
OIL PRICES AND 'PEAK OIL': COUNCIL RESPONSE

1. Purpose of Report

The purpose of the report is to:

- provide information on the implications of increasing oil prices and peak oil for Wellington City Council
- summarise the current response by Government and the Council
- recommend further action to position the Council as a leader in responding to oil-related risks.

2. Executive Summary

Recent oil price increases are resulting in increasing costs for the public and businesses and are also impacting on the Council's service delivery costs. The price increases are resulting from the intersection of high demand and constrained supply. Supply constraints are related in part to limited global oil supply and the imminent peak in oil production ('peak oil').

While expert opinions differ as to the amount of global oil reserves and the precise date of peak oil (some say it has already occurred or is about to occur, while others say it is 30 years away), the actual date is not as relevant as the need to initiate a response in advance. In a report prepared for the United States Department of Energy, Dr. Robert Hirsch states that mitigation measures must be initiated around 20 years before peak oil production to avoid global fuel shortages. Prudent risk management is essential, and it appears that the risk of inaction is much greater than the risk of premature action.

The effects of peak oil are, generally:

- significant oil price increases and price volatility
- supply shortages of oil and oil-based products like petroleum.

If no action is taken to reduce oil dependence, these oil supply shortages and increased prices will cause serious global economic hardship. Global transport infrastructure, many manufacturing processes and modern agriculture are dependent on oil-based fuels, and it is not clear that a seamless transition to non-oil fuel supplies is possible.

The overall policy response for addressing increasing oil prices and peak oil are similar; both responses involve finding alternative sources of fuel, and reducing demand for oil by changing technology and behaviour. These responses are similar to and supportive of climate change mitigation efforts.

The New Zealand Government is currently reviewing its National Energy Efficiency and Conservation Strategy, is formulating a New Zealand Energy Strategy, and is developing a legislative framework for biofuels. Local authorities can work with Government on these measures as well as any emergency response needed in the event of an oil shortage.

In addition to the Council's key activities to respond to the likelihood of peak oil such as energy management planning and the development of a Travel Demand Management Plan, it is recommended that the Council consider the issues of peak oil and rising fuel prices when making future transport investment decisions by promoting and designing a transport system that encourages more efficient use of and reduced reliance on oil-based products. It is also recommended that the Council engage with Government to identify potential measures for oil supply shortages and transitioning to a transportation system that is less-reliant on oil-based products.

3. Recommendations

It is recommended that the Committee:

1. *Receive the information.*
2. *Note that experts predict "peak oil" will occur within 30 years or less and that fuel prices are likely to continue rising, posing a serious social and economic risk for the city and region.*
3. *Note that the Council is working to reduce Wellington's peak oil vulnerability through energy management planning; trialling new fuel technologies; implementation of compact, transit-oriented growth through the Growth Spine concept; and development and implementation of a Travel Demand Management Plan that supports walking, cycling and passenger transport.*
4. *Agree to take into account the peak oil issue and rising fuel prices when making future transport investment decisions, by promoting and designing a transport system that encourages more efficient use of and reduced reliance on oil-based products.*
5. *Agree to engage, where possible and appropriate, with Government on this issue through (for example) the development of the government's New Zealand Energy Strategy, National Energy Efficiency and Conservation Strategy, and biofuels legislation.*

4. Background

Recent oil price increases are resulting in increasing costs for the public and businesses and are also impacting on the Council's service delivery costs. The increasing price trend is expected to continue both in the short and long-term.

In addition, the related issue of limited global oil supply and the imminent peak in oil production ('peak oil') is starting to be addressed by various levels of government and industry.

Several submissions to the 2006-2016 Long-Term Council Community Plan (LTCCP) expressed concern about oil prices and peak oil, and Councillors have requested a report that addresses the issue and the Council's response.

5. Discussion

The following sections first discuss the issues and impacts of rising oil prices and peak oil, then summarise response options, including actions by Government and by the Council.

5.1 *The problem and its impacts*

5.1.1 Oil prices

Between January 2005 and August 2006, crude oil prices more than doubled, from US\$34 a barrel to over US\$70 a barrel.¹ The continual price increases are resulting from the intersection of high demand and constrained supply. Oil demand continues to increase as the economies of developed countries continue to grow and large developing countries like China experience unprecedented economic growth. Supply is constrained by factors such as limited global refinery capacity, occasional supply disruptions, restricted production quotas and geopolitical uncertainties such as instability in the Middle East.

The surge in oil prices has led to increased:

- transport costs from increased petrol and diesel prices. Between January 2005 and August 2006, the retail prices of petrol and diesel (less tax) in New Zealand increased approximately 94% and 72% respectively.
- costs of goods and services as a result of increased transport costs
- costs of materials, industrial processes and energy production using oil products
- public transport trips and decreased car travel².

¹ These are the prices of Dubai crude oil as reported by Ministry of Economic Development. In the week of 7 August 2006, U.S. crude oil prices jumped by over \$2 a barrel to \$77, in response to the temporary closure of the Prudhoe Bay oilfield in Alaska.

² This trend has been observed in Wellington and in other cities internationally. It is not yet clear whether this trend will continue or if travel patterns will return to historical levels with the public preferring more fuel-efficient vehicles rather than public transport.

Increased oil prices have the most significant financial impact on the transport sector, with petroleum fuels accounting for more than 95% of energy use in the transport sector in nearly every International Energy Agency (IEA) country including New Zealand. Across all sectors, oil products account for around 50% of the energy consumed nationally.³

5.1.2 Impact of oil price increases on the Council's services

The Council uses fuel to provide a range of services such as waste collection, street cleaning, and operating a passenger-car vehicle fleet. The increased oil prices have led to increased costs for WCC. The table below compares the consumption and expenditure trends of diesel and petrol from 2004/05 and 2005/06.

	Consumption (litres)			Expenditure (ex gst)		
	2004/05	2005/06	% Change	2004/05	2005/06	% Change
Petrol	211,004	200,925	-5%	\$198,000	\$246,000	24%
Diesel	911,733	912,657	0%	\$517,000	\$757,000	46%
Total	---	---	---	\$715,000	\$1,003,000	40%

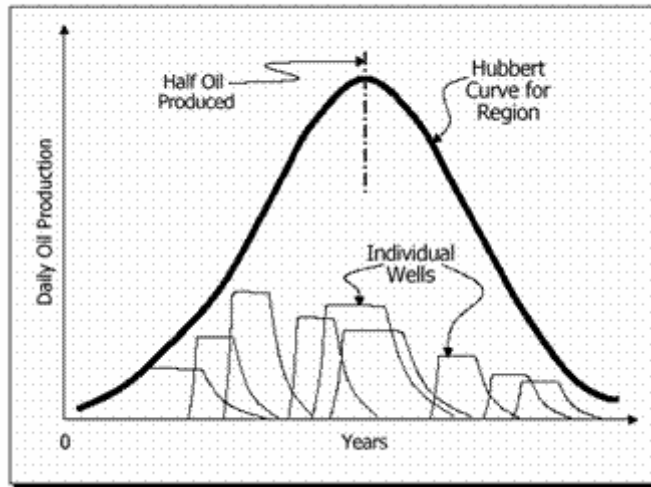
The figures above show that expenditure has increased substantially despite a drop in consumption. In addition, some of the Council's key contracted services, particularly roadworks, are heavily influenced by the price of oil. The oil product bitumen is the primary material used for chip sealing roads and is also used in asphalt concrete production. Bitumen prices increased 47% from April 2005 to May 2006 and are expected to increase further. Increased diesel prices have also led to increased construction costs of roadworks, due to the increased cost of running heavy machinery. For the 2006-16 LTCCP, the Council increased its roadworks cost assumptions by 9% due to these and other cost factors.

5.1.3 Peak oil

Peak oil refers to the situation where oil extraction and production reaches a peak and then begins to decline. This is illustrated in Figure 1 by the 'Hubbert Curve', named for geophysicist M. King Hubbert who proposed this pattern of peak oil production in 1956.

³ Statistics from 2000 and energy measured in Peta Joules.

HUBBERT CURVE Regional Vs. Individual Wells



Experts differ on the timing of peak production because of uncertainty as to the amount of global oil reserves.⁴ Several independent geologists and oil analysts have estimated that peak production will occur before 2020, while key industries and government organisations have estimated peak oil production occurring in 20-30 years time. The following list details some of these projections from the past few years:

- investment banker Matthew Simmons estimates peak oil production in 2007-2009
- oil analysts Dr. Colin Campbell and Dr. Jean Laherrere estimate peak oil production around 2010
- BP geologist Francis Harper estimates peak oil production between 2010 and 2020
- Shell Oil estimates peak oil production around 2025 and also suggests that the peak can be delayed 15 years by vehicle efficiency measures.
- the International Energy Agency estimates peak oil production around 2030
- United States Geological Survey estimates peak oil production between 2021 to 2067, with the highest probability around 2037

Peak oil does not mean that oil supply has been exhausted; in fact, it is likely that the world will never 'run out' of oil. However, shortages would become more common as supply fails to meet rising demand. In addition, after peak production occurs, remaining oil will become increasingly more expensive to extract as more marginal oil sources are developed with more costly technology. The likelihood is that society will attempt to turn to other, less expensive fuel sources before oil supplies are completely diminished. It is not clear that a seamless transition to non-oil fuel supplies is possible.

⁴ The New Zealand Government bases its peak oil forecasts on the estimates of the IEA and USGS.

While this report deals only with peak oil, it is important to note that other fossil fuel supplies are also finite, and the supply of natural gas in particular is thought by many experts to also be heading towards peak production in the next few decades.

As the price of fossil fuel increases, investment in technological innovation to unlock renewable energy potential will become more attractive, but some experts question whether renewables will ever be able to fully support society's current consumption patterns. Transport vehicles in particular are largely dependent on liquid fuels rather than the electricity that most renewable energy sources generate.

5.1.4 Potential impact of peak oil

The impact of peak oil could be extremely damaging to the global economy if not planned for effectively. This would have serious social and political repercussions as well. The effects of peak oil are, generally:

- significant oil price increases and price volatility
- supply shortages of oil and oil-based products like petroleum.

Oil shortages will not necessarily occur at the point of peak oil production. Supply shortages could occur earlier if demand exceeds supply before peak production, and conversely, supply could meet demand after the peak. But with world oil demand forecasted to grow 50% by 2025, some experts predict that demand will exceed supply in 10-15 years—similar to many predictions of the timing of peak oil production. Therefore shortages are increasingly likely, particularly after peak oil production.

Oil and petroleum supply shortages resulting from peak oil could be absolute; e.g., there could be no supply available in certain places at certain times, at any price. This might require the use of emergency oil inventories. In addition, the market effect of any reduced supply is that prices will increase significantly, especially given the likelihood of continued high demand. Another result of reduced supply is that minor disruptions affecting oil supply, such as labour strikes, natural disasters and conflicts, will result in increased price volatility compared to current standards.⁵

If no action is taken to reduce oil dependence, these oil supply shortages and increased prices will cause serious global economic hardship. The global transport infrastructure is designed to run on oil-based fuels, so the distribution of goods over long distances would increase significantly, or cease if there is a supply disruption. International tourism would probably also decline for the same reasons. The manufacture of many goods such as plastic, as well as the ability of modern agriculture to supply the world with food, rely on oil-based fuel and would be similarly impacted. The overall effect would be a combination of shortages and high prices with respect to many goods and travel-dependent services.

The global impacts of oil supply shortages would be reflected locally, affecting the Council's operations and the well-being of Wellington residents and businesses. The increased cost of the Council's service delivery that has already occurred due to rising

⁵ "Peaking of World Oil Production: Impacts, Mitigation and Risk Management," R. Hirsch, February 2005

oil prices would be magnified, and it is also possible that some local oil demand would be unmet regardless of price. If no mitigation steps are taken, the community would face higher costs and possible shortages for most goods, as well as higher travel costs. International tourism is predicted to decline because of the increased cost of fuel.

In the event of an oil supply disruption, the Council may need to rely on its fuel storage reserves. The Council has about 5,000 litres of diesel storage capacity at the Southern Landfill for its heavy vehicles, as well as a combined 8,000 litres at the Civic Centre and WEMO for emergency generators. At any given point, depending on refuelling schedules, between 25% and 100% of that capacity is available. WEMO estimates that this would provide less than a week's supply for the Council's diesel vehicles if services were to continue as normal. It is likely that the Council would have to curtail some non-essential services for the duration of the disruption.

The Council stores no petrol other than in its vehicles' tanks due to the expense of installing an underground petrol storage tank.⁶ WEMO can access service station supplies of both diesel and petrol in a declared civil defence emergency, but an oil supply shortage in itself would not constitute such an emergency. WEMO estimates that up to 439,000 litres of diesel and 784,000 litres of petrol are held by Wellington service stations.

5.2 Response

5.2.1 Worldwide options

The global policy response for addressing both increasing oil prices and peak oil are similar since both responses involve finding alternative sources of fuel, and reducing demand for oil by changing behaviour and technology. The policy responses include⁷:

- enhanced oil recovery of conventional and non-conventional sources such as heavy oil sands
- producing fuel from different fossil fuel sources such as coal liquefaction
- developing more fuel-efficient vehicles and heavy machinery
- developing fuel technologies such as biofuels and hydrogen fuel cells.

Other policy responses include:

- conservation – e.g. travel planning and carpooling to ensure minimal fuel use
- maintaining and retrofitting vehicles to be more efficient (e.g. tyre pressure)
- using transport modes such as public transport, cycling and walking
- providing supporting infrastructure for battery and plug-in hybrid electric vehicles where renewable electricity is available
- planning cities to facilitate a range of transport modes.

⁶ Underground petrol tanks are required by law due to the safety risks associated with petrol storage.

⁷ Hirsch, Feb. 2005

While the expert opinions listed earlier in this report differ as to the precise date of peak oil, it has been argued that the actual date is less important than beginning mitigation efforts now. Because conventional oil production declines as soon as peak oil extraction is reached, policy mitigation steps are unlikely to avert significant shortages unless they are initiated well in advance of peaking. Dr. Robert Hirsch, who developed a report for the US Department of Energy on peak oil mitigation steps, states that mitigation measures must be initiated around 20 years before peak oil production to avoid global fuel shortages. He highlights the need for prudent risk management, asserting that the risk of inaction is much greater than the risk of unnecessarily early action.⁸

5.2.2. Linkage to climate change mitigation

The scientific community has overwhelmingly endorsed the theory that greenhouse gas emissions produced from the use of fossil fuels like oil are accelerating the natural warming of the earth's climate. Oil supply and pricing policy responses that focus on reducing oil demand and transitioning to cleaner, renewable technologies are similar to and supportive of climate change mitigation policies. The Council has agreed to stabilize its greenhouse gas emissions at 2003 levels by 2010, and to reduce emissions 20% from 2003 levels by 2020.

5.2.3 NZ Government response

The Government does not directly intervene in setting fuel prices but influences the price by imposing taxes and influencing the value of the NZ dollar. The Government is currently reviewing three strategies that aim to influence energy supply, demand and consumption in New Zealand. Peak oil and developing more sustainable transport systems are considered in the development of the strategies along with other long term strategic issues such as energy supply security, climate change and increasing the use of renewable energy sources. The strategies include:

- **New Zealand Energy Strategy** – objectives are to plan for new investment in generation and transmission, and to ensure energy security and competitive prices
- **National Energy Efficiency and Conservation Strategy** - objectives are to pursue energy efficiency and renewable energy more aggressively and to put New Zealand on a faster course to a sustainable energy system
- **Biofuels Legislation** - development of mandatory sales targets for oil companies on the sale of biofuel blends in New Zealand. The most recent proposals call for 3% ethanol blends for petrol and 5% bio-diesel blends for diesel.

The Government has developed options for oil demand restraint measures it could implement in the event of a domestic or international oil crisis. These include rationing, minimum sales purchasing and voluntary measures. The measures include outlining the potential role of local authorities, which (in Government's view) primarily consists of communicating information to the public, monitoring the local situation and coordinating with the Government teams.

⁸ Hirsch, Oct. 2005

It is recommended that the Council engage in Government discussions on peak oil and other energy-related issues. This includes making submissions and participating where appropriate in the Government's review of legislation mentioned above. This ensures that the interests of Wellington residents and local authorities are reflected in national energy policy. The success and relevance of many local initiatives depends on strong Government leadership, supported by clear direction and legislation.

5.2.4 Wellington City Council response

The Wellington Regional Strategy has identified peak oil as a risk to the region.⁹ This raises the question of how local or regional action can address this risk. There is very little local authorities can do to influence petrol or diesel prices or regional petrol and diesel supply. However, local authorities should work with the Government to ensure efficient and adequate response in the event of a short-term oil supply shortage, and to move towards less oil dependence in the medium- and long-term.

At the local level, it is recommended that the Council develop in-house initiatives that focus on reducing consumption of oil-based fuels, using alternative fuels through its service delivery, and ensuring adequate emergency fuel reserves. The Council can also facilitate the same outcomes in the wider community, in particular by promoting behavioural change in travel modes and patterns (i.e. reduced car dependency). The sections below outline the Council's current and potential actions to respond to rising oil prices and peak oil.

Council Services

The Council is developing an energy management plan, which will initiate projects to reduce the Council's energy consumption (including petrol and diesel) that can be paid for over time through energy savings. After getting these in-house projects underway, the energy manager will also identify similar projects targeted at the community.

Council officers are actively investigating a range of other options to reduce the Council's dependence on oil-based fuel.

- Council officers are continually looking for ways to increase the fuel efficiency of its vehicles and machinery. The Council will be purchasing two hybrid vehicles in 2006/07. The Council is also trialling technology designed to increase fuel efficiency for heavy vehicles.
- CitiOperations will be moving its main office from Mt Cook to the Southern Landfill in 2006/07, with the attendant ability to park trucks at the landfill overnight. CitiOperations is investigating ways to provide shared employee transport to the Happy Valley site through private bus companies or WCC minivans.
- Council officers are reviewing rubbish and recycling collection options that could result in decreased fuel usage by CitiOperations and private operators.

⁹ "Internationally Competitive Wellington: A Sustainable Economic Growth Framework for Our Region," Discussion Document, Wellington Regional Strategy, 2005.

- As part of the wider Travel Demand Management project, the Council will soon begin an in-house travel planning project in co-operation with Greater Wellington, to reduce the frequency and length of motorised vehicle trips. This is consistent with recommendations by the Risk Assurance’s Transport Efficiency and Effectiveness Review earlier this year.
- Council officers are awaiting Government direction on the large-scale introduction of biofuels and will consider using these as they become available.
- Council officers have investigated the feasibility of a plastic-to-diesel conversion plant in the Wellington region. While the capital costs are not likely to justify a plant that would only serve Wellington, the input of a larger area (for example, the lower half of the North Island) could make such a plant viable. This project could also be implemented with the proceeds from any national waste levy (currently being considered by Government).
- To provide a larger backup supply in the event of emergency supply shortages, Council officers will be negotiating with Caltex to relocate the 5000-litre diesel tank at the Northern Landfill to the Southern Landfill.

Facilitation of Decreased Fuel Usage in the Community

Beyond its own operations, the Council can play a very important role in promoting decreased fuel use by the community, particularly by supporting reduced car dependency. The Council’s recently adopted Transport and Urban Development Strategies signal a strong leadership role in this regard, by making provisions for:

- Concentration of the city’s development along a ‘growth spine’ of key public transport routes and centres
- Development of a Travel Demand Management Plan to reduce the amount of travel undertaken by car, including:
 - increased bus priority measures
 - walking and cycling plans
 - supporting other passenger transport initiatives.

Proposed changes to the District Plan’s Subdivision Design Guide, the use of structure plans promoting connectivity and public transport, and the planned review of the Code of Practice for Land Development will further promote diversity of transport choice by creating well-connected communities conducive to walking and other modes.

Because very little electricity is generated from oil in New Zealand, the Council’s support for electricity-based transport options is an important way to reduce oil dependency.¹⁰ Retention of Wellington’s electric trolley bus service is a good example. The Council should also keep a watching brief on the benefits of electric vehicle use in

¹⁰ New Zealand’s main source of electricity generation is hydro power, and wind power is increasing its share. The Council’s Plan Change 32 (‘Renewable Energy’) promotes a further transition to renewable sources of electricity generation.

local communities, along with the need for supporting infrastructure such as electric recharging stations in some locations.

The Council's role in regional transport investment, through forums such as the Regional Land Transport Committee, is critical. The city's transport infrastructure links with that of the wider region, so regional decisions about major transport investment will influence Wellington residents' choice of travel mode. The funding and pricing of new transport projects will also influence behaviour.

To influence the fuel usage of the wider community, it is recommended that the Council continue with its development of a Travel Demand Management Plan and continue to implement the Growth Spine concept. It is recommended that future decisions on transport investment and urban form should take the likelihood of peak oil into account. This will ensure that sufficient steps are taken to initiate the transition from a predominantly car-dependent, oil-based transportation network to a more diverse and flexible transportation system that uses a range of fuel technologies.

5.2.5 Other local government responses

Local governments in New Zealand and elsewhere are beginning to acknowledge and respond to the threat of peak oil. In New Zealand, representatives of 20 local authorities met at the EnergyWise Councils Annual Forum in March 2006 to discuss the theme "Planning for the End of an Era: What Can Local Government Do to Get Ready for a World Without Cheap Oil?" Local authorities presented and discussed their efforts to promote walking and cycling, in-house energy management, and the expanded use of renewable energy sources. Overseas, the City of San Francisco's Board of Supervisors unanimously passed a resolution in April 2006 that called for a comprehensive city plan of action and response to peak oil. It based its action on the Hirsch report commissioned by the U.S. Department of Energy.¹¹

6. Conclusion

The recent oil price increases are resulting in increased costs to local authorities and the general public. In addition, the future peak in oil production will lead to significant fuel price increases and probable supply shortages, which will have major political, economical and social repercussions. In addition to the current projects planned in the next triennium that will address these issues (e.g. Travel Demand Management Plan), it is recommended that the Council consider the issues of peak oil and rising fuel prices when making future transport investment decisions, by promoting and designing a transport system that encourages more efficient use of and reduced reliance on oil-based products. It is also recommended that the Council engage with Government to identify potential measures for oil supply shortages and transitioning to a transportation system that is less reliant on oil-based products.

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¹¹ Cited earlier in this report.

Supporting Information

1) Strategic Fit / Strategic Outcome

This report relates directly to two of the long-term outcomes from the Environmental Strategy as reflected in the LTCCP:

4.6 Safer: *Wellington will have access to safe and reliable energy and water supplies, clean air, and waste disposal systems that protect public health and ecosystems.*

4.5 More Sustainable: *Wellington will reduce its environmental impact by making efficient use of energy, water, land and other resources; shifting towards renewable energy resources; conserving resources; and minimising waste.*

This report also relates to a long-term outcome of the Transport Strategy:

2.3 More Sustainable: *Wellington will minimise the environmental effects of transport and support the environmental strategy.*

In addition, this report addresses one of the four three-year priorities from the Environmental Strategy as reflected in the LTCCP:

“We will increase our promotion of water and energy efficiency and conservation, energy security, and the use of renewable energy sources, and we will take a more active leadership role in these areas.”

2) LTCCP/Annual Plan reference and long term financial impact

This report has no financial implications.

3) Treaty of Waitangi considerations

This report has no Treaty implications.

4) Decision-Making

This report does not require a significant decision to be made. Future transport investment decisions will be assessed as to their significance.

5) Consultation

a) General Consultation

This report does not require consultation.

b) Consultation with Maori

This report does not require consultation.

6) Legal Implications

There are no legal implications.

7) Consistency with existing policy

This report is consistent with the outcomes and priorities of the Environment Strategy and Transport Strategy as reflected in the LTCCP. The advice provided supports existing policy and planning work to implement the Council's strategic direction, such as travel demand management, compact growth, and energy management planning.