Review of New Zealand's oil security

Discussion paper

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Ministry of Business, Innovation & Employment

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Contents

Glossary

Backwardation	A market condition where the price of a futures contract is lower than the present spot price
Biofuels	A generic term used to describe liquid (or gaseous) fuels produced from biomass
Buffer stock	A supply of fuel held as a reserve to safeguard against unforeseen shortages or demands
Bunkering	Refers to the act of transporting fuel through capacity in existing tanks (for example, the act of transporting excess fuel in an airline tank)
EPA	Environmental Protection Agency
IEA	International Energy Agency
IEA stockholding obligations	New Zealand is required to 'hold' oil stock equivalent to 90 days of net imports. New Zealand meets this obligation through a combination of commercial inventory and oil ticket contracts
Hale & Twomey Report	Hale & Twomey published a supporting report to the NZIER Report: Hale & Twomey (2012) 'Information for NZIER Report on Oil Security'
HPMV Permit	High Productivity Motor Vehicle Permit
LPG	Liquefied Petroleum Gas
Marsden Point	Marsden Point oil refinery
MBIE	Ministry of Business, Innovation and Employment
NESO	National Emergency Sharing Organisation. A government/industry body, chaired by MBIE, which is convened when there is a severe disruption to the oil supply network, or when New Zealand is required to comply with IEA emergency edicts
NZIER	New Zealand Institute of Economic Research
NZTA	New Zealand Transport Agency
NZIER Report	A study that MBIE commissioned NZIER to undertake to update a 2005 review into oil security in New Zealand: NZIER (2012) 'New Zealand Oil Security Assessment Update'
OERS	Oil Emergency Response Strategy
PEFML	Petroleum and Engine Fuel Monitoring Levy
RAP	Refinery to Auckland Pipeline
RAP Report	This study assesses the likely industry response to an outage on the Refinery to Auckland Pipeline (RAP) or at the Wiri Terminal (Wiri): Hale & Twomey (2011) 'RAP contingency options'
RAP-WAP bypass	An proposal to connect the RAP and the WAP to allow jet fuel to bypass the Wiri terminal and flow directly to Auckland Airport

RPS	Restricted Purchasing Scheme
Ticket contracts (tickets)	An option, in return for an annual fee, to purchase specified quantities of stock at market prices in the event of an IEA-declared oil emergency
WAP	Wiri to Auckland Pipeline

Executive summary

The Ministry of Business, Innovation and Employment (**MBIE**) has commissioned three reports (**the Commissioned Reports**), which address the optimal level of oil security in New Zealand:

- Hale & Twomey (2011) 'RAP contingency options' (**RAP Report**). This study assesses the likely industry response to an outage on the Refinery to Auckland Pipeline or at the Wiri Terminal, and presents a number of options for improving the security of these pieces of infrastructure.
- NZIER (2012) 'New Zealand Oil Security Assessment Update' (**NZIER Report**). This study updates a 2005 review into oil security in New Zealand. It incorporates the findings of the RAP Report and also analyses a number of disruption scenarios beyond those in the RAP Report. The NZIER Report is the principal basis for this discussion document.
- Hale & Twomey (2012) 'Information for NZIER Report on Oil Security'. This is a supporting report to the NZIER Report.

A range of proposals to improve oil security in New Zealand have been developed based on these reports. These proposals mitigate risks of two types of oil supply disruption:

- **International supply disruption**: A supply disruption arising outside of New Zealand that would result in a spike in the global oil price.
- **Domestic supply disruption**: A disruption to domestic supply chain infrastructure that would likely result in supply shortfalls in New Zealand.

International supply disruptions

New Zealand's principal mechanism for mitigating an international oil supply disruption is its contribution to the International Energy Agency (**IEA**) global strategic oil stockholding. New Zealand is too small to mitigate international oil supply disruptions on its own and the collective arrangement under the IEA is New Zealand's best choice for coping with such disruptions. The collective stockholding mitigates the market power of oil-producing countries, and releasing stock during major international disruptions helps to moderate extreme oil price spikes.

New Zealand has a treaty obligation to contribute 90 days of net oil imports to the IEA stockholding. New Zealand presently meets this obligation through commercial inventories held by companies in New Zealand, and by entering ticket contracts with offshore companies. Tickets are an option, in return for an annual fee, to purchase specified quantities of stock at market prices in the event of an IEA-declared oil emergency. At around 10 percent of the cost of building domestic oil stockholding, tickets are by far the lowest cost option for meeting New Zealand's IEA obligation.

MBIE forecasts that ticket costs will rise from NZD5.2 million in FY2013/14 to NZD10.6 million in FY2016/17, principally due to a forecast decline in domestic oil production in the medium term (which increases the stock that we are required to hold). The government expects that the recent increase in exploration will result in new discoveries and downward pressure on tickets costs in the long-term.

Ticket costs are currently met through Crown funding. The current Vote Energy appropriation of NZD3.0 million per annum is insufficient to cover rising costs. Further, Crown funding may not be the most economically efficient source of funding for these costs.

MBIE has considered the following options for responding to these rising costs: withdrawal from the IEA; building domestic stockholding; placing a mandate on industry to hold stock; and different

options for funding the ticket regime. MBIE's preferred option is to continue to meet the IEA obligation via government procured ticket contracts, and to implement a 'user-pays' system to meet costs.

The preferred mechanism for raising the funds for the tickets is the Petroleum and Engine Fuel Monitoring Levy. The required increase in the levy rate to cover a multi-year appropriation for 2013/14 – 2015/16 would be approximately 0.110 cents per litre (which amounts to 4.4 cents for a 40 litre tank). This levy would be imposed on petrol, diesel, ethanol, and biodiesel. Imposing the levy on jet fuel, fuel oil, and other petroleum products is not considered to be desirable due to practical difficulties that implementation would raise.

Domestic supply disruptions

The government's overall position is that oil companies can and should manage the majority of domestic supply disruptions without its involvement. However, the government has the following roles with regard to ensuring domestic oil security:

- to investigate whether oil supply infrastructure resilience is socially optimal (and not just commercially optimal)
- to ensure that industry can re-establish supply as quickly as possible following a major disruption (e.g. by relaxing normal regulations, and expediting official processes, on a case-by-case basis, and as appropriate).

The Commissioned Reports identify and analyse seven low-probability, high- impact, domestic supply disruption scenarios. Using certain assumptions about how industry would respond to those disruptions, NZIER and Hale & Twomey have estimated supply shortfalls that would arise from those disruptions, and the associated economic costs of those shortfalls. The probability-weighted economic costs of these events are relatively small indicating that the fuel network in New Zealand is reasonably robust.

Government-funded domestic stockholding is not an economic way to mitigate risks of oil supply disruptions. This is because the significant cost of building stockholding (of the order of hundreds of millions of dollars) far outweighs the probability-weighted benefit of that stockholding.

Industry investment in a bypass on the Refinery to Auckland Pipeline that would allow jet fuel to flow directly to Auckland Airport may be justified if the cost is considered to be an 'insurance premium' against jet fuel disruption to Auckland Airport. The bypass is the only feasible option for getting jet fuel to Auckland Airport in the event of a Wiri Terminal outage. Even if ex-ante investment is not considered to be justified, industry should undertake preparatory work to expedite the building of the bypass in an emergency.

It was found that the most effective way to improve domestic security is to ensure that industry is able to re-establish supply as quickly as possible following a disruption. This generally means ensuring that sufficient trucking capacity is deployed quickly to move fuel from neighbouring areas in to the region with the disruption.

A number of measures have been proposed to increase the speed with which supply can be re-established in an emergency. Significant proposals are summarised below.

Primary constraints	Proposed actions
Trucking capacity: Most scenarios result in distribution issues that can be remedied by improving trucking capacity. Capacity can be increased by sourcing more trucks, or by improving the carrying efficiency of the existing fleet.	• Use existing procedures, via the High Productivity Motor Vehicle permit system, to pre-arrange contingency routes for vehicles above existing weight limits. • Better understand the ability of companies to access unconventional trucks (such as rural distribution trucks and 'upstream' trucks operating in the Taranaki region). • Seek feedback on an aspect of The Commerce (Cartels and Other Matters) Amendment Bill, which is presently before the House, as this may enable oil companies to better plan and coordinate emergency fuel deliveries.
Drivers: Sourcing sufficient drivers, who are appropriately qualified, is a major constraint to increasing trucking capacity. Obtaining emergency handling certificates is considered to be a major barrier to this response.	• Investigate ways to expedite certification of foreign (likely Australian) drivers. • Seek feedback on the possibility of managing the existing pool of approved handlers in a way that not all drivers need to have certification. • Seek feedback on the possibility of temporarily relaxing driving time restrictions to increase driver capacity.
Bottlenecks at terminals: Bottlenecks at fuel terminals reduce the efficiency of the existing trucking fleet.	• Better understand how oil companies will manage bottlenecks (e.g. by staggering driver shifts, allocating filling times to particular companies, and coordinating the allocation of fuel types to terminals to maximise off-take speed).
Decision making: Ensuring that decisions can be made quickly in an emergency will help to reduce supply shortfalls.	• Develop a handbook that outlines supply-side responses to major domestic disruption scenarios.

Introduction

Background

1. The Ministry of Business, Innovation and Employment (**MBIE**) has commissioned three reports into New Zealand's oil security:

    a. Hale & Twomey (2011) 'RAP contingency options' (**RAP Report**). This study assesses the likely industry response to an outage on the Refinery to Auckland Pipeline (**RAP**) or at the Wiri Terminal (**Wiri**), and presents a number of options for improving the security of these pieces of infrastructure.

    b. NZIER (2012) 'New Zealand Oil Security Assessment Update' (**NZIER Report**). This study updates a 2005 review into oil security in New Zealand. It incorporates the findings of the RAP Report and also analyses a number of disruption scenarios beyond those in the RAP Report. The NZIER Report is the principal basis for this discussion document.

    c. Hale & Twomey also published a supporting report to the NZIER Report: Hale & Twomey (2012) 'Information for NZIER Report on Oil Security' (**Hale & Twomey Report**).

2. MBIE has held initial discussions with relevant government departments[1] and a range of stakeholders[2] on the finding of these reports. The findings of the reports and the discussions are reflected in this discussion document.

3. The scope of the discussion document is confined to measures to improve emergency oil supply disruption preparedness. The discussion document does not consider longer-term structural issues such as reducing reliance on oil through the uptake of new transport technology.

4. Through consulting on this discussion document MBIE seeks to test the reasonableness of a number of assumptions made in the analysis and to seek feedback on a number of oil security proposals. Specific questions are contained throughout the paper.

Drivers for this work and alignment with government priorities

5. There are two drivers for presently reviewing New Zealand's oil security:

    - a need to review New Zealand's resilience to unexpected shocks such as earthquakes and external events in light of the Canterbury earthquakes
    - the projected increase in the cost of meeting New Zealand's International Energy Agency (**IEA**) oil stockholding obligations.

[1] The Treasury, the Department of Prime Minister and Cabinet, the Ministry of Civil Defence and Emergency Management, the Ministry of Transport, the New Zealand Transport Agency, New Zealand Customs Service, the Environmental Protection Authority, the Ministry for the Environment, Maritime New Zealand, and the Energy Efficiency and Conservation Authority. The Department of Labour and the Department of Building and Housing were also consulted, although these agencies now fall within the definition of MBIE.

[2] Air New Zealand; the Automobile Association; BP; Chevron; Exxon Mobil; Gull; the Motor Trade Association; Refining New Zealand; the Road Transport Forum; Z Energy.

6. Optimising New Zealand's oil security also aligns with key government objectives to:

   - build a more competitive and productive economy (the government's principal economic objective)
   - ensure secure and affordable energy, in particular to ensure security of oil supply (New Zealand Energy Strategy 2011-2021)
   - ensure resilient infrastructure (one of the six guiding principles for infrastructure development in the National Infrastructure Plan).

Distinction between international and domestic oil supply disruptions

7. There is an important distinction between an international oil supply disruption and a domestic oil supply disruption:

   a. An **international supply disruption** (e.g. from breakout of war in significant oil-producing regions) results in a spike in the international oil price. Such a spike would result in a cost to the New Zealand economy. New Zealand is too small to take action to moderate the global oil price on its own and must principally rely on *collective arrangements* through the IEA to moderate the price spike and its associated economic cost.

   b. A **domestic supply disruption** results from a disruption to domestic infrastructure or fuel contamination. In principle such a disruption could also result in a domestic price spike. However, historically oil companies have been reluctant to raise prices as a result of a domestic disruption.[3]These disruptions can result in temporary product outages which also result in a cost to the New Zealand economy. New Zealand can, however, independently implement measures to mitigate domestic supply disruptions.

[3] This is commonly understood to be because oil companies do not want to be seen to be profiteering from a domestic emergency. On the other hand price rises following an international supply emergency can be seen to be 'out of their hands'.

International oil security

Overview

8. New Zealand's principal mechanism for mitigating the effects of an international oil supply disruption is its contribution to the IEA's global strategic oil stockholding. Collective release of this stock during an international disruption acts to moderate the international oil price thereby buffering the economy against extreme price spikes.

9. New Zealand presently meets its IEA stockholding obligations through commercial inventories held in New Zealand, and through entering ticket contracts with offshore companies. Tickets are an option, in return for an annual fee, to purchase specified quantities of stock at market prices in the event of an IEA-declared oil emergency.

10. Present appropriations for ticket contracts are insufficient to cover the forecast increase in costs. This chapter analyses various options for dealing with this problem. It concludes that:

    - New Zealand's best mechanism for dealing with international oil security risks is to maintain its membership to the IEA
    - New Zealand should continue to meet its IEA obligations through government-procured ticket contracts
    - ticket contract costs should be funded through a levy on fuel rather than through Crown funding.

Background

11. The IEA was founded in response to the 1973/74 oil crisis in order to help countries coordinate a collective response to major disruptions in oil supply through the release of emergency oil stocks to the markets. New Zealand joined the IEA in 1977.

12. There are 28 members of the IEA. While members of the IEA must be members of the OECD, the opposite is not necessarily true. Membership of the IEA requires that net oil-importing countries have reserves of oil stocks equivalent to 90 days of their net imports. Further, members must have a demand restraint programme for reducing national oil consumption by up to 10 percent in an emergency.

13. New Zealand historically relied only on commercial stocks held by companies in New Zealand to meet the IEA stockholding obligation. In 2004 it became apparent that, as a result of falling domestic production, and the realisation that stock in ships destined to New Zealand could not be counted towards New Zealand's obligation, New Zealand was not holding sufficient stock to meet its obligation.

14. During 2004-2006 various options to remedy New Zealand's non-compliance were investigated, including building public domestic stockholding. Petroleum explorers were also concurrently making investment decisions to bring domestic oil discoveries into production. When the expected production from these developments was taken into account, it became apparent that New Zealand's stock requirement would be highly variable and in some years commercial stocks would again be sufficient to meet the IEA obligation. Given this variability, holding long-term reserve stock in New Zealand was considered to be an unnecessary expense and other methods of holding stock were investigated including the use of 'ticket contracts'.

15. Rather than physically holding the stock, the IEA allows members to enter into ticket contracts to meet their obligations. The ticketed stock that is held on a member's behalf must be held within another IEA member's territory. This ticketed stock may not be counted towards the host member's obligation. The ticket must be backed by a government-to-government agreement that stipulates that the host member will not impede the release of the stock in the event of an IEA emergency.

How New Zealand presently meets its IEA stockholding obligation

16. The IEA calculates the 90 day requirement for a given year by multiplying the average daily net imports of the previous year by 90.[4] At month-end each member is required to submit data for that month to verify its compliance.

17. In recent years in New Zealand, stock held by commercial operators contributes to between half of the requirement to the entire requirement, depending on production in a given year. The volume of commercial inventory has remained relatively stable in recent years.

> Q1. Are you aware of any future investments or shut-downs, or any other factors that are likely to significantly alter the level of commercial inventories held in New Zealand?

18. New Zealand makes up the remainder of its requirement by entering into ticket contracts with overseas companies (oil companies and traders). To date, New Zealand has held tickets in Australia[5], Japan, the Netherlands, and the United Kingdom.[6] In 2012 New Zealand held approximately a third of ticketed stocks in each of these countries.

19. In the event that IEA members agree to declare an IEA emergency and release stock onto the global market, New Zealand generally has two options open to it under the ticket contracts:

    a. **Release**: allows the government to terminate the contract which would allow the stockholder to sell that stock on the international market.

    b. **Purchase**: allows the government to purchase the stock at prevailing market prices from the stock holder. The government would likely only exercise the purchase option if companies operating in New Zealand were willing to purchase the stock (i.e. those companies cannot source stock on their own at market prices).

20. If New Zealand exercised the purchase option, it would take approximately one to two months for stock to arrive in New Zealand (depending on location of the stock).

Forecast of ticket contract costs

21. A full analysis of the forecast of ticket contract requirements and costs, including an analysis of sensitivities, is contained in Appendix 1. Table 1 is the forecast of ticket contract costs out to 2016/17.

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[4] The IEA converts volumes of different kinds of oil products to a standardised 'IEA tonne' by multiplying by different yield factors.

[5] It is unlikely that Australia will allow New Zealand to hold ticket contracts in the near future because it requires all its stockholding capacity to meet its own IEA obligations.

[6] New Zealand has entered into the requisite government-to-government agreements with governments of all these countries and has also recently entered into an agreement with Denmark (2012) and is in the process of finalising an agreement with Spain.

Table 1: ticket contract cost forecast

Fiscal year	*2013/14*	*2014/15*	*2015/16*	*2016/17*
Cost (NZD million)	5.2	6.7	8.7	10.6

22. Vote Energy has an ongoing appropriation of NZD3 million per year to cover the costs of New Zealand's IEA obligations. This appropriation is unlikely to be sufficient to cover the forecast costs. Further, given the principal beneficiaries of the stockholding are fuel consumers, it is questionable whether it is economically efficient to cover the costs of the obligation through Crown funding.

Problem definition

23. The forecast costs of the current method of meeting New Zealand's IEA stockholding obligation (the ticketing regime) are unlikely to be fully funded by the existing Vote Energy appropriations. Further, Crown funding may not be the most economically efficient source of funding for IEA obligation costs.

> Q2. Do you agree that the international oil security problem definition is appropriate?

Selection criteria for options

24. MBIE proposes the following criteria[7] to assess the options proposed below:

    a. **International reputation**: New Zealand should not unduly damage its international standing, particularly with key partners.

    b. **Equity**: beneficiaries of oil security should pay for that security proportionately to their benefit.

    c. **Low cost**: any funding mechanism should be administratively simple and low-cost to operate.

    d. **Low avoidance**: it should be difficult for liable parties to avoid paying dues under any funding mechanism.

    e. **Future-proof**: the funding mechanism should be flexible enough to cope with changing costs and changes in market structure.

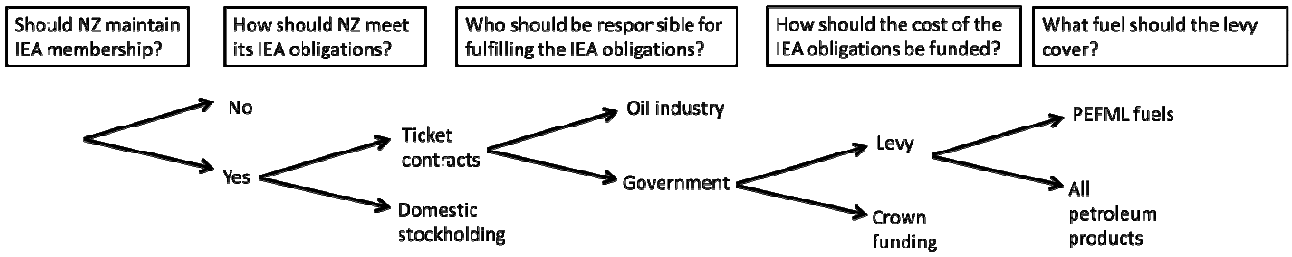
> Q3. Do you agree with the selection criteria used for the international oil security analysis?

Options

25. Figure 1 sets out the options that will be assessed and the logic flow of the assessment.

[7] Criteria b to e are based on the Treasury's *Guidelines for setting charges in the public sector,* December 2002.

Figure 1



Options analysis

New Zealand should maintain its membership to the IEA

26. Before deciding on how New Zealand should meet its IEA obligations, it should first be confirmed that New Zealand should meet its IEA obligations, i.e. should New Zealand maintain its membership of the IEA and continue to contribute to the IEA's global stockholding, or should it rely on other IEA countries to maintain collective oil security?

27. New Zealand belongs to the IEA to increase global security against an international oil disruption. New Zealand contributes to collective security proportionally to its oil stockholding. Relying on other IEA countries to maintain the collective IEA arrangements (in effect, free-riding) would be inconsistent with New Zealand's general effort to be regarded as a good international citizen by participating in collective international arrangements (such as security and climate change). Oil security is closely linked to overall security, and oil is a key driver of the foreign and security policies of many OECD countries. No country has ever withdrawn from the IEA, and a number of other significant trading partners are seeking to join (including Russia, China, Indonesia, and Chile).

28. The reputational risk to New Zealand from withdrawing from the IEA, or becoming noncompliant with its treaty obligations, is significant. It is likely that New Zealand would come under considerable pressure from some its closest partners to remain in the IEA and to maintain compliance with its obligations.

29. IEA membership also provides: New Zealand with ready access to IEA publications, studies, statistics and policy advice; the opportunity for New Zealand scientists to participate actively in ongoing collaborative R&D projects with major industrialised economies; and a five-yearly in-depth review of New Zealand's energy policies by an IEA expert panel.

30. Given the above considerations, and notwithstanding the cost savings that withdrawal from the IEA would entail, the 'international reputation' selection criteria is the overriding consideration for this decision. It is MBIE's assessment that New Zealand should maintain its membership of the IEA due to the significant reputational risk of withdrawal from the collective arrangements.

> Q4. Do you agree that New Zealand should maintain its membership of the IEA and continue to meet its IEA obligations?

New Zealand should continue to meet its IEA stockholding obligations through ticket contracts rather than purchasing domestic stockholding

31. New Zealand could meet its IEA obligations either through new domestic stockholding or through continuing to enter ticket contracts. Ticket contracts are much cheaper than building new domestic stockholding. The NZIER Report estimates the annualised cost of building new storage in New Zealand to be USD10.88 – 14.25/tonne/month.[8] This compares with historical average ticket prices of USD0.79 – 1.86/tonne/month.

32. Further, the NZIER Report found that there are no net benefits for New Zealand's domestic oil security (i.e. security against domestic infrastructure disruption) from building new stockholding within New Zealand.[9]

33. Given the above, the use of ticket contracts is clearly the preferred option based on the 'low cost' criterion. Further, the flexibility that ticket contracts provide in the face of New Zealand's highly variable IEA requirement means that the use of ticket contracts are the preferred option based on the '**future proof**' criterion. These two options are neutral with regard to the other selection criteria.

> Q5. Do you agree that New Zealand should continue to meet its IEA stockholding obligations through ticket contracts rather than purchasing domestic stockholding?

Government should purchase tickets rather than place a mandate on industry

34. The question then arises as to who is best placed to purchase ticket contracts. Tickets could either be purchased directly by government, or government could place a mandate on the oil industry (e.g. oil product retailers of a certain size) to hold stock, either themselves or through ticket contracts. Given the significantly lower cost of ticket contracts it is likely that industry would fulfil the mandate by purchasing tickets.

35. Placing a mandate on industry would require a compliance regime to be set up. Further, a regime would need to be set up to allocate a fair share of the IEA requirement to each industry player, presumably based on market share. Both of these would require data collection systems which entail costs.

36. The advantages of government purchasing tickets are that:

- government purchases the entire requirement and so purchases with economies of scale
- there are no unfair commercial advantages to one party over another in sourcing tickets
- administration costs are lowered since only one party is purchasing
- there are no associated costs of compliance and allocation regimes
- the governments that New Zealand has government-to-government agreements with are likely to want continued direct New Zealand government involvement in ticket contracts.

[8] p.31 of the NZIER Report. NZIER figures have been converted to monthly USD values using an assumed exchange rate of 0.75

[9] Section 6.1.1 of the NZIER Report.

37. It could be argued that industry might be able to source better value ticket contracts, though this is unclear. On balance it seems that government purchasing tickets better fulfils the '**low-cost**' criterion compared to an industry mandate. It also better fulfils the '**low avoidance**' criterion. Whether costs are ultimately equitably allocated to end consumers when government purchases tickets depends on how government funds the tickets and will be considered next. The two options are neutral to the remainder of the criteria.

> Q6. Do you agree that the government should continue to procure ticket contracts rather than placing a mandate on industry?

IEA compliance costs should be funded by a levy on fuel consumers rather than through Crown funding

38. There are two options to consider for funding ticket contracts: Crown funding or funding from a levy on fuel consumers.

39. The case for raising the required funding for ticket contracts through a user-pays system rather than through general taxation is that fuel users, rather than general taxpayers, are the principal beneficiaries of IEA oil stocks. While the benefits of the stockholding flow-on to the economy as a whole, fuel consumers are the direct beneficiaries of the oil security.

40. Fuel consumers are likely to benefit more from the oil security the more fuel they consume. It is therefore more equitable to apportion the cost of the stockholding proportionally to the volume of fuel consumed. The best approach for a proportional system is to raise revenue through a per-litre levy on fuel. While a per-litre levy may not perfectly target costs to the direct beneficiaries of the oil security, it does so better than the Crown funding option. On balance, a per-litre levy satisfies the 'equity' criterion better than the Crown funding option.

41. How the levy option performs against the 'low cost' and 'low avoidance' criteria depends on the design of the levy (see below). The levy option is relatively neutral to the remainder of the criteria.

> Q7. Do you agree that it is more equitable to recover ticket contract costs via a levy on fuel than from general taxation? Are there any other matters that the government should consider?

The levy should only cover petrol, diesel, biodiesel, and ethanol

42. In principle, the proposed levy should cover all fuels that contribute to the 90 day obligation, i.e. petrol; diesel; jet fuel; fuel oil; other petroleum products, such as LPG, bitumen, and solvents; and biofuels that are destined for blending with other fuels.[10] This levy coverage would best satisfy the '**equity**' criterion. However, jet fuel for international travel is exempted from tax under the Convention on International Civil Aviation. Further, various considerations weigh against levying a number of the other products:

    a. It would be relatively complex and costly to administer a levy on 'other petroleum products' given the small quantities involved and the involvement of various suppliers other than the main oil companies (these constitute approximately seven percent of products able to be levied). Therefore levying 'other petroleum products' does not satisfy the '**low-cost**' criterion well.

[10] Stocks of petrochemical naphtha and international marine bunkers do not count towards the obligation.

b. Ensuring accurate separation and reporting of domestic and international sales of jet fuel and fuel oil may raise practical difficulties and add administrative costs. Therefore levying domestic jet fuel and fuel oil may not satisfy the '**low-cost**' and the '**low avoidance**' criteria well. Further, levying domestic sales of jet fuel (seven percent of products able to be levied) and fuel oil (four percent of products able to be levied) has the potential to put domestic/New Zealand-owned airlines and shippers at a competitive disadvantage to overseas airlines and shippers operating within New Zealand.

43. On balance, although full coverage of all fuel products would be more equitable and efficient in principle, these latter considerations weigh against the inclusion of jet fuel, fuel oil, and other petroleum products in the coverage of the proposed levy. These make up a relatively small proportion (around 18 percent) of products able to be levied.

44. MBIE's preferred option is to raise funding through an increase in the Petroleum and Engine Fuel Monitoring Levy (**PEFML**). The levy is currently set at a maximum of 0.045c/l on petrol, diesel, ethanol and biodiesel and is collected by the New Zealand Customs Service. It currently covers other IEA-related costs (including acquiring energy data), as well as fuel quality and safety monitoring. Increasing the PEFML to cover the costs of holding IEA oil stocks would require an amendment to the Energy (Fuels, Levies and References) Act 1989 to widen the purposes of the levy and to allow for a change in the rate through the setting of regulations. Since the proposal is to increase an already existing levy, it is administratively '**low-cost**'.

> Q8. Do you agree that the PEFML is the most appropriate levy by which to recover ticket contract costs and that it should only cover petrol, diesel, ethanol, and biodiesel?

Levy design

The proposed levy should fund a multi-year budget appropriation

45. MBIE proposes that an appropriation funded by the levy is sought during the usual appropriations process. This allows for parliamentary scrutiny of ticket contract costs. This proposal would replace the existing Vote Energy appropriations.

46. MBIE proposes that a three year appropriation is sought to cover the cost of ticket contracts and that the levy rate is smoothed over this three year period. The appropriation and levy rate could be updated as necessary as forecasts of ticket contract costs are updated. Future levy rate changes should take account of any surpluses or deficits from previous periods. This approach has a number of advantages:

- government is better able to manage revenue from the levy by smoothing over a number of years; and
- the levy rate will not necessarily change from year-to-year which will reduce compliance costs for oil companies subject to the levy.

> Q9. Do you agree that it is best to smooth the levy rate over three years? How much lead time is required for companies to prepare for a change in the rate?

Setting the levy rate

47. The levy rate should be calculated using the following formula:

    Rate = (forecast ticket contract cost for three years – surplus from previous period) / forecast petrol and diesel demand for three years.

48. The government would endeavour to align any change in the levy rate with other changes in fuel taxes such as the excise duty. This would help to reduce compliance costs for businesses.

49. Incorporating surpluses/deficits from previous periods into the calculation of the next period's levy rate will not result in equity concerns if there are no significant changes in the relative proportions of fuels being consumed by end consumers (which is a reasonable assumption).

50. The MBIE Energy Outlook 2011 forecasts petrol and diesel demand to be 6.02 billion litres in 2013/14, rising gradually to 6.10 billion litres in 2015/16. The forecast 2013/14 – 2015/16 levy rate based on the above forecast of ticket contract costs and petrol and diesel demand is 0.110 cents per litre(which amounts to 4.4 cents for a 40 litre tank).

51. Sensitivity of the three year levy rate to uncertainties in ticket price, exchange rate, and volume requirement[11] are shown in Table 2.

Table 2: Sensitivity of levy rate

Sensitivity	Range
To ticket price	0.08 – 0.14 cents/litre[12]
To exchange rate	0.10 – 0.17 cents/litre
To volume requirement	0.07 – 0.16 cents/litre

[11] See Appendix 1 for further details of sensitivity analyses.

[12] 0.33 cents/litre for extreme ticket price scenario.

Domestic oil security

Overview

52. This chapter develops proposals to economically minimise supply shortfalls arising from severe disruptions to domestic infrastructure.

53. The chapter:

- provides an overview of the domestic fuel supply network
- outlines seven low probability, high-impact, oil supply disruption scenarios, and outlines the expected response to these disruptions from industry under the status quo
- identifies and evaluates options for expediting the re-establishment of supply following a disruption
- identifies and applies a cost benefit analysis to more costly options for improving the resilience of the network.

54. The chapter concludes that:

- the fuel supply network in New Zealand is already reasonably robust
- the oil supply industry is adept at responding to most supply disruptions
- government already has processes in place to manage severe disruption events
- significant capital expenditure by government in the oil supply network is not justified
- there are a number of steps government can take to ensure that industry can expedite the re-establishment of supply during an emergency supply disruption.

Background

55. The government's overall position is that oil companies can and should manage the majority of domestic supply disruptions without its involvement. Beyond commercial drivers for companies to manage disruptions, management of disruptions is also an obligation under section 60 of the Civil Defence and Emergency Management Act 2002.

56. Government responsibilities, and powers to manage a disruption, increase commensurately with the severity of the disruption. Government will likely only become involved in the management of the most severe supply disruptions. In the case of a severe disruption, the National Emergency Sharing Organisation[13] (**NESO**) would be convened to determine the best response by industry, with the support of government.

57. In 2008 the government developed the 'Oil Emergency Response Strategy'[14] (the **OERS**). The OERS focuses on:

- supply-side measures to respond to an IEA declared international supply emergency (release of ticket contract stock held offshore, and surge domestic production)

[13] NESO is a government/industry body, chaired by MBIE, which is convened when there is a severe disruption to the oil supply network, or when there is a call for New Zealand to comply with IEA edicts around increasing supply or reducing demand. NESO ensures that there is a well-coordinated response between government and industry to severe disruptions.

[14] www.med.govt.nz/sectors-industries/energy/pdf-docs-library/energy-security/780059-2.pdf

- measures to reduce demand during international or domestic emergencies (a voluntary fuel savings campaign, and, as a last resort, a mandatory fuel rationing scheme).

58. The release of overseas ticket contract stock and surging domestic crude production are not considered to be effective measures for increasing supply during a disruption to domestic infrastructure. These measures are meant to help to increase global supply during an international supply disruption.

59. As mentioned above, the focus of this domestic oil security review is on supply-side measures to minimise supply shortfalls in the case of domestic infrastructure disruptions.

Objectives for review of domestic security and for consultation on proposed measures

60. Oil companies will only invest in oil supply infrastructure resilience to a commercially optimal level. It is the role of government to investigate whether this level of resilience is socially optimal.[15]

61. It is also the government's role to ensure that industry can re-establish supply as quickly as possible following a disruption through appropriately relaxing normal regulations, and expediting official processes. Government would only take such measures if the situation justified them, and would make such decisions on a case-by-case basis.

> Q10. Do you agree that the rationale for government investigation into domestic oil supply security is to ensure that domestic oil infrastructure resilience is socially optimal, and to ensure that industry can re-establish supply as quickly as possible following a disruption?

62. While there are various measures available to industry and government to reduce demand in the case of a supply shortfall, such measures come with an economic cost. The focus of this chapter is on minimising supply shortfalls either by:

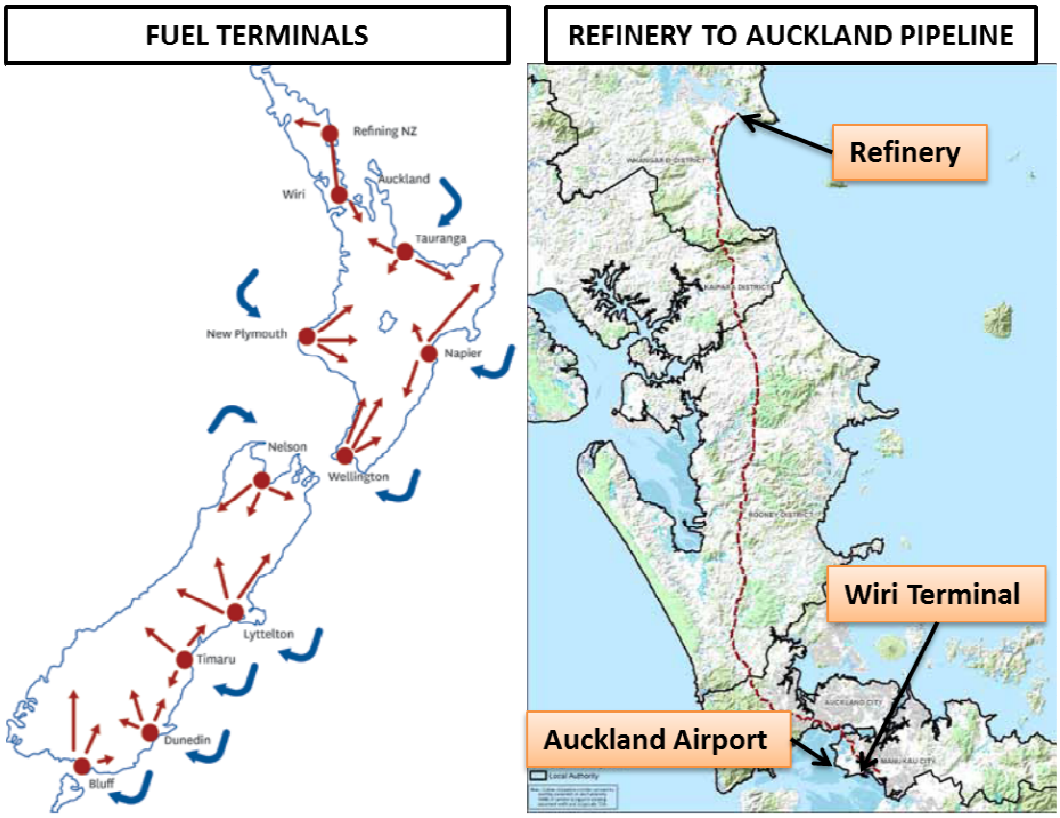
- increasing the speed with which the network can be restored back to capacity, or
- increasing the *ex-ante* resilience of the supply chain to disruption.

63. Through consulting on this chapter MBIE seeks to test the reasonableness of a number of assumptions made in the analysis and to seek feedback on the proposals for improving security against supply shortfalls. Specific questions are contained throughout the paper.

[15] As described in paragraph 143, this is achieved by applying an economic cost-benefit analysis to proposals to increase the resilience of oil supply infrastructure.

Supply chain overview

Figure 2: New Zealand's significant oil distribution infrastructure



64. New Zealand's significant oil distribution assets comprise:

- the Marsden Point oil refinery (**Marsden Point**) which is the only oil refinery in New Zealand, and produces around two-thirds of New Zealand's finished product
- the RAP, which transmits 90 percent of Auckland's finished product to Wiri Terminal
- Wiri Terminal which supplies the Auckland region's finished products
- the Wiri-to-Airport Pipeline (**WAP**) which supplies 100 percent of Auckland Airport's jet fuel from Wiri
- a network of fuel terminals[16] that are supplied by two coastal tankers from Marsden Point, and also directly with imported product.

65. Products are distributed from terminals to around 1,200 service stations throughout New Zealand, and to bulk consumers via road tankers.

66. Disruption to any one of New Zealand's significant pieces of oil infrastructure has the potential to result in supply shortfalls at either regional or national levels.

[16] Tauranga, Napier, New Plymouth, Wellington, Nelson, Lyttelton, Timaru, Dunedin and Bluff.

Supply-side response to domestic supply disruptions under the status quo

67. Various supply-side measures are already available to industry and government to manage supply disruptions. A number of these measures have been assumed in the scenario analysis below.

Industry measures to increase supply

68. The following measures are available to industry to manage supply disruptions:

- drawing down on buffer and safety stocks
- reprioritising/rescheduling distribution
- increasing imports of refined products
- optimising use of existing trucking capacity
- importing additional trucking capacity
- importing additional coastal tankers
- recommissioning mothballed infrastructure.

Government measures to increase supply

69. The OERS contains measures open to government to improve fuel supply in an emergency. The most effective measure for responding to a domestic disruption appears to be the relaxation of fuel specifications. This would allow the importation and sale of fuel that could otherwise not be sold in New Zealand, such as from Australia.

> Q11. Are there any other measures available to industry or government to increase supply following an emergency disruption?

Scenario analysis

70. The NZIER Report and the Hale & Twomey Report identify and analyse seven low-probability, high-impact, domestic supply disruption scenarios. While the list of scenarios is not exhaustive, it is considered to cover the most likely high-impact scenarios.

71. For each scenario, this section summarises:

- the expected response to these disruptions from industry under the status quo
- the probability of the scenario occurring (to be used to assess whether costly mitigation measures are economic)
- the expected supply shortfall under the status quo
- constraints to industry's ability to more effectively respond to the disruption, and to minimise the resulting supply shortfall.

72. Options to address these constraints are then considered in the next section.

73. While some of the descriptions of the expected industry responses below assume that government will allow trucks to overload to capacity, it is important to note that this would be allowed once the relevant routes had been pre-approved under existing regulations, as described further below in paragraph 115.

Major refinery outage[17]

Outage scenario and expected response under status quo

74. A major refinery outage is an incident where oil companies have to re-establish 100 percent of their supply via imports. It is estimated that it will take companies 42 days to re-establish full supply via imports.

75. The following assumptions are made about the response to the incident:

- refinery tankage and the RAP will be available within one to two weeks of the incident to transport imported cargoes to Wiri
- a number of oil companies will divert cargoes destined for other countries to New Zealand (two in the first few weeks, two more within five weeks), and government will relax fuel specifications if appropriate
- oil companies will draw down on normal buffer stock and safety stock in terminals;
- airline flight schedules will be amended
- airlines will bunker fuel into New Zealand (i.e. airlines will carry fuel into New Zealand over and above what is necessary for that flight).

76. Depending on the length of time that the refinery tankage and the RAP are out of operation, trucking capacity may have to be shifted northward to transport fuel into Auckland.

77. It is estimated that 24 percent of normal petrol and diesel demand cannot be met over the 42 day period it takes to re-establish supply via imports. It is likely that demand-side measures would need to be implemented to manage this shortfall.

78. While 48 percent of normal jet demand cannot be met over this period, it is assumed that airlines would manage this shortfall by rationalising flights and bunkering fuel.

> Q12. Is the description of the major refinery outage accurate? If not, what should be expected?

Probability

79. Marsden Point is a critical component of the New Zealand petroleum supply chain. It continues to achieve first-quartile performance for operational availability for refineries in the Asia-Pacific region.[18]The Hale & Twomey report estimates a probability range of 0.20-0.25 percent per year (one in 400-500 years) for a major Marsden Point outage.

> Q13. Is 0.20-0.25 percent per year a reasonable probability range for a major outage at the refinery?

[17] For a full description of the outage scenario, risk profile and expected response please see pp 4-7 of the Hale & Twomey Report.

[18] As benchmarked by Solomon Associates.

Constraints to effective industry response

80. The main factor that determines the size of the supply shortfall under this scenario is the speed with which industry can import refined products. For example, if a fuel ship destined to Australia can be diverted to New Zealand quickly, then the supply shortfall will be reduced.

> Q14. Are there other factors that can be addressed to enable industry to better respond to a major refinery outage?

Minor refinery outage[19]

Outage scenario and expected response under status quo

81. A minor refinery outage is an incident that disrupts the refinery for three weeks. Supply from the refinery will be re-established before supply could be fully re-established via imports.

82. The following assumptions are made about the response to the incident:

- refinery tankage and the RAP will be available within three days
- a number of oil companies will divert cargoes destined for other countries to New Zealand (two within the three week outage), and government will relax fuel specifications if appropriate
- oil companies will draw down on normal buffer stock and safety stock in terminals
- airline flight schedules will be rationalised
- airlines will bunker fuel into New Zealand.

83. It is estimated that two percent of normal petrol and diesel demand cannot be met over this period, and thus that there may be brief stock outs in certain areas for short periods.

84. While 24 percent of normal jet demand cannot be met over this period, it is assumed that airlines would manage this shortfall by rationalising flights and bunkering fuel.

> Q15. Is the description of the minor refinery outage accurate? If not, what should be expected?

Probability

85. The Hale & Twomey report estimates a probability range of 0.5-1.0 percent per year (one in 100-200 years) for a minor Marsden Point outage.

> Q16. Is 0.5-1.0 percent per year a reasonable probability range for a minor refinery outage?

[19] For a full description of the outage scenario, risk profile and expected response please see pp. 7-8 of the Hale & Twomey Report.

Constraints to effective industry response

86. As with the major refinery outage scenario, the main factor that determines the size of the supply shortfall under this scenario is the speed with which industry can import refined products.

> Q17. Are there other factors that can be addressed to enable industry to better respond to a minor refinery outage?

Long-term disruption to RAP/Wiri[20]

Outage scenario and expected response under status quo

87. This scenario is an incident that disrupts Wiri for an extended period of time (up to 18 months). Further, all stock at Wiri is lost. Ultimately, this incident requires that petrol/diesel is transported by truck from Marsden Point and from Mt Maunganui terminal rather than down the RAP.

88. The following assumptions are made about the response to this incident:

- trucking assets that usually service Wiri will be deployed to move petrol/diesel into Auckland from Marsden Point and Mt Maunganui
- trucking assets from Northland and Bay of Plenty/Waikato will be partially redeployed to move petrol/diesel into Auckland from Marsden Point and Mt Maunganui
- sufficient coastal shipping capacity is available to move a proportion of the Auckland region's demand through Mt Maunganui
- there are 10 spare trucks in the country that can be deployed to assist in transporting petrol/diesel
- government allows trucks to overload to capacity (as allowed by relevant regulations)
- some demand can be shifted from the Auckland region (e.g. freight truck demand), fuel distribution fleets (e.g. rural distribution trucks) are utilised, and loading efficiencies are made
- offshore trucks start arriving after one month and build up to a point where supply into Auckland is fully re-established after two months
- domestic jet supply and some international jet supply will be shifted from Auckland to other New Zealand airports
- jet fuel build-up at Marsden Point will not affect refinery operations (excess jet fuel will be exported or blended into diesel)
- airline flight schedules will be rationalised
- airlines will bunker fuel into New Zealand.

89. It is estimated that 12 percent of normal upper North Island petrol and diesel demand cannot be met over the two months it takes to re-establish supply, although the shortfall over the first two weeks is 28 percent. Demand-side measures may need to be implemented to address this shortfall.

[20] For a full description of the outage scenario, risk profile and expected response please see pp. 8-10 of the Hale & Twomey Report.

90. It is estimated that around 65 percent of normal Wiri jet fuel supply will not be met (35 percent will be met through other airports). This is likely to require significant flight rationalisation until a permanent solution can be found (e.g. the RAP-WAP bypass discussed from paragraph 145).

> Q18. Is the description of the long term disruption to RAP/Wiri accurate? If not, what should be expected?

Probability

91. The Hale & Twomey report estimates a probability range of 0.2-0.3 percent per year (one in 333 to one in 500 years) for a long-term RAP/Wiri disruption event.

> Q19. Is 0.2-0.3 percent per year a reasonable probability range for a long term RAP/Wiri disruption event?

Constraints to effective industry response

92. The following issues may constrain the speed with which full supply can be re-established into Auckland via trucks from Marsden Point and Mt Maunganui:

- the inability of government to relax truck weight restrictions in a timely way
- bottlenecks at Marsden Point and Mt Maunganui loading gantries
- delays in importing offshore trucks
- delays with overseas licensed drivers being able to drive fuel trucks in New Zealand
- competition law issues preventing effective trucking collaboration between oil companies in an emergency.

93. A disruption to RAP/Wiri will also put more load on coastal shipping tankers. There is a small amount of excess capacity in the existing fleet, but it is possible that more shipping resources will be needed at short notice.

> Q20. Are there other factors that can be addressed to increase the speed with which industry can respond to a long term disruption to RAP/Wiri?

Short-term disruption to RAP/Wiri[21]

Outage scenario and expected response under status quo

94. This scenario is an incident that disrupts the RAP pipeline for nine days. The stock at Wiri is still available. As with the long-term RAP/Wiri disruption scenario, this incident requires that the petrol/diesel that the RAP transported into Auckland is replaced by petrol/diesel that is transported by truck from Marsden Point, and from Mt Maunganui terminal.

[21] For a full description of the outage scenario, risk profile and expected response please see pp. 11-12 of the Hale & Twomey Report.

95. The following assumptions are made about the response to the incident:

- 50 percent of trucking assets that usually service Wiri will be redeployed to move petrol/diesel into Auckland from Marsden Point and Mt Maunganui, while the remaining 50 percent continues to transport the stock left at Wiri
- sufficient coastal shipping capacity is available to move a proportion of the Auckland region's demand through Mt Maunganui
- there are 10 spare trucks in the country that can be deployed to assist in transporting petrol/diesel
- domestic jet fuel supply will be shifted from Auckland to other New Zealand airports;
- jet fuel build-up at Marsden Point will not affect refinery operations (excess jet fuel will be exported or blended into diesel)
- flight schedules will be rationalised
- airlines will bunker fuel into New Zealand.

96. It is estimated that 17 percent of normal petrol and diesel demand cannot be met over the nine day outage. This shortfall could be minimised if consumers deferred demand until RAP supply was re-established, for example, by running down their tanks. Relaxation of truck weight limits would also reduce this shortfall. Demand-side measures may need to be implemented to address any remaining shortfall.

97. It is estimated that around 33 percent of normal Wiri jet fuel supply will not be met (55 percent of normal Wiri jet supply will go through Auckland Airport, while 12 percent will go through other New Zealand airports). This supply shortfall will be met through flight rationalisation and fuel bunkering.

> Q21. Is the description of the short term disruption to RAP/Wiri accurate? If not, what should be expected?

Probability

98. The Hale & Twomey report estimates a probability range of 0.5-1.0 percent per year (one in 100 to one in 200 years) for a short-term RAP/Wiri disruption event.

> Q22. Is 0.5-1.0 percent per year a reasonable probability range for a short term RAP/Wiri disruption event?

Constraints to effective industry response

99. A significant constraint for this scenario is the ability to encourage consumers to defer demand until RAP supply is re-established.

> Q23. Are there other factors that can be addressed to enable industry to better respond to a short term outage to RAP/Wiri?

Long-term disruption at Wellington[22]

Outage scenario and expected response under status quo

100. This scenario is an incident that takes out all Seaview terminals[23] (either the jetty is unusable, or a natural disaster disables all four terminals). Seaview normally services the Wellington, Manawatu, Wairarapa, and Taranaki (for petrol) regions. It is assumed that all stock in the terminals is lost. Similarly to a Wiri outage, this incident requires that Seaview supply is replaced by supply via truck from Napier and Taranaki (for diesel).

101. The following assumptions are made about the response to the incident:

- the northernmost areas that are normally supplied from Seaview would be supplied from Mt Maunganui to relieve pressure on Napier terminal
- trucking assets that usually service Seaview will be deployed to move petrol/diesel into the region from Napier and Taranaki
- product import ships that normally offload at Seaview would need to offload at Napier to keep it supplied
- there are 10 spare trucks in the country that can be deployed to assist in transporting petrol/diesel
- government allows trucks to overload to capacity (as allowed by relevant regulations)
- some demand can be shifted from the region (e.g. freight truck demand), fuel distribution fleets (e.g. rural distribution trucks) are utilised, and loading efficiencies are made
- offshore trucks start arriving after one month and build up to a point where supply into the region is fully re-established after two months.

102. It is estimated that 15 percent of lower North Island petrol and diesel demand cannot be met over the two months it takes to re-establish supply, although the shortfall over the first two weeks is 35 percent. Demand-side measures may need to be implemented to address this shortfall.

> Q24. Is the description of the long term disruption at Seaview accurate? If not, what should be expected?

Probability

103. The Hale & Twomey report estimates a probability range of 0.15-0.25 percent per year (one in 400 to one in 667 years) for a long-term Seaview disruption event.

> Q25. Is 0.15-0.25 percent per year a reasonable probability range for a long term Seaview disruption event?

[22] For a full description of the outage scenario, risk profile and expected response please see pp. 12-14 of the Hale & Twomey Report.

[23] There are two other terminals in Wellington: Kaiwharawhara for marine fuels (no truck loading); and Miramar for jet fuel. Disruptions to these terminals are not considered here but are assumed to be relatively minor compared to a Seaview outage.

Constraints to effective industry response

104. Similar constraints to those identified in the 'long-term disruption to RAP/Wiri' scenario (where the Wiri terminal is disrupted) apply to this scenario.

> Q26. Are there other factors that can be addressed to enable industry to better respond to a long term disruption to Seaview?

Long-term disruption to Lyttelton[24]

Outage scenario and expected response under status quo

105. This scenario is an incident that takes out all Lyttelton terminals or the port, so that no product can be received at the port. It is assumed that all stock in the terminals is lost. Similarly to a Wiri outage or a Seaview outage, this incident requires that Lyttelton supply is replaced by supply via truck from Timaru, Nelson, and Dunedin.

106. The following assumptions are made about the response to the incident:

- trucking assets that usually service Lyttelton will be deployed to move petrol/diesel into Lyttelton's service area from Timaru, Nelson, and Dunedin
- product import ships that normally offload at Lyttelton would need to offload at Timaru and Dunedin to keep these terminals supplied
- there are 10 spare trucks in the country that can be deployed to assist in transporting petrol/diesel
- government allows trucks to overload to capacity (as allowed by relevant regulations)
- some demand can be shifted from the region (e.g. freight truck demand), fuel distribution fleets (e.g. rural distribution trucks) are utilised, and loading efficiencies are made
- offshore trucks start arriving after one month and build up to a point where supply into the region is fully re-established after two months.

107. It is estimated that 15 percent of the petrol and diesel demand of the South Island north of Timaru cannot be met over the two months it takes to re-establish supply, although the shortfall over the first two weeks is 28 percent. Demand-side measures may need to be implemented to address this shortfall.

108. Jet supply to Christchurch Airport would be severely disrupted. The majority of fuel supply for domestic flights from Christchurch would need to shift to other domestic airports. International flights would be required to bunker in fuel or stop at Auckland.

> Q27. Is the description of the long term disruption at Lyttelton accurate? If not, what should be expected?

[24] For a full description of the outage scenario, risk profile and expected response please see pp. 14-16 of the Hale & Twomey Report.

Probability

109. The Hale & Twomey report estimates a probability range of 0.2-0.3 percent per year (one in 333 years to one in 500 years) for a long-term Lyttelton disruption event. It is noteworthy that the recent earthquakes in Christchurch, including the 22 February 2011 earthquake which was centred in Lyttelton, resulted in outages at the Lyttelton Terminal for periods of days, rather than weeks, as assumed in this scenario.

> Q28. Is 0.2-0.3 percent per year a reasonable probability range for a long term Lyttelton disruption event?

Constraints to effective industry response

110. Similar constraints to those identified in the 'major refinery outage' scenario (where the Wiri terminal is taken out) apply to this scenario.

> Q29. Are there other factors that can be addressed to enable industry to better respond to a long term disruption to Lyttelton?

Disruption to multiple terminals[25]

111. This scenario is an incident that takes out more than one terminal in New Zealand, namely a large tsunami. The Hale & Twomey report notes that the probability of a tsunami that results in disruptions that are more severe than those outlined above is extremely small (less than one in 2,500 years). Such an event is therefore not considered any further.

> Q30. Do you agree that the probability of a tsunami that results in disruptions that are more severe than those outlined above is extremely small?

Options for reducing constraints to emergency response

112. This section identifies and evaluates options that address constraints to the reestablishment of supply following a disruption.

Trucking capacity

113. Most of the above scenarios modelled result in distribution issues that can be remedied by extra trucking capacity. A number of options for increasing trucking capacity in an emergency are outlined below.

Relaxing weight restrictions on trucks

114. Fuel trucks in New Zealand generally have spare capacity which cannot normally be used because of road weight restrictions. Temporarily allowing trucks to overload will help to make up capacity shortfalls during a disruption.

[25] For a full description of the outage scenario, risk profile and expected response please see pp. 16-17 of the Hale & Twomey Report.

115. New Zealand Transport Agency (**NZTA**) advises that High Productivity Motor Vehicle (**HPMV**) permits already allow for overloading of trucks. NZTA needs to undertake route assessments before issuing HPMV permits which can take a number of months. Using existing procedures to pre-arrange contingency routes for vehicles above existing weight limits could assist in expediting increased trucking capacity in a fuel supply disruption.

116. MBIE intends to progress discussions with NZTA, fuel companies, and local authorities to better understand the requirements for route assessments and HPMV permits. This work will:

- align with existing procedures in place to look at providing specific routes for higher loaded vehicles in accordance with government economic policy
- look at specific contingency routes on an established priority basis.

Accessing unconventional trucks within New Zealand:

117. Stakeholders have identified various trucks that could be utilised to transport fuel in an emergency. It is expected that industry would access such trucks as required. Examples of these include:

- 'upstream' trucks that transport crude oil in the Taranaki region;
- rural distribution trucks (trucks that deliver fuel to farmers and large rural users) that are unlikely to be used at night; and
- spare milk trucks that could possibly be used to transport diesel.

> Q31. How viable is it to use the abovementioned trucks, are there any other trucks in New Zealand that have not been considered above, and are there any regulatory barriers to unconventional trucks being utilised in an emergency?

Allowing collaboration between companies in an emergency

118. Distribution efficiency gains could be made in an emergency if oil companies coordinate fuel deliveries and trucking resources (e.g. have one company deliver fuel to another company's service stations). Concerns have been raised by stakeholders that such activity could be anticompetitive under the Commerce Act, even in an emergency.

119. The Commerce (Cartels and Other Matters) Amendment Bill, which is presently before the House, contains a number of exemptions that would enable oil companies to plan and coordinate fuel deliveries and trucking resources between themselves in an emergency. These include exemptions for collaborative activity and vertical supply arrangements.

> Q32. Assuming the Commerce (Cartels and Other Matters) Amendment Bill is enacted, would oil companies be able to plan and coordinate fuel deliveries and trucking resources between themselves in an emergency?

Accessing offshore trucks

120. Temporarily importing trucks from Australia could make up trucking capacity shortfalls during a disruption. Australia is the most likely source for additional trucking capacity due to its proximity and similar standards.

121. Hale & Twomey estimate that, following an emergency disruption, trucks would start arriving in one month and build up to required capacity in two months. This estimate is based on the following assumptions:

    a. Time taken to free up Australian trucks: some freed up quickly, some take up to a month.

    b. Time taken to secure space on ship for trucks: approximately one to two weeks.

    c. Time taken to clear biosecurity and New Zealand truck standards inspections: approximately one week.

    d. Shipping time: approximately five days.

> Q34. Are the assumptions about the length of time to import trucks from Australia reasonable? How could the importation of offshore trucks be expedited in an emergency?

Drivers

122. Sufficient numbers of drivers must be available to drive fuel trucks in an emergency.

123. Petrol tank drivers are required to have a dangerous goods endorsement on their licences, while diesel tank drivers are not. Furthermore, persons loading/unloading both petrol and diesel are required to have approved handler certification and must be properly trained.[26]

124. Beyond the existing pool of fuel truck drivers, the following 'ready-to-go' sources of fuel truck drivers have been identified by stakeholders:

- 'upstream' drivers that transport crude oil in the Taranaki region
- defence force fuel tank drivers
- driver trainers
- recently retired fuel tank drivers that still have necessary licence endorsements and approved handler certification.

> Q35. Are there any other sources of drivers that could drive fuel trucks in an emergency?

Dangerous goods endorsements and approved handler certification for other emergency drivers

125. Beyond the existing pool of fuel truck drivers, stakeholders have identified the following potential sources of drivers:

- Australian fuel truck drivers (petrol and diesel)
- domestic milk truck drivers (possibly only diesel).

[26] People loading/unloading petrol and diesel are required to be approved handlers, or supervised by approved handlers, under the Hazardous Substances and New Organisms Act 1996, and must be properly trained, or supervised by someone that is properly trained, under the Health and Safety in Employment Act 1992.

126. NZTA has indicated that Australian truck licences and dangerous goods endorsements are valid in New Zealand, so that Australian drivers could drive petrol trucks. Both Australian drivers and domestic milk truck drivers could drive diesel trucks (with or without a dangerous goods endorsement).

127. The EPA has indicated that both Australian drivers and milk truck drivers would be required to obtain approved handler certification before loading/unloading petrol and diesel. The EPA has indicated that training for this can take up to six weeks. However, if Australian drivers are already competent in handling dangerous goods, in-principle, testing and certification should be able to be undertaken quickly in an emergency.

> Q36. Are there any issues that would hinder Australian drivers and New Zealand milk truck drivers driving fuel trucks in an emergency? What measures could be taken to ensure that Australian drivers could obtain approved handler certification sooner? How long would it take to certify Australian drivers if such measures were taken?

128. Managing the existing pool of approved handlers could mean that truck drivers do not necessarily need to have approved handling certification, for example:

    a. If the filler at the terminal is an approved handler, and there is an approved handler at a service station/drop-off point, drivers would not need approved handler certification.

    b. Convoying trucks with only one approved handler would mean that all other drivers would not need approved handler certification.

> Q37. Should drivers without approved handler certification still be utilised in an emergency if they are not required to physically load/unload fuel?

Relaxing driving time restrictions

129. Relaxing driving time restriction could increase driver capacity. The effect would be particularly pronounced if increasing the allowed driving time by a small increment meant that a driver is able to undertake a round-trip, rather than a one-way trip. MBIE understands that such allowances can already be made if, for example, drivers are required to take more rest stops.

> Q38. Should driver time restrictions be relaxed in an emergency?

Bottlenecks at terminal loading gantries

130. Increased trucking of fuels during an emergency may cause bottleneck at terminal loading gantries. Stakeholders have noted that it is likely that oil companies would manage such bottlenecks between themselves to maximise the efficiency of the trucking fleet by, for example, staggering driver shifts, allocating filling times to particular companies, and coordinating the allocation of fuel types to terminals to maximise off-take speed.

> Q39. What other measures could be taken to reduce bottlenecks at loading gantries at terminals?

Coastal shipping

131. A number of emergency scenarios require increased coastal shipping capacity. The two existing coastal ships may not have sufficient capacity to cope with these scenarios.

132. Coastal shipping capacity could be increased by using product import ships to ship product to terminals.

133. MBIE understands that a foreign ship can already carry cargo from one New Zealand port to another if the trip is an incidental part of the ship's international voyage.[27] If this incidental requirement is not satisfied, the Minister of Transport has the power to authorise any other foreign ship to carry cargo.

> Q40. What other measures can be taken to increase coastal shipping capacity in an emergency?

Encouraging consumers to defer demand

134. During outages that last a matter of days (e.g. the short-term RAP/Wiri outage), supply shortfalls could be minimised if consumers could be encouraged to defer demand until the outage is resolved (e.g. by running tanks down). Conversely, the supply shortfall will be exacerbated if panic-buying occurs.

135. The government already has a well-developed voluntary fuel savings campaign and mandatory demand restraint measures available under the OERS to encourage/mandate consumers to defer demand until supply is re-established. Particularly for cases where the length of the outage is well known, encouraging consumers to defer demand using a media campaign could be effective.

> Q41. Do you agree that a government campaign to encourage voluntary demand restraint in a short term disruption will be effective at minimising a short term supply shortfall?

Consents

136. Under a number of the scenarios, the speed with which infrastructure can be repaired will affect the magnitude of the fuel supply shortfall. Consent processes for emergency repairs of oil infrastructure are outlined below.

Building consents

137. Oil infrastructure that is part of a Network Utility Operator system, as defined by section 9 of the Building Act 2004, does not require a building consent.

Pipeline consents

138. Owners/operators of pipelines that transmit fuel are required to have a current Certificate of Fitness for that pipeline under the Health and Safety in Employment (Pipelines) Regulations 1999. If the pipeline is damaged, the Certificate of Fitness is invalidated. Once repairs are made the Certificate of Fitness can be reissued.

[27] Under section 198 of the Maritime Transport Act 1994.

Resource consents

139. Remedial work on infrastructure may require consent under the Resource Management Act 1991. However, emergency works can be carried out without prior resource consent by Network Utility Operators that have been approved as a 'requiring authority' by the Minister for the Environment.[28] Such works can be carried out if there would otherwise be an adverse effect on the environment, loss of life, injury, or serious damage to property.

140. While Network Utility Operators do not have a right of entry to private property to carry out emergency works, the operator may have an existing easement or a pre-negotiated agreement allowing for emergency access. Where entry was not otherwise legally available, a local or consent authority may rely on section 330(2) of the Act to enter private property.

> Q42. Do you envisage that any consenting process would result in delays to emergency repairs of fuel infrastructure? If so, what are they?

Contingency measures publication

141. Based on the analysis of domestic disruption scenarios, and submissions on this discussion document, MBIE believes it beneficial to develop a ready-reference handbook that outlines various domestic supply disruption scenarios and the supply-side response measures to these scenarios. Such a handbook would clarify roles and responsibilities in a supply disruption, and would aim to ensure that the most effective response can be implemented in a timely way. It is envisaged that this publication would inform NESO[29] in an emergency.

> Q43. Do you think that a handbook with representative domestic supply disruption scenarios, and supply-side response measures would help to expedite an emergency response?

Options analysis for more costly measures to improve oil security

142. As well as ensuring that industry can respond to domestic disruptions quickly to reduce supply shortfalls, the NZIER Report also analysed a number of more costly options to increase the resilience of the network. Some of these options are for consideration by industry, and some for government.

143. NZIER uses a consumer welfare cost-benefit metric to determine whether an option optimises oil security: oil security is optimised when the overall consumer welfare cost of both disruptions and measures to mitigate those disruptions is minimised over time.[30]

144. Assessments of investments that could be made by industry to increase the resilience of the network follow.

[28] Under section 167 of that Act.

[29] See footnote 13 for a description of NESO.

[30] For a particular disruption scenario the cost to the economy is estimated. This is then multiplied by the probability of that scenario occurring to give the 'expected value' of the cost of that disruption. The cost of measures to mitigate the disruption is then estimated. Oil security is optimised when the sum of the expected value of the cost of the disruption and the cost of mitigation is minimised.

RAP – WAP bypass[31]

145. As discussed above, an outage at Wiri Terminal would result in a large supply shortfall of jet to Auckland Airport. Trucking jet fuel from Marsden Point to Auckland Airport is not a feasible option. This is due to the numbers of jet fuel specific trucks that would be required, the difficulty in off-taking jet fuel at the refinery, and the stringent checks that are required for jet fuel each time it is transferred.

146. An alternative supply route for jet fuel to Auckland Airport during a Wiri outage is a connection between the RAP and the WAP that enables Wiri to be bypassed. It is estimated that such a bypass would cost NZD5m- NZD15m and would take three to six months to build.

147. NZIER found that, depending on how long it takes to build the bypass and re-establish supply, building the bypass pre-emptively may not maximise welfare.[32] However, NZIER acknowledges that there is considerable uncertainty around the assumption and figures used to calculate the cost of disruption to airlines and the cost of building the bypass. Although building the bypass pre-emptively may not maximise welfare under the assumptions that NZIER has made, because the costs of building the bypass are relatively low, pre-emptively building could be viewed as an insurance premium against the risk of disruption.

> Q44. Do you agree that building the RAP-WAP bypass is a reasonable 'insurance premium' to pay to avoid disruption of jet supply to Auckland Airport? Which party is best placed to cover these costs?

148. If the bypass is not pre-emptively built, NZIER has estimated the costs that could be justified for preplanning in order to expedite the building of the bypass following a disruption, e.g. it estimates that it would be worthwhile spending NZD0.5m on an annualised basis to reduce the build time from six to two months. NZIER has recommended that details about what work can pre-emptively be done to expedite the building of the bypass be ascertained.

> Q45. What work could be pre-emptively undertaken to expedite the building of a RAP-WAP bypass following a disruption, how much time would this work expedite the build by, and what would this work cost? Which party is best placed to cover these costs?

Increased trucking capacity[33]

149. Disruption scenarios that involve long-term disruptions to fuel terminals all require fuel to be trucked from neighbouring terminals. While a large proportion of the requisite trucking capacity can be obtained by using the existing domestic trucking fleet and by relaxing truck weight restrictions, the scenario analysis finds that, to re-establish normal levels of supply, some extra trucking capacity is required (most likely from Australia).

150. Importing trucks from Australia will result in a lag before supply can be fully re-established. (estimated to be two months). This lag results in a supply shortfall which entails an economic cost.

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[31] pp.40-42 of the NZIER Report.

[32] This assessment includes estimates of the costs by assumption to New Zealand airlines from bunkering fuel and rationalising flights.

[33] pp.36-40 of the NZIER Report.

151. As an alternative, NZIER analysed whether it would be economic to have a spare fleet of 12 fuel trucks on standby in New Zealand to avoid the time lag and the associated economic cost of relying on imported trucks. Given the low-probability of long-term terminal outages occurring, NZIER found that it was not economic to have a stand-by fleet.

152. Rather than investing in a standby fleet, NZIER recommends that it is best to investigate options for expediting the importation process from Australia. NZIER estimates that it is worth spending NZD0.2 million per year on preparatory measures for expediting the import of trucks that would speed up the re-establishment of full supply from two months to one month.

> Q46. What preparatory measures could industry take to expedite the importation of trucks from Australia in the event of a long term terminal outage? What measures can government take to ensure that the importation process is sped up?

Government investment in public stockholding[34]

153. The NZIER Report also analyses whether government investment in public stockholding is justified. Contrary to the 2005 review of New Zealand's oil security[35], NZIER found that building new stockholding in New Zealand is not economic.[36] This is because the significant cost of building stockholding (of the order of hundreds of millions of dollars) far outweighs its benefit, when that benefit is weighted by the small probabilities of disruption events occurring.

154. The main reason that the recommendation has changed since 2005 is that the cost of storage has increased significantly, due both to the increase in the oil price but also due to increasing costs of building the infrastructure itself. In addition, NZIER concluded that the costs of disruption (and hence the benefits of holding stocks to mitigate the disruption) are lower than estimated in 2005, mainly because recent international studies have concluded that the probability of major international disruptions is lower than earlier estimates. Revisions to externalities avoided were also made.

> Q47. Do you agree that the construction of domestic stockholding is not an economic solution to improving domestic oil security? If you disagree, please state why?

Other options

155. A number of other more costly measures to improve network resilience have been raised by industry. While NZIER's analysis concludes that significant investment by government in the network is not justified, MBIE is interested in learning about any other cost effective options for improving resilience.

> Q48. What cost effective options are there for improving the resilience of the network? Please provide an explanation of the network vulnerabilities that the option would address, and an estimate of costs.

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[34] pp.35-36 of the NZIER Report.

[35] *Oil Security Review*, 2005, Covec and Hale & Twomey.

[36] The added benefit of meeting part of New Zealand's IEA obligations through domestic stockholding has been factored into the analysis.

Conclusion

156. While the government and industry have a number of 'last resort' measures available to constrain demand in a domestic oil supply emergency, it is important that:

    - full supply can be re-established as quickly as possible in the event of a disruption
    - the ex-ante resilience of the fuel network is socially optimal.

157. NZIER and Hale & Twomey have analysed a number of domestic supply disruption scenarios and, using certain assumptions about how industry would respond to those disruptions, estimated supply shortfalls and the economic costs of those shortfalls. The probability-weighted economic impacts of these events are relatively small indicating that the fuel network in New Zealand is reasonably robust.

158. While the probability-weighted economic costs of disruptions clearly do not justify investment by government in public stockholding, there may be a case for industry investing in a RAP-WAP bypass. Investment in the bypass could be considered an 'insurance premium' against the cost of jet fuel disruption to Auckland Airport. Alternatively NZIER has estimated that it may be worthwhile spending up to NZD0.5m on an annualised basis to reduce the build time for the bypass from six to two months. MBIE is interested in feedback on the bypass proposals, on what work could be pre-emptively undertaken to expedite the building of the bypass, and who is best placed to cover associated costs.

159. It was found that the most effective way to ensure domestic security is to ensure that industry is able to re-establish supply as quickly as possible following a disruption. This generally means ensuring that sufficient trucking and shipping capacity is deployed quickly to move fuel from neighbouring areas in to the region with the disruption. NZIER found that investing in a fleet of standby fuel trucks is not economic, and it is better to ensure that Australian trucks can be imported as quickly as possible in an emergency. A number of measures have been proposed to increase the speed with which supply can be re-established in an emergency via trucking and shipping, and MBIE is interested in feedback on these.

Making a submission

Submissions and next steps

You are invited to make a written submission on the issues raised in this discussion paper. All submissions will be taken into account.

The closing date for submissions is **5.00pm, Tuesday 27 November 2012**.

Specific questions are listed throughout the discussion paper, and the full set of questions is listed below. We welcome comment on some or all of the questions raised, as well as broader comment on the issues.

Submissions will be considered by MBIE officials who will then provide advice to Ministers on next steps. If approved by Cabinet, it is possible that international and domestic proposals contained in this paper could be progressed in isolation. Specific next steps are ultimately determined by the outcome of this consultation.

Submissions should be sent to:

Email: OilSecurity@med.govt.nz (preferred option)

Post: Energy Markets Group
Ministry of Business, Innovation and Employment
PO Box 1473
Wellington 6140
New Zealand

Delivery address: 33 Bowen Street, Wellington 6011

Fax: +64 4 473 7010

If you post or fax your submission, please also send it electronically if possible (as a PDF or Microsoft Word document).

Publication of submissions

Written submissions may be published at www.med.govt.nz. We will consider you to have consented to publication by making a submission, unless you clearly specify otherwise in your submission. If sensitive material in your submission cannot be published, please provide two versions of your submission – a full version and a publishable version.

In any case, all information provided to the Ministry is subject to public release under the Official Information Act 1982. Please advise if you have any objection to the release of any information contained in a submission, and in particular, which part(s) you consider should be withheld, together with the reason(s) for withholding the information. We will take into account all such objections when responding to requests for copies and information on submissions to this document under the Official Information Act 1982.

The Privacy Act 1993 establishes certain principles with respect to the collection, use, and disclosure of information about individuals by various agencies including the Ministry. It governs access by individuals to information about themselves held by agencies. Any personal information you supply in the course of making a submission will be used by the Ministry only in conjunction with the matters covered by this document. Please clearly indicate in your submission if you do not wish your name to be included in any summary of submissions that the Ministry may publish.

Questions

Q1. Are you aware of any future investments or shutdowns, or any other factors that are likely to significantly alter the level of commercial inventories held in New Zealand?

Q2. Do you agree that the international oil security problem definition is appropriate?

Q3. Do you agree with the selection criteria used for the international oil security analysis?

Q4. Do you agree that New Zealand should maintain its membership of the IEA and continue to meet its IEA obligations?

Q5. Do you agree that New Zealand should continue to meet its IEA stockholding obligations through ticket contracts rather than purchasing domestic stockholding?

Q6. Do you agree that the government should continue to procure ticket contracts rather than placing a mandate on industry?

Q7. Do you agree that it is more equitable to recover ticket contract costs via a levy on fuel than from general taxation? Are there any other matters that the government should consider?

Q8. Do you agree that the PEFML is the most appropriate levy by which to recover ticket contract costs and that it should only cover petrol, diesel, ethanol, and biodiesel?

Q9. Do you agree that it is best to smooth the levy rate over three years? How much lead time is required for companies to prepare for a change in the rate?

Q10. Do you agree that the rationale for government investigation into domestic oil supply security is to ensure that domestic oil infrastructure resilience is socially optimal, and to ensure that industry can re-establish supply as quickly as possible following a disruption?

Q11. Are there any other measures available to industry or government to increase supply following an emergency disruption?

Q12. Is the description of the major refinery outage accurate? If not, what should be expected?

Q13. Is 0.20-0.25 percent per year a reasonable probability range for a major outage at the refinery?

Q14. Are there other factors that can be addressed to enable industry to better respond to a major refinery outage?

Q15. Is the description of the minor refinery outage accurate? If not, what should be expected?

Q16. Is 0.5-1.0 percent per year a reasonable probability range for a minor refinery outage?

Q17. Are there other factors that can be addressed to enable industry to better respond to a minor refinery outage?

Q18. Is the description of the long-term disruption to RAP/Wiri accurate? If not, what should be expected?

Q19. Is 0.2-0.3 percent per year a reasonable probability range for a long-term RAP/Wiri disruption event?

Q20. Are there other factors that can be addressed to increase the speed with which industry can respond to a long-term disruption to RAP/Wiri?

Q21. Is the description of the short-term disruption to RAP/Wiri accurate? If not, what should be expected?

Q22. Is 0.5-1.0 percent per year a reasonable probability range for a short-term RAP/Wiri disruption event?

Q23. Are there other factors that can be addressed to enable industry to better respond to a short-term outage to RAP/Wiri?

Q24. Is the description of the long-term disruption at Seaview accurate? If not, what should be expected?

Q25. Is 0.15-0.25 percent per year a reasonable probability range for a long-term Seaview disruption event?

Q26. Are there other factors that can be addressed to enable industry to better respond to a long-term disruption to Seaview?

Q27. Is the description of the long-term disruption at Lyttelton accurate? If not, what should be expected?

Q28. Is 0.2-0.3 percent per year a reasonable probability range for a long-term Lyttelton disruption event?

Q29. Are there other factors that can be addressed to enable industry to better respond to a long-term disruption to Lyttelton?

Q30. Do you agree that the probability of a tsunami that results in disruptions that are more severe than those outlined above is extremely small?

Q31. How viable is it to use the abovementioned trucks, are there any other trucks in New Zealand that have not been considered above, and are there any regulatory barriers to unconventional trucks being utilised in an emergency?

Q32. Assuming the Commerce (Cartels and Other Matters) Amendment Bill is enacted, would oil companies be able to plan and coordinate fuel deliveries and trucking resources between themselves in an emergency?

Q34. Are the assumptions about the length of time to import trucks from Australia reasonable? How could the importation of offshore trucks be expedited in an emergency?

Q35. Are there any other sources of drivers that could drive fuel trucks in an emergency?

Q36. Are there any issues that would hinder Australian drivers and New Zealand milk truck drivers driving fuel trucks in an emergency? What measures could be taken to ensure that Australian drivers could obtain approved handler certification sooner? How long would it take to certify Australian drivers if such measures were taken?

Q37. Should drivers without approved handler certification still be utilised in an emergency if they are not required to physically load/unload fuel?

Q38. Should driver time restrictions be relaxed in an emergency?

Q39. What other measures could be taken to reduce bottlenecks at loading gantries at terminals?

Q40. What other measures can be taken to increase coastal shipping capacity in an emergency?

Q41. Do you agree that a government campaign to encourage voluntary demand restraint in a short-term disruption will be effective at minimising a short-term supply shortfall?

Q42. Do you envisage that any consenting process would result in delays to emergency repairs of fuel infrastructure? If so, what are they?

Q43. Do you think that a handbook with representative domestic supply disruption scenarios, and supply-side response measures would help to expedite an emergency response?

Q44. Do you agree that building the RAP-WAP bypass is a reasonable 'insurance premium' to pay to avoid disruption of jet supply to Auckland Airport? Which party is best placed to cover these costs?

Q45. What work could be pre-emptively undertaken to expedite the building of a RAP-WAP bypass following a disruption, how much time would this work expedite the build by, and what would this work cost? Which party is best placed to cover these costs?

Q46. What preparatory measures could industry take to expedite the importation of trucks from Australia in the event of a long-term terminal outage? What measures can government take to ensure that the importation process is sped up?

Q47. Do you agree that the construction of domestic stockholding is not an economic solution to improving domestic oil security? If you disagree, please state why?

Q48. What cost effective options are there for improving the resilience of the network? Please provide an explanation of the network vulnerabilities that the option would address, and an estimate of costs.

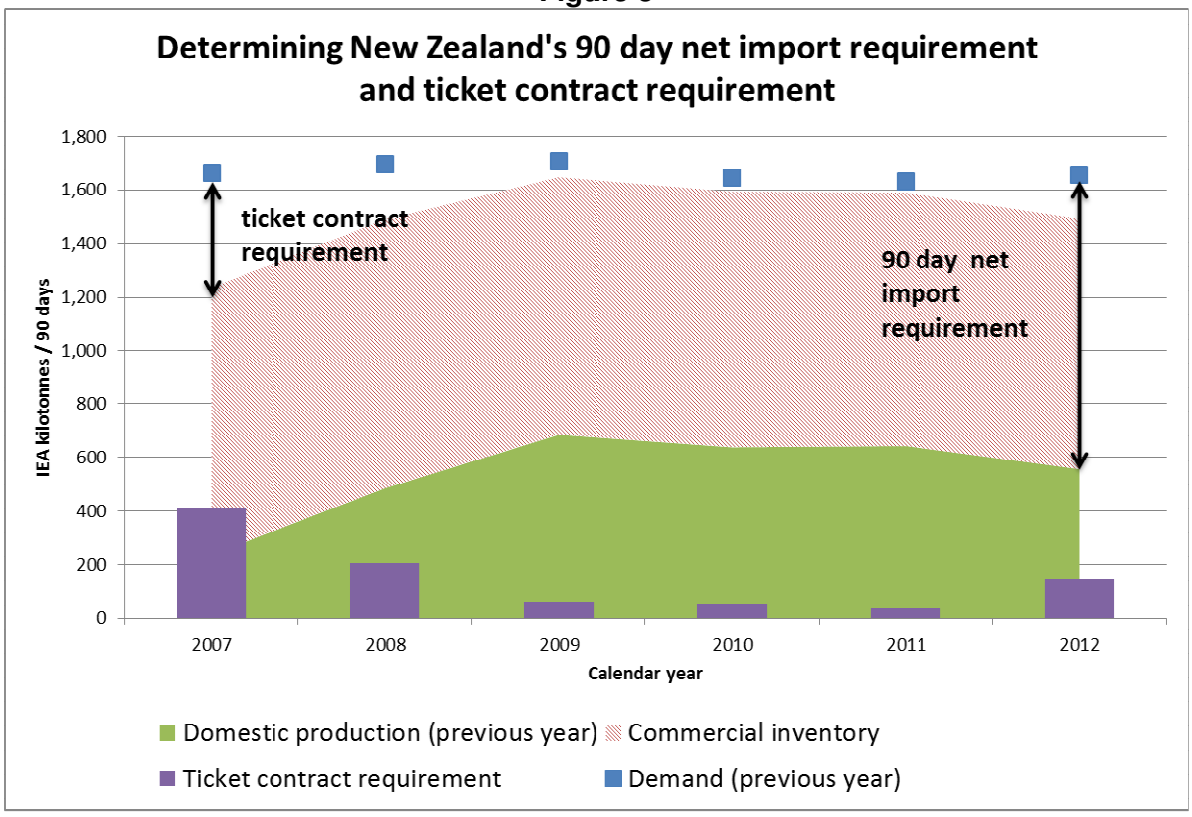
Appendix 1 – Forecast of ticket contract requirement and costs

History and forecast of New Zealand's IEA ticket contract requirement

New Zealand's ticket contract requirement fluctuates significantly due to fluctuations in domestic production

1. New Zealand's relatively small demand means that new domestic production coming online can significantly change its net imports and hence its 90 day requirement. Figure 3 illustrates this (all graphs are normalised to 90 days): The bottom area plot (green) shows New Zealand's production profile from 2007 to 2012. The square markers along the top show New Zealand's demand profile. The gap between the production profile and the demand profile is New Zealand's IEA net import requirement.[37] The second area plot (red) is the commercial inventory held in New Zealand. It can be seen that this makes up the majority of New Zealand's 90 day obligation requirement. The gap between the commercial inventory and the demand profile represents the volume that New Zealand makes up via ticket contracts. This ticket contract volume is plotted in the bar graph along the bottom.

Figure 3



How forecasts for demand, commercial inventory, and domestic production are made

2. A forecast of the ticket contract requirement is necessary to estimate the future cost of the ticketing regime. To forecast New Zealand's ticket contracting requirement it is necessary to forecast:

   - demand for oil products

[37] Stock changes within the country will have a relatively small effect on New Zealand's net imports.

- commercial inventory
- domestic production.

3. For this analysis the oil product **demand forecast** developed by MBIE as contained in its *Energy* Outlook *2011* is used.

4. Levels of **commercial inventory** have been relatively stable over recent years as the period of infrastructure rationalisation following fuel market deregulation has tailed off. Because compliance with the 90 day obligation is checked by the IEA every month, the commercial inventory forecast of a given year must be for the lowest month of that year. This ensures that sufficient ticket contracts are purchased that New Zealand is compliant with its obligations for every month of that year. The forecast is based on historical minimum commercial inventories.

5. **Production forecasts** could be made up of two components:
   - a forecast based on estimated production profiles of known fields that are supplied to MBIE by companies operating in New Zealand
   - a theoretical forecast of production profiles of yet undiscovered reservoirs.

6. Theoretical forecasts of new petroleum discoveries are highly uncertain. While the government expects that the recent increase in exploration will result in new discoveries, given that lead times for development are usually at least three to four years, and given that production usually takes a number of years to ramp up, it is not necessary to take production from new discoveries into account for forecasts out to about five years.

7. For this analysis a forecast of ticket contract requirements is made only out to five years, and hence only production profile estimates provided by oil companies are used. Beyond 2017, an estimate of ticket contract costs at the extremes (when New Zealand becomes a net exporter, and when New Zealand domestic production is zero) is provided.

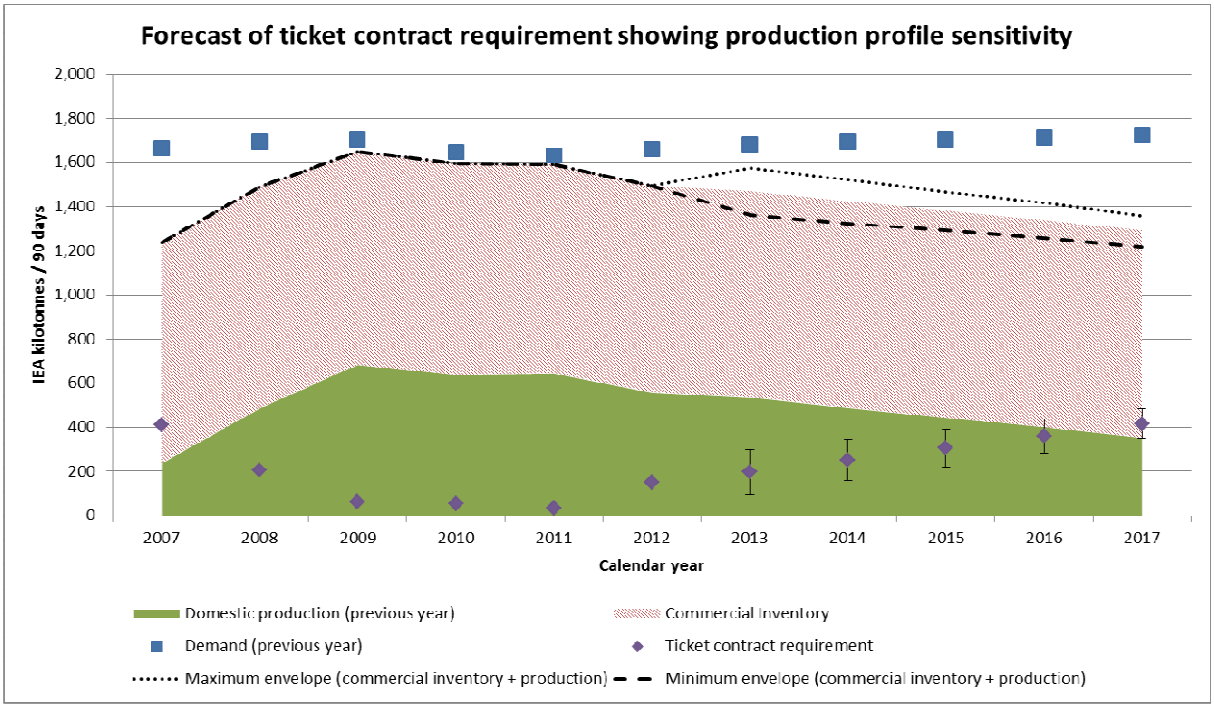
The forecast reduction in production in the short-term results in a large increase in ticket contract requirements but also has the largest uncertainty

8. With no large new oil discoveries in recent years production from known fields is forecast to continue to decline over the next five years putting upward pressure on New Zealand's net import obligation and hence its ticket contract requirement.

9. In the short-term it is likely that work will be done on existing fields that will lead to incremental increases in known reserves, thus resulting in upside uncertainty in the forecast. Further, even without these incremental increases, actual production profiles will vary from the estimates provided by companies. This uncertainty is estimated to be +/-20 percent from the forecast based on historical reassessments of reservoirs that have been made by companies.

10. Figure 4 shows forecasts out to 2017 for demand, commercial inventory and production, and shows how the forecast decrease in production leads to a large increase in New Zealand's ticket contract requirement. Also shown is a sensitivity analysis of the production profile using an envelope of +/-20 percent. The 20 percent uncertainty in the production profile results in a +/-28 percent change in the total ticket contract volume over 2013-2017.

Figure 4

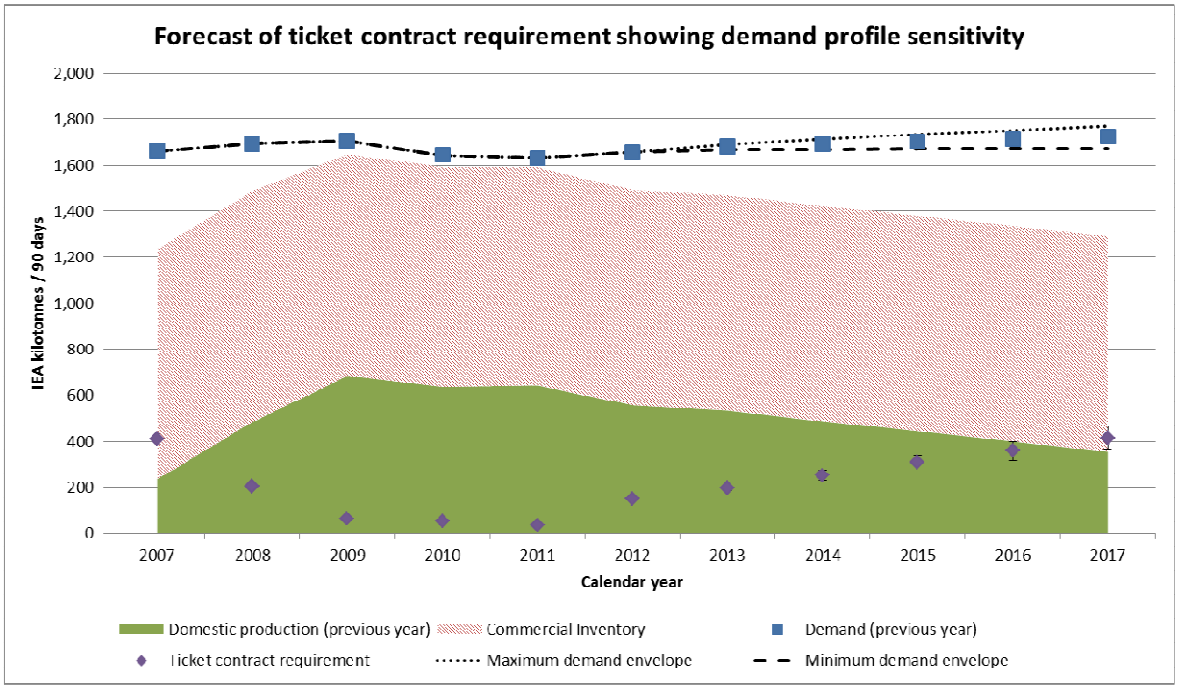


Demand is forecast to rise gradually and is sensitive to GDP

11. The MBIE *Energy Outlook 2011* forecasts a gradual rise in oil product demand. It also provides high and low GDP growth forecasts that are used here to test the sensitivity of the ticket contract requirement on the demand profile.

12. Figure 5 shows how the gradual rise in demand contributes to the increase in the ticket contract requirement. Also shown is the sensitivity analysis of the demand profile using the high/low GDP growth scenarios as a sensitivity envelope. The demand uncertainty results in a +10 percent/-11 percent change in the total ticket contract volume over 2013-2017.

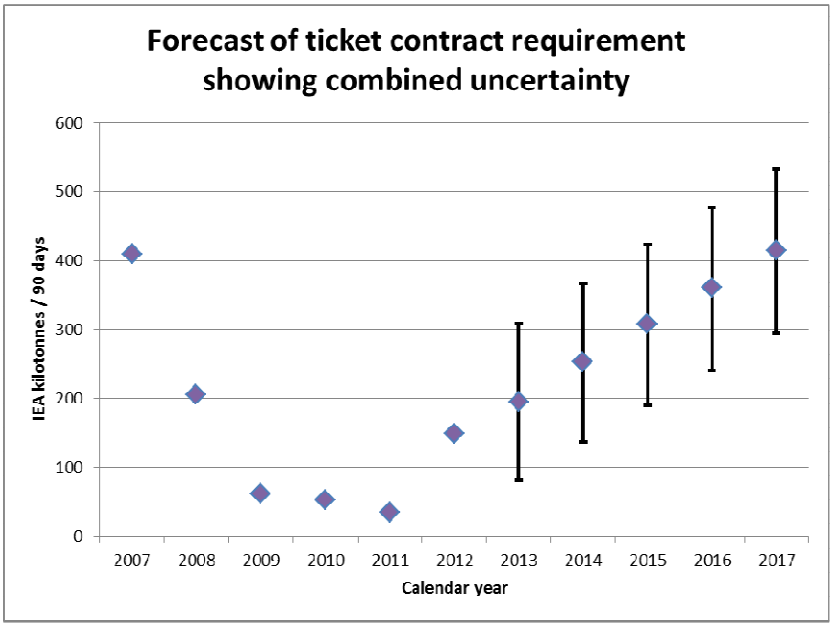
Figure 5



The combined uncertainty from the production and demand profiles is estimated to be 38 percent

13. Figure 6 shows the combined uncertainty in the ticket contract requirement from the uncertainties in the production and demand profiles. The combined uncertainty results in a +/- 38 percent change in the total ticket contract volume over 2013-2017.

Figure 6



History and forecast of cost of ticket contracts

Ticket contract prices year-to-year depend on the state of the oil market when New Zealand goes to tender, on the volume that New Zealand tenders for, and on the exchange rate

14. The **oil market structure** is a significant determinant of the price of the ticket contracts that are offered when New Zealand goes to tender each year. For most of the past few years futures prices of oil have been higher than current prices. This gives companies an incentive to hold stock as they can lock in the market benefit. When current prices are higher than futures prices (called backwardation) ticket prices become higher.[38]

15. If the volume of ticket contracts that New Zealand tenders for is high then the average price of ticket contracts also generally becomes higher.

16. Lastly, the NZD/USD **exchange rate** is a determining factor for the cost of ticket contracts since tickets are offered in USD.

17. The average price of ticket contracts entered into by New Zealand between 2007 and 2012 has ranged from around USD0.79/tonne/month to USD1.86/tonne/month.

Forecasts of ticket contract costs depend of forecasts of ticket prices, exchange rate, and ticket requirements

18. The annual cost of ticket contracts is:

cost = average ticket price x exchange rate x requirement

[38] This was the situation during tender for 2012 ticket contracts.

19. This analysis uses the 2007-2008 average ticket price of about USD1.50/tonne/month as a **reference scenario forecast for the ticket price**. This is a reasonable assumption given that the forecast volume requirements for the next five years are comparable to requirements during 2007-2008.[39]

20. For the **reference scenario forecast for the NZD/USD exchange rate** the forecast of the New Zealand Institute of Economic Research is used.

21. The **ticket requirement forecast** developed above and shown in Figure 6 is used as the reference scenario for the ticket requirement.

22. These reference scenarios result in the reference ticket cost forecast in Table 3.

Table 3: Ticket contract cost forecast

Fiscal year	*2013/14*	*2014/15*	*2015/16*	*2016/17*
Cost (NZD million)	5.2	6.7	8.7	10.6

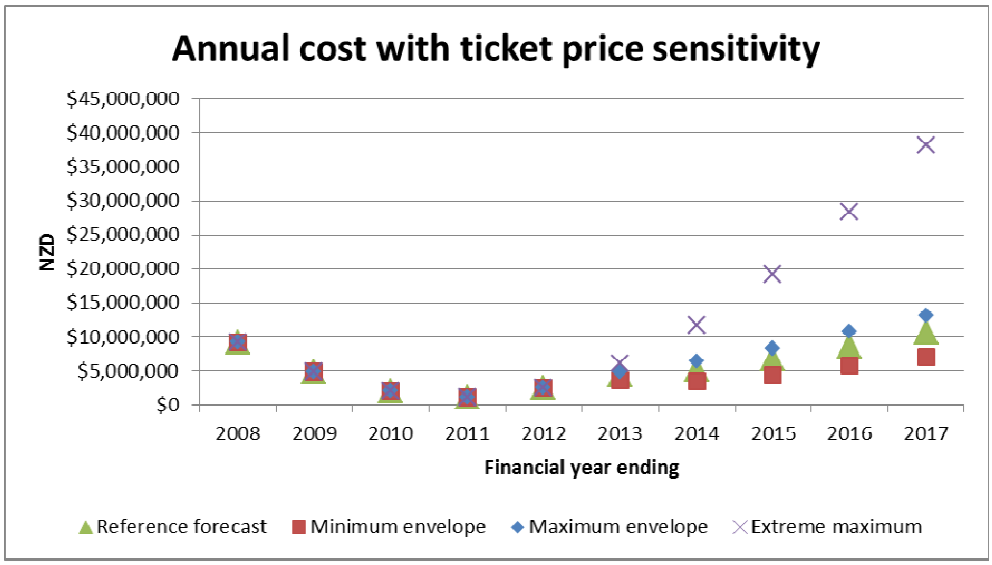
Ticket costs are sensitive to ticket prices, exchange rate, and ticket volume requirements

23. To test the **sensitivity of the ticket costs to ticket prices** a low price scenario of USD1/tonne/month and a high price scenario of USD1.86/tonne/month are used. To test an extreme scenario the 2012 ticket prices (which were unusually high due to the backwardation of the oil market at the time of tender) are used, but rather than using the average price paid in 2012, all prices offered are taken account of by incrementally accepting the more uncompetitive offers as the volume requirement increases over the next five years.

24. Figure 7 shows an increasing annual cost for ticket contracts which results from the increasing ticket contract requirement through to 2017. Also shown are the low and high price scenarios discussed above which change the average cost of ticket contacts over 2013-2017 by +22 percent and -31 percent respectively.

25. The extreme price scenario results in a rapid escalation of costs over the forecast period since New Zealand would have purchase relatively expensive tickets.

Figure 7



[39] MBIE notes that historical prices do not necessarily provide an accurate estimate of future prices.

26. MBIE does not consider that the extreme scenario is likely for the following reasons:

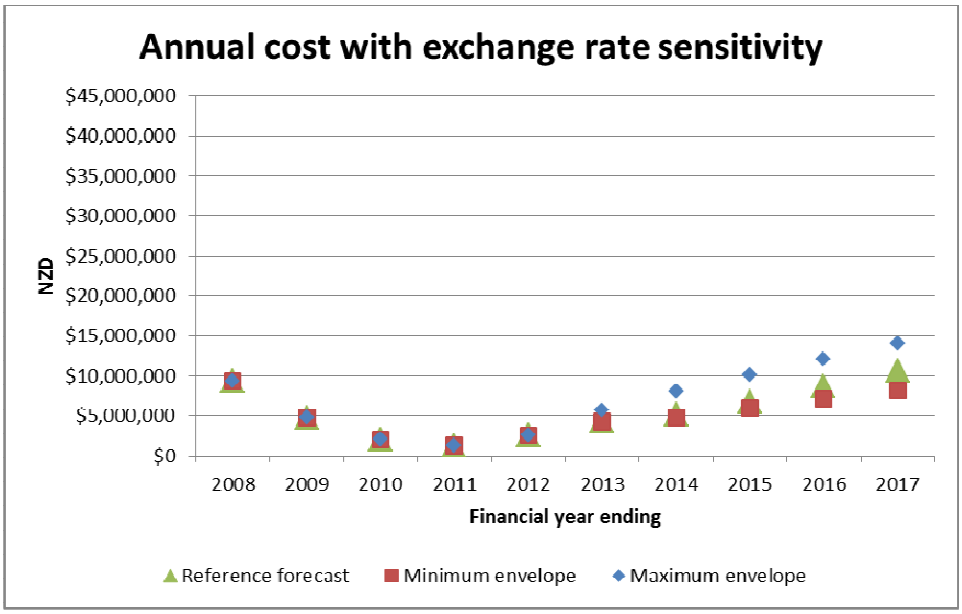
    a. The tenders offered for 2012 were expensive due to the unusual level of backwardation of the oil market at the time of tenders.

    b. Since the last tender New Zealand has entered into a further government-to-government agreement with Denmark thereby increasing the range of suppliers that New Zealand has access to.

    c. A further government-to-government agreement is presently being finalised with Spain and New Zealand plans to approach further IEA members to gauge their interests in entering agreements.

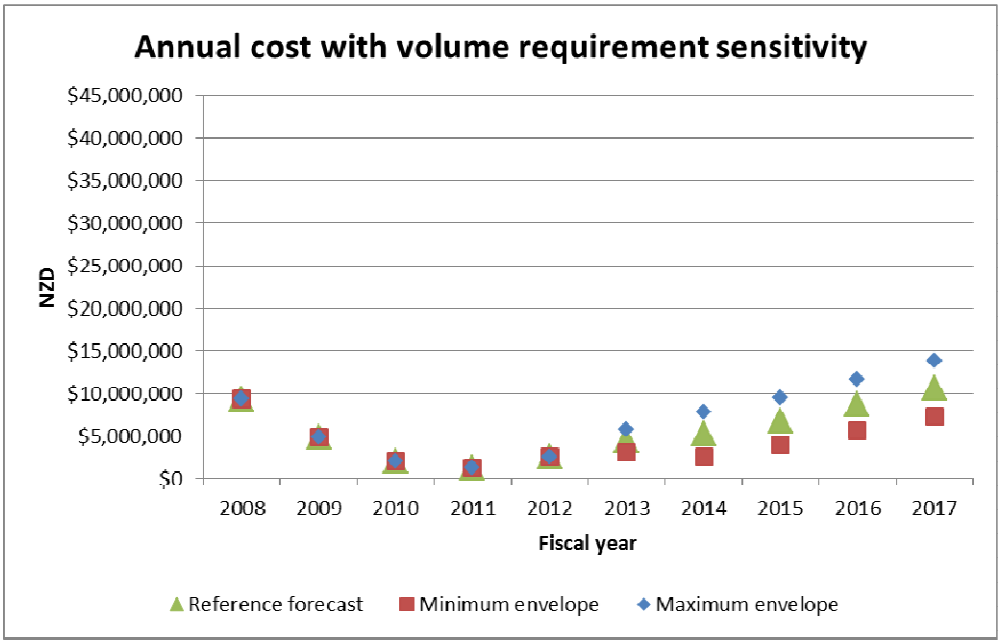
27. To test the **sensitivity of ticket costs to exchange rate** the 2009 low of approximately 0.50 NZD/USD and the 2011 high of approximately 0.85 NZD/USD are used. Figure 8 shows the low and high exchange rate scenarios. These scenarios change the average cost of ticket contacts over 2013-2017 by +40 percent and -15 percent respectively.

Figure 8



28. The uncertainty of the volume requirement (see Figure 6) is used to test the **sensitivity of tickets costs to the volume requirement**. Figure 9 shows the low and high ticket requirement scenarios. These scenarios change the average cost of ticket contacts over 2013-2017 by +36 percent and -37 percent respectively.

Figure 9



New Zealand's ticketing cost in the long-term

29. As discussed above, New Zealand's ticketing requirement in the long-term (beyond about 2017) is very uncertain mainly due to uncertainty in the production profile beyond five years. However, estimates of the limits of the annual cost of tickets can be made.

30. On one extreme the annual cost of purchasing tickets could be zero. This would occur if New Zealand increased domestic production to a point where net imports are covered by commercial stocks.

31. The other extreme is that New Zealand's production goes to zero. The forecast cost of tickets in 2020 would be approximately NZD18 million, assuming:

    - the forecast 2020 average 90 day demand of 1770 kilotonnes
    - commercial inventory stays stable at 936 kilotonnes
    - a ticket price of USD1.50/tonne/month
    - an exchange rate of 0.66 NZD/USD.

32. Beyond 2020 this would change gradually with change in demand.