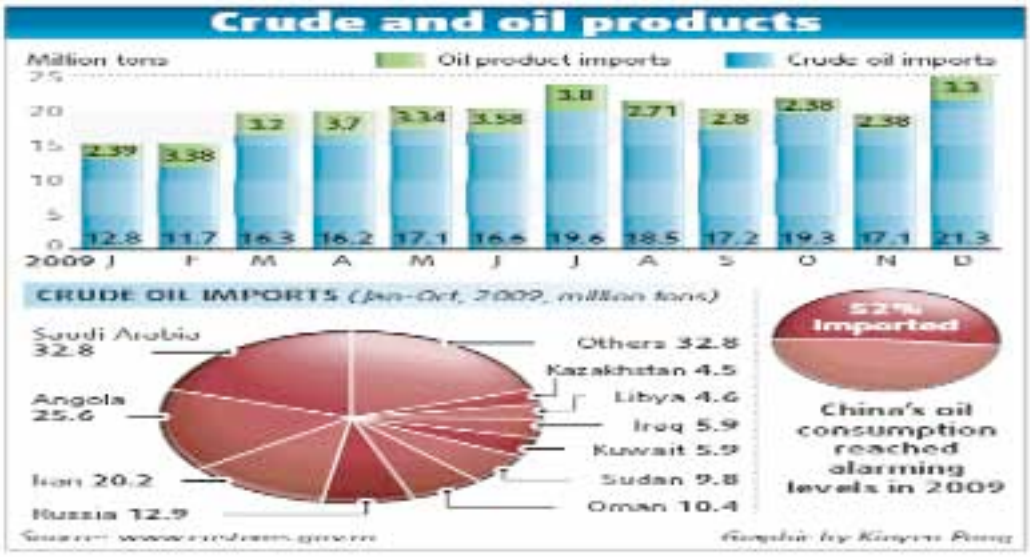

Fig 7

8. Pedelecs enlarge public transport catchment areas, making cross suburban travel easier across radiating rail and express bus routes.

Australia needs to better integrate between alternative transport modes they do in Europe and Japan. Europe and Japan have greatly reduced car use and multiple car ownership in households because of their need to be less reliant on fuel price increases and future fuel shortages. The price of Australia's imported oil is now US$ 85 a barrel and will inevitably double in a few years.

Outer suburban households are going to need bicycle networks and shared car services that connect with new stations and new trunk express bus routes. The Netherlands is also promoting bicycle and pedelec access to stations and other transport stops/hubs which is an effective, practical way of increasing the catchment area of each station,

Riding a bicycle uses the ergonomic 'mechanical advantage' of pedalling over walking to go at least 3.5 times as far, for the same physical effort. Cycling rather than walking increases the number of homes with access to stations by around a factor of 10. The pedelec increases the number of homes with access to public transport by at least a factor of 20 over walking and cycling.

This is why Australian modal interchanges and rail stations need to become a highly visible focal point of surrounding bike networks and become the objective of land use development and urban renewal. The use of pedelecs could become the main means of local transport and to access rail stations or express and trunk bus routes, providing that secure parking is available.

Our capital cities have sprawled In the hilly parts of Australia and 250 watts pedelecs would enable able-bodied people to cycle much more than they do now which is an important safety consideration because of the need to ride up hills without weaving. It reduces the speed differential with motor vehicles when riding in the kerb lane or a bike lane. This why the Bicycle federation of Australia recommends a 300 watt power output for pedelecs.(Salomon 2008).

pedelecs could be used to enhance personal mobility in hilly areas much the same way as bicycles do in flat cities. In Japan , housewives and elderly cyclists start to give up cycling when it becomes too strenuous but when 250 watt pedelecs are available they will use them. See below. From a strategic transport planning perspective, investing in urban bikeway networks and using solar assisted pedelecs, and public transport reduces the demand for coal fired electricity which is the most sustainable way of all to reduce GHG emissions

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The "back up batteries" would be charged from roof top solar cells during the day. pedelecs have the potential to reduce peak hour loads on power station.
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Figure 8 *Shows an able bodied female around 55 kg in weight riding easily up hill. An overweight male of around 110 kg would stall the motor very quickly. This is why those with weight problems need a extra 150 watts more than the existing 200 watt maximum power output.*

9. Japan's energy concerns creates energy efficient transport .

Japan is completely dependent on imported fuels and the cost of electricity was very high with a stagnant economy and ageing population when it slashed fuel demand in 2009.

This explains the large Japanese investment in the rail network and the 27% of trips made to work or education by public transport by 1990. Five million people cycle to the rail system every workday; around 15% of the population cycle all the

way to work and another 12 % walk to work. Japan's energy security policy has reduced oil dependence in the transport sector from 80% in 1973 to 50% in 2004, thus reversing a negative trend (Hooke 1994).

The economic benefits of the Japanese energy security policy 1973 to 1994:

> This policy....as part of a broader policy to nurture its domestic industries, constrain consumption and encourage savings and minimise the costs of inputs to industry. By minimising aggregate transportation costs, Japan has been able to minimise. production costs, making their goods more competitive in international markets. Further by constraining the use of automobiles and encouraging savings a larger pool of potential investment capital was created ... and encouraged investments in modern technology... The bicycle far from being a symbol of economic backwardness is rather a symbol of a society able to meet its passenger transport needs in a most cost effective and least environmentally damaging way, allowing scarce economic resources to be invested elsewhere." (Hooke 1994)

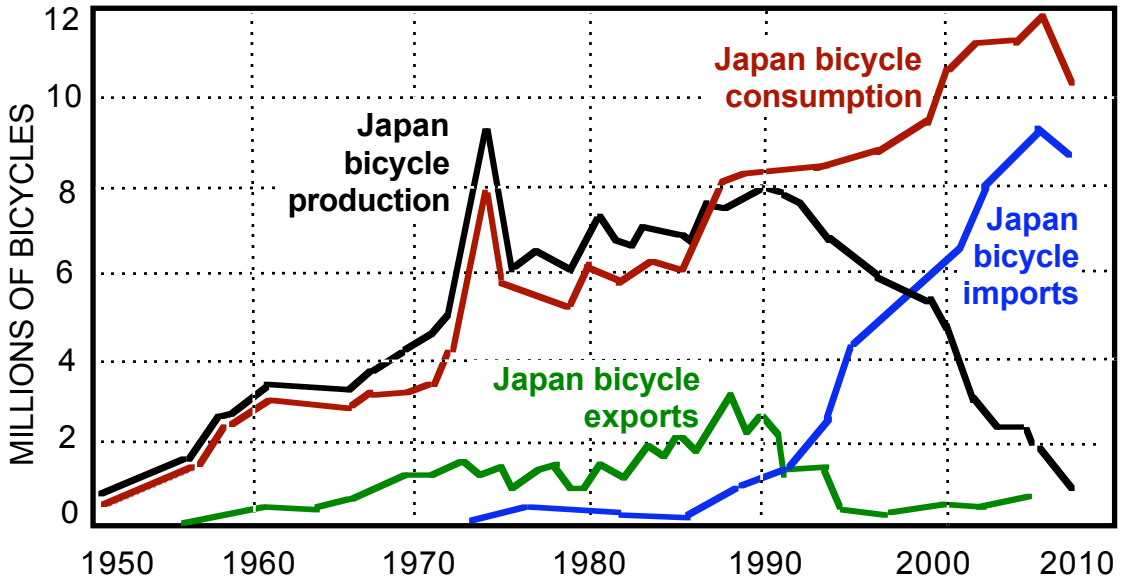

Figure 9. JAPAN: Blcycle production, imports, exports, and domestic consumption

Data source: Japan Bicycle Manufacturers Association

This also explains why Japan has been exploiting renewable energy resources since the early 1990s and now generates half the world's solar power.

10. In 1990 Japan's energy policies produces the solar pedelec.

This fits in with the evolution of the mains electric pedelec into a solar powered means of transport. Solar powered electric cars requiring 50,000 or more watts power output have a limited future, but electric pedelecs with a power output of only 250 watts are economically viable now and will be on the market within a few years.

Indeed, the Japanese solar power industry is expected to grow fivefold by 2010 when over one million homes will generate their own electricity from solar electric panels. In the last three years there have been several experiments using solar electricity for the recharging of batteries of a pedelec and other domestic appliances.

The most important innovation to this time came in 1989 when Yamaha introduced the second generation of electric bicycles for the Japanese market. The Yamaha electric 'PAS Prototype' was a major design breakthrough with torque sensors in the cranks linked to the motor controls for automatic power assistance when it is actually needed. The basic design concept was that only half the normal pedalling effort would be necessary for most trips and that hills and strong head and cross winds would be far less of a constraint.

The annual sales of pedelecs in Japan (shown in figure 4) has stabilised at around 350,000 a year but is likely to increase as the growth of the elderly population increases. (CyclePress 2005-2008-2009). Also the safety agency did not want the power assistance to be used by irresponsible male cyclists to go fast on footways or narrow access roads shared with pedestrians in their cities; as a consequence a computer chip to automatically fade out the power assistance to less than 25 KPH was developed.

In operation the extra dead weight of the lead acid batteries and motors limited speed and this deterred fit young people from buying them. Japan was researching new light batteries for the car Industry as a spin off between 2001 and 2004 NiCad or Ni-MH batteries were available on E-bikes. By 2010 low weight lithium batteries were fitted to all new Japanese made pedelecs and the objective of enhancing the mobility of the elderly has been achieved.

The Japan Bicycle Association Foundation of the major manufacturers has committees on Bicycles, Components, Safety and Trade that offer advice and assistance. The Bicycle Committee includes experts on electric bicycles with automatic speed limitation. This Committee has a relationship to the Safety Promotion Committee of the National Police Agency in matters dealing with the safety aspects of electric bicycle design.

Compared to Australia it is a more complex system of design guidelines, design and safety standards but it has produced products that are well engineered with high quality. that has benefited Japanese consumers and could also benefit Australian consumers and allow the import and sale of Japanese designed pedelecs form China into Australia and for them to be classified as bicycles.

!0.1 Japanese National Police Agency established the rules and regulations.

The Japanese National Police Agency established the rules for speed limitation and controls in 1993 and the Road Traffic Law Enforcement Regulations were established in 1995 which allowed E-bikes to operate on roads with traffic.
Approvals for new pedelec models require the following procedures:

1. The design, quality control, handling instructions, and test results are submitted to the National Public Safety Commission for examination and approval. (Jamerson and Benjamin 2005 and 2007)

2. The Commission asks the Japan Traffic Management Technical Association to test the models and report back the results. When tests and other requirements are met, the Technical Association grants a certificate of approval to the manufacturer. (Jamerson and Benjamin, 2005 and 2007)

A regulatory revision introduced in 2008 in Japan increases the power assistance from 1:1 to 2: 1 doubling motor power only at speeds of less than 6 kph. New pedelec models boosted sales The change spurred an increased in pedelec sales in 2009 to around 350,000. (Cycle press 2009).

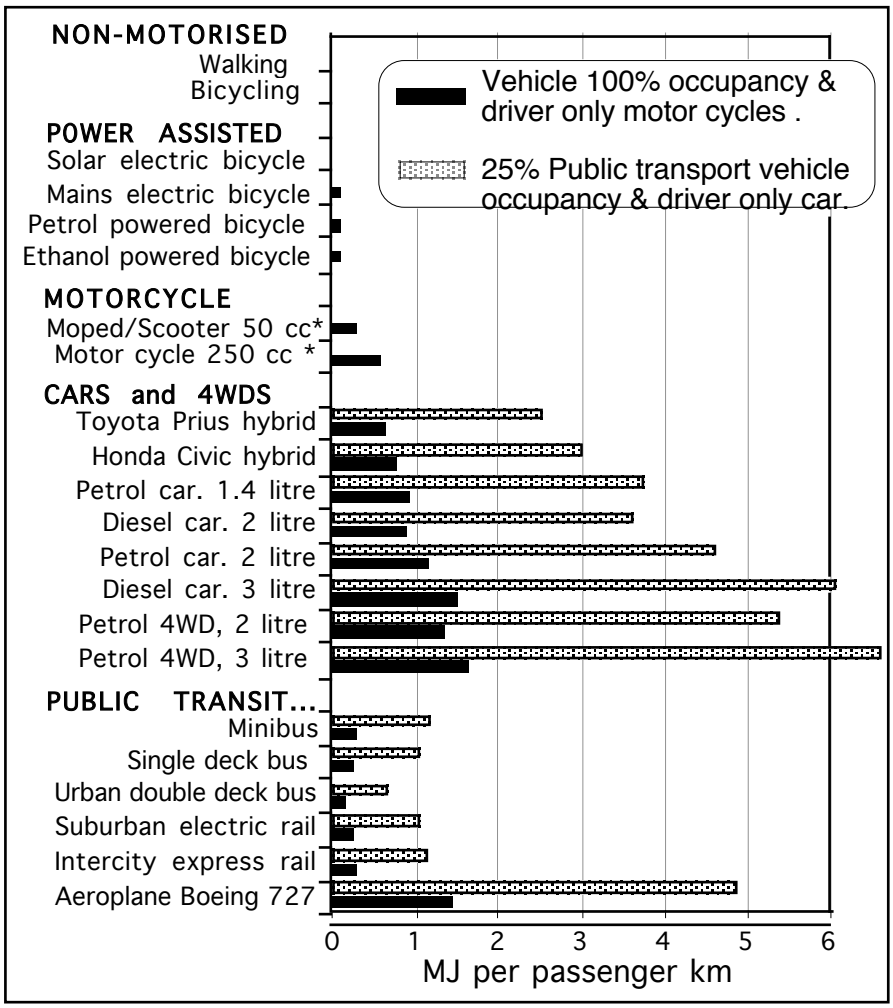

Figure 10 shows the energy efficiency per passenger km of Japanese pedelecs and petrol/electric hybrids compared to other vehicles.

SOURCES: Public transit: European Commission 1992 "The impact of Transport on the Environment". Greenhouse office fuel consumption guide 2002-2003. Parker 2004 Electric Bike data

11. The oil conserving role of solar powered pedelecs in Australia

Is clearly shown on figure 10. In Australia only 5% of condensate will be produced from Australian refineries some of which may be shut down. Crude oil production from known oil fields will dramatically decline by 85 % 0ver the next 10 years the prospect for new oil discoveries is not very good. Oil provides 40–43% of all energy used by the United States, Europe, and the world.

Oil dependence varies, 30% in China, 50% in Japan, 59% in the EU 82%.It seems that China and the US will be facing the same problem of a dangerous dependency on imported oil and the sooner the US implements an energy security policy like the Japanese did in 1970 the sooner the twin risks of global warming and peak oil will be controlled.

The price of West Texas Crude was $US 132 a barrel on 28-5-08 an event which was not anticipated In studies by Commonwealth agencies who have assumed that the price of oil in 2020 will be around $US 25 a barrel. In 2005 the Bureau of Transport and Regional Economics (BTRE), the IEA, EIA and Opec produced a grossly inaccurate projection of future oil prices which are shown on Table 1. The unsound forecasts of the International Energy Agency (IEA) and other prestigious overseas energy agencies were blindly assumed to be true by Commonwealth bureaucrats, particularly the Productivity Commission and the BTRE.

Some government economists have made serious errors of judgement because they have put their faith in oil reserve estimates that ultimately are derived from the nationalised oil industries of dictatorial regimes. These countries do not publish details about how much oil is extracted from each reservoir, what methods are used to extract that oil; nor do they permit external audits. (Economist 2006)

Table 1 Oil price forecasts for the period 2010, 2020 and 2030 (US $ per barrel)

Government or intergovernmental source	2010	2020	2030
International Energy Agency (IEA).	22	26	29
Energy Information Agency (EIA); US Department of Energy.	23	25	
European Commission (EC)	28	33	40
Organisation of Petroleum Exporting Countries (OPEC)	19	19	
Institute of Energy Economics Japan (IEEAJ)	24	27	
Centre for Global Energy Studies (GGES)	20	15	

Source: (BTRE 2005 working paper 61. p. 24).

The Chief Economist at the IEA is now taking a more realistic approach to future oil prices and states that the price of oil in 2030 will perhaps be US $121 above the estimate in table 1. *(Birol, F. 2008)*

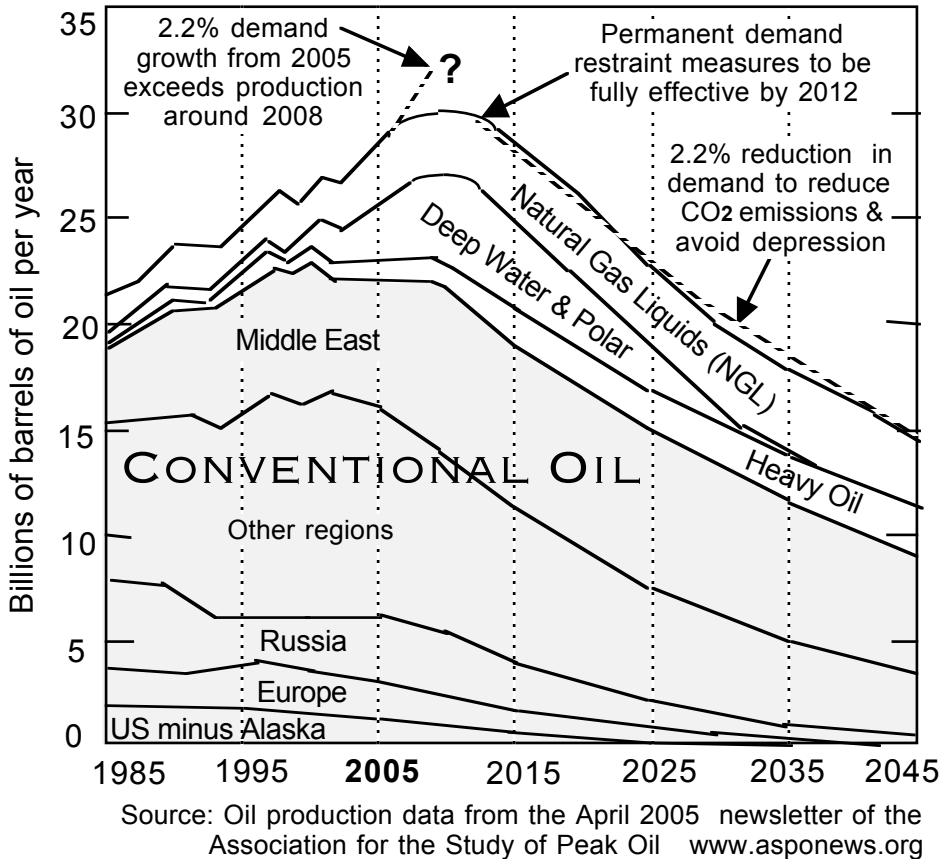

Figure 11 shows the problem of oil supplies peaking around 2010

Some government economists do not accept that oil shortages are inevitable. because low cost clean conventional oil is a finite resource. Nor do they accept that the high quality oil gets used up first and the quality drops off as an oil field becomes exhausted over many years. They believe that by increasing the price of crude oil the market creates more of the good oil, when all it does is to increase the supply of carbon intensive sour and heavy oils, tar sands and other substitutes with a much lower energy return on energy invested. To extract and refine them into fuels costs more and increases CO2 emissions. (Parker 2007)

The price of West Texas Crude was $US 132 a barrel on 28-5-08 an event which was not anticipated In studies by Commonwealth agencies who have assumed that the price of oil in 2020 will be around $US 25 a barrel. In 2005 the Bureau of Transport and Regional Economics (BTRE), the IEA, EIA and Opec produced a grossly inaccurate projection of future oil prices which are shown on Table 1.

The unsound forecasts of the International Energy Agency (IEA) and other prestigious overseas energy agencies were blindly assumed to be true by Commonwealth bureaucrats, particularly the Productivity Commission and the BTRE.

Because peak oil is certain to occur it would be prudent to conserve oil to maintain essential public services and food production. A major change is needed in the planning and management of the Australian transport sector which has one of the highest levels of per capita car and air travel, road freight carried, greenhouse gas emissions and oil consumption in the world. There is a need is to reduce oil consumption by 2.2 % per year by decoupling the growth in oil consumption from the growth of GDP and persuading regional neighbours to do likewise. (Heinburgh 2006).

Note that figure 11 uses data produced by the Association for the Study of Peak oil at about the same time as the BTRE., the IEA and OPEC made their absurd forecasts of the price of oil in 2010 and 2030 shown in table 1.

A US study and recent Senate Inquiry into future oil supplies recommended that government take a risk management approach to future oil shortages. However that has not been done so far. (Senate 2006).(Hirsch, Bezdek, and Wendling 2005)

12. Four Austrlian niche markets that need to to grow by 2016

For the future there are four niche markets that can reasonably be expected to grow and contribute to a safer and more sustainable Australian passenger transport system:

1. People of all ages using their own or company electric pedelec at apartments, factories and offices with mains electricity or solar battery charging and secure storage facilities.
2. Commuters and students using electric pedelecs to access rail stations and modal interchanges. Five million Japanese park bicycles at rail stations every workday. Electric pedelecs will progressively move into that niche market for multi-modal travel, as many users need a bicycle at both ends of their rail journey.
3. Young male and female bicycle riders using electric pedelecs to take the extra physical effort out of riding in hilly cities so that they are as mobile as cyclists in flat urban areas.
4. The elderly for all kinds of trips particularly for recreation and shopping; light weight fold-up electric pedelecs are allowed on bullet trains and easily fit in the boot of a car.

This writer,s personal experience in coping with a serious heart problem is that there is lot of benefit from the gentle exercise when riding an E-bike on the flat with a max power output of 200 watts. Being overweight there is also a need to manage the extra effort required to ride uphill. pedelecs provide automatic power assistance on uphills so that it is possible to safely maintain a safe level of physical effort exercise for those who are not overweight and of average height but for the overweight it is not .

A choice of a pedelec or E-bike that has sufficient power output for riding uphills is definitely needed. The tests conducted in Germany on 20 pedelecs and E-bikes

reveal that some of the them give relatively less power output on the flat but provide more assistance on hills. The tests results enable potential buyers to pick the ones most suitable for their needs which vary according to the terrain they ride on. (ExtraEnergy Test report 2007)

13. Conclusion

This paper proposes action by Australian government bodies to enable pedelecs and E-bikes to be used so as to reduce carbon emissions, air pollution and enhance the mobility of the elderly and the partially disabled.

Those concerned with the twin threats of global warming and peak oil need to know that the next advance in the design of pedelecs is well on its way and being applied In Japan. China is a major Australian trading partner and can mass produce safe and sustainable pedelecs to EU regulations and safety standards for the Australian market at low cost. Austraians should the right to buy them like they have to safest cars

n 2016 the mains charged pedelecs and E-bikes are potentially just as important as the various kinds of hybrid car in reducing carbon dioxide emissions. and for reducing the growing dependence on imported crude oil that will probably increase to US$150 plus per barrel by 20 (Parker 2007). Australia needs both these hybrid vehicles and lots of them as quickly as possible.

In 2016 years the solar electric charged pedelecs and E-bikes have the potential to be a growing means of motor transport in cities to replace car trips of less than 10 km and to access public transport for longer trips.

The problem has been the lack of political will and the absence of a future vision of what really needs to be done to cope with an uncerntain future in a rapidly changing world.

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