

In Australia 250 watt Pedelecs cannot enhance the safety and mobility of young and elderly riders due to inept state laws

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1. Summary

The pedelec invented, tested and made in Japan in the 1990s and mass produced in Europe, China and Japan since 2007. Fitted with ion lithium batteries by 2010, charged by small solar cell arrays at home or work by 2015, could de-congest the roads, the clean up the air and reduce CO2 emissions in the cities of the EU, China, Australia and the developing world by 2020. The adoption of new Pedelec safety regulations, by the EU, China, Australia and other countries during or before 2012. Speed limited 250 pedelecs are a safe, healthy and viable alternative to unsustainable car travel in cities needed for the evolution of sustainable transport for 2 billion city dwellers by 2020. Consumers able to legally ride pedelecs as bicycles and make better use of both existing and new bicycle infrastructure. In Australia the 200 watt limit and contradictory state regulations need to be replaced by EU regulations as the Chinese government intends to. Other aspects of the Pedelec and its potential use in cities follow.



1.1. Definition of the pedelec: it usually looks look similar to a bicycle with a female frame (figure 1). Pedelecs have male, female, fold up and tricycle frames; have wheels from 20 to 28 inches; weighing 15 kg to 25 kg. All have automatic start by ignition key; giving 2 to 1 power assistance till 6 Km/hr, then 1 to 1 assistance up to 25 Km/hr before cutting out power. They are heavier than bicycles, but with lightweight lithium batteries are easier to control and to increase travel range. Like bicycles they come with adjustable saddles and with the same length of pedals cranks used on bicycles of similar size. Some new pedelec designs use regenerative braking, riding down hill to reduce battery life.

1.2. Definition of the 250 watt (E-bike) is that it is throttle controlled and started by riding that cuts in at the 1 to 1 power assist and cuts out at 25 km per hour. It is a electric bicycle (e-bike) it not a pedelec, electric scooter, or a petrol powered moped that is not speed limited.

1.3. Riding a Pedelec is more ergonomically energy efficient than bicycling and enables the average rider to go further. Pedelec riders go even further and make productive use of the existing road system and bike ways and 30 times more homes are accessible to railway stations and express bus routes. In Australian outer suburbs, 90% of commuter trips are by car, which could be replace by pedelec/rail trips as in Japan and the Netherlands, (Parker, A.A. 1999 B)

1.4. Evidence that riding pedelecs is safe comes from selected bicycle friendly EU countries which have the following 2010 road death rates per 100,000 population: - UK 2.9, Sweden 3.0, Netherlands 3.9, Japan 4.3, and Germany 4.7, Denmark 4.5, Switzerland 4.5 France 6.1. Australia's death rate is higher (6.2) and the US death rate of 10.5 is even higher.

Ideally, it is desirable to analyse the three road safety risks measures used by the international IRTAD accident analysis to compare the safety levels in those countries experiencing a large growth in both bicycle and pedelec usage, as is done for other road vehicles. Today pedelecs and E-bike accidents are both counted as bicycle accidents.

Table 1 . Road deaths and death rates selected EU countries. Source IRTAD 2011

| COUNTRY | Number of deaths | | | Country : road death rates | | | | |
|----------------|-------------------|------------------|---------------------|----------------------------|-----------------|----------------|------------------------------|---------------------------------|
| | number road users | | | Per 100,000 persons | | | billions of vehicle Kms 2009 | 10,000 registered vehicles 2009 |
| | Total deaths 2010 | Total ped's 2009 | Total cyclists 2009 | total deaths 2010 | 0-14 years 2009 | 65+ years 2009 | | |
| Australia | 1492 | 196 | 31 | 6.23 | 5.0 | 7.6 | 6.7 | 0.95 |
| Denmark | 250 | 52 | 25 | 4.54 | 4.0 | 7.0 | 8.2 | 1.1 |
| France | 3848 | 496 | 162 | 6.1 | 4.0 | 7.5 | 7.8 | NA |
| Germany | 3738 | 591 | 462 | 4.7 | 3.0 | 7.0 | 6.0 | 0.8 |
| Netherlands | 691 | 63 | 136 | 3.7 | 5.5 | 7.5 | 5.5 | 0.7 |
| Sweden | 323 | 44 | 20 | 3.4 | 1.9 | 6.5 | 4.4 | 0.7 |
| Switzerland | 343 | 88 | 21 | 4.5 | 5.2 | 6.5 | 5.7 | 0.7 |
| New Zealand | 358 | 31 | 8 | 8.3 | 3.5 | 10.0 | 9.6 | 1.2 |
| Japan | 5541 | 2012 | 933 | 4.3 | 2.5 | 10.0 | 7.74 | 0.64 |
| United Kingdom | 1846 | 524 | 104 | 3.0 | 3.4 | 4.2 | 4.6 | 0.7 |
| United State | 32,118 | 4052 | 630 | 10.5 | 7.5 | 13.5 | 7.0 | 1.5 |

1.5 In the Netherlands cyclists' deaths have reduced from 185 in 2009 to 162 in 2010. Since 1970 the reduction in road fatalities has benefited all age groups but the most impressive reduction has concerned young bicyclists (the age group 0 to 14) for which fatalities decreased by 95%, from 459 in 1970 to 23 in 2008 (IRTAD 2011). 70% of Dutch urban roads have a 30 km/ hr speed limit and the police take a tougher approach to unsafe drivers.

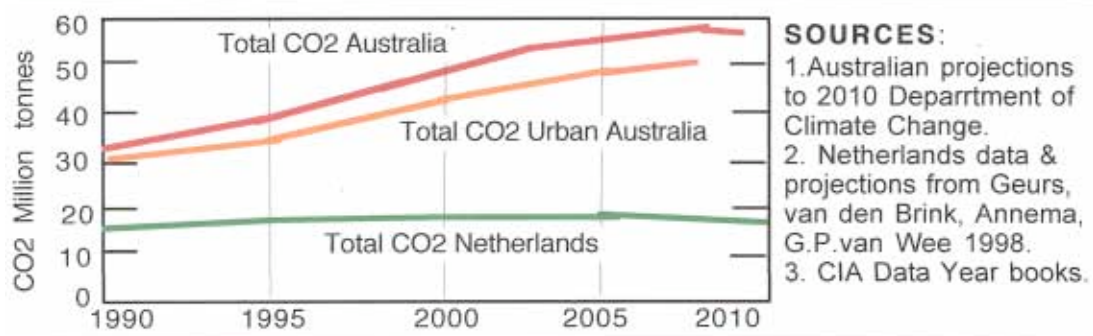
The fastest growing market for pedelecs is in the Netherlands, with 700,000 fleet now mostly being used by the elderly. Life expectancy is high, at 80 years, as in other EU bicycle friendly countries. Dutch road deaths increased from 1950 (1,020) and peaked in 1972 (3440) and then declined to 691 in 2010, and the population grew from 10 million to 16.5 million in 2010. In 2010 the traffic death rate was 3.7, deaths/100,000 population. Since 1970, the reduction in child deaths (0 to 14) from 459 to 23 in 2008 was impressive, decreasing by 95%. For the elderly of 65+ years deaths reduced from 648 in 1970 to 187 in 2009. (IRTAD 2011)

The Dutch own 18 million bikes and about half of them ride bikes once a day. The average distance travelled by bike per person per day was 2.5km. The bicycle is used for almost a quarter of all journeys and 35% of journeys below 7.5km. Roads are safer because 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% and driving speeds on these roads reduced substantially. According to Wellemen, the former Manager of the Dutch Bicycle Masterplan, (NEPP 3 1998) the most important measure in increasing bicycle use in Dutch cities is reducing car parking on a systematic basis in inner urban areas. (Wellemen 1995 &1999).

Using a pedelec in the Netherlands instead of a car use some 5 to 6 kWh per 100 kilometres, compared with 80 to 100 kWh for a 'medium size' car. As a result, each pedelec on the road

allows avoiding on average 900 car kilometres per year and with that 80 litres of petrol. The average medium size Australian car would use 150 to 200 kWh.

Figure 2. CO2 emissions: passenger cars: Australia and the Netherlands



1.6 Japans' elderly need pedelecs: Life expectancy in Japan is the highest in the world. Researchers found that elderly cyclists in Japan needed bicycles with auxiliary motors which required 50% less effort to pedal, and contributed to their health and mobility and enabled them to ride up hills. Pedelec sales increased to 414,000 in 2010 and enhance the mobility of the elderly, This research evidence persuaded Yamaha to design a powered bicycle to take 50% of the effort of riding. It took 5 years to perfect the computer chip controls for the throttle driven E-bikes with heavy lead acid batteries in 2000 and another ten years to improve today's light and safe pedelec. With sales of 500,000 in 2012, mostly made in China. (CyclePress 2008)

Japan had developed sound methods of 'community policing' the behaviour of bicyclists in Japanese cities using mini police stations (Kobans) which housed small police bicycle patrols units. (Parker A.A.1993 B). Japan's experience of successfully enforcing bicycle law became the model for the pedelec law enforcement. In 1993 the Japanese National Police Agency established the rules for speed limitation and controls. The Road Traffic Law Enforcement Regulations for electric bicycles to operate on roads. (Jamerson, F and Benjamin, E 2007)

Japanese designed pedelecs have been tested and proven as electricity savers by users in the last five years. At night they can be charged with off peak mains electricity or from back up batteries in 'stables' at places of work, study, shop or play. At home roof top solar cells can feed pedelecs directly or at night from back up batteries. The evolution of Japan's mains electric battery charged pedelec fleet into a solar powered means of transport is taking place now because the price of solar electricity is coming down. Mains electric charged pedelecs with a power output of only 250 watts are economically viable now. Within a few years pedelecs will be sold complete with a package of solar cells for DIY installation at home.

1.7 Enhanced mobility of the elderly needed worldwide

In 2006, 16.8% of the population in the EU-27 was aged 65 and over, that is almost 83 million people and the number is growing (ETRA 2008]). More of them become less mobile. In some EU countries the elderly were helping themselves. 700,000 pedelecs were being used, mostly by elderly people, in the Netherlands in 2010 thus providing evidence that the pedelec was part of a real transport solution for the EU's 65+ population. The number of elderly in China is increasing and has alarmed the government. China's national health care system is already straining and two-thirds of rural workers are without pensions. Indeed more than 13 percent of the population was over the age of 60, up 3% from the 2000 count. (China Census 2010)

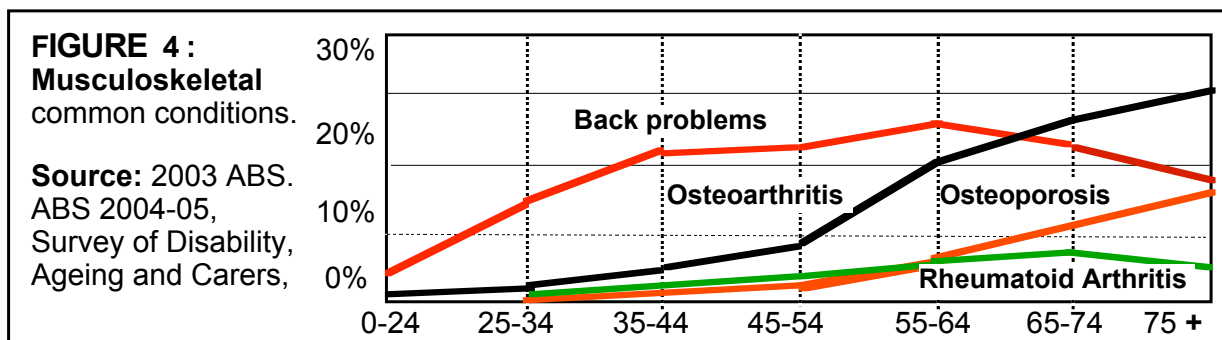
There are pedelec models, which are specifically designed for the elderly, with low step-through frames and adult tricycles which are available with 250 watt electric front wheel motors. With proven medical needs, as confirmed in letters from doctors. At the discretion of the NZ Minister for Transport 650 watt pedelecs can be used by See figure 5. Parker A.A 1992



Figure 3.

1.8. Elderly Australians need to use pedelecs but are constrained by unsuitable regulations. The need of more bicycle infrastructure, lower speed limits, to improve safety. Health experts recommending use of pedelecs as the “In-between machine”, after driving cars but before using the 3 and 4 wheeled scooters is urgently needed

Australia has a proportionally smaller elderly population than Japan but Australian data shown on figure 6 and below show the proportion and mix of common elderly ailments. Many other elderly conditions could also benefit from using 2 and 3 wheeled pedelecs: asthma, MS, lung heart and muscle conditions, obesity, alcoholism chronic fatigue syndrome. In Australia in 2004–05, 31% (6 million) of the population (33% of females and 29% of males) reported having a long-term disease of the musculoskeletal system and connective tissue. In 2004-05, of those with arthritis, 51% reported having osteoarthritis and 16% reported having rheumatoid arthritis



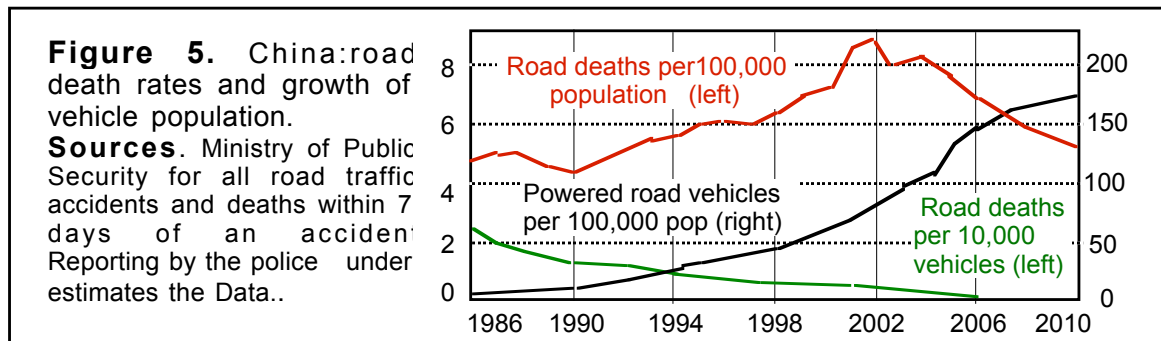
1.9 China wants to make pedelecs to EU standards and regulations

The latest and safest pedelecs manufactured in China, for export to the EU and Japan originate from European and Japanese designs, and from June 1, 2011 will comply with EU safety standard EN 15194. The Chinese government wants all pedelecs and E-bikes made for export to the EU to meet the EU standards and will be China’s largest sales market for many years. The production of electric bicycles in China stood at 27 million units in 2010 most going to the domestic market, and 600,000 E-bike to the 27 EU countries, the total export number for the whole of 2010 is estimated at 700,000 units; (BIKE Europe 2011 B).

The idea for a common China/EU standard for e-bikes came at seminar organised by the China Bicycle Association about one year ago where the European standardisation process was

analysed and emphasised the importance for China to become actively involved in this work. The reason 60% of China's e-bike exports go to Europe for complete E-bikes and pedelecs The parts that are shipped from China and built into bikes at EU factories do not appear in the 60% above as most of the components, including frames, also come from China including Bafang Motor 400,000 hub motors to Europe in 2010. (BIKE Europe 2011 B).

China recognises the need to reduce the road deaths of bicyclists, pedestrians, pedelec and E-bike users. Total road death rate per 100,000 population is 6.2 in 2007. See figure 5.



2. Electric bicycle legislation in Australia, EU and China

Having a Federation of States and Territories, each with their own road traffic regulations applying to imported pedelecs and e-bikes, is inept and complex because pedelecs are not made in any State but by Asian trading partners who mass produce safe pedelecs complying with EU regulations and safety standards. Compliance safety standards for ion lithium batteries and E-bike component parts is also required for Australia. Another serious problem because no Commonwealth or State Standard exists. This regulatory bungle started in 2001 and still applies in 2011. When there three new national strategies for “Road safety”, “Bicycles”, and “Future Cities” released in 2011 with no mention of the word pedelec (Austroads 2010).

Worst of all the Australian Bicycle Council (ABC) in its report on the future of bicycling made no mention of the need for elderly and lame bicyclists or postal workers to use pedelecs. Even so, the first Australia Post bikes, retrofitted with 200 watt 36 volt Ion lithium batteries, have been in use in Melbourne since March 2011.(Austroads 2010) This paper concludes that all transport infrastructure projects need take into account the mobility needs of elderly people and all cabinet minutes relating to bicycle-pedelec infrastructure include an elderly impact statement.

Vic roads, on the 29 April 2010, reaffirmed its existing 200 watt rule. Yet Bicycle Victoria, which has 45,000 members, through its representative on the State Bicycle Advisory Committee, (Hosted by Vic Roads) that “It expected all Australian States to adopt the new European Standard of 250 watts”. (Bicycle Victoria 2011) .

Meanwhile the world market in quality bicycles, pedelecs and e-bicycles is booming. More and more bicycles sold on the European markets are made in Asia. Nine million bicycles were imported from the top ten Asian producing countries in 2010. If the regulations in dispute have not been resolved by the EU by June 2011 a planning opportunity exists for the Australian Commonwealth and State Government to give Australian consumers and importers what they want, while keeping compulsory helmet wearing, which can continue with an Australian 250 watt road rule. The states need to collect exposure data on both bicyclists and pedelecs.

There is a need for the NBC to consider the safety records of large pedelec fleets in the EU. IN particular the EU postal services. British Royal Mail had 14,000 pedelecs. Deutsche Post has 8,000 pedelecs, France in 2011 ordered 5000, Posti Finland about 2,000.

Five Other pedelec postal fleets are in use in the EU, and two in Australia in Sydney and Melbourne. Indeed, Australia Post were impressed with the safety record of EU postal services and did not see safety problems with their 250 watt pedelecs but had to retro fit postal worker bicycles with new powered front wheels with 200 watt geared brushless motors. The retro fitter was EVS Electric Vehicles (EVS 2010). The objective was to cut CO2 emissions by 1000 tonnes a year and reduce the need to use motor cycles.

3. Pedelecs help cope with peaked oil supplies and Increased fuel prices.

Japan was always dependent on imported fuels and the cost of electricity was very high with a stagnant economy and ageing population. 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. Seven 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). (Parker 1995)

The EU, US, Japan, China and India know they have to reduce oil imports and reduce their consumption. In Australia BTRE economists have made serious error of judgment in 2005 and put their faith in oil reserve estimates that ultimately are derived from the nationalized oil industries of dictatorial regimes. As shown in the absurd forecasts in Table 2.

Table 2. BTRE Absurd forecasts in 2005

| 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).

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 and some are failing economies. (Economist 2006)(Parker A.A.2007)

Figure 6. ABARE's recent oil price forecasts reflect the 2004 forecasts of the US IEA, EIA and OPEC for 2010. Source See table 2



Fatih Birol, chief economist for the International Energy Agency, (IEA) has warned that rising oil prices due to the conflicts in Libya and the Middle East could threaten the global economic recovery now that oil production has peaked.

On 30 May 2011 he said that energy related 2010 CO₂ emissions were estimated to have climbed to a record 30.6 Gigatonnes (Gt). The IEA has estimated that 80% of projected emissions from power stations in 2020 are already locked in, as they are currently in place or under construction today. "This significant increase in CO₂ emissions and the locking in of future emissions due to infrastructure investments represent a serious setback to our hopes of limiting global rise in temperature to no more than 2°C." The prospect of limiting the global temperature to 2% is getting bleaker and current rate fossil fuel consumption will push the global temperature up by 4°C (Harvey, Fiona 2011)

4. Conclusion

This paper concludes that Australian government bodies should enable 250 watt pedelecs to be imported so as to reduce carbon emissions and air pollution while enhancing the mobility of the young, the elderly and the partially disabled, by simply using the new China/EU regulations, the existing state regulations are in conflict, obsolete and useless for meeting future needs.

China, Japan and EU countries are leading the way to sustainable transport systems by introducing pedelecs, energy efficient hybrid cars, and faster rail transport. Indeed all are trying to risk manage 4 serious problems they share with Australia: global warming, oil depletion, population growth, and less liveable cities. (US academy of science 2007) In Australia we see can see unsustainable road congestion growing worse due to a lack of policy vision.

In the real world solar charged pedelec batteries and quality bicycles will reduce car use and reduce electricity demand on power stations. By 2020 China will be making: 40 % of the world's cars, and 160 million E-bikes and pedelecs while continuing to encourage small and medium enterprises evolving into mass producers of new high tech pedelecs. Shimano has new electronic pedelec components and a computer to monitor: riding mode, battery power, gear indicator, speedometer and odometer which will be available soon. Daimler a German 250 watt pedelec innovator offers: four levels of power assistance to 25 km per hour with a range up to 90 km by the smart use of four levels, integrate with smart phones and the same improvements as Shimano while listening to music. Daimler has a theft prevention measure that many police forces will be pleased with. By removing the pedelec smart phone its effectively locks the drive motor.

5. Recommendations.

- ◆ Dumping old state electric bicycle regulations and adopt the new China/EU Pedelec regulations, whatever they do, as a decision seem certain by early 2012. That would be a small but significant step towards sustainable transport
- ◆ Ensure that all new and existing transport infrastructure projects take into account the mobility needs of elderly people and all cabinet minutes relating to bicycle and pedelec infrastructure include and include an elderly impact statement
- ◆ Evidence based actions to improve accessibility and mobility of elderly non-drivers at local and state levels and ensure they are implemented at a regional level.
- ◆ These recommendations should form part of a revision to the Austroads National Australian Cycling Strategy 2011-2016". (Austroads 2010)
- ◆ The Australian Bicycle Council should be funded and staffed to coordinate action on these recommendations. And undertake a two yearly review of progress being made

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