

The following member country profile is an excerpt from Chapter 4 of the publication Energy Supply Security 2014 and is not intended as a stand-alone publication.

CHAPTER 4: Emergency response systems of individual IEA countries

The ability of the International Energy Agency (IEA) to co-ordinate a swift and effective international response to an oil supply disruption stems from the strategic efforts of member countries to maintain a state of preparedness at the national level. Energy security is more than just oil, as the role of natural gas continues to increase in the energy balances of IEA countries. The most recently completed cycle of Emergency Response Reviews (ERRs) reflected this change by assessing, for the first time, the member countries' exposure to gas disruptions and their ability to respond to such crises. This chapter provides general profiles of the oil and natural gas infrastructure and emergency response mechanisms for 29 IEA member countries.

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New Zealand

Key data

Table 4.19.1 Key oil data

	1990	2000	2005	2010	2011	2012	2018*
Production (kb/d)	58.1	44.6	24.2	59.8	50.2	45.7	17.7
Demand (kb/d)	106.7	133.8	152.8	151.7	150.9	151.0	158.9
<i>Motor gasoline</i>	45.3	50.3	55.2	54.5	53.3	52.9	-
<i>Gas/diesel oil</i>	25.8	42.8	51.1	50.5	52.0	53.3	-
<i>Residual fuel oil</i>	4.6	4.9	6.3	5.9	5.6	5.8	-
<i>Others</i>	30.9	35.7	40.2	40.8	40.0	39.2	-
Net imports (kb/d)	48.6	89.2	128.6	91.9	100.7	105.3	141.2
Import dependency (%)	45.5	66.7	84.2	60.6	66.7	69.7	89
Refining capacity (kb/d)	95.0	98.0	103.6	134.0	134.0	134.0	-
Oil in TPES** (%)	28	33	36	33	33	33	-

* Forecast.

** TPES data for 2012 are estimates.

Table 4.19.2 Key natural gas data

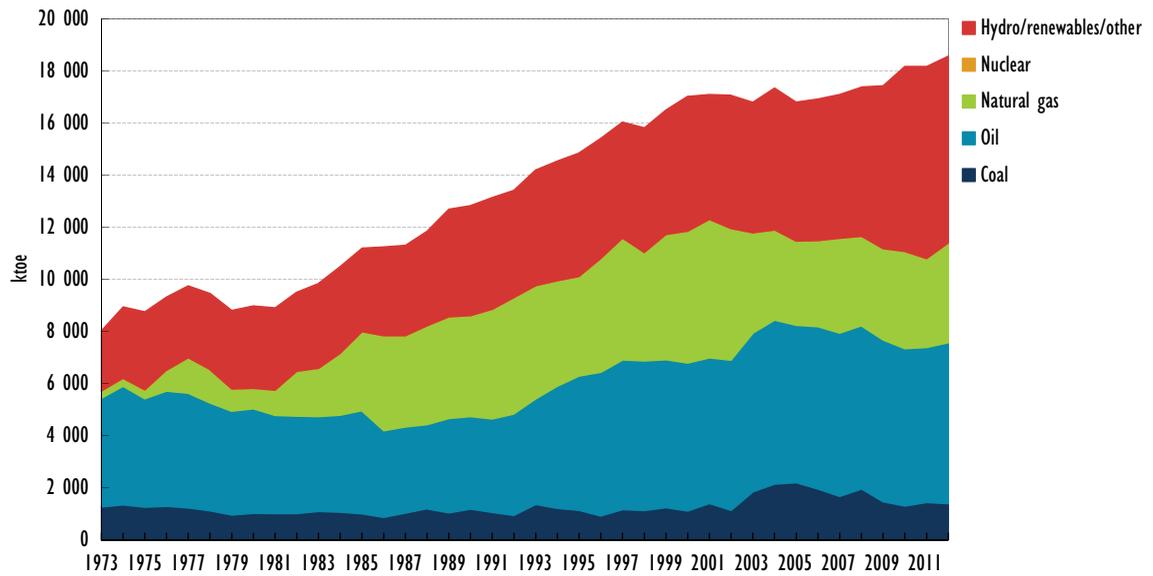
	1990	2000	2005	2010	2011	2012*	2018**
Production (mcm/y)	4 910	6 324	4 129	4 832	4 360	4 590	4 372
Demand (mcm/y)	4 888	6 327	4 126	4 651	4 326	4 653	4 372
<i>Transformation</i>	2 526	2 374	2 206	2 210	1 891	0	-
<i>Industry</i>	1 938	3 346	1 254	1 785	1 785	0	-
<i>Residential</i>	95	195	181	161	154	0	-
<i>Others</i>	329	412	485	495	496	0	-
Net imports (mcm/y)	- 22	3	- 3	- 181	- 34	63	0
Import dependency (%)	- 0.5	0.0	- 0.1	- 3.9	- 0.8	1.4	0
Natural gas in TPES (%)	30	30	19	21	19	21	-

* 2012 data are estimates.

** Forecast.

Note: This section on the emergency response systems of individual member countries was written by the IEA. All countries provided valuable information and comments. All opinions, errors and omissions are solely the responsibility of the IEA.

Figure 4.19.1 Total primary energy source (TPES) trend, 1973-2012



Map 4.19.1 Oil infrastructure of New Zealand



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Map 4.19.2 Gas infrastructure of New Zealand



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Country overview

New Zealand's relative geographical isolation from the global oil and natural gas market supply chain creates a particular challenge to oil and natural gas supply security. Fortunately, New Zealand has relatively abundant domestic fossil fuel resources, compared to most International Energy Agency (IEA) member countries. It has large reserves of coal and some reserves of natural gas and oil.

Oil consumption has declined slightly since 2005, following a period of steady growth since the mid-1980s. Although there is some domestic production, imports are necessary to meet around 70% of New Zealand's oil demand. Most imports are in the form of crude oil. Following an upgrade, New Zealand's sole refinery supplies more than 80% of the country's product demand.

New Zealand's oil emergency response policy is based on an escalating series of measures ranging from the release of oil stock "tickets" to a range of demand restraint measures. During an IEA collective action the New Zealand government's preferred response would be the release of stock tickets, while demand restraint measures are only likely to be used as a last resort.

New Zealand places no minimum stockholding obligation on industry and, until 2007, the country relied on the industry's normal stockholding practices to meet the country's 90-day net-import obligation as a member of the IEA. Since 1 January 2007, the New Zealand government has routinely acquired ticket reservations for stocks held in other IEA countries to supplement the country's domestically held commercial stocks to ensure that it meets its 90-day obligation.

All tickets are held directly by the New Zealand government, rather than through an agency on the government's behalf. In an IEA co-ordinated action, New Zealand would likely contribute to the collective response by releasing these public stocks, and possibly implementing a campaign for voluntary demand restraint.

New Zealand has significant domestic natural gas production – enough to meet 100% of the country's natural gas demand. The country does not have a liquefied natural gas (LNG) import terminal, and will remain entirely reliant on domestic production for its gas needs for the foreseeable future.

New Zealand's natural gas demand has declined by some 33% since its peak in 2001, and stood at 4.65 billion cubic metres (bcm) in 2012. Demand is dominated by the energy and transformation sectors, which together accounted for 50% of total gas demand in 2011.

There are no government-mandated requirements on gas pipeline owners, system operators or industry participants to hold minimum reserves of natural gas. However, these participants, particularly the system operators, are required to maintain operating pressure in the reticulated network and therefore grid owners, system operators or industry participants will hold a certain amount of "reserve gas" as linepack for this purpose.

The Ahuroa Gas Storage (AGS) facility, New Zealand's first underground natural gas storage facility, was officially opened by Contact Energy, one of New Zealand's electricity and gas power companies, in May 2011. It is primarily intended to provide gas supply flexibility for the purposes of managing periods of peak demand, so does not constitute a strategic gas reserve.

Curtailment of gas demand is the primary tool in managing significant gas supply emergencies.

Oil

Market features and key issues

Domestic oil production

All New Zealand's oil production is from fields in the Taranaki Basin, located on the west coast of the North Island. Most of the basin is located offshore, but the majority of small producing fields are onshore. Most oil produced in New Zealand is light, sweet crude. However, New Zealand's sole refinery is geared towards sour crude, so the majority of oil produced in the country is exported.

Following a surge in production brought on by the streaming of the Tui field in 2007 and the commissioning of the Maari field in 2009, New Zealand's average rate of oil production has declined recently. However, some fields are expected to show an increase in production in 2014.

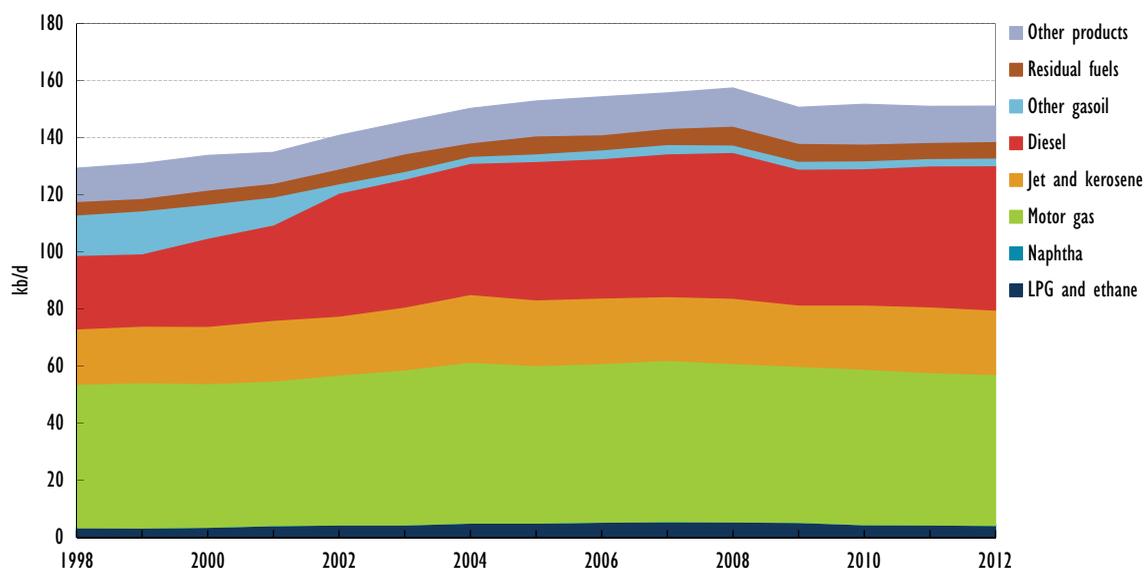
The country's oil production, including natural gas liquids (NGL) averaged 45.7 thousand barrels per day (kb/d) in 2012, down from 50.2 kb/d in 2011 and a peak of 59.8 kb/d in 2010. According to IEA forecasts, New Zealand's rate of production is expected to enter a long-term phase of decline in the absence of new discoveries.

Oil and natural gas exploration activity has increased in recent years and is continuing to increase. The main focus remains on the Taranaki Basin, but there has also been activity in other areas, including the east coast of the North Island, off the east coast of the South Island, and in the lower South Island.

Oil demand

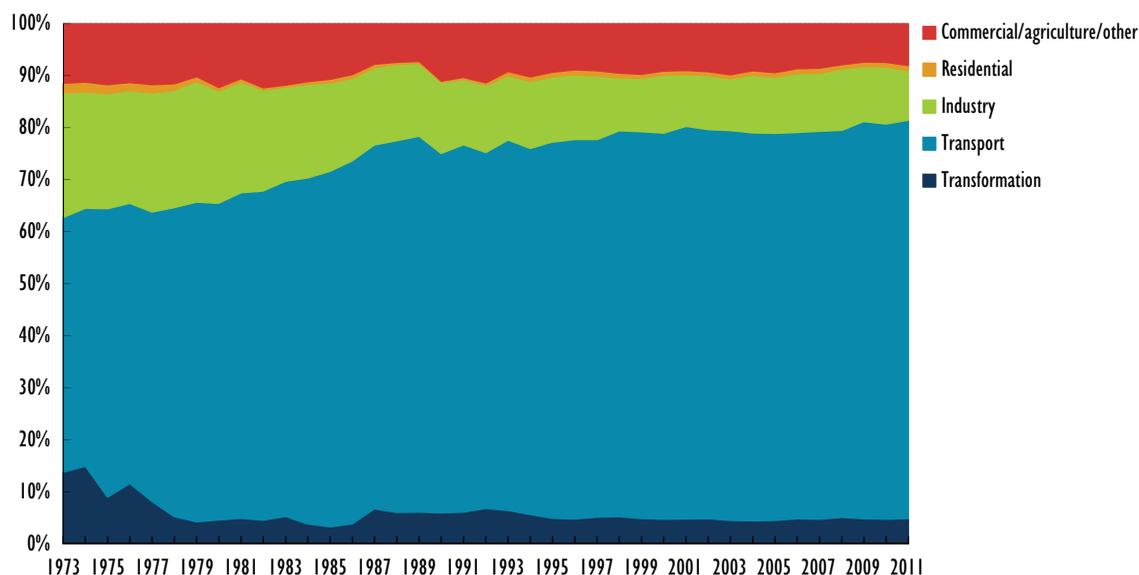
New Zealand's oil demand has declined slightly since 2005, following a period of steady growth from the mid-1980s. Total oil demand averaged 151 kb/d in 2012, accounting for 33% of the country's total primary energy supply (TPES). As in many OECD member countries, the transportation sector accounts for an increasing share of total oil demand, reaching 77% in 2011.

Figure 4.19.2 Oil demand by product, 1998-2012



Motor gasoline, gas/diesel oil, and jet kerosene are the main transportation fuels. Demand for diesel oil has grown at a notably rapid pace over the past decade. Diesel consumption averaged 51 kb/d in 2012 (accounting for 33% of total oil demand), up from 45 kb/d in 2003 – an increase of nearly 13%. In contrast, gasoline is still marginally ahead of diesel consumption – averaging 53 kb/d in 2012 (35% of total oil demand) – but is down 1.9% from 54 kb/d in 2003.

Figure 4.19.3 Oil consumption by sector, 1973–2011



According to IEA forecasts, oil demand is expected to increase in the medium term, reaching 159 kb/d by 2018. Future oil demand growth in New Zealand will primarily be driven by increases in the use of transport fuels.

Imports/exports and import dependency

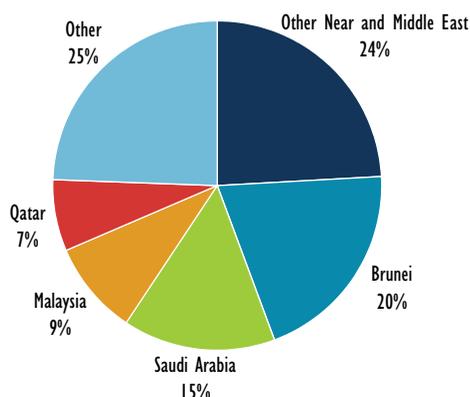
New Zealand's relative geographical isolation at the end of the global oil market supply chain creates a particular challenge to oil supply security. For example, the long maritime shipping routes for oil and product imports means that if the country suffered a major oil or oil product supply disruption it could take weeks to take delivery of alternative supplies.

On average, oil consumption has grown steadily since the mid-1980s, and although there is some domestic production, imports have historically been necessary to meet the majority of New Zealand's oil demand. In 2012 New Zealand imported almost 70% of its (net) oil requirements, up sharply from 60.6% in 2010. If this trend continues import dependence is forecast to reach 89% in 2018.

Around two-thirds of oil imports are in the form of crude oil. New Zealand's import sources are well diversified, coming primarily from Brunei, Saudi Arabia and other Near and Middle Eastern countries, and to a lesser extent from Southeast Asian countries, including Malaysia and Indonesia, as well as Australia.

Only one-third of New Zealand's imports are in the form of products. In 2012 these came primarily from Singapore (61%) and Korea (27%), according to IEA figures.

Figure 4.19.4 Crude oil imports by origin, 2012



New Zealand's sole refinery, Refining NZ, supplies more than 80% of the country's product demand. The country's remaining product requirements are imported. As demand for these products (particularly road transport fuels) continues to rise, product imports are likely to rise further.

Oil company operations

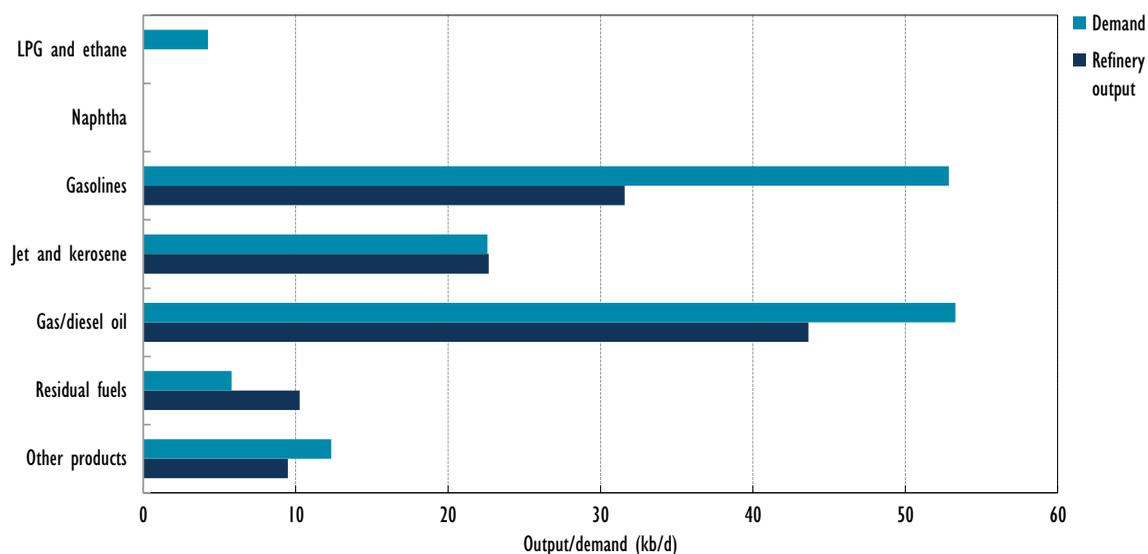
At the wholesale level, New Zealand is a highly concentrated market, with the four main oil companies – BP, Chevron (Caltex), ExxonMobil and Z Energy – maintaining an all-products market share of up to 95%. At the retail level, there is more competition than at the wholesale level, with at least 15 branded networks and a rising number of unbranded sites. Collectively, these smaller networks account for over 15% of the retail market. Gull is the biggest independent retailer, with a market share of 2% to 3%, but the company has found its retail scope geographically limited to the northern half of the North Island because its only storage terminal is located in Mount Maunganui.

Oil supply infrastructure

Refining

As previously mentioned, New Zealand has one refinery, Refining NZ, at Marsden Point, near Whangarei in the North Island. In late 2009, the refinery's topping capacity was increased from 104 kb/d to approximately 120 kb/d. Refining NZ supplies more than 80% of the country's refined product demand.

Figure 4.19.5 Refinery output vs. demand, 2012



Refining NZ is a toll refiner, i.e. it charges a fee to convert crude oil and other feedstock into refined products. This fee is based on the difference between the value of initial feedstocks and final products, according to reported Singapore prices. Refining NZ's profits are not affected by downstream pricing decisions of the four oil companies (BP, Chevron, ExxonMobil and Z Energy) that own the majority of the refinery. Importantly, the four oil companies have processing agreements which allocate the full capacity to them, unless they choose not to use it.

Ports and pipelines

Refining NZ owns the Refinery to Auckland Pipeline (RAP), which transports refined products to bulk storage facilities in the greater Auckland area, New Zealand's major petroleum market. The pipeline has a capacity of some 53 kb/d (2.6 Mt/yr); as of early 2010 about 90% of this capacity was utilised. About half of the refinery's production is distributed via the RAP pipeline; the balance is transported by coastal tankers and by road to the rest of New Zealand.

Coastal distribution delivers refined product from Refining NZ to a number of locations around New Zealand, where industry receives finished products (from Refining NZ via coastal distribution as well as imports). New Zealand has 13 terminal locations (including the refinery), of which 11 are seaboard terminals. The Marsden Point truck-loading facility serves the Northland and North Auckland region, while the Wiri (South Auckland) terminal supplies Auckland (and parts of Waikato), and receives product from Refining NZ via the RAP. The three major import terminals are Mount Maunganui, Wellington and Lyttelton.

Storage capacity

New Zealand does not hold public stocks domestically, nor does it impose an obligation on industry to hold stocks. As such, all storage capacity is commercially built and used. Because of the country's geography, ports and storage are closely intertwined, as products are primarily transported around the country by ships.

The oil majors employ a system that enables each company to draw product from any location subject to having access arrangements with a specific storage provider. This

system is designed to offer a great deal of flexibility and efficiency to the domestic supply chain. The system works on an accounting system in which stock volumes are credited to companies based on a combination of refinery production as it accrues to the individual company processing at Refining NZ and as supplemented by periodic imports. A company's ability to draw stock from the system is subject to having a positive stock balance.

Decision-making structure

The Ministry of Business, Innovation and Employment (MBIE) is responsible for policy related to oil supply security and in an international disruption would chair the national emergency strategy organisation (NESO) and take the lead in developing a plan of action. However, the Ministry of Civil Defence and Emergency Management (MCDEM) is responsible for civil contingency planning through a national Civil Defence Emergency Management (CDEM) Plan and for liaison with local authorities for domestic events at the local and regional level.

MCDEM's mandate covers aspects such as pandemics and natural disasters (e.g. earthquakes), and is leading work to improve domestic contingency planning within the petroleum sector. MBIE is working with MCDEM to ensure co-ordination between operational responsibilities.

New Zealand's NESO is made up of staff from MBIE, as well as representatives from oil companies and from Refining NZ. In an oil supply emergency, depending on the nature and scale of the disruption, the NESO would invite relevant non-members to participate in consultations, including representatives of large user groups such as the Road Transport Forum and the Automobile Association.

There are two main legal instruments available to authorities during an oil supply disruption: the International Energy Agreement Act of 1976 (IEA Act) and the Petroleum Demand Restraint (PDR) Act of 1981. The IEA Act enables New Zealand to carry out its obligations as a member of the IEA, including compliance with international petroleum supply obligations. The PDR Act deals with demand and distribution issues in a supply crisis.

Stocks

Stockholding structure

As previously noted, New Zealand has no domestic public stocks, and the government does not place a minimum stockholding obligation on industry. All stocks in New Zealand are held on a commercial basis.

Until the acquisition of government-owned ticket reservations, New Zealand relied solely on the industry's normal stockholding practices to meet the country's overall minimum 90-day net-import obligation as a member of the IEA. From 1 January 2007, the New Zealand government acquired ticket reservations for stocks held in other IEA member countries to supplement the country's domestically held commercial stocks.

When New Zealand's domestic production was growing, the country's net imports dropped, thereby reducing its IEA stockholding obligation (and need for tickets). However, since 2010 domestic production has, on average, started to decline and New Zealand's stockholding obligation and need for tickets have once again begun to increase. All tickets are held directly by the New Zealand government, rather than through an agency on the government's behalf.

Crude or products

As of April 2013, total stocks held by industry in New Zealand stood at around 8 mb, of which 29% were crude and unrefined oils; the rest consisted of finished products.

Location and availability

The New Zealand government has entered into government-to-government agreements with Australia and the United Kingdom and has concluded formal treaties with the Netherlands, Japan and Denmark to enable stocks held in those countries to count towards New Zealand's IEA obligations. In an IEA co-ordinated action, these stocks held outside of the country may be released onto the global market. If needed domestically, the stocks can be purchased and transported directly or swapped with stock held closer to New Zealand in order to reduce transport costs and delivery time.

The ticketed public stocks held in other countries are normally a mix of crude oil and gasoline.

Monitoring and non-compliance

As New Zealand has no compulsory stockholding requirements, there is no monitoring of individual company compliance. The government relies on accurate data from the oil companies in order to assess whether or not the total level of stocks in the country is sufficient to meet the IEA stockholding obligation. New Zealand authorities assure the accuracy of the company reporting by undertaking audits of the information supplied. The IEA Act allows the Minister of Energy and Resources to direct any petroleum-supplying company to keep books, accounts and records, and to furnish returns and information as requested. Any company which fails to comply with these directives commits an offence against the Act and is liable, on summary conviction, to a fine.

Stock drawdown and timeframe

In principle, a release of the stocks held overseas in the form of tickets could be implemented very quickly, with the stocks delivered directly into the local market where they are being held.

With regard to domestically held company stocks, the legal authority to require a stock drawdown is contained in the PDR Act. However, the government's preference would be for NESO to reach a voluntary arrangement with regard to the release of stocks during an emergency or an IEA co-ordinated action.

Any decision to release stocks is the responsibility of the Minister of Energy and Resources in consultation with colleagues, and is expected to take 4 to 10 days. However, depending on where the stock is required, it is estimated to take 15 to 45 days for physical delivery of stocks to the market after the stockdraw decision has been made.

Financing and fees

All industry stockholding costs are recovered by oil companies through their normal operations. The public stock ticket reservations are (as of the end of 2013) financed through the government's general budget.

Other measures

Demand restraint

New Zealand has a series of demand restraint measures that escalate from voluntary, light-handed measures to more substantive compulsory requirements, depending on the impact and severity of the emergency. As the transport sector makes up 77% of oil consumption in New Zealand (in 2011), the main focus of demand restraint measures is on transport fuels.

Voluntary demand reduction is the lowest level response initiated through a public information campaign encouraging consumers to conserve oil. This could include telecommuting, using public transport, carpooling and staggering work start times to relieve highway congestion. The New Zealand authorities estimate that these measures could reduce the number of trips by approximately 10%, producing a 3.5% (5 kb/d) overall reduction in consumption of oil products.

The public information campaign would also include a detailed promotion of eco-driving, encouraging drivers to use their vehicles as efficiently as possible. This includes voluntary speed reductions, avoiding rush hour traffic, checking the tuning of the car's engine, the condition of its air filters and the inflation of its tyres. Authorities estimate that these measures would reduce oil consumption by approximately 3% for cars and freight vehicles, resulting in an overall reduction of 2% (3 kb/d).

The country's public information campaign would also target industrial and agricultural users of oil, encouraging them to conserve in different ways. It is estimated that these sectors could achieve a savings of 5% of their consumption, equating to an overall oil savings of 0.5% (0.8 kb/d).

A higher level response is available through the demand restraint provisions of the PDR Act. Allocation and quality rationing are the most complex and substantive response mechanisms available to government.

Fuel switching

New Zealand uses very little oil to generate power or heat, so the scope for petroleum savings from fuel switching is limited.

Other

- *Surge oil production*

Surging of oil production would take several months to implement and could increase output by 1% to 2%.

- *Relaxing fuel specifications*

The government has the authority to alter mandatory fuel specifications under the Energy (Fuels, Levies and References) Act 1989 to enable the importing or blending of fuels currently not covered by existing specifications. This would increase the potential range of alternative supply options during an oil supply disruption.

Gas

Market features and key issues

Gas production and reserves

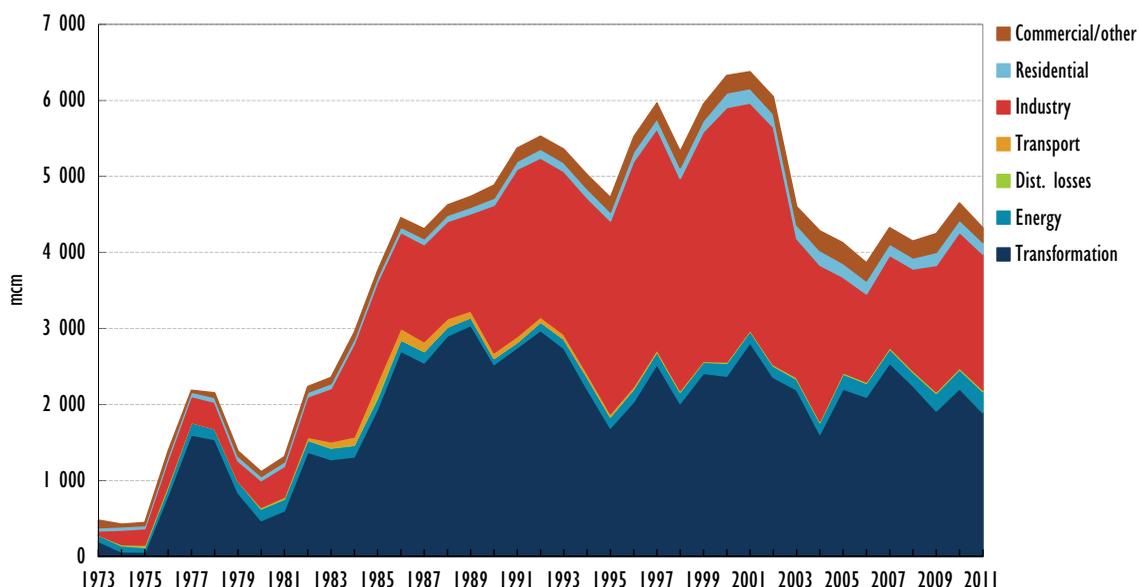
New Zealand has significant domestic natural gas production – enough to meet 100% of the country’s natural gas demand. In 2012, natural gas production was 4.6 bcm according to IEA estimates – up from 4.4 bcm in 2011.

As of 2011 there were 17 fields producing natural gas in New Zealand – all located in the Taranaki region of the country’s North Island. The majority of production comes from the Pohokura field (38%) and the Maui field (19%).

Gas demand

Gas demand has declined by some 33% since its peak in 2001, and stood at 4.65 bcm in 2012. Demand is dominated by electricity generation (the energy and transformation sectors) which accounted for 50% of total gas demand in 2011 according to IEA figures. (According to government figures, the proportion of natural gas used for electricity generation in 2012 was 44.1%). The proportion of natural gas used for electricity generation in New Zealand is expected to drop rapidly from 2013-14 – with the gas used increasingly for methanol production instead.

Figure 4.19.6 Natural gas demand by sector, 1973–2011



The industry sector is also a significant consumer of natural gas, accounting for 41% of total demand in 2011 according to IEA figures (rising to 46.3% in 2012, according to government figures). The petrochemical industry accounts for around two-thirds of the gas consumed by the industry sector (which it uses to produce methanol and ammonia/urea) and, as noted earlier, the proportion of gas used for methanol production is set to increase. The residential and commercial sectors each only account for 4% of demand according to IEA figures.

The country's natural gas demand peaks in the winter months, which can extend from May through September, and troughs in summer from November through February. Peak demand on the Maui pipeline is a good proxy for peak demand, as about 80% of gas flows along the Maui pipeline. Four fields have an interconnection into the Maui pipeline: Maui, Pohokura, McKee/Mangahewa and Turangi fields.

The large Maui field has historically been very flexible in terms of production flows, and could thus be modulated in order to meet fluctuating demand. However, with the decline in production rates, the Maui field has lost its flexibility. This has made the New Zealand gas market tighter at moments of peak demand, and partly led to Contact Energy creating the AGS facility.

Gas import dependency

All gas supply in New Zealand is domestically produced in the Taranaki region. New Zealand does not have an LNG import terminal or pipeline connections to other countries, and is therefore entirely reliant on domestic production for its gas needs.

An LNG import terminal has been considered at Port Taranaki to import around half of New Zealand's total annual gas requirements. However, new gas supplies have been brought to the market or are nearing production, and the project has been postponed indefinitely.

Gas company operations

The main upstream producers are Shell, Todd Energy, Origin Energy, Greymouth Petroleum, OMV New Zealand, TAG Oil New Zealand Limited, AWE and NZEC.

Vector runs the Kapuni Gas Treatment Plant which receives raw gas from Shell and Todd.

The biggest distribution and retail companies are Contact Energy, Genesis, Vector, Mighty River Power, Trustpower, Greymouth Petroleum, Novagas, Powerco and Gasnet.

Gas supply infrastructure

Ports and pipelines

New Zealand does not have an LNG import terminal, and so is entirely reliant on domestic production for its gas needs.

New Zealand's North Island has a network of over 3 500 km of high-pressure gas transmission pipelines. Over 2 800 km of intermediate-, medium-, and low-pressure distribution pipelines are connected to the high-pressure system.

All the country's natural gas enters the transmission system in the Taranaki region from both offshore and onshore production. The Maui and Pohokura fields are the largest producers and are connected to the Maui pipeline. Other producers are connected to the Maui or Vector pipelines at various locations around Taranaki.

The Maui pipeline runs from Oaonui and dominates capacity north as far as Rotowaro (near the Huntly Power Plant), although the smaller Vector pipeline runs in parallel. The transmission pipelines north of Rotowaro (through Auckland and up to the refinery), east into the Bay of Plenty and Gisborne, and south of Taranaki (to Wellington and east to Hastings) are all part of the Vector system and are small pipelines relative to the Maui pipeline, typically in the 100 to 300 mm diameter range.

Because of its significantly larger size, balancing across the system is conducted on the Maui pipeline. The Maui pipeline is owned by Maui Development Limited (MDL), which

is, in turn, owned by Shell (83.75%), OMV (10%) and Todd 6.25%). There is no natural gas production or consumption in the South Island, although several urban centres have small liquefied petroleum gas networks.

Storage

The AGS facility, New Zealand's first underground natural gas storage facility, was officially opened in May 2011. Owned by Contact Energy, the facility has a maximum drawdown capacity of 45 terajoules per day.

The AGS is located close to Contact Energy's 380 megawatt (MW) Taranaki Combined Cycle (TCC) power station and a 200 MW gas-fired peaking power station located near the TCC at Stratford. The facility provides contact with significant natural gas supply flexibility and, if required, can provide sufficient gas to fully supply the peaking units at Stratford. It does not, however, constitute a strategic natural gas reserve.

Emergency policy

A regulated critical contingency management system is in place to achieve the effective management of critical gas outages and other security of supply contingencies without comprising long-term security of supply. The system provides for several contingencies:

- a critical contingency operator (CCO) with powers to require gas consumers to curtail demand
- curtailment bands, which classify non-domestic consumers into groups and which define the order in which the CCO will curtail those groups.

The system is administered by New Zealand's gas industry body – The Gas Industry Company. Declaration and termination of a critical contingency by the CCO, the curtailment and restoration of gas consumption during a critical contingency, and obligations of transmission system operators (TSOs), retailers and consumers before, during and after a critical contingency are the key components of the system.

Emergency response measures

There are no government-mandated requirements on grid owners, system operators or industry participants to hold minimum reserves of natural gas. However, these participants, particularly the system operators, are required to maintain operating pressure in the reticulated network and therefore pipeline owners, system operators and industry participants will hold a certain amount of "reserve gas" as linepack in this respect.

Fuel switching

New Zealand currently has 500 MW of capacity available at Huntly that can be run on coal, natural gas or fuel oil. In a situation where a gas disruption has occurred, this capacity could be run solely on coal. The Huntly power station stockpiles coal on site and is within short proximity of its domestic coal supplier.