

AGENDA

Sustainability Advisory Committee

MEETING OF THE SUSTAINABILITY ADVISORY COMMITTEE

TO BE HELD ON

MEETING DATE



THURSDAY 29 MARCH 2007

commencing at 6 pm

in Conference Room 2

JOONDALUP CIVIC CENTRE,
BOAS AVENUE, JOONDALUP



GARRY HUNT
Chief Executive Officer
23 March 2007

www.joondalup.wa.gov.au



City of
Joondalup

CITY OF JOONDALUP

Notice is hereby given that a meeting of the **SUSTAINABILITY ADVISORY COMMITTEE** will be held in Conference Room 2, Joondalup Civic Centre, Boas Avenue, Joondalup on **THURSDAY 29 MARCH 2007** commencing at **6 pm**.

GARRY HUNT
Chief Executive Officer
23 March 2007

Joondalup
Western Australia

AGENDA

Committee Members

Cr Michele John	Presiding Person
Cr Sue Hart	
Cr Steve Magyar	
Cr Russ Fishwick	
Mr W Carstairs,	Community Rep
Ms Melanie Barter	Edith Cowan University
Ms U Goeft,	PhD Candidate, Edith Cowan University
Mr John Willett	Community Rep
Mr Brett Dorney	West Coast TAFE
Mr Dennis Godley	Community Rep
Ms Wendy Herbert	Community Rep
Vacant	Community Rep
Vacant	Community Rep
Vacant	Community Rep

Officers

Mr Ian Cowie	Director, Governance & Strategy
Ms Rhonda Hardy	Manager, Strategic Development
Mrs Catherine Thompson	Senior Project Officer
Ms Janet Harrison	Administrative Services Co-ordinator
Mrs Jill Hewison	Administrative Secretary

In Attendance

Cr Jon Strachan, Fremantle South Ward

Terms of Reference

- *To recommend to the City of Joondalup Council on policy, advice and appropriate courses of action that promote sustainability, which is (1)*

environmentally responsible, (2) socially sound and (3) economically viable

- *To provide advice to Council on items referred to the Committee from the City of Joondalup administration*

DECLARATION OF OPENING

APOLOGIES/LEAVE OF ABSENCE

CONFIRMATION OF MINUTES

MINUTES OF THE SUSTAINABILITY ADVISORY COMMITTEE HELD ON THURSDAY 8 FEBRUARY 2007

RECOMMENDATION

That the minutes of the meeting of the Sustainability Advisory Committee held on Thursday 8 February 2007 be confirmed as a true and correct record.

ANNOUNCEMENTS BY THE PRESIDING PERSON WITHOUT DISCUSSION

DECLARATIONS OF INTEREST

IDENTIFICATION OF MATTERS FOR WHICH THE MEETING MAY SIT BEHIND CLOSED DOORS

PETITIONS AND DEPUTATIONS

Presentation by Cr Jon Strachan, Fremantle South Ward on the City of Fremantle's adoption of the Kyoto protocol.

REPORTS

Item 1	Setting Meeting Dates	Page 4
Item 2	A Cleaner Energy Future for WA	Page 6

MOTIONS OF WHICH PREVIOUS NOTICE HAS BEEN GIVEN

REQUESTS FOR REPORTS FOR FUTURE CONSIDERATION

CLOSURE

ITEM 1 SETTING MEETING DATES - [00906]

WARD: All

RESPONSIBLE Mr Ian Cowie
DIRECTOR: Governance and Strategy

PURPOSE/ EXECUTIVE SUMMARY

To provide the Sustainability Advisory Committee (SAC) with options on the meeting cycle for the Committee.

BACKGROUND

At its meeting on 8 February 2007 the Committee requested the following for future consideration:

Report relating to the setting of meeting dates of the Sustainability Advisory Committee, providing options on whether meetings should be set on an 8-week cycle or held on an as-needs basis at the discretion of the presiding person.

DETAILS

Current Schedule of Meeting Dates for the SAC

The following are the current dates that were set at the meeting on 19 October 2006. These dates for meetings of the SAC for 2006/07 were scheduled at approximately four – six week intervals, excluding the month of January and the Easter period.

- 24 May 2007
- 14 June 2007
- 12 July 2007

Suggested Schedule of Meeting Dates for the SAC

The following dates are a suggestion to replace the above dates should the Committee agree to set an 8-week cycle for future meetings:

- 24 May 2007
- 19 July 2007
- 13 September 2007

Should the Committee decide on future meeting dates being held at the discretion of the presiding person, a number of factors will need to be taken into account.

- How agenda items will be set
- Coordination of the notice of meetings
- Availability and flexibility of Committee members to attend ad-hoc meeting dates

Link to Strategic Plan:

Not Applicable.

Legislation – Statutory Provisions:

Not Applicable.

Risk Management Considerations:

Not Applicable

Financial/Budget Implications:

Not Applicable

Policy Implications:

Not Applicable.

Regional Significance:

Not Applicable.

Sustainability Implications:

Not Applicable.

COMMENT

Not Applicable.

ATTACHMENTS

None

VOTING REQUIREMENTS

Simple majority

RECOMMENDATION

That the Sustainability Advisory Committee APPROVE an eight weekly meeting cycle with the meeting dates for 2007 be as follows:

- **24 May 2007**
- **19 July 2007**
- **13 September 2007**

ITEM 2 A CLEANER ENERGY FUTURE FOR WA

WARD: All

RESPONSIBLE Mr Ian Cowie
DIRECTOR: Governance and Strategy

PURPOSE/EXECUTIVE SUMMARY

To provide the Sustainability Advisory Committee (SAC) with an overview of the 'A Cleaner Energy Future for WA' report. This provides advice to the Western Australian Government on practical and economically feasible ways to manage and reduce greenhouse gas emissions.

BACKGROUND

On 30 May 2005, the Western Australian Environment and Science Minister Judy Edwards announced a high-level taskforce to help Western Australia 'make a substantial leap forward in its approach to managing greenhouse gas emissions'. A Greenhouse and Energy Taskforce was established and chaired by Dr Roy Green AO, FTSE.

On 5 February 2007, the Premier of WA released the Taskforce's report.

DETAILS

The report of the Greenhouse and Energy Taskforce makes 14 recommendations (see attachment 1 to this report) on practical and economically feasible ways to manage greenhouse gas emissions from the stationary energy sector which will be incorporated into the State's forthcoming Climate Action Plan. A complete copy of the report is available online at <http://www.dec.wa.gov.au>.

While the report is positive and outlines a way forward for Western Australia through climate change uncertainty, there is some disregard for the work already undertaken by Local Governments in WA. The Western Australian Local Government Association (WALGA) believes that this calls for comment and invites Local Government to read and consider the report and to provide feedback to WALGA.

Link to Strategic Plan:

Objective 2.1 - To plan and manage our natural resources to ensure environmental sustainability.

Legislation – Statutory Provisions:

Not applicable.

Risk Management Considerations:

Not applicable.

Financial/Budget Implications:

Not applicable.

Policy Implications:

This topic is generally linked to the City's Sustainability Policies.

Regional Significance:

Not applicable.

Sustainability Implications:

The effective and efficient management of greenhouse gas emissions is a key sustainability issue for Council.

Consultation:

Not applicable.

COMMENT

A key issue for the City of Joondalup is reducing its level of greenhouse emissions. The City is taking many actions to reduce its production of greenhouse gas emissions through participation in the ICLEI - Cities for Climate Protection Program (CCP).

The purpose of this program is to reduce corporate and community greenhouse gas emissions through a planned approach that is measured and quantified. The City has been participating in the ICLEI CCP program since 1999 and achieved milestone 5 of the program in 2006, which means the City was able to reduce its emissions in excess of the target that was set.

ATTACHMENTS

Attachment 1 – Executive Summary of 'A Cleaner Energy Future' report.

RECOMMENDATION**That the Sustainability Advisory Committee:**

- 1. NOTES the recommendations made by the Greenhouse and Energy Taskforce in the 'A Cleaner Energy Future' report to the Minister for the Environment and the Minister for Energy.**
- 2. Provides COMMENT to Council on the report's recommendations in relation to the work already undertaken by the City of Joondalup in the greenhouse gas emission area and REQUESTS Council to provide these comments to WALGA.**

NOTICE OF MOTION – CR S MAGYAR – PEAK OIL

In accordance with Clause 26 of Standing Orders Local Law 2005, Cr S Magyar has given notice of his intention to move the following motion at the Sustainability Advisory Committee Meeting to be held on 29 March 2007:

“That the Sustainability Advisory Committee advises Council that:

- 1. peak oil is a major issue that affects all aspects of lifestyle, operations and sustainability of the City of Joondalup and its residents;**
- 2. Council has a responsibility to address the strategic planning implications of peak oil;**
- 3. the first step in strategically dealing with peak oil is for Council to adopt the “Oil Depletion Protocol”;**
- 4. Council adopts the “City of Joondalup Oil Depletion Protocol”:**

“The City of Joondalup acknowledges that:

History has recorded an increasing pace of change, such that the demand for energy has grown rapidly in parallel with the world population over the past two hundred years since the Industrial Revolution;

Energy supply required by the population has come mainly from coal and petroleum, such resources having been formed but rarely in the geological past and being inevitably subject to depletion;

Oil provides ninety percent of transport fuel, is essential to trade, and plays a critical role in the agriculture needed to feed the expanding population;

Oil is evenly distributed on the Planet for well-understood geological reasons, with much being concentrated in five countries bordering the Persian Gulf;

All the major reproductive provinces of the World have been identified with the help of advanced technology and growing geological knowledge, it being now evident that discovery reached a peak in the 1960s, despite technological progress and a diligent search;

The past peak of discovery inevitably leads to a corresponding peak in production during the first decade of the 21st Century, assuming no radical decline in demand;

The onset of the decline of this critical resource affects all aspects of modern life, such having grave political and geopolitical implications;

It is expedient to plan an orderly transition to the new World environment of reduced energy supply, making early provisions to avoid the waste of energy, stimulate the entry of substitute energies, and extend the life of the remaining oil;

It is desirable to meet the challenges so arising in a co-operative and equitable manner, such to address related climate change concerns, economic and financial stability, and the threats of conflicts for access to critical resources.

The City of Joondalup supports:

Calling a convention of nations to consider the issue with a view to agreeing an Accord with the following objectives:

- to avoid profiteering from shortage, such that oil prices may remain in reasonable relationship with production cost;
- to allow poor countries to afford their imports;
- to avoid destabilising financial flows arising from excessive oil prices;
- to encourage consumers to avoid waste;
- to stimulate the development of alternative energies.

The Accord shall have the following outline provisions:

- The world and every nation shall aim to reduce oil consumption by at least the world depletion rate.
- No country shall produce oil at above its present depletion rate.
- No country shall import at above the world depletion rate.
- The depletion rate is defined as annual production as a percent of what is left (reserves plus yet-to-find).
- The preceding provisions refer to regular conventional oil – which category excludes heavy oils with cut-off of 17.5 API, deepwater oil with a cut-off of 500 meters, polar oil, gas liquids from gas fields, tar sands, oil shale, oil from coal, biofuels such as ethanol, etc.

Detailed provisions shall cover the definition of the several categories of oil, exemptions and qualifications, and the scientific procedures for the estimation of Depletion Rate.

The signatory countries shall co-operate in providing information on their reserves, allowing full technical audit, such that the Depletion Rate may be accurately determined.

The signatory countries shall have the right to appeal their assessed Depletion Rate in the event of changed circumstances.

The City of Joondalup shall:

1. examine all its operations to find ways to reduce the City's oil consumption by 3% per year;

2. **examine its District Planning Scheme to find ways to enable the residents of the City to reduce their oil consumption by 3% per year;**
3. **include in its Annual Report progress on achieving the 3% reduction in its operations and the 3% reduction of its residents;**
4. **work with other local governments and the other levels of government to assist achieving a world wide reduction of 3% per year.**

REASONS FOR MOTION:

Cr Magyar submitted the following comments in support of his motion:

“The problem of peak oil is a risk management problem well explained in the report “Peaking Of World Oil Production: Impacts, Mitigation, & Risk Management”, February 2005. Although the report was produced for the United States Government, the problems are very similar for both Australia and the United States. Therefore, the executive summary (as per Attachment 1 to this report) explains why peak oil is a major issue to be addressed by the City of Joondalup and every local government globally.”

Officer’s Comment

This Notice of Motion raises a range of issues and each is addressed in turn.

1. **It requests SAC to advise Council that peak oil is a major issue.**

Response:

This has already been done. At its meeting of 8 February 2007, SAC resolved to “advise Council that the issue of peak oil has major implications for the lifestyle of the residents of the City of Joondalup”. It also agreed to advise Council that “peak oil has major implications for the sustainability of the City”. These resolutions will be presented to Council on 27 March 2007.

2. **It requests SAC to advise Council that Council has a responsibility to address the strategic planning implications of peak oil.**

Response:

This has already been done. At its meeting of 8 February 2007, SAC resolved to “advise Council that addressing peak oil should be a major consideration in strategic planning for the City of Joondalup”. This resolution will be presented to Council on 27 March 2007.

3. **It requests SAC to advise Council that Council should adopt the “Oil Depletion Protocol”.**

Response:

At its meeting of 8 February 2007, SAC resolved to seek Council support to examine the potential for the City to adopt the “Oil Depletion Protocol”. It was proposed that,

once Council receives and accepts the minutes of the SAC meeting of 8 February 2007, a report on the “Oil Depletion Protocol” would be prepared.

This Notice of Motion runs counter to the position accepted by SAC which involves the preparation of a report on the Protocol.

4. It requests SAC to advise the Council to adopt the “Oil Depletion Protocol” now and presents the wording of the Protocol to be adopted.

Response:

Here it is noted that the Protocol wording covers many issues and a commentary is provided on the relevant paragraphs below.

- Paragraphs 1-4 appear reasonable and can be supported.
- Paragraph 5 indicates that all the major productive provinces for oil in the world have been identified. While this may be true, this has not been confirmed. Consequently, it is debatable whether the City should acknowledge this statement. In this regard, consideration should be given to Recommendation 1 of the Senate Standing Committee Report which recognises the need to act in relation to oil depletion but supports further investigation of supply potential.
- Paragraph 6 indicates a peak in production during the first decade of the 21st Century. This comment is not supported by the quotations which are given in the ‘Reasons for Motion’ section. For instance, the Hirsch et al report notes that “when world oil peaking will occur is not known with certainty”. The Senate Standing Committee note that the International Energy Agency have estimated that “a peak of conventional oil production (may occur) between 2013 and 2037 depending on assumptions”. Further, the Portland Study notes that “predictions for the year oil production will peak range from present day until 2040”. Consequently, it would appear inappropriate for the City to acknowledge that a peak in oil production will occur in the first decade of the 21st Century.
- Paragraph 7 appears reasonable and can be supported.
- Paragraph 8 talks about planning an orderly transition to reduced energy supply. Here, comment is made about avoiding the waste of energy. This concept would appear reasonable whether peak oil has been reached or not. Equally, stimulating the entry of substitute energies is currently being debated and is occurring nationally. The Senate Standing Committee Report also recognises the need to explore alternative energy sources through recommendations 3, 4 and 5. The City of Joondalup has also commenced a range of initiatives to achieve energy savings.
- Paragraph 9 mentions the desirability of meeting the challenges of peak oil in a co-operative and equitable manner. While this appears desirable from an Australian perspective, this may not be the view of all members within the global community.
- The accord itself raises some interesting philosophical issues. For instance, the accord seeks to avoid profiteering from oil shortage. While this may be desirable from an Australian perspective as an oil importer, it is not necessarily desirable from an oil producer’s perspective. Indeed, just about every society in the world operates under an economic system which supports market operations and therefore profiteering.

The accord also focuses on allowing poor countries to afford their imports of oil. There is a vast array of problems facing poor countries. Oil might be critical to western societies; it is not as critical in many third world countries where alternative modes of transportation necessarily exists. Should Council be concerned with the situation facing poor countries, there are potentially other and more appropriate ways of supporting such nations.

The stability of financial flows depends on a range of things. Again, stabilising flows supports the status quo and those that are wealthy under the current system. In effect, such outcomes support Australia.

The accord's aspiration that a nation should aim to reduce oil consumption by at least the world depletion rate is noble from an Australian or developed world perspective. However, developing countries need to consume more oil under current technological limitations to support their development. The depletion rate is also likely to be highly controversial as it relates to reserves plus oil "yet to be found" which will be subjective, no matter what auditing regimes are put in place.

The protocol's accord presented in the Notice of Motion indicates that signatory countries will have the right to appeal their assessed depletion rate. Appeal processes are not explained however.

The Notice of Motion also raises four points specifically directed to the City of Joondalup. Before addressing these, it is considered desirable to evaluate the recommendations of the Senate Standing Committee and the Portland report which are provided in the Reasons for Motion.

Senate Standing Committee

Recommendation 1 – That relevant bodies within Australia reassess estimates of future oil supply and report to the Commonwealth on the probabilities and risks involved.

Response:

This recommendation is considered worthy of support. This issue is most directly relevant to the Commonwealth Government and it is important that it has the best information available.

Recommendation 6 – This recommendation supports further investigation into trends in the fuel efficiency of light vehicles and passenger cars. It indicates the potential for a mandatory code in this area.

Response:

Here, a crucial question is whether supply is leading demand for specific types of vehicles or whether demand is leading supply. Whatever the case, while there are increasing sales of small vehicles, there are also, in WA at least, increasing sales of larger vehicles and SUVs. A mandatory code for fuel efficiency is one way of increasing efficiency, although it constrains choice within the limits set.

Recommendation 8 – This recommendation relates to TravelSmart projects.

Response:

The City is now participating in the TravelSmart program in conjunction with the State Government. The maintenance of such programs is considered valuable.

Portland Report

The Portland Report begins by stating that “every day, businesses, government agencies and households around the world plan and make decision based on the assumption that oil and natural gas will remain plentiful and affordable”. This quotation can be questioned in Western Australia. Actions at Commonwealth, State and local government levels all indicate a growing awareness about the negative effects of burning oil and coal and potential supply constraints in the future.

The Portland Report provides 11 recommendations and the comments within the Reasons for Motion note that “the Portland document is a good example of what the City of Joondalup should be doing”.

Each recommendation is therefore considered in turn to assess its relevance for Australia and Joondalup.

1. *Reduce oil and natural gas consumption by 50 percent over the next 25 years:*

This target will only be achieved with the involvement of the Commonwealth and State Government.

2. *Educate citizens about peak oil and foster community and community-based solutions:*

Educating citizens in this regard is principally a Commonwealth and State Government role.

3. *Engage business, government and community leaders to initiate planning and policy change:*

The City of Joondalup is undertaking such change. It has a Sustainability Policy, has a Sustainability Advisory Committee, has a Greenhouse Action Plan and is developing a new Strategic Plan and an Environmental Plan, to name but a few. Through its planning initiatives, the City has achieved significant savings in energy use.

4. *Support land use patterns that reduce transportation needs, promote walkability and provide easy access to services and transportation options:*

The State Government’s “Network City” initiative is designed to achieve this outcome. The review of DPS2 can consider these initiatives if Council so wishes.

5. *Design infrastructure to promote transportation options, facilitate efficient movement of freight and prevent stranded investments:*

This recommendation appears to relate to major transportation options and freight movement. Such movements generally do not occur along local roads which are the responsibility of local government. Consequently, it is seen as principally a State Government responsibility but also a Commonwealth responsibility.

6. *Encourage energy-efficient and renewable transportation choices:*

This is occurring, as the City:

- reduces the size of its fleet;
- reduces the cylinder capacity of its fleet;
- introduces hybrid vehicles into its fleet;
- operates the CAT transportation system for the CBD area;
- supports cycling and alternative travel arrangements through its TravelSmart initiative and its bike plan.

7. *Expand building energy-efficiency programs and incentives:*

This is principally occurring at the Commonwealth and State level. For instance, the Australian Building Codes Board has introduced environmental considerations into the Building Code of Australia; the building industry has developed a Green Smart rating system and the State Government is looking to develop the BASIXs system to require energy efficient building.

8. *Preserve farmland and expand local food production and processing:*

This does not relate to the City of Joondalup.

9. *Identify and promote sustainable business opportunities:*

The City is supporting the Eco Business initiative to achieve this outcome as well as encouraging Eco Tourism.

10. *Redesign the safety net and protect vulnerable and marginalised populations:*

This is principally a State and Commonwealth Government responsibility.

11. *Prepare emergency plans for sudden and severe shortages:*

This is principally a State and Commonwealth Government responsibility although the City has specific Emergency Management Plans for a variety of situations.

Each of the four points within the Notice of Motion which are addressed to the City are now considered below.

- 1. *The City should examine all its operations to find ways to reduce the City's oil consumption by 3% per year.***

Response:

The City's Greenhouse Action Plan considers oil consumption in part and seeks to reduce consumption. This Plan is currently being updated. The Council also adopted the Green Motoring Guide which is a national manual to assist organisations improve fleet management from a 'green' perspective.

There would be resource implications associated with identifying new ways to reduce oil consumption and maintaining an accurate measure of the consumption savings achieved.

- 2. *The City examine its District Planning Scheme to find ways to enable residents to reduce their oil consumption by 3% per year.***

Response:

While the Planning Scheme clearly controls and influences behaviour, it is considered almost impossible to measure specific consumption reductions which arise. However, the City's Greenhouse Action Plan, the Green Transport Plan and TravelSmart Household all contain measurable targets.

- 3. *The City report on its achievements in relation to the 3% reductions in its Annual Report.***

Response:

Progress is and will, in future, be reported against plans which contain measurable actions.

- 4. *That the City work with other local governments and other governments to achieve a worldwide reduction of 3% per year.***

Response:

The City continues to work with other local governments where possible. Whether this will directly achieve a worldwide reduction of 3% in consumption per year is debatable.

It should be noted that the International Council for Local Environment Initiatives (ICLEI) has been established by local governments to 'lead the charge' on worldwide initiatives. The City actively participates in a range of ICLEI programs. It would appear inappropriate and ineffective for the City of Joondalup to take on the role for which ICLEI was formed.

**APPENDICES FOR AGENDA OF
SUSTAINABILITY ADVISORY COMMITTEE**

ITEM	TITLE	APPENDIX	PAGE
Item 2	A Cleaner Energy Future for WA – Executive Summary	1	1
	Notice of Motion – Cr Magyar – Peak Oil	2	11



Executive Summary

In addressing its terms of reference, the Taskforce acknowledges the mounting scientific evidence that human activities are leading to adverse changes in our climate system, and the WA Government's desire to manage greenhouse gas emissions so that serious impacts do not occur. Scientific consensus is that this will require global reductions of the order of 50 to 60% below 1990 levels by 2050. This corresponds with the WA Government's request to advise on the feasibility and implications of such a reduction from stationary energy sources, which account for about half of WA emissions and an even greater proportion of emission growth. To reduce to one half of 1990 levels by 2050 actually means a reduction by a factor of approximately eight from a best estimate of a 'business-as-usual' scenario. This is clearly a very significant challenge.

The Taskforce is also conscious of the nature of WA's economic structure, with a heavy emphasis on trade-exposed export industry, and that the State has only a small absolute level of emissions (albeit high on a per-capita measure). Injudicious unilateral action would achieve little and could impact heavily on the WA economy. The Taskforce believes that global action on greenhouse will strengthen as the consequences of climate change become more evident, but the timing of a global framework is currently uncertain. WA should participate in achieving a global solution, and its policies, planning and preparation should be geared to implementation of proactive measures in line with global developments.

There are, of course, measures that can be implemented forthwith to achieve emission reductions that do not impact seriously on WA industry or the community. The Taskforce is strongly of the view that the sooner such measures are implemented the better, particularly as achieving the longer-term targets is critically dependent on early actions wherever they are viable.

Other measures will involve more significant costs, but will be necessary if WA is to

move towards the deeper cuts in emissions which are considered necessary to prevent unacceptable impacts. The Taskforce has assessed a range of measures available, and the likely costs associated with them. The Taskforce has developed an integrated set of recommendations which the WA Government could use in reaching its decisions on policy measures and priority actions for emission abatement in the stationary energy sector, taking into account, as it must, the broader span of objectives across the economy as a whole.

In reaching its conclusions and recommendations, the Taskforce considered it was essential to recognise that greenhouse gas emissions impose a cost on the community that is not currently accounted for in the market. The Taskforce believes that this could start to be recognised through a national emissions trading scheme, and also when evaluating technologies and energy efficiency measures.

Section 6 of the report provides the Taskforce's key findings and recommendations against the terms of reference. In this executive summary, the structure follows that of the report.

Abatement potential

While acknowledging that there are significant risks and uncertainties, the Taskforce believes that the combination of measures set out in this report could return greenhouse gas emissions to current levels by around 2030. This provides a pathway towards deeper emission cuts by 2050. It is clear, however, that meeting a 50% reduction in emissions on 1990 levels by 2050 would require substantial new breakthroughs in energy technology. Widespread deployment of energy efficiency or lower emission technologies is unlikely without either mandatory requirements or a carbon price signal. The Taskforce has made recommendations which it believes would enable these savings to be harvested. It has also recommended that the WA Government enhance its leadership role.



From a policy perspective, WA's low-emission technology effort could focus on improved efficiency in the immediate and short-term and on securing competitive advantages over the longer-term. In partnership with industry and the research community, the State can invest significantly in relevant **research and development** initiatives related to these needs, safe in the knowledge that accelerated technological innovation is an internationally accepted way of tackling climate change, while at the same time positioning for economic opportunity.

Developing competitive sources of **renewable energy** in Western Australia offers potentially significant returns in a low carbon future, particularly if based on Western Australia's natural advantages. While the costs are high currently, they are on a downward curve. Other factors also need to be considered, such as industrial development opportunities and energy diversity and security.

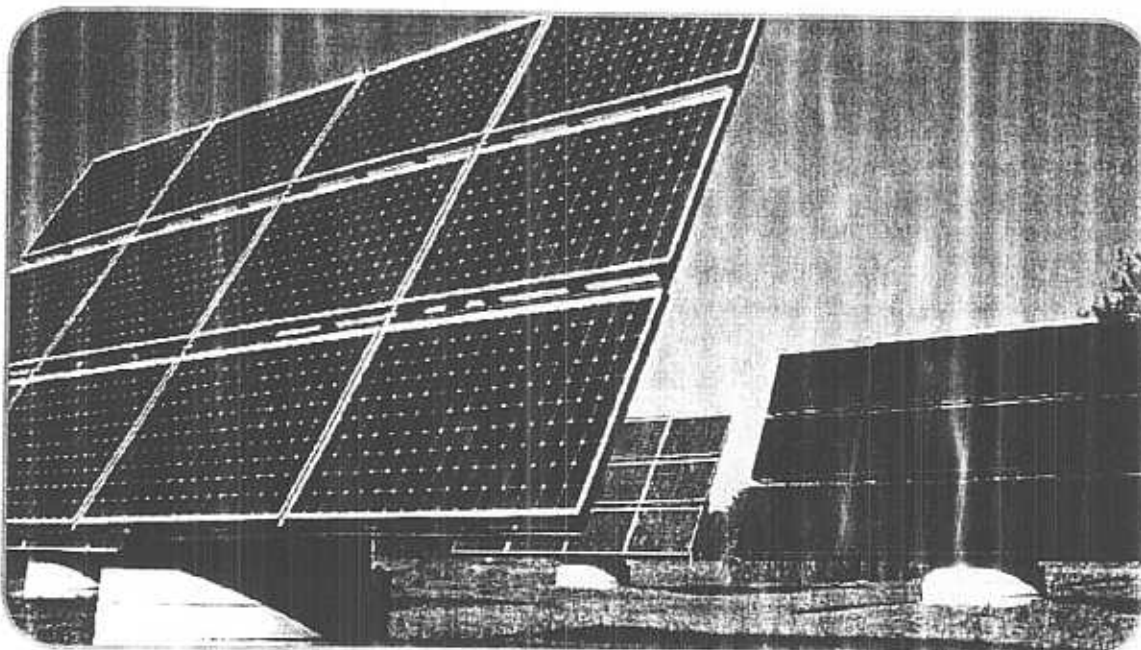
Of particular importance to the achievement of cleaner energy supply is the need to **capture and store emissions**. Development of the associated technologies is progressing strongly

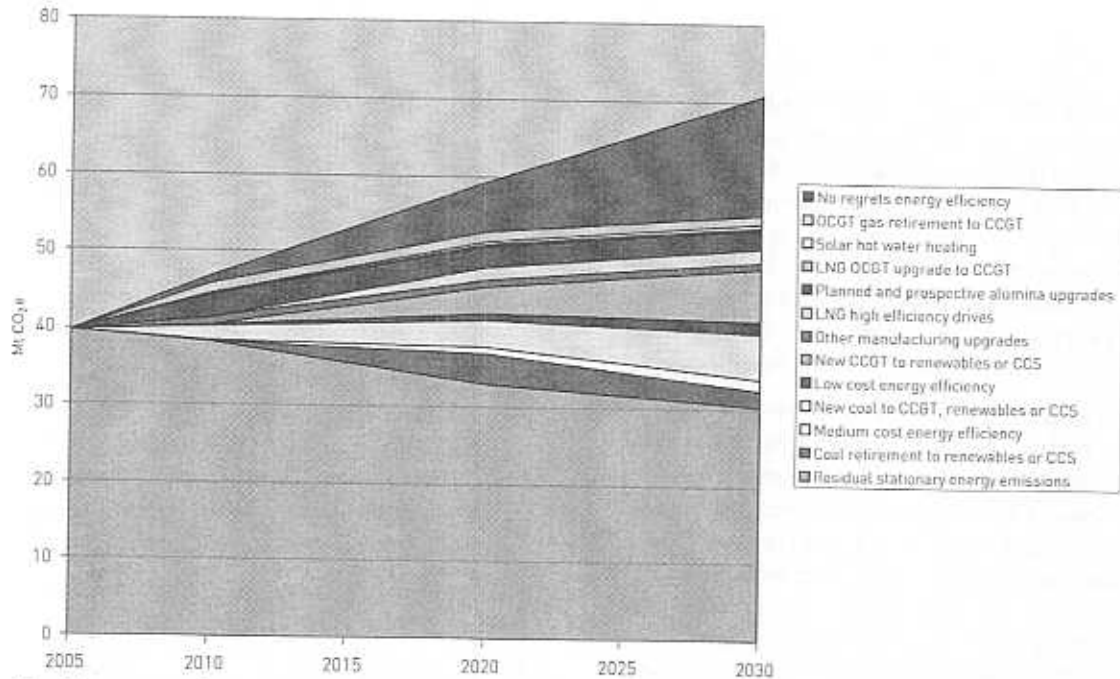
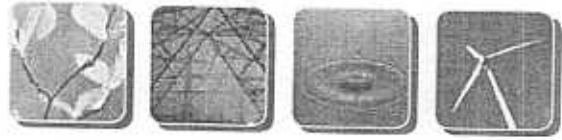
both nationally and internationally. This recognises that, globally, fossil fuels are a major source of energy. WA needs to ensure that it is ready to adopt these technologies as soon as they become viable.

The wedge diagram below indicates the scale of emission reductions which modelling indicates are potentially achievable from energy efficiency and low emission supply options in 2020 and 2030, if a market-based carbon price of \$25/t carbon dioxide equivalent (CO₂e) was in place, complemented by other policies and measures:

- Energy efficiency improvements with private internal rates of return exceeding 15% (i.e. meeting or exceeding normal investment guidelines) could reduce energy use by 19 Mt CO₂e by 2030; and
- Low to zero emission supply options provide potential emission reductions of 22 Mt CO₂e by 2030.

As the Taskforce believes that a carbon price of \$25/t is likely by 2020, strong actions to implement these two measures could result in stationary energy emissions being lower in 2030 than they were in 2005.





Indicative greenhouse gas abatement 'wedges' from technology and energy efficiency at a carbon price of \$25/t CO₂e

The net potential is a reduction by 2030 to about the current level of emissions, if immediate, strong and ongoing commitment is made to the policies and programs identified by the Taskforce. While providing a pathway to deeper cuts by 2050, achieving 50% of 1990 levels would require substantial breakthroughs in energy technology.

Targets and market mechanisms

Although achieving a reduction to 50% below 1990 levels by 2050 does not appear feasible without technological breakthroughs, the Taskforce believes that the WA Government should still establish this as an indicative target. The timeframe is such that new, more efficient technologies and processes are expected to become available. Such a target is also in line with targets adopted by a number of other states and nations.

Of more significance is the need to drive action in the shorter term. Most economic modelling shows that the earlier the action, the lower

the cost and the higher the likelihood of achieving the long-term targets. The Taskforce considers this requires a short-term target. It is, however, concerned that a mandatory emissions reduction target, while simple and easy to understand, might prove very costly, particularly if the global response is less rapid than anticipated. It has therefore proposed a market approach to this issue; establishing a price trajectory for the cost of carbon through time, to drive emission reductions but to keep the costs within targeted limits in the medium term. The pricing arrangements would have to be reviewed at regular intervals of three to four years to determine whether the reductions are being achieved, and strengthened if that is not the case.

Emissions trading is a market-based instrument widely regarded as an effective and efficient means to achieve national or global emissions reductions at least cost over the long-term. WA is working with the other states and territories towards the development of a National Emissions Trading Scheme



(NETS). The Taskforce considers that the broad direction of the NETS proposal is appropriate, with many of the proposed features beneficial from WA's perspective, and strongly supports ongoing endeavour to establish a NETS which it considers to be a key component in achieving greenhouse abatement. Nevertheless, some aspects which could be disadvantageous will require careful attention by the WA Government.

Offset is a term used to describe greenhouse gas removal or reduction by a discrete activity that is then used to counterbalance or 'offset' emissions elsewhere in the economy (such as a power station). Examples of offsets are: planting trees; capturing and storing greenhouse gas emissions; and modifying industrial processes to reduce emissions. The Taskforce has considered the potential for offsets to be used as one way by which proponents can meet emission restrictions, providing the flexibility to take the lowest cost approach to achieve an emissions cap. It has set down the requirements which it considers to be necessary for a WA offset regime.

Recommendations

- Recommendation 1** The Taskforce recommends that the WA Government set policy goals for action to reduce greenhouse gas emissions as follows:
- i. To maximise the chances of success of international efforts to prevent dangerous and costly climate change;
 - ii. To reduce emissions in ways that avoid severe or seriously inequitable economic impacts on WA industry or the community and avoid stranded assets;
 - iii. To limit the expense to WA taxpayers to that which is reasonable, cost effective and equitable in the context of global initiatives; and
 - iv. To review progress regularly and incorporate additional measures as they become appropriate in the national and global context.
- Recommendation 2** The Taskforce recommends that the WA Government strengthen government capacity and expertise in greenhouse policy development commensurate with the increasing priority of the issue.

Economic analyses

Several recent studies have concluded that:

- the global cost of taking action is less than the cost of not taking action; and
- the cost of substantial greenhouse gas abatement will be lower if prompt action is taken.

Macroeconomic modelling of the proposed NETS indicated that a carbon price in the region of \$25/t CO₂e would reduce emissions substantially with minimal overall economic impact. At higher prices, the economic impacts of achieving abatement rise quite sharply.

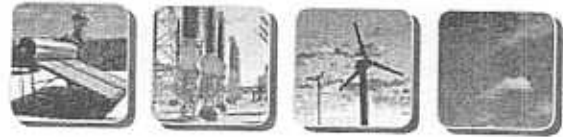
Unilateral greenhouse gas abatement actions by WA could lead to net economic cost, but may still be justified on complementary policy, preparedness and new industry development arguments. Care would be needed in the design of any package of unilateral actions to ensure costs are identified and kept to acceptable levels.



- Recommendation 3 The Taskforce recommends that, to harness cost effective efficiency opportunities and reduce energy waste, the WA Government:
- i. Improve pricing signals in energy markets through carbon pricing, mandatory use of smart metering, tests for network augmentation, and allowing network service providers to recover foregone revenue from demand side investments;
 - ii. Support and extend energy rating and labelling;
 - iii. Implement world class minimum energy performance standards for appliances, homes, office buildings and industrial equipment, extend their coverage, factor in a carbon price and regularly review standards to keep pace with technology development;
 - iv. Establish a mandatory energy efficiency program for large to medium energy users, initially to ensure that efficiency opportunities that offer no regrets greenhouse savings to the community as a whole are implemented; and
 - v. Establish an Energy Savings Fund, based on the NSW model of a small surcharge on energy consumption, to identify and invest in energy savings, home energy retrofitting, awareness raising, incentives, rebates and energy auditing for small and medium enterprises.
- Recommendation 4 The Taskforce recommends that in order to discourage new investment in high emission technologies, the WA Government undertake the following steps:
- i. Make a clear statement of policy intent that WA will need to move towards a less carbon-intensive economy;
 - ii. Require significant new generators to minimise emissions in line with contemporary emission intensity benchmarks, taking steps to limit any adverse impact of resulting electricity price rises;
 - iii. Require all high CO₂ content natural gas fields to use capture and storage technology for fugitive emissions; and
 - iv. Facilitate adequate and economic gas supply through a domestic gas reservation policy and the development of adequate pipeline capacity.
- Recommendation 5 The Taskforce recommends that, in order to prepare WA for future carbon pricing, the WA Government:
- i. Make a clear statement that, as a general principle, all new stationary energy developments will be liable for the full cost of future greenhouse gas emission compliance; and



- ii. Foreshadow a future carbon price, develop a carbon risk analysis framework and consider imposing a requirement for project proponents to undertake a carbon price sensitivity analysis.
- Recommendation 6** The Taskforce recommends that, in order to facilitate longer term technology development, the WA Government:
- i. Establish a dedicated and technically competent Greenhouse Technologies Development Unit to plan, coordinate and implement an Energy Technology Innovation Strategy;
 - ii. Assign the Greenhouse Technologies Development Unit, as a first task, to scope and plan the science infrastructure needs, including human resources, relevant to the development of world class research activity in emission reduction technologies in partnership with industry and academe;
 - iii. Establish a low emission technology development fund, to leverage significant Commonwealth and other public and private research and development expenditure to position WA industry to prosper in this field of economic opportunity, and to support research and development identified as high priority for WA.
 - iv. Provide incentives to attract cutting edge projects and develop skills, critical mass and intellectual property in emerging low emission technologies which have particular relevance to the State's needs and competitive advantage;
 - v. Work with industry to undertake a detailed feasibility study for carbon capture networks in industrial regions;
 - vi. Undertake a detailed identification and assessment of potential sites for geo-sequestration of CO₂, geothermal, wind, wave and tidal energy development and review any barriers to deployment of these technologies;
 - vii. Establish policy measures to secure strategic geo-sequestration sites; and
 - viii. Encourage proponents of new energy intensive projects to provide financial contributions to the low emission technology development fund.
- Recommendation 7** The Taskforce recommends that the WA Government take significant additional steps to promote the development and expansion of renewable and very low emission energy, including:
- i. Setting a mandatory renewable energy target for the South West Interconnected System (SWIS) through to 2020 of the order of 15 to 20%, recognising the desirability of keeping costs consistent with the carbon price trajectory set out in Recommendation 11;



- ii. Measures to provide further support for renewable and very low emission energy technologies, including geothermal, solar and wave technologies, which have significant potential for WA in the future, but that are not yet sufficiently developed to compete with established technologies (such as wind). Consideration should be given to:
- sub targets for particular technologies set within the overall target;
 - premium tariffs or subsidies per unit of energy supplied; and
 - capital grants or concessional finance;
- iii. Implementing a project facilitation service to assist projects to access finance, locate suitable sites and deal with planning, approval and grid connection processes and barriers; and
- iv. Calling for expressions of interest to establish a pilot geothermal (hot dry rock) energy project in WA.
- Recommendation 8 To strategically prepare for a carbon constrained world, the Taskforce recommends that the WA Government:
- i. Fast-track work to identify suitable geo-sequestration sites in WA;
 - ii. Facilitate a pilot geo-sequestration project in the Perth Basin; and
 - iii. Require all major new fossil fuel plants to plan for future carbon capture retrofit as carbon capture and storage (CCS) technology becomes available.
- Recommendation 9 The Taskforce recommends that the WA Government lead by example by:
- i. Buying or leasing, and operating, minimum 5-star buildings or tenancies (subject to availability), buying the most efficient appliances in range, and ensuring all computer and office equipment is Energy Star compliant and enabled;
 - ii. Purchasing a greater proportion of Green Power for government electricity use, establishing new energy efficiency targets for government agencies and extending its Carbon Neutral and Solar Schools programs;
 - iii. Establishing a program to progressively install cogeneration in government-owned hospitals and other appropriate institutions wherever possible; and
 - iv. Continue working closely with and assisting local government in their greenhouse gas abatement initiatives and programs.
- Recommendation 10 The Taskforce recommends that the WA Government adopt an indicative target to reduce greenhouse gas emissions to a level of 50% below 1990 levels by 2050.



- Recommendation 11 The Taskforce recommends that, to provide direction for policy development and private investment in the short-term, the WA Government:
- i. Develop an estimate of the future risk weighted carbon price trajectory;
 - ii. Base policy for achieving substantial emissions abatement by 2020 on this estimated carbon price trajectory;
 - iii. Determine indicative emission reduction profiles based on the carbon price trajectory; and
 - iv. Establish legislative triggers for progressive policy intervention every three to four years to strengthen policies if current measures fail to deliver the desired emission reductions toward the 2020 and 2050 objectives.
- Recommendation 12 The Taskforce recommends that, in order to prepare WA for future carbon pricing, the WA Government:
- i. Endorse national emissions trading as a preferred domestic transition to a carbon constrained world;
 - ii. Continue to work with the National Emissions Trading Taskforce towards a national scheme involving the Commonwealth and the States and Territories;
 - iii. Support implementation of the National Emissions Trading Scheme based on:
 - a phased approach to sectoral coverage commencing with the electricity generation sector;
 - assistance for adversely affected firms through the allocation of permits;
 - assistance for trade-exposed energy intensive industry to account for the impacts of the scheme on individual projects; and
 - inclusion of offsets.
- Recommendation 13 The Taskforce recommends that, in establishing a WA offset regime, the WA Government:
- i. Promote the establishment of a national registry to govern offset creation, registration and trade and provide a set of common offset rules for all national programs;
 - ii. Seek compatibility with international rules for offsets;



- iii. Establish a WA registry:
- to manage WA offsets as an interim measure before a national registry is in place; and
 - to manage WA offsets that meet international requirements but are not recognised nationally;
- iv. Establish a regulatory body to determine the parameters and establish procedures to ensure that offset standards are applied and that there is no double counting; and
- v. Assess the WA potential for offset supply and facilitate their supply through government programs.
- Recommendation 14 The Taskforce recommends that the WA Government:
- i. Strengthen its capacity for greenhouse policy related economic analysis, including consideration of a specialist area and additional on-going resources;
- ii. Initiate additional economic analysis on the following initial priorities:
- the existing extent of subsidies that encourage higher emissions and the opportunities to eliminate or reduce perverse subsidies;
 - analysis of the likely costs and benefits of key emerging technologies including, for example, CCS, geothermal and wave;
 - underpinning modelling and data for drawing the proposed carbon price trajectory; and
 - economic impacts on WA of market measures, particularly emission trading scheme design options.

Dr Roy Green

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Acronyms

ABARE	Australian Bureau for Agricultural Research and Economics
AGO	Australian Greenhouse Office
AP6	Asia Pacific Partnership on Clean Development and Climate
CCP Plus	Cities for Climate Protection Plus Initiative
CCPP	Cities for Climate Protection Program
CCGT	Combined Cycle Gas Turbine
CDM	Clean Development Mechanism
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
CCS	carbon capture and storage
COAG	Council of Australian Governments
CSP	concentrating solar power
EU	European Union
FCCC	Framework Convention on Climate Change (United Nations)
GSP	Gross State Product
IEA	International Energy Agency
IMO	Independent Market Operator
IPCC	Intergovernmental Panel on Climate Change
ITC	Induced Technical Change
JI	Joint Implementation
LETDF	Low Energy Technology Development Fund
LNG	Liquefied Natural Gas
MEPS	Minimum Energy Performance Standards
MRET	Mandatory Renewable Energy Target
NETS	National Emissions Trading Scheme
NETT	National Emissions Trading Taskforce
NGGI	National Greenhouse Gas Inventory
ppmv	parts per million by volume
PV	photovoltaic
RECs	Renewable Energy Certificates
RRPGR	Remote Renewable Power Generation Program
SEDO	Sustainable Energy Development Office
SWIS	South West Interconnected System
VRET	Victorian Renewable Energy Target

"PEAKING OF WORLD OIL PRODUCTION: IMPACTS, MITIGATION, & RISK MANAGEMENT

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February 2005

EXECUTIVE SUMMARY

The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. As peaking is approached, liquid fuel prices and price volatility will increase dramatically, and, without timely mitigation, the economic, social, and political costs will be unprecedented. Viable mitigation options exist on both the supply and demand sides, but to have substantial impact, they must be initiated more than a decade in advance of peaking.

In 2003, the world consumed just under 80 million barrels per day (MM bpd) of oil. U.S. consumption was almost 20 MM bpd, two-thirds of which was in the transportation sector. The U.S. has a fleet of about 210 million automobiles and light trucks (vans, pick-ups, and SUVs). The average age of U.S. automobiles is nine years. Under normal conditions, replacement of only half the automobile fleet will require 10-15 years. The average age of light trucks is seven years. Under normal conditions, replacement of one-half of the stock of light trucks will require 9-14 years. While significant improvements in fuel efficiency are possible in automobiles and light trucks, any affordable approach to upgrading will be inherently time-consuming, requiring more than a decade to achieve significant overall fuel efficiency improvement.

Besides further oil exploration, there are commercial options for increasing world oil supply and for the production of substitute liquid fuels: 1) Improved Oil Recovery (IOR) can marginally increase production from existing reservoirs; one of the largest of the IOR opportunities is Enhanced Oil Recovery (EOR), which can help moderate oil production declines from reservoirs that are past their peak production; 2) Heavy oil / oil sands represents a large resource of lower grade oils, now primarily produced in Canada and Venezuela; those resources are capable of significant production increases; 3) Coal liquefaction is a well established technique for producing clean substitute fuels from the world's abundant coal reserves; and finally, 4) Clean substitute fuels can be produced from remotely located natural gas, but exploitation must compete with the world's growing demand for liquefied natural gas. However, world-scale contributions from these options will require 10-20 years of accelerated effort.

Dealing with world oil production peaking will be extremely complex, involve literally trillions of dollars and require many years of intense effort. To explore these complexities, three alternative mitigation scenarios were analyzed:

*Scenario I assumed that action is not initiated until peaking occurs.
Scenario II assumed that action is initiated 10 years before peaking,
Scenario III assumed action is initiated 20 years before peaking.*

For this analysis estimates of the possible contributions of each mitigation option were developed, based on an assumed crash program rate of implementation.

Our approach was simplified in order to provide transparency and promote understanding. Our estimates are approximate, but the mitigation envelope that results is believed to be directionally indicative of the realities of such an enormous undertaking. The inescapable conclusion is that more than a decade will be required for the collective contributions to produce results that significantly impact world supply and demand for liquid fuels.

Important observations and conclusions from this study are as follows:

- 1. When world oil peaking will occur is not known with certainty. A fundamental problem in predicting oil peaking is the poor quality of and possible political biases in world oil reserves data. Some experts believe peaking may occur soon. This study indicates that "soon" is within 20 years.*
- 2. The problems associated with world oil production peaking will not be temporary, and past "energy crisis" experience will provide relatively little guidance. The challenge of oil peaking deserves immediate, serious attention, if risks are to be fully understood and mitigation begun on a timely basis.*
- 3. Oil peaking will create a severe liquid fuels problem for the transportation sector, not an "energy crisis" in the usual sense that term has been used.*
- 4. Peaking will result in dramatically higher oil prices, which will cause protracted economic hardship in the United States and the world. However, the problems are not insoluble. Timely, aggressive mitigation initiatives addressing both the supply and the demand sides of the issue will be required.*
- 5. In the developed nations, the problems will be especially serious. In the developing nations peaking problems have the potential to be much worse.*
- 6. Mitigation will require a minimum of a decade of intense, expensive effort, because the scale of liquid fuels mitigation is inherently extremely large.*
- 7. While greater end-use efficiency is essential, increased efficiency alone will be neither sufficient nor timely enough to solve the problem. Production of large amounts of substitute liquid fuels will be required. A number of commercial or near-commercial substitute fuel production technologies are currently available for deployment, so the production of vast amounts of substitute liquid fuels is feasible with existing technology.*
- 8. Intervention by governments will be required, because the economic and social implications of oil peaking would otherwise be chaotic. The experiences of*

the 1970s and 1980s offer important guides as to government actions that are desirable and those that are undesirable, but the process will not be easy.

Mitigating the peaking of world conventional oil production presents a classic risk management problem:

Mitigation initiated earlier than required may turn out to be premature, if peaking is long delayed.

If peaking is imminent, failure to initiate timely mitigation could be extremely damaging.

Prudent risk management requires the planning and implementation of mitigation well before peaking. Early mitigation will almost certainly be less expensive than delayed mitigation. A unique aspect of the world oil peaking problem is that its timing is uncertain, because of inadequate and potentially biased reserves data from elsewhere around the world. In addition, the onset of peaking may be obscured by the volatile nature of oil prices. Since the potential economic impact of peaking is immense and the uncertainties relating to all facets of the problem are large, detailed quantitative studies to address the uncertainties and to explore mitigation strategies are a critical need.

The purpose of this analysis was to identify the critical issues surrounding the occurrence and mitigation of world oil production peaking. We simplified many of the complexities in an effort to provide a transparent analysis. Nevertheless, our study is neither simple nor brief. We recognize that when oil prices escalate dramatically, there will be demand and economic impacts that will alter our simplified assumptions. Consideration of those feedbacks will be a daunting task but one that should be undertaken.

Our study required that we make a number of assumptions and estimates. We well recognize that in-depth analyses may yield different numbers.

Nevertheless, this analysis clearly demonstrates that the key to mitigation of world oil production peaking will be the construction a large number of substitute fuel production facilities, coupled to significant increases in transportation fuel efficiency. The time required to mitigate world oil production peaking is measured on a decade time-scale. Related production facility size is large and capital intensive. How and when governments decide to address these challenges is yet to be determined.

Our focus on existing commercial and near-commercial mitigation technologies illustrates that a number of technologies are currently ready for immediate and extensive implementation. Our analysis was not meant to be limiting. We believe that future research will provide additional mitigation options, some possibly superior to those we considered. Indeed, it would be appropriate to greatly accelerate public and private oil peaking mitigation research. However, the reader must recognize that doing the research required to bring new technologies to commercial readiness takes time under the best of

circumstances. Thereafter, more than a decade of intense implementation will be required for world scale impact, because of the inherently large scale of world oil consumption.

In summary, the problem of the peaking of world conventional oil production is unlike any yet faced by modern industrial society. The challenges and uncertainties need to be much better understood. Technologies exist to mitigate the problem. Timely, aggressive risk management will be essential.

The executive summary of the Senate Standing Committee on Rural and Regional Affairs and Transport, final report titled "Australia's future oil supply and alternative transport fuels" dated February 2007 is quoted below. The executive summary provides a good review of the latest knowledge of peak oil and possible actions from an Australian perspective. It should be noted that Senate report is a conservative document.

More information more applicable to local government is supplied after the Senate Report quotation.

"Executive summary

CHAPTER 1. Introduction

This inquiry was prompted by the question of whether Australia should be concerned about peak oil. This term refers to the theory that, for fundamental geological reasons, global conventional oil production will reach a peak and then start an irreversible decline soon enough to be of concern. [1.3]

CHAPTER 2. Future oil demand and supply Projections of world oil production and consumption

The International Energy Agency (IEA), in its World Energy Outlook 2005, predicts that in a 'reference scenario' world demand for oil will grow from 82 million barrels per day in 2004 to 92 millions barrels per day in 2010 and 115 million barrels per day in 2030 . an average growth rate of 1.3 per cent per year over the period. [2.30]

It assumes that most of the increased demand for oil to 2030 will be supplied by a large increase in OPEC production, particularly in the Middle East. [2.32]

The IEA argued that resources are adequate to meet projected demand, although 'reserves will need to be "proved up" in order to avoid a peak in production before the end of the projection period [2030].' However it noted that financing the investment needed to find and exploit the resources is a serious challenge. [2.31]

The core document used to support the assumption that oil supply will not be constrained before 2030 appears to be the US Geological Survey's World Petroleum Assessment 2000 (USGS 2000). This estimated that the world's total conventional oil and natural gas liquids produced to 1995, or with potential to be added to reserves between 1995 and 2025, is about 3,345 billion barrels. Of this about 1,000 billion barrels has already been produced. [2.35]

Oil production and consumption in Australia

Australia's demand for petroleum is over 750,000 barrels per day. This is projected to rise to over 800,000 barrels per day by 2009-10, and over 1,200,000 barrels per day by 2029-2030. [2.43]

Australia's net self-sufficiency in oil is expected to decline significantly as future discoveries are not expected to make up for the growth in demand and the decline in reserves as oil is produced. [2.48]

CHAPTER 3 . Peak oil concerns about future oil supply

Peak oil commentators commonly predict a peak of conventional oil production somewhere between now and 2030. They fear that declining production after the peak will cause serious hardship if mitigating action is not started soon enough. [3.3]

Peak oil commentators mostly estimate an ultimately recoverable resource (total production past and future) of conventional oil much lower than official agencies such as the US Geological Survey. This affects the timing of the peak as the rate of production should be expected to peak when about half the ultimately recoverable resource has been produced. [3.17, 3.73]

The main areas of disagreement are:

- Estimates of current reserves: Peak oil commentators argue that estimates of remaining reserves are unreliable and probably overstated, particularly in the Middle East. [3.19]
- Estimates of future reserve growth: Reserve growth is the commonly seen increase in the estimated reserves of already discovered oilfields over time. USGS 2000 estimated future world reserve growth by analogy with past reserve growth in the United States. Peak oil commentators argue that this is unsound, since US reserve growth has been enlarged by factors which do not apply worldwide or will not apply as much in future. [3.25, 3.27, 3.31]
- Estimates of future oil discoveries: New field oil discoveries have declined greatly since the 1960s. USGS 2000 estimates of future discoveries, to be realised, would require a drastic turnaround of this declining trend. Peak oil commentators argue that the declining trend of oil discovery reflects geological fundamentals and should be expected to continue. [3.38, 3.40, 3.52]

Estimating the timing of peak oil

The timing of peak oil is debated. However the concept appears to be well accepted including by official agencies. [3.88]

The US Energy Information Administration in 2000 estimated a peak between 2020 and 2050 depending on assumptions about demand growth and the size of the ultimately recoverable resource. In a similar exercise the International Energy Agency (IEA) in 2004 estimated a peak of conventional oil production between 2013 and 2037 depending on assumptions. Many commentators predict an earlier peak. [3.79, 3.82, 3.86]

The US Energy Information Administration study found that widely differing estimates of the ultimately recoverable resource (URR) make surprisingly little difference to the timing of the peak. The exponential growth of demand is the dominating factor. [3.83]

From this it follows that an optimistic view of long term oil supply cannot rely only on a high estimate of the URR. It must rely on an optimistic view of the ability of market forces and

technological progress to bring alternative fuels on stream in a timely way in sufficient quantity to serve the post (conventional) oil age. [3.90]

Investment needed to maintain production

The upstream developments needed to offset depletion of existing oilfields and to supply demand growth will require very significant investment. The IEA's recent World Energy Outlooks have stressed that there is no guarantee that this will be forthcoming. [3.94]

The prospects of nonconventional oil

All scenarios for future oil production assume increased exploitation of nonconventional oil (heavy oil, tar sands, shale oil) to offset declining conventional oil. Peak oil commentators argue that large scale exploitation of these resources will be too difficult and costly to make much difference to the peak oil problems which they predict. [3.99, 3.105]

The IEA notes that producing such a massive amount of resources can only be done over long periods of time, simply mobilising the capital. is likely to take several decades.. [3.107]

Implications for the price of oil

Demand for oil is relatively inelastic, because for its major use transport there are no easy substitutes. This means that a relatively small shortfall in supply can cause a large increase in price. This will increase the volatility of the price in response to small changes in supply when there is little spare capacity. [3.114]

The IEA now expects that the price of crude oil will ease to about US\$47 per barrel by 2012, then increase to US\$55 by 2030 (2005 dollars). Prices are likely to remain volatile. Some commentators believe that much higher prices are possible. [3.112, 3.117]

New warnings in the World Energy Outlook 2006

The IEA's World Energy Outlook 2006 (WEO 2006) gives serious new warnings about the energy future. It regards current trends as neither secure nor sustainable. It stresses the need for energy policy to be consistent with environmental goals chiefly, the need to reduce greenhouse gas emissions. [3.121, 3.122]

The WEO 2006 proposes an alternative policy scenario to reduce the growth of energy use and greenhouse gas emissions. A key finding is that energy saving measures reduce the total investment required to meet the demand for energy services. [3.125, 3.128]

Committee comment on peak oil concerns

The essence of the peak oil problem is risk management. The risks involved are high if peak oil comes earlier than expected, or if economies cannot adapt quickly enough to the post peak decline. Australian governments need better information from which to decide a prudent response to the risk. [3.135]

Recommendation 1 (paragraph 3.136)

The committee recommends that Geoscience Australia and ABARE reassess both the official estimates of future oil supply and the 'early peak' arguments and report to the Government on the probabilities and risks involved.

The committee considers that more needs to be done to reduce Australia's oil dependency in the long term. This is desirable not only because of peak oil concerns, but also for other reasons, to

mitigate greenhouse gas emissions; to mitigate the costs of the expected long term decline in Australia's net oil self-sufficiency; and to mitigate the risks of supply disruptions as oil production becomes concentrated in a declining number of major oil-producing countries, some of which are politically unstable. [3.144]

Recommendation 2 (paragraph 3.145)

The committee recommends that in considering a less oil dependent policy scenario, the Government take into account the concerns expressed in the World Energy Outlook 2006, namely - . current trends in energy consumption are neither secure nor sustainable; . energy policy needs to be consistent with environmental goals, particularly the need to do more to reduce fossil fuel carbon dioxide emissions.

CHAPTER 4 . Economic and social impacts of possible higher fuel prices

The general impact of a long term higher oil price would be reduced economic growth. A price increase transfers income from oil-consuming to oil-producing nations, and the net economic effect is negative. [4.11]

Industries in which fuel is a higher proportion of input costs will be relatively more affected. These include transport (particularly aviation), mining and agriculture. [4.30- 4.35]

Among consumers, higher fuel prices are likely to have most effect on those who are highly reliant on car transport and lack alternatives. These people tend to be outer suburban residents and rural and regional communities. [4.36]

The expected future concentration of oil production in fewer countries increases the risk of disruptions to supply. [4.46]

**CHAPTER 5 . Supply side responses: overview and exploration
Oil exploration in Australia**

Australia's self-sufficiency in oil is expected to decline into the long term as reserves are depleted and because of rising demand. It appears prudent to encourage oil exploration. [5.5, 5.7]

By world standards Australia's sedimentary basins have been only lightly explored. However opinions differ about the prospects of finding significant quantities of new oil. [5.8, 5.12, 5.13]

Current exploration activity is not high by historical standards, because of exploration costs and risks; uncertainty about the longer term price of oil; and policy settings including taxation regimes and incentives. On 14 August 2006 the Prime Minister announced a number of initiatives to stimulate exploration. [5.18, 5.19, 5.30]

There are reasonable grounds to believe that there are good prospects for discovering further reserves. However a multifaceted approach to reduce dependence on imported oil is still necessary. [5.33]

CHAPTER 6 . Alternative fuels from gas, coal and shale Gaseous fuels: natural gas, LPG and hydrogen

Natural gas as a vehicle fuel has advantages and disadvantages. Advantages include its ready availability and claimed lower emissions. Disadvantages include the size and weight of storage tanks, the limited range of vehicles; the energy cost of compressing or liquefying the gas; the lack of refuelling infrastructure; and doubt about the long term gas price. [6.28, 6.29, 6.36]

The claimed environmental advantages of natural gas are not completely clear. Greenhouse gas emissions in use are lower than petrol or diesel; however on a well to wheels basis the advantage may be reduced or neutralised by the energy cost of compressing or liquefying the gas; the unintended leakage of methane (which is a powerful greenhouse gas); and by release of carbon dioxide which is found in natural gas reservoirs. [6.65-6.67]

Australia is the world's largest per capita user of automotive LPG, and the number of LPG vehicles is increasing, encouraged by recently established government subsidies. LPG is superior to regular petrol in greenhouse terms. However there are some doubts about the long term adequacy of supply, depending on what proportion of the vehicle fleet is converted. [6.76, 6.83, 6.90]

Hydrogen has been put forward as a transport fuel, however there are formidable technical challenges before it could be widely used. In the committee's view it might be considered for the distant future, but it is not a useful option for the current or medium term. [6.93-6.95]

Synthetic fuels from gas or coal

Processes to produce liquid fuels from gas or coal are well proven. [6.96] Gas-to-liquids (GTL) diesel is compatible with existing refuelling infrastructure and can be blended with conventional diesel. Plants have tended to be built where gas prices are low. Uncertainty about the longer term oil price seems to be holding back investment in Australia and elsewhere. [6.102-6.106]

The well to wheels greenhouse gas performance of the output liquid is debated. One study shows greenhouse emissions higher than conventional diesel, though lower than conventional petrol. [6.110-6.111]

Coal-to-liquids (CTL) is seen by some as a viable method of producing liquid fuel on a large scale in the near future. Capital costs per barrel of daily capacity are somewhat higher than for a gas-to-liquids plant. A plant currently proposed for the Latrobe Valley is estimated to cost \$5 billion to produce 60,000 barrels per day, 80 per cent of which would be diesel. [6.116, 6.120, 6.123]

The output liquid has high well to wheels greenhouse gas emissions. If a charge was made for carbon dioxide emissions in future this would affect its viability. [6.121] The CTL plant proposed for the Latrobe Valley would include carbon capture and storage. Carbon capture and storage has been demonstrated on a relatively small scale in several parts of the world, and the committee was told it is well on the path of being proven. [6.126, 6.129]

It appears that there are grounds for cautious optimism that carbon capture and storage technology has good prospects for success. However, the committee also notes the comments in the recently released IEA World Energy Outlook 2006 that carbon capture and storage has not yet been demonstrated on a commercial basis. [6.138]

Significant production of gas-to-liquids or coal-to-liquids fuel will require large capital investment and long lead times, and involve risks that are hard to manage, such as the longer term price of oil and gas. [6.135-6.136]

Oil from shale could theoretically make a significant contribution to Australia's transport fuel requirements, however there are serious economic, technical and environmental obstacles to commercialising it. It is suggested that oil from shale is only viable when the long term crude oil price reaches \$US70-95 per barrel. [6.148, 6.149]

CHAPTER 7 - Supply side responses: biofuels

The government has a target of 350 million litres of biofuels production by 2010. The two most commonly discussed biofuels are ethanol and biodiesel. [7.1, 7.7]

Ethanol

Ethanol blended with petrol is widely used as a vehicle fuel in some countries. In Australia it is currently produced from sugarcane (generally using molasses), grain and grain residues. [7.15]

Some submissions argued that the availability of affordable feedstocks is a major factor limiting greater ethanol production. Production of ethanol from lignocellulose, though not yet proven on a large commercial scale, offers potential to greatly increase production and improve the energy return on energy invested. [7.17, 7.25]

E10 has fewer greenhouse gas emissions than neat petrol. The net effect on other emissions is less clear. [7.35]

The 2005 Biofuels Taskforce found that the long term oil price would need to average US\$42-47 per barrel (2004 dollars) for new ethanol producers to be viable after 2015 without assistance (depending on the feedstock used). [7.44]

The main barrier to growth is the commercial risk for investors considering the uncertainty of the future price of petrol and ethanol, and current consumer resistance to ethanol. [7.51, 7.54]

The committee supports the development of a fuel ethanol industry, but notes the significant barriers that need to be overcome before it becomes a mainstream fuel. It appears that production from lignocellulose is the only realistic way to make ethanol a mainstream fuel. [7.56, 7.57]

The committee considers that there is a need to increase transparency in relation to whether biofuels targets are being met. [7.62]

Recommendation 3 (paragraph 7.63)

The Committee recommends that the Government publish the results of its review of progress made towards meeting the biofuels target of 350ML per year, including which companies are meeting the target.

Recommendation 4 (paragraph 7.64)

The committee recommends that the Government examine the adequacy of funding for lignocellulose ethanol research and demonstration facilities in Australia, and increase funding where appropriate.

Biodiesel

Biodiesel is a diesel-like fuel made by chemically modifying vegetable oils or animal fats. A limited amount of biodiesel is already produced in Australia, but it is available at only a few locations. A major challenge for increasing production is obtaining affordable feedstocks. [7.66, 7.68, 7.89]

Biodiesel has lower emissions of pollutants and greenhouse gases than conventional diesel. [7.86 - 7.88]

Recent changes to the fuel taxation system have reportedly had an adverse impact on the prospects of the industry. The Biofuels Taskforce considered that between 2010 and 2015 biodiesel is likely to become commercially unviable. [7.72]

The committee considers that biodiesel can make a small but worthwhile contribution to Australia's fuel mix. However the economics of the industry are precarious, particularly if government assistance is reduced, as is the current policy. [7.89]

Committee comments on alternative fuels in general

In relation to alternative fuels in general, the committee acknowledges that massive investment in large scale production will be essential if they are to replace conventional fuels to any significant degree. Corporations see this investment as risky.

Some alternative fuels face consumer acceptance barriers. There are also long lead times associated with many of these projects. Unless risk can be quantified or controlled, investment will not be forthcoming. [7.90 - 7.93]

Recommendation 5 (paragraph 7.96)

The committee recommends that the Government commission a research group within the Department of the Treasury to identify options for addressing the financial risks faced by prospective investments in alternative fuels projects that are currently preventing such projects from proceeding. This group should determine how these risks might be best addressed in order to create a favourable investment climate for the timely development of alternative fuel industries, consistent with the principles of sustainability and security of supply.

CHAPTER 8 . Demand side responses

Increasing the fuel efficiency of vehicles

Since 1979 the fuel efficiency of light vehicle engines has improved significantly. However the efficiency of the light vehicle fleet has improved more slowly, as consumers have moved to larger, more powerful vehicles. [8.4]

A current voluntary code agreed in 2003 between government and the Federal Chamber of Automotive Industries calls on FCAI members to improve the national average fuel consumption of new passenger cars to a target of 6.8 litres per 100km by 2010 (the actual figure in 2001 was 8.28 litres/100km). This would require a significant improvement on the trend of the decade before 2001. [8.9]

It is unclear what progress has been made to achieve this target. The committee recommends that this should be investigated. [8.12, 8.13]

Recommendation 6 (paragraph 8.21)

The committee recommends that the Government, in consultation with the car industry, investigate and report on trends in the fuel efficiency of the light vehicle fleet and progress towards the 2010 target for the fuel efficiency of new passenger cars. If progress under the present voluntary code seems unlikely to meet the target, other measures should be considered, including incentives to favour more fuel efficient cars; or a mandatory code.

Other suggestions in submissions to improve the fuel efficiency of cars include:

- measures to encourage smaller and hybrid cars, for example by adjusting registration fees to favour them;*
- measures to encourage diesel cars; and*
- increasing the fuel excise to encourage use of more efficient vehicles (this could be coupled with lower registration charges to be tax-neutral overall). [8.16]*

Congestion charges

A congestion charge is a road use charge tailored to target the most congested times or places for example, a cordon charge to enter a Central Business District, or a toll that varies according to the time of day. [8.29]

A congestion charge, by discouraging some users, reduces congestion. This improves fuel efficiency, as vehicles use more fuel in congested conditions. [8.29]

While the economic case for congestion charging is strong, politically it has been difficult to implement because of the perception that it is 'yet another tax on motorists'. To win public support it is important to hypothecate the revenue for transport improvements, including public transport improvements so more motorists have alternatives to their cars. [8.31]

The committee suggests that Australian governments should take a more active role in educating the public about the benefits of congestion charges. [8.34]

Recommendation 7 (paragraph 8.35)

The Committee recommends that Australian governments investigate the advantages and disadvantages of congestion charges, noting that the idea may be more politically acceptable if revenue is hypothecated to public transport improvements (as has been done in London, for example).

Encouraging walking, cycling and public transport in cities

Many submissions argued for increased use of walking, cycling and public transport as a way of reducing transport fuel use. Ambitious goals for increasing the public transport mode share are commonly seen in official plans. [8.36, 8.39]

Many submissions urged the Commonwealth to be more involved in improving urban public transport infrastructure, as happens in many other federal countries. The Commonwealth's policy is that public transport is the responsibility of the states. [8.39, 8.41]

However the Commonwealth has supported Travelsmart projects through the Greenhouse Gas Abatement Programme. Travelsmart aims to reduce car use by direct approach to targeted households (for example, to give information about public transport services). This can be a very cost effective, and the committee recommends that Commonwealth support should continue. [8.42, 8.55]

Recommendation 8 (paragraph 8.56)

The committee recommends that Commonwealth support for Travelsmart projects be maintained beyond the currently planned termination date.

The committee does not suggest that the Commonwealth should take over the States' basic responsibility to operate public transport services. However there may be a case for Commonwealth assistance to major projects such as rail extensions which are unlikely to happen, or unlikely to happen soon enough, without the involvement of the bigger budget which the Commonwealth commands. [8.53]

Integrating transport planning and land use planning

Car-dominated transport habits reflect patterns of urban development which make high car use necessary. Submissions stressed that turning around this situation requires better public transport

and planning policies to shape urban development so that public transport networks can work efficiently and attract more choice customers. [8.57, 8.61]

Urban strategic planning is the responsibility of State and Territory governments. The needed initiatives involve state and local governments. The right institutional arrangements and powers are needed to ensure that the planning and the execution are coherent. [8.67]

More use of rail for long distance freight

Many submissions argued for more use of railways for long distance freight. Trains use about one third the fuel of trucks per net tonne/kilometre. [8.71]

Commonwealth policy recognises that the rail system has been under funded in the past and has the potential to increase its share of the freight task if there are improvements to infrastructure and modernisation of operating practices. The Commonwealth has committed \$2.4 billion to rail improvements over the five years to 2008-2009, mostly for the Melbourne-Sydney-Brisbane corridor. [8.75]

If there is a long term rise in the price of fuel, this will favour rail, because fuel is a greater proportion of total costs for road transport. This may suggest a need to increase the pace of catch-up investment in rail infrastructure. Auslink corridor strategies should allow for this. [8.77]

Recommendation 9 (paragraph 8.78)

The committee recommends that corridor strategy planning take into account the goal of reducing oil dependence as noted in recommendation 2. Existing Auslink corridor strategies should be reviewed accordingly.

Fringe benefits taxation of employer-provided cars

Many submissions argued that the concessionary tax treatment of cars as a fringe benefit should be abolished, on the grounds that

- it encourages car use and undesirably distorts economic behaviour;
- as a way of assisting the Australian car industry it is poorly targeted, as now only 29 per cent of new cars are Australian made. [8.82, 8.87]

The concession arises because the statutory formula which most people use to calculate the tax obligation overestimates the amount of business use of the cars in question thus, some private use is untaxed. [8.84]

The committee notes that the Council of Australian Governments (COAG) is now considering options for managing urban traffic congestion. The committee suggests that this should include the Commonwealth reconsidering the policy behind the concessionary fringe benefits taxation of cars. [8.91]

Recommendation 10 (paragraph 8.94)

The Committee recommends that the government review the statutory formula in relation to fringe benefits taxation of employer-provided cars to address perverse incentives for more car use.

It should be stressed that the question of whether the tax should be concessionary is different from the question of minimising compliance costs. A statutory formula method can be retained for the sake of easy compliance, while the concessionary aspect can be removed by adjusting the rates. [8.95]"

Some Cities have started working on the peak oil problem. The City of Portland in the U.S.A. has released "Descending the Oil Peak: Navigating the Transition from Oil and Natural Gas Report of the City of Portland Peak Oil Task Force", dated January 16, 2007. The executive summary of the report is quoted below. The Portland document is a good example of what the City of Joondalup should be doing.

"Descending the Oil Peak: Navigating the Transition from Oil and Natural Gas

Report of the City of Portland Peak Oil Task Force

DRAFT FOR DISCUSSION

January 16, 2007

Executive Summary

Introduction: Preparing for Peak Oil

Every day, businesses, government agencies and households around the world plan and make decisions based on the assumption that oil and natural gas will remain plentiful and affordable. In the past few years, powerful evidence has emerged that casts doubt on that assumption and suggests that global production of both oil and natural gas is likely to reach its historic peak soon. This phenomenon is referred to as "peak oil." Given both the continuous rise in global demand for these products and the fundamental role they play in all levels of social, economic and geopolitical activities, the consequences of such an event are enormous. This report assesses Portland's vulnerabilities in the face of wide-ranging changes in global energy markets and provides an initial set of recommendations for addressing that challenge thoughtfully and prudently.

Task Force Created by City Council

In May 2006 Portland City Council adopted Resolution 36407 establishing the Peak Oil Task Force consisting of 12 citizens from a wide variety of backgrounds. The resolution charged the Task Force with examining the potential economic and social consequences of peak oil in Portland and developing recommendations to mitigate the impacts of rising energy costs and declining supplies. Over the past six months, the Task Force held more than 40 meetings and involved more than 100 stakeholders and interested citizens in gathering information.

Impacts and Vulnerabilities: High Fuel Prices Will Change Portland

Fifty years from now, the peak of global oil production will be a distant memory. Predictions for the year oil production will peak range from present day until 2040, with the most common estimates between 2010 and 2020. Despite the apparent breadth of current projections, even the most optimistic forecasts offer little time to adapt given the very long lead times required to change such things as transportation and building infrastructure.

Of all the impacts from rising oil prices, the clearest are those on transportation, which will experience profound pressure to shift toward more efficient modes of travel. For personal travel, this means transit, carpooling, walking, bicycling and highly efficient vehicles. Transportation of freight will become more costly and either decline or shift modes from air and truck to rail and boat. Population may shift to city centers, and density and mixed-use buildings will increase.

Food is a critical resource, and the American food system has become highly dependent on fossil fuels. Food production and distribution accounts for 17 percent of U.S. energy consumption. Because of this, higher oil and natural gas prices are expected to lead to a decline in the amount and variety of food produced and available locally, even with Portland's proximity to the agricultural production of the Willamette Valley. Food prices will rise, further straining the ability of low-income households to put food on the table.

Like agriculture, the economy as a whole is expected to experience significant disruption and volatility. Impacts will vary widely by industry and firm, and Portland has strengths in high technology and relatively diversified transportation system. Portland also enjoys a strong and growing clean energy sector, which is likely to see increased demand. Nevertheless, many of Portland's industries are dependent on national and global markets, and Portland's economy will experience significant impacts from peak oil, likely including an increase in business start-ups and failures.

Unemployment could be a major economic and social issue. This is of particular concern, since social services are already stretched to their limits. Vulnerable and marginalized populations are likely to grow and will be the first and hardest hit by rising oil prices. Increasing costs and decreasing incomes will reduce health coverage and further stress the health care system, a system already in crisis.

Heating, maintenance, and monthly housing costs will consume a larger share of household budgets and push people toward lower-quality housing choices at the same time that auto transportation costs increase dramatically. First responders, especially police, are likely to be further taxed as social service agencies struggle to meet demand.

Recommendations: Act Big, Act Now

The Task Force findings illustrate the profound economic and social vulnerabilities that could result as fuel supplies cease to be abundant and inexpensive. The magnitude of this issue led the Task Force to explore bold and far-reaching solutions. The Task Force is unified in urging strong and immediate action.

The Task Force recommends preparedness on two different levels. Most of the recommendations seek to reduce Portland's exposure to rising fuel prices, anticipating the economic and lifestyle adjustments that will be needed in the future. Other recommendations prepare Portland to maintain community stability as volatile energy markets trigger conditions ranging from emergency shortages to longer-term economic and social disruption.

Reduce Portland's exposure: *The Task Force proposes cutting oil and natural gas consumption in half, transforming how energy is used in transportation, food supply, buildings and manufacturing. It proposes strategies to maintain business viability and employment in an energy-constrained marketplace.*

Strengthen community cohesion: *However well Portland succeeds in its energy transition, it will not be able to isolate itself from global energy crises or the resulting economic implications.*

The Task Force sees the potential for profound economic hardship and high levels of unemployment, and it recommends having plans in place to adapt social and economic support systems accordingly. Similarly, contingency plans are needed for fuel shortages that may last for several weeks, well beyond the time considered in existing emergency plans.

The Task Force recommends a comprehensive package of actions, proposing strategies to initiate institutional change and to motivate action by households and businesses. Of these recommendations, the first and most fundamental is to reduce oil and natural gas use by 50 percent over the next 25 years.

While all the recommendations are important, **achieving a significant reduction in oil and natural gas use is a necessity for easing the transition to an energy-constrained future.**

1. **Reduce oil and natural gas consumption by 50 percent over the next 25 years.**

Leadership builds the public will, community spirit and institutional capacity needed to implement the ambitious changes.

2. **Educate citizens about peak oil and foster community and community-based solutions.**
3. **Engage business, government and community leaders to initiate planning and policy change.**

Urban design addresses the challenge at a community scale.

4. **Support land use patterns that reduce transportation needs, promote walkability and provide easy access to services and transportation options.**
5. **Design infrastructure to promote transportation options, facilitate efficient movement of freight and prevent stranded investments.**

Expanded efficiency and conservation programs shape the many energy choices made by individual households and businesses.

6. **Encourage energy-efficient and renewable transportation choices.**
7. **Expand building energy-efficiency programs and incentives.**

Sustainable economic development fosters the growth of businesses that can supply energy efficient solutions and provide employment and wealth creation in a new economic context.

8. **Preserve farmland and expand local food production and processing.**
9. **Identify and promote sustainable business opportunities.**

Social and economic support systems prepare to help Portlanders dislocated by the effects of fuel price increases.

10. **Redesign the safety net and protect vulnerable and marginalized populations.**

Prepare for emergencies in the event of sudden price increases or supply interruptions.

11. **Prepare emergency plans for sudden and severe shortages.**

Each of these 11 major recommendations is accompanied by a series of action items detailing how it can be implemented.

Next steps

A number of the recommendations imply the need for a central program to coordinate goal setting, tracking and communications. Other recommendations are policies, programs or projects to be implemented by specific bureaus or groups of bureaus. The Task Force proposes that a

team of city staff be appointed to translate these recommendations into a funded, operational course of action.

Acting on this report, however, does not need to await further study or analysis. City bureaus can immediately look for ways to begin addressing these energy concerns and impacts into ongoing planning activities and educational programs around sustainable development. City Council can challenge bureaus to align their investment and activities with the recommendations outlined in this report.

Finally, the Task Force members would like to express their willingness to continue assisting the City of Portland as it engages City staff and the public about peak oil.

Introduction: Preparing for Peak Oil

Every day, businesses, government agencies and households around the world plan and make decisions based on the assumption that oil and natural gas will remain plentiful and affordable. In the past few years, powerful evidence has emerged that casts doubt on that assumption and suggests that both oil and natural gas production are likely to begin to decline significantly. This phenomenon is known as "peak oil."¹ Given the fundamental role of oil and natural gas in all levels of social, economic, and geopolitical activities, the consequences of such a change are enormous. Portland City Council created the Peak Oil Task Force by resolution to investigate the implications for Portland of a future in which oil and natural gas production is declining, prices are rising, and supply is subject to periodic volatility. The resolution charged the Task Force with addressing these issues and presenting findings and recommendations to the City Council.

The starting point for the Task Force is well summarized in the introduction to the February 2005 United States Department of Energy (U.S. D.O.E.) report, *Peaking of World Oil Production: Impacts, Mitigation, & Risk Management*:

The Earth's endowment of oil is finite and demand for oil continues to increase with time. Accordingly, geologists know that at some future date, conventional oil supply will no longer be capable of satisfying world demand. At that point world conventional oil production will have peaked and begin to decline.

While there is a wide range of opinions on when the peak will occur, many experts predict global oil production will peak within five years, and few anticipate a peak later than 2020. For purposes of the Task Force these debates about when the peak will occur are largely irrelevant.

Fossil fuel consumption patterns cannot be substantially altered without changing the transportation and building infrastructure. Since these change slowly, action is required now even if peak production is 10 or more years away. Again, the U.S. D.O.E. report is instructive:

Mitigation will require an intense effort over decades. This inescapable conclusion is based on the time required to replace vast numbers of liquid fuel consuming vehicles and the time required to build a substantial number of substitute fuel production facilities.

There will be no quick fixes. Even crash programs will require more than a decade to yield substantial relief.

Development of alternative liquid fuels will help, but no credible authority believes that a significant portion of petroleum transportation fuels can be replaced by alternatives in the short term or that they can make up the whole gap, even in the long term.

To avoid unnecessary confusion and debate in the reading of this report, a crucial point of understanding is that peak oil does not imply that the world is physically running out of oil or natural gas in the immediate future. Generally, the peak of production is expected to occur at the

point at which about half the resource has been used, meaning that half still remains. The crucial concern is that, while production is approaching its peak, demand for oil is rising rapidly. The inevitable collision between escalating demand and a plateau and decline in production will bring sweeping economic consequences.

The oil and natural gas we have already used were relatively cheap to obtain. Many of the existing oil fields are known to be in decline, and the remaining supplies are deeper, under water, in more extreme climatic locations and/or in politically unstable regions. All these conditions place upward pressure on production costs. Following from this, even current production levels cannot be maintained without massive, risky investments in new production that will directly increase costs. Even in a static situation, therefore, either production will fall or costs—and then prices—will rise. Unfortunately, the situation is not static. Greatly exacerbating the increasing cost of production is rapidly increasing global demand resulting from accelerating industrialization, particularly in China and India, both of which have extremely large populations. Current production capacity exceeds demand by only a few percent, and that margin is steadily shrinking. As in any market where production costs are rising, demand is rising, and supply and demand are closely matched, basic economic theory holds that:

- 1) Long-term prices will rise;
- 2) Short-term prices will be more volatile, with spikes and drops occurring at an increasing rate; and
- 3) Supplies will become less reliable because even small disturbances at any point in the production or delivery chains will lead to immediate shortages for consumers.

The scenario that the Task Force addressed assumed all of these outcomes would occur. The Task Force focused its efforts, however, on the impacts of gradually increasing long-term prices because the longer timeframe allows for the development and implementation of meaningful long-term policy recommendations. While the Task Force fully believes oil and natural gas supplies will likely be punctuated by sudden disruptions and price hikes that will trigger periodic emergencies, it also recognizes that it has less to add in this arena, as the consequences will be similar to other types of emergencies which are already addressed by agencies such as the Portland Office of Emergency Management.

The Task Force acknowledges the possibility of a scenario in which the impacts are so severe that society will deteriorate severely, leading to rampant unemployment, hunger, crime and violence. While such a collapse is not out of the realm of possibility, the Task Force felt it would not be constructive to focus on it because, by its very definition, such a situation implies that government is able to respond in an extremely limited way. The transition the Task Force chose to focus on is meant to mitigate the likelihood of such a collapse and to provide some ability to respond to a collapse, should one occur.

During six months of careful study, consultation and dialogue, the Task Force investigated the types of impacts that Portland may experience as a result of changes in the global supply and demand for oil and natural gas. This document briefly reviews the process the Task Force followed in developing this report, explores in detail the impacts peak oil is anticipated to lead to, and makes recommendations to City Council for responding to those impacts. This report is intended to assess Portland's vulnerabilities in the face of wide-ranging changes in global energy markets and to provide an initial set of recommendations for addressing that challenge thoughtfully and prudently."