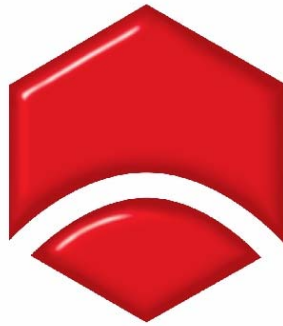


**AUSTRALIA'S FUTURE  
TRANSPORT FUEL OPTIONS**  
**Submission to the Senate Rural and  
Regional Affairs and Transport  
Committee**



**ENGINEERS  
AUSTRALIA**

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## 1. INTRODUCTION

*Engineers Australia* is the peak body for engineering practitioners in Australia representing all disciplines and branches of engineering. Membership is now approximately 75,000 Australia wide and *Engineers Australia* is the largest and most diverse engineering association in Australia. All *Engineers Australia* members are bound by a common commitment to promote engineering and to facilitate its practice for the common good. *Engineers Australia* is organised by Colleges and geographic regions. The Colleges exercise the learned society functions of engineering and often exercise this function through National Committees. One such Committee is the National Committee on Transport Engineering which has separately forwarded a Submission to this Inquiry.

*Engineers Australia* supports the views advanced by the National Committee on Transport Engineering (NCTE). The principal focus of the NCTE Submission is the vulnerability of common transport modes to their high dependence on oil and to reflect on the prognosis for alternative transport fuels. In this supplementary Submission, *Engineers Australia* draws attention to a number of additional broader matters not covered by the NCTE.

In particular, *Engineers Australia* is concerned that the risks arising from economic factors are not being treated with sufficient urgency. Far too much of the discussion on the future of oil is devoted to the illusory precision of when peak oil will occur. Suffice it to say that it will occur and within the next 10 years, give or take a few years. The substantive issue is that oil prices remain high and major world authorities believe that they will go on increasing. As in the past there will be price fluctuations, but market fundamentals have changed and this is reflected in long dated oil futures prices which has not previously been the case.

*Engineers Australia* believes that world and Australian circumstance in respect to oil have changed sufficiently that the continuation of present policies have become inconsistent with prudent risk management and government. *Engineers Australia* believes that present policy should be urgently revised with an emphasis on the current tenet of security of access but in a more broadly based risk management context.

## 2. PRESENT POLICY ENVIRONMENT

The supply of energy in Australia comprises the production of fossil fuels, renewable fuels and uranium supplemented by imports, principally of fossil fuels. The demand for energy comprises final domestic consumption, exports and energy used to convert base resources into usable energy sources. According to the Government's energy policy statement<sup>1</sup>, about 41% of final energy consumption is used in the transport sector and the demand for transport energy is growing at about 2.4% a year. Three-quarters of transport fuel is used by road transport, air transport is the second highest user at 16% and much smaller shares in water transport, rail and gas pipe-lines (4%, 2% and 2% respectively).

Internal transport is the life blood of the Australian economy. Transport energy is highly dependent on petroleum fuels and alternatives account for only 3%. There is some existing degree of substitutability with alternative fuels, notably LPG and bio-fuels and additives which do not require major changes to vehicle mechanics, even so, the Government expects<sup>2</sup> Australia's high dependency on petroleum fuels to continue because it believes that;

- Alternatives are not competitively priced;
- Fuel production and distribution infrastructures have long life expectancies; and
- The large stock of transport vehicles cannot be replaced or converted to alternatives quickly.

In general, the lower the price of a product the higher will be the demand for that product. In securing Australia's Energy Future<sup>3</sup> the Government states that an important reason for Australia having the fourth lowest petrol prices in the OECD is relatively low excise on petrol in Australia. In other words, Australia's high dependency on petroleum fuels, among other factors, is the result of Government policy. Data for petrol prices in the OECD show some variation in pre-tax prices, reflecting sources of supply and market variations, but the most evident difference is the level of excise tax which in most OECD countries is about double Australian levels.

While there are measures in place to support the use and production of alternative transport fuels in Australia, the Government's policy statement appears to have little confidence that these will lower Australia's dependency on petroleum fuels.<sup>4</sup> These policies briefly are:

- Excise concessions estimated to be the equivalent of \$840 million per annum in revenue foregone. This will be changed as a result of the Fuels Excise Reforms with the introduction of excise imposts on all fuels used to power internal combustion engines. Existing concessions remain in place until 2011 and excise will progressively increase towards equalization in 2015.
- A new \$1000 grant for LPG powered vehicles will come into force on 1 July 2011 and remain available until 30 June 2014.
- Capital grants of \$37.6 million have been made available to fund new bio-fuels production capacity.

Appropriately, the stated view of the Government is that the development of alternative fuels should be seen as economic opportunities for Australia. However, the Government is unequivocal in its view at a practical level. "Ultimately these fuels must compete on their commercial merits and the government will not mandate the use of alternative transport fuels"<sup>5</sup> and there is no case for accelerated take up of these alternatives.<sup>6</sup>

The sections on petroleum fuels in *Securing Australia's Energy Future* are dominated by material on the competitiveness and characteristics of Australian fuel markets and the need to reform the fuel excise regime<sup>7</sup>. Undoubtedly the competitiveness of fuel markets is of profound importance. Similarly, simplification of the fuel excise system which also delivers preferable equity outcomes is worthwhile. However, these are matters that do not alter the fundamental stance of policy.

*Securing Australia's Energy Future* makes clear that energy security is a major tenet of Government policy<sup>8</sup>. "There are sufficient reserves to supply world demand for around 40 years."<sup>9</sup> This assertion is supported by the view that while at times there have been supply disruptions, access has not been a problem.<sup>10</sup> So far as the long term future is concerned, Australia has "access to potentially large sources of alternative fuels and new sources of conventional fuels."<sup>11</sup> Included here are Australia's large reserves of liquefied petroleum gas and reserves of natural gas. However, beyond reliance on conventional market economics, no information is provided on the nature of the transition to the long term and the steps that may be necessary to achieve it.

*Engineers Australia* believes the Government's policy on the use of petroleum fuels in transport is insufficient for the circumstances confronting Australia and belongs to an era in which oil supplies were more bountiful, security of supply was more clear cut and base prices were cheap. There are sound reasons which suggest that these caveats no longer apply and that Australia's continuing high dependency on petroleum fuels for transport poses increasing risks inconsistent with prudent risk management and government.

*Engineers Australia* also believes that the temporary assistance provided to alternative transport fuels is insufficient given the longer term prognosis facing Australia. This is especially the case in regards to the use of LPG in which Australia has a long term supply, and price, comparative advantage, and security of supply. These attributes, in terms of the Government's own criteria indicate that LPG has advantages over long term dependence on imported crude oil. While more needs to be done in all countries to improve the long term viability of other fuel alternatives, Australian and world circumstances indicate that, contrary to the Government's view, the case for accelerated development of these alternatives is pressing.

### **3. PEAK OIL**

The debate about peak oil is not about whether it will happen, but when will it happen and the events which will characterize the approach path to the peak and the years following the peak. Two recent papers raise issues relevant to this Inquiry. In Australia the Bureau of Transport and Resource Economics (BTRE)<sup>12</sup> describes the debate between the so-called "depletionists" and "anti-depletionists."

- There have been numerous predictions of when world peak oil will be reached and all have proven to be incorrect.
- Global oil supply prospects are highly sensitive to the prospects of "giant" oil fields. There have been no new discoveries of "giant" oil fields for some time

and the lack of transparency of oil well data make accurate analyses of the status of existing fields problematic. This is compounded by the failure of International Accounting Standards to provide for consistent and transparent estimation of reserves.

- The methodologies used to establish oil reserves are susceptible to differences in judgement by different analysts and are dependent on assumed oil prices and extraction technologies. There is growing acceptance of the concept that oil reserves are to a degree price dependent.
- Prices determine the boundary between reserves of conventional oil and non-conventional oil and as prices rise the divide between these two categories of reserves will diminish.
- There is a tendency to treat short term price spikes as indicative of long term trends and see this as evidence of peaking.

While relatively impartial, this analysis is far too sanguine about prospects that conventional economics will find a solution. The BTRE does not attempt a judgement on when peak oil may occur, but implicitly sides with the anti-depletionists through acceptance of the International Energy Agency's (IEA) views, especially in respect of that Agency's view that the high oil prices in late 2004 are unsustainable and that market fundamentals will drive them down over the next two years. Instead, what has happened is that the IEA has been forced to revise its price forecasts.<sup>13</sup>

The second study undertaken for the National Energy Technology Laboratory of the United States Department of Energy<sup>14</sup> (DOE) discusses peak oil without focus on the date itself. The paper is primarily concerned with the impacts of peak oil and the scope for mitigation. However, in an Appendix<sup>15</sup>, the study's authors set out what is described as the (US) Energy Information Administration's (EIA) most meaningful oil peaking scenario. This estimate is useful to present in this Submission for two reasons. First, the methodology employed is removed from the debate between the depletionists and the anti-depletionists which at times becomes unhelpful. Second, the estimates are underpinned by work of the US Geological Survey (USGS) which are generally regarded as being more optimistic than the estimates made by most other experts.

The USGS has put forward low, expected and high estimates for ultimate world recoverable oil. The DOE study chose to use the expected value which was that recoverable oil reserves are 3,003 billion barrels. This supply scenario was combined with an expected world oil demand growth rate of 2% which was one of four possibilities (0, 1, 2 and 3%) posited by the US Energy Information Agency (EIA) and is consistent with the demand growth rate used by the EIA for its World Energy Outlook Forecasts<sup>16</sup>. The date for peak oil then depends upon the assumed production decay rate following the occurrence of peaking. Once again two possibilities were considered. In the first, production decay is assumed to emulate the pattern displayed in known examples of oil wells which have peaked (2% decline after the peak). Under this assumption world oil will peak in 2016. In the second, a higher production decay rate set at 10 times the reserves to production rate. This resulted in an estimate of world oil peaking in 2037.

#### 4. THE SIGNIFICANCE OF PEAK OIL

What is the significance of these estimates for world peak oil? First, it is important to understand the world will not run out of oil when the peak occurs. Peak oil will signal that maximum world production of oil has been reached and that future production rates will decline over time. The Australian Government has asserted that “there are sufficient reserves to supply world demand for around 40 years.”<sup>17</sup> This figure is echoed in the BTRE study mentioned above and appears to be based on an estimate originating from BP.<sup>18</sup> These estimates do not mention peak oil, but simply refer to available recoverable reserves.

The DOE study presents a more optimistic view; under the 2016 peaking scenario, oil reserves will continue to provide supply for another 100 years. In the 2037 peaking scenario, oil reserves will continue to supply the world until the end of this century. In other words the Australian Government position is hardly optimistic as some critics have suggested.

The second key issue relating to peak oil is the behaviour of oil prices. Much of the debate between depletionists and anti-depletionists has been about whether the behaviour of world oil prices is a reliable signal on the imminence of the peak or not. There may well be merit in this line of argument, but the attention given to this issue has overshadowed a more critical issue. Oil prices are rising. Contemporary practice has been to explain the temporary nature of the rises<sup>19</sup>, but there is growing evidence that these arguments are wrong and a long term trend of rising oil prices is emerging.

- While overall peak oil may occur at a point in time, in practice what will occur is a succession of peaks in different oil fields of varying sizes throughout the world. Eventually there will be a point when the last remaining influential oil field peaks and overall peak oil will have been realised. Depending on the importance of individual fields to overall supply, the price of oil will progressively ratchet up to reflect the supply-demand circumstances.
- As more oil fields peak, post-peak production costs will rise reflecting the increased difficulty of extracting oil and the costs of newer technology necessary for extraction. The positive aspect to this is that oil price rises will result in higher reserves as previously uneconomic fields become commercially viable. There will eventually be a geological limit. So for a time supply will continue but will cost more.
- Global refinery capacity at the end of 2004 was very close to world oil demand. There was little evidence of new investment in refinery capacity in the near term creating the circumstances for longer term price rises as demand pressures increase. Volatility in prices is also possible because there is no refinery buffer to cope with any demand surges.<sup>20</sup>
- The IMF has reported that contrary to “previous episodes of large crude oil price increases, long dated futures prices have increased significantly during the past two years.”<sup>21</sup> The IMF goes on to report a strong correlation between these futures prices and spot oil prices which contrasts with the past when there was no correlation. This means that observed oil price increases may be

permanent.<sup>22</sup> The IMF believes that there are structural factors at work which differentiate the present situation. These include the perception that China and India have *permanently* shifted demand higher and growing awareness that supply from non-OPEC sources might peak in the next 5-10 years.<sup>23</sup>

- There is evidence that other agencies are recognising this phenomenon as well even though some are finding it difficult to shake off the remaining vestiges of their belief there are “temporary” factors at work. This is found in the BTRE paper,<sup>24</sup> in data from the EIA<sup>25</sup> and is also evident in IEA projections.<sup>26</sup> ABARE data<sup>27</sup> also show that real oil prices have steadily risen since 2000 but persistently obscure this in long term graphs of oil prices since 1970.
- There is acceptance in *Securing Australia's Energy Future* that oil prices have risen and may rise again, but security of access<sup>28</sup> is seen as more important.

Commentators often rationalise high oil prices by comparing contemporary oil price rises to the record prices during the 1979-80 oil shock. Their main objective is to contrast the turmoil following the 1979-80 oil shock to the relatively smooth absorption of oil price changes now. The argument goes that while high in present day terms, “real” oil prices are still lower than the records achieved in 1979-80. The economy recovered from the impacts of that shock and current price rises are not as severe. The economy will take current changes in its stride and the price system will bring about the necessary adjustments.

However, while oil supply shocks have induced sudden rises in the price of oil in the past and could do so again in the future, the evidence suggests that different factors are at work in the current situation. The rise in oil prices has been induced by rising demand and not as a result of a supply shock. “As a result most of the increase in prices has acted as an “automatic stabiliser” operating to slow down robust growth rather than raise costs for the same level of global output.”<sup>29</sup> The second factor which is different to the past is the substantial decline in oil intensity which is now about 38% lower than in the 1970's. This means that increases in oil prices will have a lower first round effect than in the past, in other words, reductions in oil intensity cushion growth against the effects of higher oil prices. Finally, higher oil prices have not yet manifested themselves in core inflation and second round impacts from possible interest rate increases have been avoided.<sup>30</sup>

## 5. PEAK OIL IN AUSTRALIA

The situation for Australia is complicated by the prospects of increasing reliance on imported oil. Geoscience Australia has reported that Australia's “consumption of crude oil and gas condensate in 2004 could be sustained by remaining economic reserves for only 9.3 years.”<sup>31</sup> In essence peak oil occurred in Australia around 1999-2000 as shown in Figure 1.

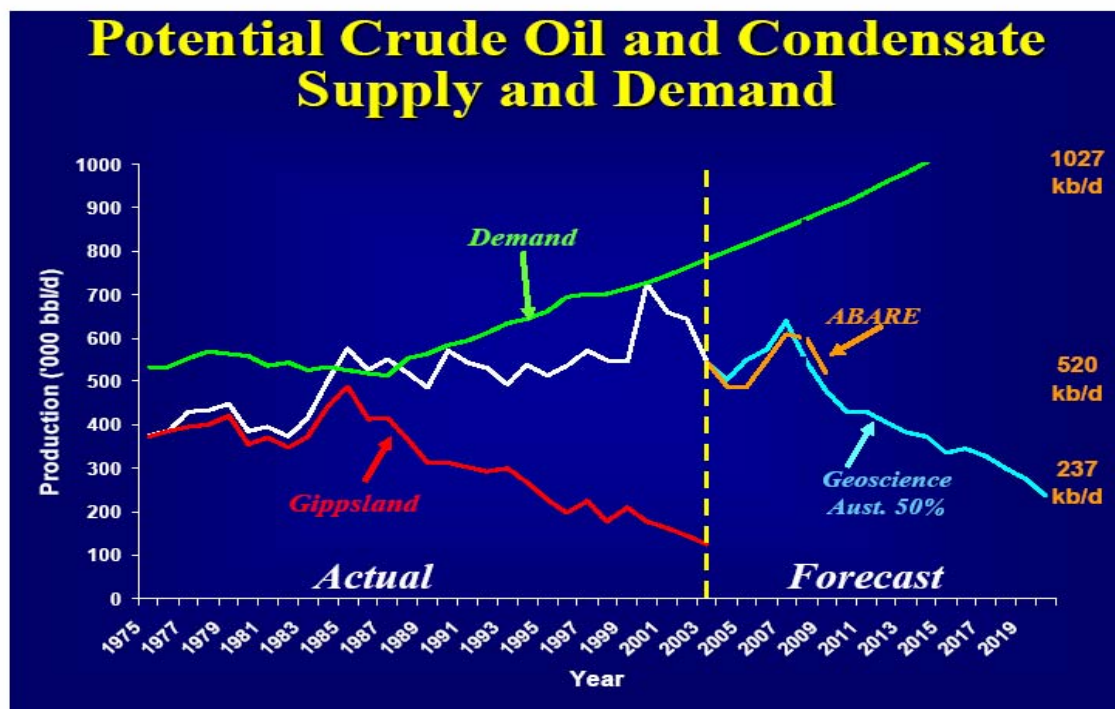
The Gippsland oil field peaked in about 1986 but because of new wells coming into production elsewhere in Australia, overall production continued to increase until around 1999-2000. Production then fell until late 2005 when, as the Australian Bureau



of Agricultural and Resource Economics (ABARE) noted recently<sup>32</sup>, new production from the Mutineer/Exeter development in Carnarvon came on stream. The graph shows, however, that ABARE and Geoscience Australia agree that the production increase is temporary. The scenario for forecast production is the Geoscience Australia 50% probability scenario which is a good deal more optimistic than its 90% scenario. In contrast, Figure 1 shows that the demand for crude oil is expected to continue its rapid growth.

The significance of this situation is that Australia will become increasingly reliant on imports of crude oil as domestic production falls over the coming years. Currently about 75% of Australia's crude is sourced domestically, but by 2010 this is likely to be only 40%. There are several strands to the ensuing implications.

FIGURE 1: CRUDE OIL SUPPLY AND DEMAND IN AUSTRALIA



Source: Australian Petroleum Production and Exploration Association

- The high contribution of domestic supply to meeting the demand for oil in the past has shielded Australia from overseas supply disruptions even though indirect effects through the price of oil were felt. As Australia's dependence on imported oil grows this protection will dissipate and world supply disruptions will be felt more directly in Australia. Access security, while not necessarily threatened, is less with high import dependency.
- Variations in exchange rates will also become more important as will be the overall balance of payments upon which the exchange rate depends. Recently

the US/Australian exchange rate has been relatively stable around 0.75. If the exchange rate fell to the levels recorded as recently as 2004 (around 0.60), the import bill for oil in Australian dollar terms could rise by up to 20%.

- The major source of crude oil for domestic use is the Gippsland Basin where production has fallen to about 24% of Australia's production. The Carnarvon Basin now accounts for about 60% of Australia's oil production but is mainly exported.<sup>33</sup> This difference becomes more critical when exchange rates vary. For example, if exchange rates fell, Australia would receive less for exported Carnarvon oil exports and would pay more for necessary import replacements exacerbating the balance of trade by more than the quantitative difference between oil exports and imports.
- The cost of extracting remaining reserves of domestic crude is likely to increase unless significant new production becomes available. The mantra in official publications is hopeful of new discoveries<sup>34</sup> but Industry experts believe that little new exploration is occurring and new discoveries are few in number and small in size. The high risk exploration of frontier sedimentary basins is not happening because of high costs and risks.<sup>35</sup>
- Australia is overwhelmingly a net exporter of energy, but is a net importer of oil and petroleum products. In 2000-01 Australia was a net exporter in both categories of energy. The balance of trade in oil and petroleum products was a positive \$4,269 million (constant 2004-05 prices). This has since deteriorated. By 2002-03 there was an approximate balance of trade, but in 2003-04 Australia recorded a trade deficit of \$3,495 million (constant 2004-05 prices) and this blew out to \$8,127 million in 2004-05. As Australia dependence on imports of oil and petroleum products grows this deficit will escalate even further.<sup>36</sup>

## **6. IMPACTS ON AUSTRALIA**

When considering the future prospects of oil supplies it is far too easy to become embroiled in debating the precise timing of peak oil. Knowing the answer to this issue would most certainly crystallize perspectives, but it is not essential. Whether oil peaks in 2016, give or take a few years, will not mean that the supply of oil will dry up. Oil supplies will continue to be available for some decades, as the Government has stated. The Government believes the supply horizon is about 40 years, but the above discussion shows that there are more optimistic observers.

Before oil supplies actually run out the real damage will have happened. Oil prices are rising and will continue to rise. Australia is becoming increasingly dependent on imported oil, and price effects will be exacerbated by exchange rates variations. Australia will also become more susceptible to supply interruptions and in the future both quantity and price effects will be felt.

How will Australians react to on-going higher oil prices? Some idea can be gauged from the Press Releases issued by the NRMA last year in reaction to the sharp increases in petrol prices experienced in Australia.

- One reported on a survey which found that 94% of motorists expect higher petrol prices to impact on the cost of other goods and services. The general message was that discretionary income has fallen and in some cases so has non-discretionary expenditure.<sup>37</sup>
- A second reported on the impact of higher petrol prices on small business: 95% of whom reported in a survey that there were negative bottom line effects.<sup>38</sup>

Similar views were reported in Press Releases reporting on changes in the Westpac-Melbourne University index of consumer sentiment. Higher petrol prices were reported as key influences in falls in consumer sentiment in July and September 2005.<sup>39</sup> Consumer are resilient and by February of 2006 there were reports that consumer have adjusted to the new circumstances of higher petrol prices.<sup>40</sup>

But how have consumers financed their larger petrol bills? By reducing other expenditure (38.7%), by reducing savings (46.2%) and by increasing debt (10.3%) are the explanations provided an adjunct to the Westpac- Melbourne University Consumer Sentiment Survey in September 2005<sup>41</sup>. This analysis goes on to say that in 2005 consumers will increase their expenditure on petrol by \$2.3 billion over 2004 and would result in a 0.2% reduction in GDP in 2005.

More generally the transmission mechanisms through which higher oil prices will impact on the economy are as follows:<sup>42</sup>

- There will be a fall in global demand as income is transferred from oil consumers (who have a relatively high consumption propensity) to oil producers (who have a relatively low consumption propensity).
- There will be a supply effect reflecting higher production costs associated with more expensive oil and lower profit margins for the economy as a whole.
- Rising costs will manifest themselves in underlying inflation which may trigger second round effects depending upon monetary policy reaction.
- Consumer expectations will be dampened and this will result in lower expenditure while similar impacts on investor expectations will lead to reductions in long term capital investment.

Sceptics will argue that world economic activity has been resilient despite the increases in oil prices. Taking into account the influence of lower oil intensity and the attribution of the price rises to permanent shifts in the demand for oil, IMF research shows that “a persistent 10 percent increase in oil prices is associated with a 0.1-0.15 percent reduction in global GDP”<sup>43</sup> implying that “the cumulative effect of the oil price rises since 2003 on global activity may have been in the 1 to 1.5 percent range.”<sup>44</sup> The IMF believes that the reduction in oil intensity is a temporary cushion.

Consumer behaviour is predicated on the price rises being temporary and many governments throughout the world have subsidised oil prices. Eventually consumers will need to allocate more of their budgets to cover the impact of oil price induced changes to expenditure patterns. Similarly, governments cannot maintain subsidies indefinitely. Thus, in Australia there will be direct effects governed by local circumstances and indirect flow-on from the impact on the world economy.

The implications of slower growth in Australia are well known. In this respect conventional economics will no doubt be the dominant change mechanism. The issue for this Inquiry is whether economic change will find sufficient guidance in existing Government policy on transport fuels to forge a smooth transition. *Engineers Australia* believes that present policy is insufficient for this purpose and changes which reflect contemporary circumstances are essential.

## 7. RISK MANAGEMENT AND MITIGATION

Risk management is about living with the possibility that future events may create adverse effects. Risk management is an accepted component of modern governance. The most recent example of the application of risk management principles to broad based public policy in Australia is aimed at countering the risks of terrorism. Another recent example of risk management in Australian public policy is the Government's policy of greenhouse gas mitigation. The approach here was to sum the contribution of mitigation from a number of relatively small changes in different areas to achieve a targeted mitigation total.<sup>45</sup>

Peak oil, prospective world excess demand for oil, Australia's growing dependence on imported oil and the almost total reliance of Australian transport on liquid petroleum fuels present textbook circumstances for public policy firmly based on risk management principles. *Engineers Australia* believes that Australian public policy on the future of transport fuels begin from this premise.

Present policy is essentially *laissez faire* reliance on economic principles and effective operation of world oil market. Undoubtedly, these mechanisms will play be important in shaping the future. However, *Engineers Australia* is convinced that Australia's dependence on liquid transport fuels is so high, and there are so many, and diverse, prospective risks, that markets require fresh guidance in the form of revised policy. In particular, prudent public policy should emphasize diversification, mitigation and ways to ameliorate the price pressures resulting from oil prices crowding out consumer and business budgets.

Diversification and mitigation strategies directed at liquid transport fuels will take time to develop and implement. The DOE<sup>46</sup> referred to earlier in this Submission examined mitigation scenarios. The objective was to benchmark the implementation of "crash" mitigation scenarios to reflect on the character of the risk management problem facing government. The three scenarios chosen began with mitigation introduced at the time world oil peaks. There were two anticipatory scenarios; the first assumed that mitigation begins 10 years before peak oil and the second 20 years before peak oil.

Whenever there is a major shift in the application of new public policy a myriad of circumstances lead to delays and to elongation of the implementation period. They include excessive time taken to negotiate normal planning and approval processes with State, Territory and Local government agencies even for straight forward facilities. In Australia, like in the USA, the NIMBY (not in my back yard) principle on occasions manifests itself as does the BANANA (build absolutely nothing anywhere near anything) principle. When the proposal is the least part controversial even greater difficulties may be encountered.

Simpler changes are also subject to resistance and inertia for various reasons, many of which are valid generally and important to those concerned. An example is the introduction of unleaded petrol. This began in 1986 and there are still cars using lead substitute fuels even though leaded petrol is no longer available.<sup>47</sup> The reference to “crash” mitigation scenarios relates to importance of effectively confronting sources of delay. In the DOE paper the assumption was made that conventional processes would be effectively circumvented to resolve the difficulties associated in trying to estimate how long they might take.

The DOE paper constructed a mitigation package comprised of known and proven technologies and some where more research and development work was needed. The elements were:

- Conservation; encouraging, and possibly mandating, fuel efficiency, by switching to more fuel economic vehicles, by switching to more economic engines such as diesel and by switching to hybrid vehicles.
- Improved oil recovery methods, including CO<sub>2</sub> sequestration similar to the proposal recently announced by the government.
- Use of non-conventional oil and gas to liquid technologies.
- Use of liquid fuels from coal and oil shale.
- Switching to electricity and other alternatives.

The key point to take away from the DOE research is that mitigation “will require an intense effort over decades.”<sup>48</sup> In particular

- Crash mitigation coinciding with the occurrence of peak oil would leave the world with a significant liquid fuel shortfall for more than two decades.
- Mitigation 10 years before peak oil will still result in significant liquid fuel shortfalls for over a decade.
- Mitigation 20 years out offers the prospect of avoiding liquid fuel shortfalls.

The risk management problem for government is characterized this way. “Mitigation efforts initiated earlier than required may turn out to be premature, if peaking is long delayed. On the other hand, if peaking is imminent, failure to initiate timely

mitigation could be extremely damaging.”<sup>49</sup> Recall that the context is estimates of peak oil ranging from 2016 as the most likely consistent with USGS estimates of oil reserves and known behaviour of post-peak oil wells, to 2037 under more radical post-peak production reduction assumptions.

## 8. MITIGATION OPTIONS FOR AUSTRALIA

Australia is well placed so far as mitigation options are concerned. As the Government's has consistently pointed out Australia is a net exporter of energy even though it is a net importer of petroleum fuels. *Engineers Australia* believes that the first option in a mitigation strategy should be conservation. Several strands may be considered;

- Policies which encourage and facilitate widespread adoption of more fuel efficient vehicles.
- Policies which promote the use of more efficient fuels. Australian use of diesel engines is largely confined to long-haul transport which contrasts with Europe where diesel engines are widespread. Diesel engines use about 30% less fuel than petrol engines.
- Policies which encourage the adoption of hybrid fuel vehicles.
- Effective steps to radically increase the use of public transport, particularly in areas of dense population.
- Policies which shift long haul transport from road to rail will reduce fuel demand.

*Engineers Australia* believes a second mitigation option is to strengthen and reinforce the existing policy on security of access to transport fuels.

- This could be achieved in the immediate future by more effectively utilising Australia's known resource base. Gippsland oil, which is the main source for Australia consumption, could be supplemented by Carnarvon oil which is mainly exported, partially restoring Australian self sufficiency in oil production.
- As Figure 1 amply shows this is not enough unless there are new oil discoveries. A second component of this option would be greater use of LPG to fuel Australian vehicles. The Government already has taken steps in this direction. These need to be brought forward and made more attractive to encourage widespread fuel conversion.
- Greater encouragement of almost viable alternative fuels such as bio-diesel and bio-additives to petroleum fuels should be part of mitigation option directed at security of access.

*Engineers Australia* believes that there is considerable future potential in other alternatives to petroleum fuels which require further research and development. Two examples are the greater use of electric vehicles and the use of hydrogen as a transport fuel. *Engineers Australia* is aware of Government encouragement to developments in this area, but given the circumstances described in this submission, believes that much more support is necessary. *Engineers Australia* believes that the circumstances are no longer appropriate to support the level of faith in market mechanism present in existing policies.

*Engineers Australia* accepts the Government's assurances concerning the existing resources of non-conventional oil resources available to Australia and agrees that these resources must be a vital component of a mitigation strategy. The time is now appropriate to spell out how this will be achieved, the investment needed, the time necessary to achieve useful results and who the key players will be. In the absence of definition along these lines progress will be slower than required.

As outlined in the discussion of the DOE paper, mitigation will take time. At least a decade is what that work suggests under assumptions that require major and radical change to development processes. In practice, more than a decade will be needed. When compared to the historical planning horizons of Australian Governments mitigation will be a significant challenge. *Engineers Australia* believes that Australian Governments need to squarely face this challenge.

## 9. ENDNOTES

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<sup>1</sup> Commonwealth of Australia, Securing Australia's Energy Future, Canberra, 2004, p12

<sup>2</sup> Op cit, p82

<sup>3</sup> Op cit, pp83-4

<sup>4</sup> Op cit, p82

<sup>5</sup> Op cit, p91

<sup>6</sup> Op cit, p124

<sup>7</sup> See the material on pp85-90 and Chapter 5 on Fuel Excise Reform

<sup>8</sup> See Chapter 7, Energy Security, pp115-126

<sup>9</sup> Op cit, p119

<sup>10</sup> Op cit, p121

<sup>11</sup> Op cit, p123

<sup>12</sup> Bureau of Transport and Resource Economics (BTRE), Is the World Running Out of Oil? A Review of the Debate, Working Paper No 61, February 2005

<sup>13</sup> IEA Press Release, [www.iea.org/dbtw-wpd/Textbase/press/pressdetail.asp?PRESS\\_REL\\_ID=163](http://www.iea.org/dbtw-wpd/Textbase/press/pressdetail.asp?PRESS_REL_ID=163), 7 November 2005

<sup>14</sup> Robert L Hirsch, R Bezdek and R Wendling, Peaking of World Oil Production: Impacts, Mitigation and Risk Management, National Energy Technology Laboratory, Department of Energy, USA, February 2005

<sup>15</sup> Op cit, pp69-70

<sup>16</sup> Energy Information Administration, (IEA) International Energy Outlook 2005, July 2005, p1 [www.eia.doe.gov](http://www.eia.doe.gov)

<sup>17</sup> Securing Australia's Energy Future, p119

<sup>18</sup> BTRE, p21

<sup>19</sup> See for example the discussion on p22 of the BTRE paper.

<sup>20</sup> IMF. World Economic Outlook, September 2005, p59 and p62

<sup>21</sup> Op cit, p62

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- <sup>22</sup> Op cit, p65  
<sup>23</sup> Op cit, p62  
<sup>24</sup> BTRE, P27  
<sup>25</sup> EIA, Annual Energy Outlook 2006, December 2005, Table 12  
<sup>26</sup> IEA, P1  
<sup>27</sup> See the data on p7 and compare these to the graph on p8 in ABARE, Energy in Australia 2005, 2005  
<sup>28</sup> Securing Australia Energy Future, p121  
<sup>29</sup> IMF, op cit, p64  
<sup>30</sup> Op cit, p64-65  
<sup>31</sup> Geoscience Australia, Oil and Gas Resources of Australia, 2003, up-dated April 2005  
<sup>32</sup> ABARE, Australian Commodities, Energy, Oil Prices Ease but Spikes Possible in 2006, vol. 12 no 4 December Quarter 2005,p655  
<sup>33</sup> ABARE, Energy in Australia, 2005, pp19-20  
<sup>34</sup> ABARE, op cit, p24 and Securing Australia's Energy Future, p53  
<sup>35</sup> APPEA, High Oil Prices: What it Means for Australia's Upstream Oil and Gas Sector, Address to CEDA, 21 September 2005, [www.appea.com.au](http://www.appea.com.au)  
<sup>36</sup> ABARE, Energy in Australia, 2005, p26  
<sup>37</sup> NRMA Media Release, Petrol Prices:taking food off the table, 29 September 2005  
<sup>38</sup> NRMA Media Release, Fuel Crisis hitting small business hard: NRMA survey, 28 September 2005  
<sup>39</sup> Westpac, Consumer Sentiment down sharply, 13 July 2005 and Consumer Sentiment collapses, 14 September 2005  
<sup>40</sup> Queensland Business Review, Consumer sentiment bounces back in February, 8 February 2006  
<sup>41</sup> Westpac Press Release, Petrol Prices the impact on growth, 14 September 2005.  
<sup>42</sup> IMF World Economic Outlook 2005, op cit, p64  
<sup>43</sup> Op cit, p65  
<sup>44</sup> Op cit, p65  
<sup>45</sup> Australian Greenhouse Office, Stationary Energy Sector Greenhouse Gas Emissions Projections 2004, p29  
<sup>46</sup> Hirsch et al, op cit.  
<sup>47</sup> See [www.aip.com.au](http://www.aip.com.au)  
<sup>48</sup> Hirsch et al, op cit, p65  
<sup>49</sup> Hirsch et al, p66