MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

16

2015 CALENDAR YEAR EDITION

Comprehensive information on and analysis of New Zealand's energy supply, demand and prices

Energy in New Zealand

New Zealand Government

Energy in New Zealand 2015

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Evidence, Monitoring & Governance

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Important

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Authorship

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Availability

A free electronic version of this publication can be downloaded from: www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/

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Energy in New Zealand 2016 provides annual information on and analysis of New Zealand's energy sector and is part of the suite of publications produced by the Energy & Building Trends team of the Ministry of Business, Innovation & Employment (MBIE).

The 2016 edition includes information up to the end of the calendar year 2015.

Full data tables may be downloaded from the *Energy in New Zealand* webpage:

www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand

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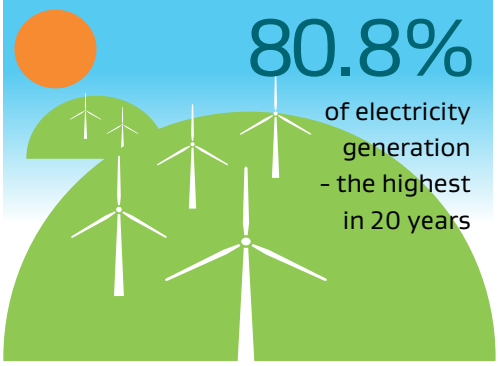
Quick facts for 2015

In 2015, renewable sources made up

80.8%

of electricity generation - the highest in 20 years



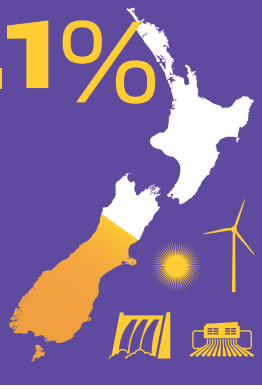
GEOTHERMAL ELECTRICITY GENERATION AGAIN REACHED A RECORD OF

7,411 GWh

overtaking Gas as the second largest producer of electricity

40.1%

of our primary energy supply came from renewable sources, the highest on record



Solar generated an estimated

33 GWh of electricity

. . .about enough to supply every household in the Central Hawke's Bay District

New Zealand's ANNUAL PRIMARY ENERGY SUPPLY WOULD SUPPLY AUSTRALIA FOR ABOUT

2 MONTHS

THE AVERAGE RESIDENTIAL ELECTRICITY COST FOR THE MARCH YEAR 2016 **FELL**

2.1%

IN **REAL TERMS**

The **Tiwai Point** aluminium smelter accounted for

13%

of national electricity consumption **IN 2015.**

13
Al
Aluminium
26.981539

TRANSPORT DEMAND WAS UP

8.3PJ

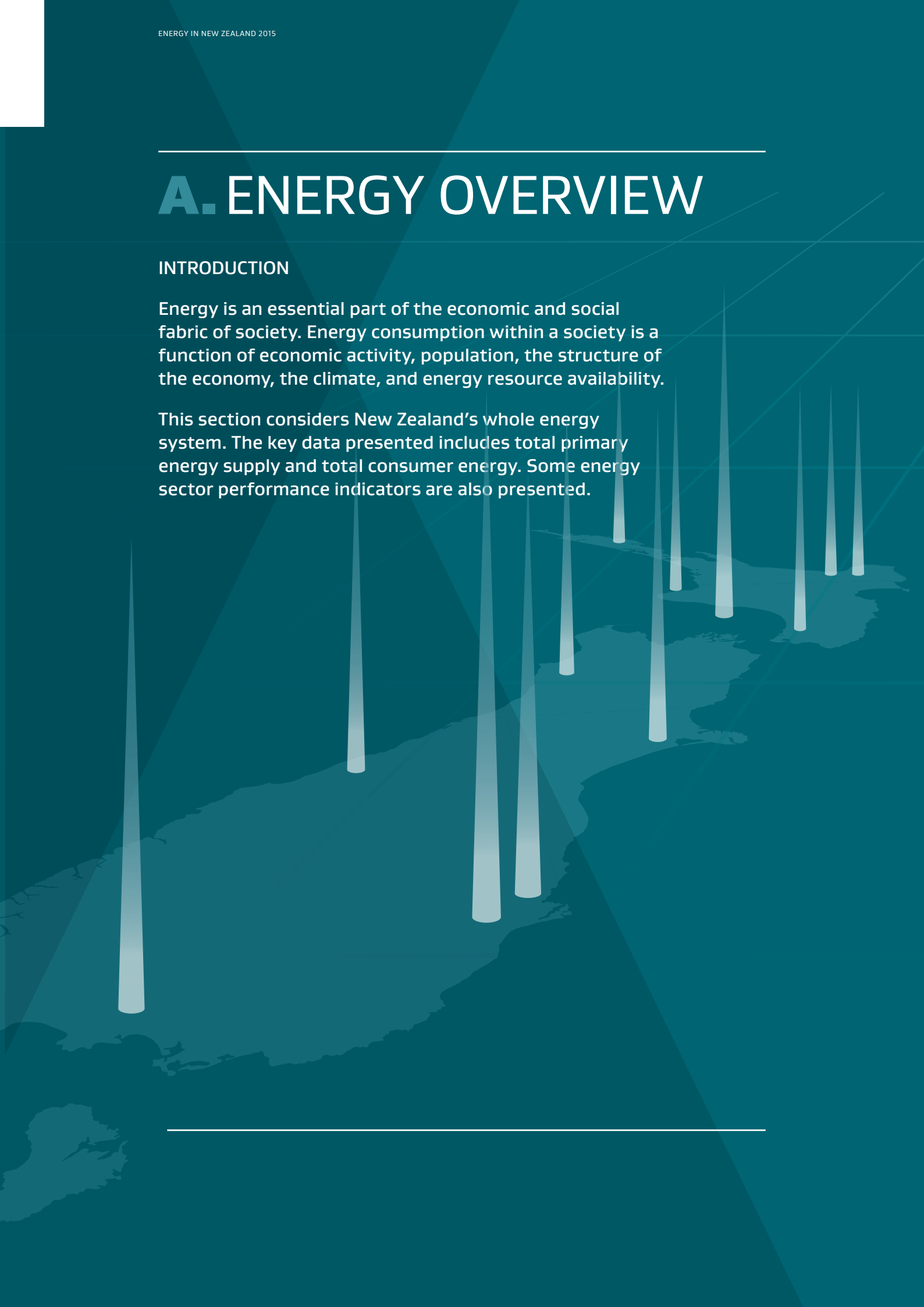
THE LARGEST ANNUAL INCREASE IN 20 YEARS

A. ENERGY OVERVIEW

INTRODUCTION

Energy is an essential part of the economic and social fabric of society. Energy consumption within a society is a function of economic activity, population, the structure of the economy, the climate, and energy resource availability.

This section considers New Zealand's whole energy system. The key data presented includes total primary energy supply and total consumer energy. Some energy sector performance indicators are also presented.



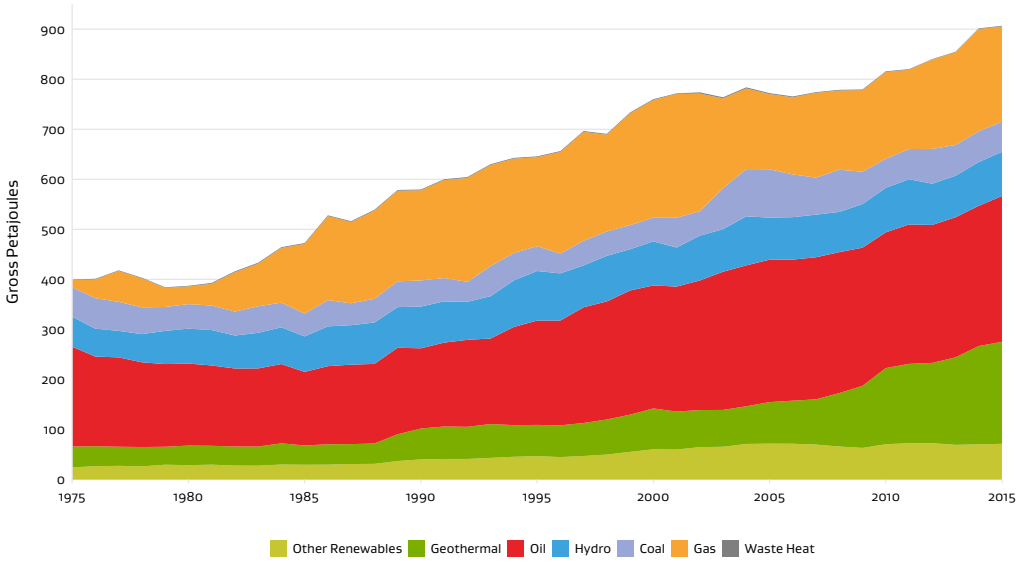
Primary Energy Supply

Total primary energy supply (TPES) is the total amount of energy supplied for use in New Zealand. This is calculated as domestic production plus imports, less exports and energy used for international transport. Figure A.1 shows New Zealand's TPES by fuel since 1975. In 2015, New Zealand's TPES increased by 5 PJ to 907 PJ, an increase of 0.6% on the 2014 calendar year. Renewable energy made up 40.1% of the total. This level of contribution from renewable energy was slightly up on last year's value of 39.3%, and was the highest on record. The latest international comparison shows that New Zealand has the third highest contribution of renewable energy to TPES in the Organisation for Economic Co-operation and Development (OECD), behind Iceland and Norway.[1]

The rapid increase in renewable energy's share of TPES since 2008 has been driven by increased electricity generation from geothermal energy and reduced electricity generation from coal. As geothermal fluid is much lower in temperature than steam produced by a coal or gas boiler, the transformation efficiency of geothermal energy is significantly lower. The low transformation efficiency of geothermal energy (approximately 15%) contributes to New Zealand's relatively high renewable TPES compared with most other countries.

Although geothermal energy's share has increased rapidly over the last eight years, oil continues to dominate New Zealand's TPES. In 2015, oil accounted for 32%, gas for 21% and geothermal energy for 22% of New Zealand's TPES. TPES was up by 0.6% in 2015 and has increased by an average of 2% per annum over the last five years.

Figure A.1: Total Primary Energy Supply by Fuel



1 Source: IEA (2016), *Renewables Information 2016*, OECD Publishing, Paris. The most recent year for which data were available was 2014.

Energy Transformation

Energy transformation refers to the conversion of primary energy (see above) to more useful forms of energy. It includes activities such as electricity generation, oil refining and other transformation (including coal used for steel manufacturing) as well as accounting for losses. By convention, energy used as an input to energy transformation is recorded as negative; energy output from energy transformation is recorded as positive (e.g. gas used for generating electricity is negative, while the electricity generated from gas is positive). For more discussion on oil refining and electricity generation, please read Section D (Oil and Gas) and Section F (Electricity).

Total energy transformation has increased by 62% since 1990. This is mainly due to the strong uptake of geothermal electricity generation since 2008. In 2015, total energy transformation was 272 PJ, which was 2% larger than in 2014. Since 2010, total energy transformation has grown on average by 2.5% per year.

Energy Consumption

Consumer Energy Demand

Consumer energy demand (or total consumer energy) includes all energy used by final consumers. It does not include energy used for transformation, or non-energy use. Consumer energy demand in 2015 rose by 0.7% to 572 PJ. Figure A.2a shows consumer energy demand by fuel, while Figure A.2b shows consumer energy demand by sector. The rise in consumer energy demand in 2015 was a result of increased demand from the transport sector (up 4%), the commercial sector (up 2%) and residential sector (up 2%), balanced by a drop from the industrial sector (down 3%).

Domestic transport contributed the largest observed increase in energy consumption, increasing its demand for petroleum and diesel based energy by 7 PJ, or a 4% increase over the calendar year.

Both the agricultural, forestry and fishing and the industrial sectors demanded less energy in 2015. With the exception of food processing, most industrial activities decreased their demand for predominantly natural gas energy. The agricultural, forestry and fishing industry's energy demand fell 3.6% over the year. The industrial industries decreased 2.6% over the year.

Figure A.2a: Consumer Energy Demand by Fuel

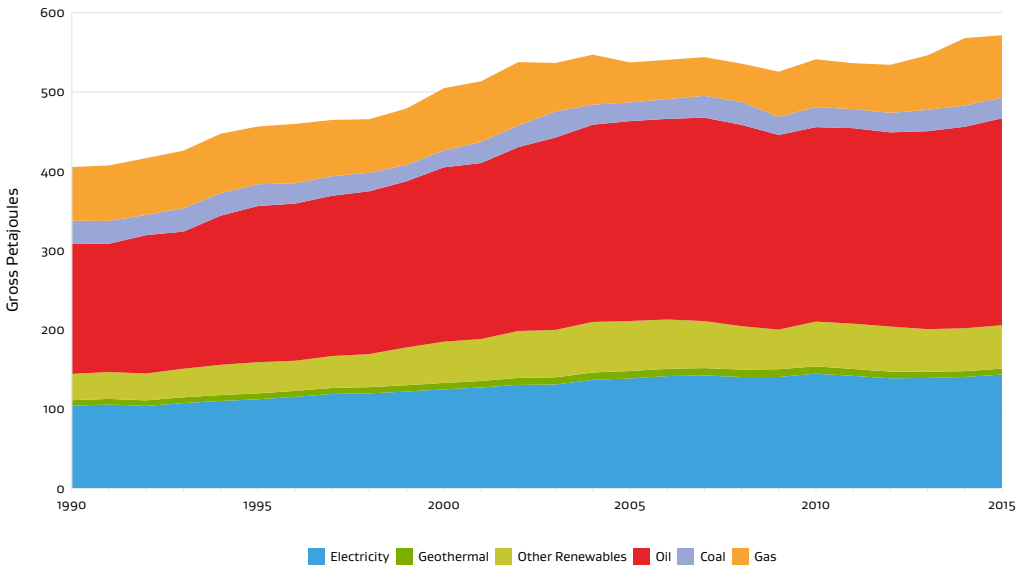
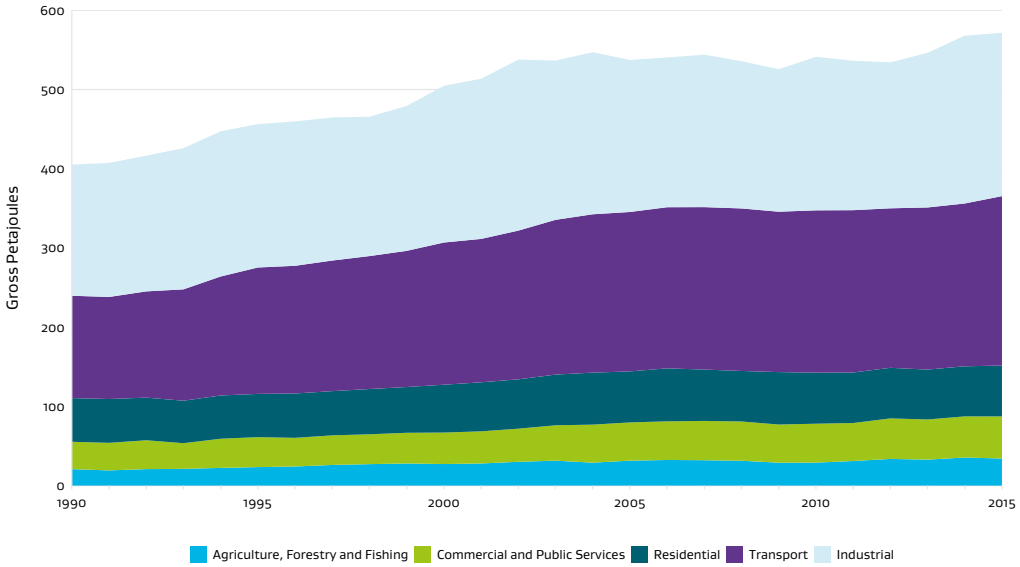


Figure A.2b: Consumer Energy Demand by Sector



Oil (46%) and electricity (27%) made up the majority of consumer energy in 2015, with the other fuels making up the balance. The transport (37%) and industrial (36%) sectors consumed the most consumer energy in 2015. The biggest change in the year was the transport sector, whose demand increased by 8 PJ (4%), with petrol demand up 3 PJ (3%) and diesel up 2 PJ (2%).

Figure A.2c: Consumer Energy Demand Share by Fuel in 2015

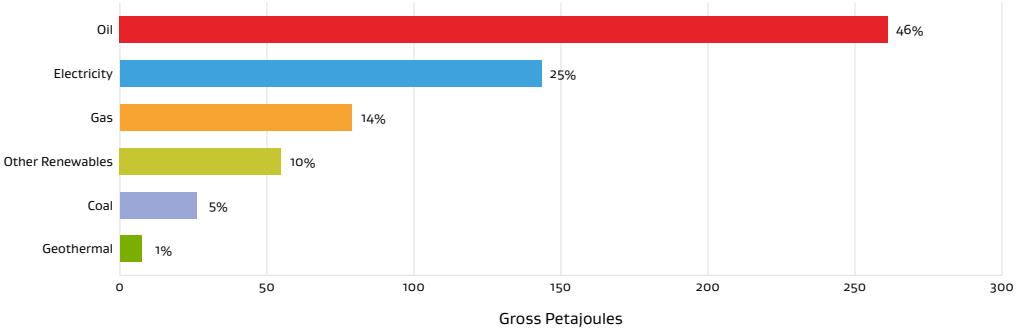
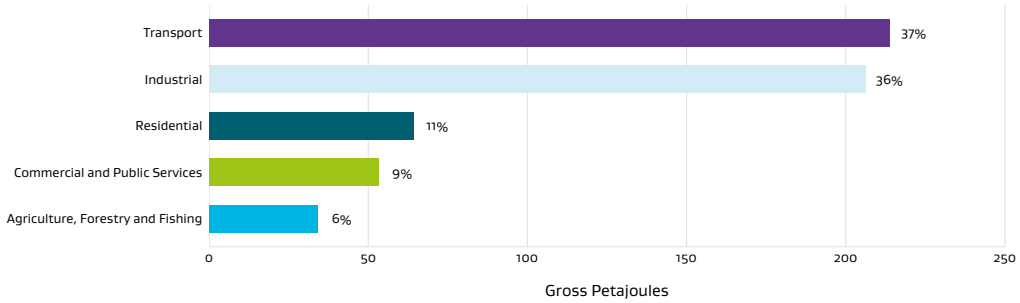


Figure A.2d: Consumer Energy Demand Share by Sector in 2015



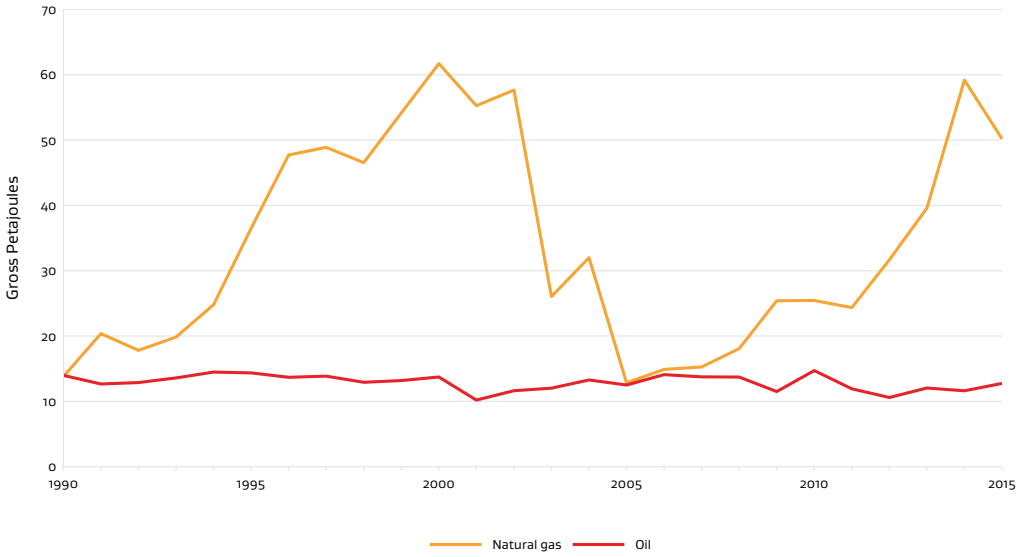
Non-Energy Use

Non-energy use refers to the use of fuels to produce non-energy products. Non-energy products are products where neither the raw energy source used to produce the product nor the product itself are combusted.

Non-energy use in New Zealand consists mostly of natural gas (conversion of natural gas to methanol or urea) with the remainder being oil (e.g. bitumen for roads). Although methanol can be combusted for energy purposes, the methanol produced in New Zealand is mainly exported for use as a chemical feedstock (e.g. to make plastic). Gas combusted during the production of petrochemicals such as methanol, urea and ammonia is included in industrial sector demand within total consumer energy. Only gas used as a feedstock, and therefore not combusted, in petrochemical production is classified as a non-energy use.

In 2015, total non-energy use was 63 PJ, 13 PJ of which was from oil and 50 PJ from natural gas. Methanex New Zealand's second methanol production train at Motunui was restarted in mid-2012 and their mothballed Waitara Valley plant was restarted in October 2013. After returning to a high level in 2014, non-energy use of natural gas fell by 15% in 2015 as methanol production fell 15% due to mechanical issues at Methanex's plants (see Section D - Gas section for further information).

Figure A.2e: Non-Energy Use by Fuel



Energy Sector Performance Indicators

Energy sector performance indicators show how well New Zealand's energy sector is performing on a variety of aspects. These include energy intensity and energy self-sufficiency.

Energy Intensity

Energy intensity is a measure of the energy used (in MJ) per unit of Gross Domestic Product (GDP). It is influenced by the composition of industry within the economy, improvements in energy efficiency, and changes in behaviour. For a more detailed analysis of the drivers of energy use in New Zealand, readers are encouraged to read the report *Changes in Energy Use — New Zealand, 1990–2011.*[2]

Energy Intensity by Industry

Since 1990, the overall energy intensity of the economy has improved by an average 1.2% per annum to 2.6 MJ per (2009/10) dollar in 2015. The most significant factor in energy intensity improvement has been the rapid growth of the commercial sector (low energy intensity) relative to the industrial sector (high energy intensity). Figure A.3a shows the changes in real GDP by sector between 1990 and 2015. The commercial sector's GDP (excluding transport) has doubled since 1990.

Figure A.3b shows a time series of the energy intensity of industries within the New Zealand economy. In this chart, the dashed lines refer to individual sectors, whereas the solid line is the average energy intensity of New Zealand. The New Zealand economy has generally shown improvements in energy intensity since 1990. Trend energy intensity within the agriculture, forestry and fishing sector has been relatively flat, but the level has been quite variable since 1990. The variability of energy intensity is largely derived from the GDP data, specifically, agricultural production volatility. The commercial sector is the least energy intensive sector at 0.4 MJ per dollar in 2015 and has steadily improved its energy intensity since 1990.

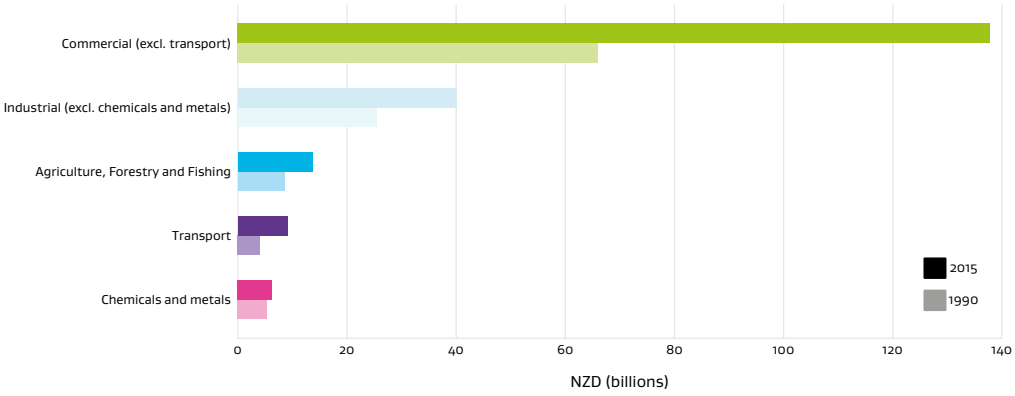
2 Available at http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/changes-in-energy-use

Energy intensity within the industrial sector has improved at an average rate of 0.8% per annum since 1990, while energy intensity within the chemical and metals manufacturing sub-sector has nearly doubled since 2005.

Factors affecting industrial energy use in 2015 included:

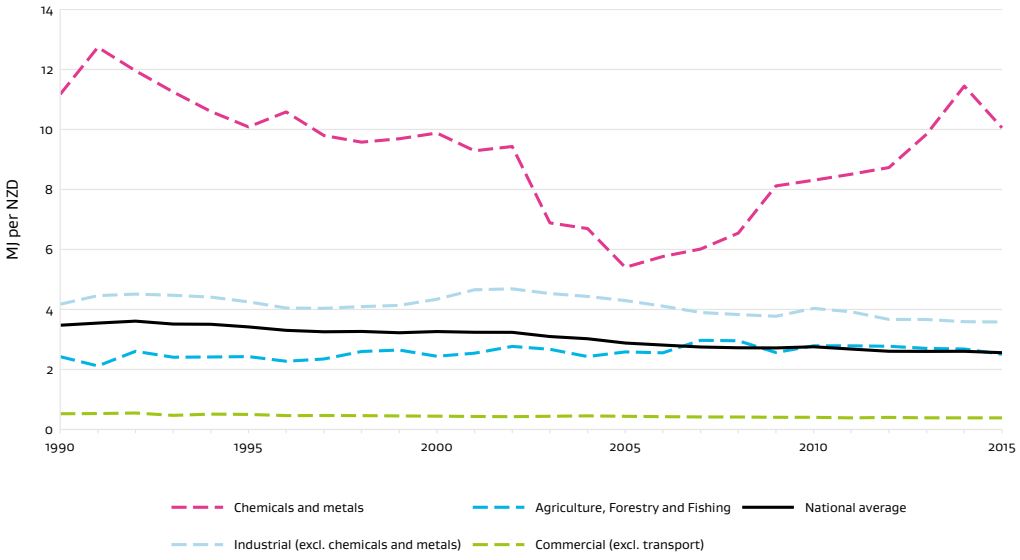
- Outages at Methanex New Zealand affecting energy use and output of the chemicals subsector.
- Steady production at the Tiwai Point aluminium smelter.
- Increasing GDP output from the agriculture and commercial sectors, along with a decrease from the mining subsector.

Figure A.3a: New Zealand GDP (Real 2009/10 Prices) by Sector in 1990 and 2015



* Data from Statistics New Zealand. Table reference SNE065AA.

Figure A.3b: Energy Intensity of New Zealand Industries



Energy Self-Sufficiency

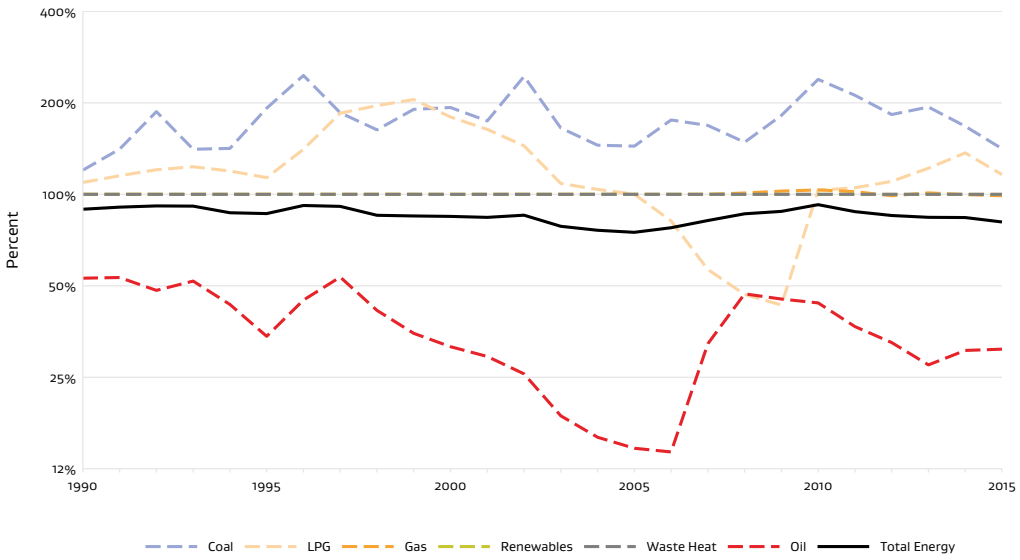
Energy self-sufficiency is the ratio of indigenous energy production to total primary energy supply. It is a measure of a country's ability to meet its own energy supply requirements (which includes non-energy uses such as natural gas used as a feedstock to manufacture methanol). A self-sufficiency value of 100% would indicate that New Zealand produces all the energy it needs, whereas values above or below 100% indicate that New Zealand is a net exporter or importer of energy respectively.

Overall, New Zealand's total energy self-sufficiency was 81% in 2015. Energy self-sufficiency peaked in 2010 at 92% due to a combination of historically high oil, gas and coal production. The minimum self-sufficiency occurred in 2005 at 75%. New Zealand meets all of its gas, renewables and waste heat needs through indigenous production.

New Zealand is a net exporter of coal. Coking coal is exported from the West Coast of the South Island and is mostly used for steel manufacturing in Asia. New Zealand is also a net exporter of liquid petroleum gas (LPG), except during the period of 2006–09. Self-sufficiency for LPG peaked in 1999 when the Maui field was producing strongly.

New Zealand is a net importer of oil, although this series should be interpreted with care because almost all domestically produced New Zealand oil is exported. New Zealand crude oil is very high quality and fetches a premium price on the international market. Cheaper foreign oil is imported and refined at the Marsden Point refinery. Oil self-sufficiency peaked in 1997 at 53%. This was due to a peak in production at the Maui oil (and gas) field. Since then, self-sufficiency fell until 2007, when the Tui and Pohokura fields started producing.

Figure A.4: Energy Self-sufficiency for New Zealand by Fuel



B. ENERGY BALANCES

INTRODUCTION

New Zealand's energy production derives from both renewable and non-renewable sources. New Zealand imports and exports fossil fuels, which generate export revenue, but also results in a dependency and vulnerability to energy commodity prices which vary according to international supply and demand factors outside of New Zealand's control.

The energy balance tables reflect how energy supply and demand by sector varies by energy fuel type. Domestic energy supply is derived from either indigenous production or imported from overseas sources. In turn, fuel types can be transformed into different forms of energy, at the cost of losses and inefficiencies which vary by transformation process. Supply, demand, losses and inefficiencies are reflected in balanced energy supply and demand tables.

Both the energy supply and demand dimensions of the energy balance tables are derived from surveys spanning different sources. An imbalance exists between the value of consumer energy calculated from supply, and the value of consumer energy observed from statistical measure.

Interpretation of Energy Balance Tables

Supply

Total primary energy is the amount of energy available for use in New Zealand. Much of it is converted into other forms of energy before it is used. By convention, fuel used for international transport is excluded from total primary energy. Indigenous gas production does not include gas that is flared, reinjected, or LPG extracted. The primary energy figures presented are actual data, except for some that go into electricity generation as detailed under energy transformation.

Energy transformation includes generation of electricity (including cogeneration), oil production (including refinery operations and the manufacture of synthetic fuel from natural gas – Methanex ceased methanol to petrol production in April 1999) and other transformation, primarily steel production.

In the Energy Transformation section of the balance tables, "energy in" is shown as negative values and "energy out" as positive values in the appropriate fuel columns. Transformation of energy from one form to another always results in conversion losses, particularly in thermal electricity generation, as much energy is lost as heat.

Transformation losses in electricity generation are derived from the net electricity generated, with the actual fuel input being used where available and the conversion factors shown in Table B.1 used otherwise. Fuel input to biogas, hydro, wind and waste heat are fully estimated. Quarterly figures for electricity generation are derived from actual data from major generators and the Electricity Authority. Estimates are made where actual data are unavailable at the time of publishing.

Table B.1: Default Electrical Transformation Factors

FUEL	DEFAULT EFFICIENCY
Biogas	30%
Coal	30%
Gas (Single Cycle) †	30%
Geothermal ‡	15%
Hydro	100%
Oil	30%
Waste Heat	15%
Wind	100%
Wood	25%

* Default efficiencies are only used where real data is unavailable.

† For combined cycle plants, the assumed efficiency is 55%. Currently, however, actual fuel input data are collected for all combined cycle plants.

‡ Geothermal is predominantly based on real plant steam data and uses a 15% efficiency where these are unavailable.

Liquid biofuel production (bioethanol and biodiesel) appears as renewable energy supply in the energy balance tables. As bioethanol and biodiesel are generally blended with motor petrol and diesel before consumption, liquid biofuel also appears in Energy Transformation under Fuel Production.

Losses and own use in the energy balances include losses before and after transformation, losses and own use in production, transmission and distribution losses, electricity industry own use free of charge, and oil industry losses and own use (which includes distribution tankage losses, stocks, accounts adjustment and own consumption). Transformation losses are excluded.

Non-energy use is primary energy used for purposes other than combustion, e.g. bitumen used in road construction, and natural gas used as chemical feedstock in the production of methanol and ammonia/urea.

Treatment of Solar Photovoltaic Panels

Estimates of the amount of electricity generated using solar photovoltaics (PV) are included in the energy balance tables in this edition of Energy in New Zealand. The total primary energy supply of solar is the sum of the direct use of solar thermal (i.e. for hot water heating), and the amount of solar energy directly converted into electricity via PV panels.

Solar PV electricity generation is estimated using data on the total installed capacity of grid-connected solar PV installations in New Zealand , and then converted to output using an assumed capacity factor of 14% (i.e. the solar panels produce their full output 14% of the time). Consumption of solar thermal is included in the demand section of the energy balance table under Renewables – Solar, whereas the consumption of electricity generated by solar PV panels appears under Electricity. Solar PV consumption by sector is apportioned using data from the Electricity Authority.

Demand

Consumer energy is the amount of energy consumed by final users. It excludes energy used or lost in the process of transforming energy into other forms and in bringing the energy to the final consumers. For example, natural gas is a primary energy source (see Total Primary Energy Supply), some of which is transformed into electricity, of which some is lost in transmission to consumers.

Consumer energy statistics can be either calculated from supply-side data or observed from usage data.

Consumer energy (calculated) forms the top half of the energy balance tables and is calculated as TPES less energy transformation less non-energy use.

Consumer energy (observed) forms the bottom half of the energy balance tables and it represents reported demand in the agriculture, forestry and fishing; industrial; commercial; transport and residential sectors. With the exception of domestic/national use of energy for on-road, rail, sea and air transport in the transport sector, these sectors follow the Australia New Zealand Standard Industrial Classification 2006 industry definitions.

Annual figures presented for consumer energy (observed) are actual data except for thermal fuels used for cogeneration in the industrial and commercial sectors, and biogas, wastes and wood. Estimates of on-site cogeneration demand are included in electricity end use.

Where the energy end-use is not available or confidential, the “unallocated” category is used.

International transport includes international sea and air transport. It excludes coastal shipping, national air transport and all land transport.

Statistical differences shows the difference between “consumer energy (calculated)” and “consumer energy (observed)”. This difference is shown at the bottom of the energy balance tables.

Table B.2: Energy Supply and Demand Balance, Calendar Year 2015

	Converted into Petajolues using Gross Calorific Values	COAL			OIL							
		Bituminous & Sub-bitum.	Lignite	Total	Crudes/ Feed-stocks/ NGL	LPG	Petrol	Diesel	Fuel Oil	Av. Fuel/ Kero	Others	Total
SUPPLY	**Indigenous Production**	80.36	4.94	**85.30**	87.59	9.59						**97.18**
	• Imports	9.67	0.00	**9.67**	243.10	0.37	48.55	33.72	-	3.19	6.81	**335.75**
	• Exports	43.06	-	**43.06**	84.58	1.83	-	0.96	5.56	-	-	**92.93**
	• Stock Change	-8.40	-0.04	**-8.44**	-14.61	-0.13	7.85	0.78	1.71	-0.17	-1.21	**-5.78**
	• International Transport						0.00	1.63	12.41	40.36	-	**54.39**
	TOTAL PRIMARY ENERGY	**55.38**	**4.99**	**60.36**	**260.73**	**8.26**	**40.69**	**30.35**	**-19.67**	**-37.00**	**8.02**	**291.38**
	ENERGY TRANSFORMATION	**-33.81**	**-0.28**	**-34.09**	**-257.93**	**-0.01**	**68.23**	**93.16**	**26.42**	**49.74**	**4.73**	**-15.66**
	• Electricity Generation	-11.99	-	**-11.99**				-0.01	-			**-0.01**
	• Cogeneration	-7.74	-0.25	**-7.99**								
	• Fuel Production				-257.80		68.05	92.92	26.42	49.76	13.17	**-7.48**
	• Other Transformation	-11.84	-	**-11.84**								
	• Losses and Own Use	-2.23	-0.03	**-2.26**	-0.13	-0.01	0.18	0.26	0.01	-0.02	-8.44	**-8.16**
Non-energy Use											**-12.75**	**-12.75**
CONSUMER ENERGY (calculated)		**21.57**	**4.70**	**26.27**	**2.80**	**8.25**	**108.92**	**123.51**	**6.75**	**12.74**	**-**	**262.98**
DEMAND	**Agriculture, Forestry and Fishing**	**2.08**	**0.02**	**2.10**		**0.08**	**1.43**	**16.54**	**1.61**	**-**		**19.66**
	• Agriculture	2.07	0.02	**2.09**		0.08	1.32	12.04	-	-		**13.43**
	• Forestry and Logging	0.01	-	**0.01**			0.01	3.07	-	-		**3.08**
	• Fishing	-	-	**-**			0.11	1.43	1.61	-		**3.15**
	Industrial	**18.43**	**4.16**	**22.58**		**3.09**	**0.41**	**13.82**	**1.22**	**-**		**18.54**
	• Mining	-	-	**-**			0.00	2.90	-	-		**2.91**
	• Food Processing	13.13	4.14	**17.28**			-	-	-	-		**-**
	• Textiles	0.10	-	**0.10**								
	• Wood, Pulp, Paper and Printing	0.42	0.01	**0.43**								
	• Chemicals	0.00	-	**0.00**								
	• Non-metallic Minerals	4.52	0.00	**4.52**								
	• Basic Metals	0.07	-	**0.07**			-	-	-	-		**-**
	• Mechanical/Electrical Equipment	0.00	-	**0.00**								
	• Building and Construction	-	-	**-**			0.01	3.72	0.02	-		**3.75**
	• Unallocated	0.17	-	**0.17**		3.09	0.41	7.19	1.20	-		**11.88**
	Commercial	**0.61**	**0.38**	**1.00**		**1.32**	**0.32**	**4.62**	**0.01**	**-**		**6.27**
	Transport	**0.01**	**-**	**0.01**		**0.36**	**107.44**	**87.51**	**5.86**	**12.41**		**213.59**
	Residential	**0.19**	**0.21**	**0.39**		**3.03**	**-**	**0.11**	**-**	**-**		**3.13**
CONSUMER ENERGY (observed)		**21.32**	**4.77**	**26.09**	**-**	**7.88**	**109.61**	**122.59**	**8.70**	**12.41**	**-**	**261.19**
Statistical Differences		**0.25**	**-0.06**	**0.19**	**2.80**	**0.37**	**-0.69**	**0.92**	**-1.95**	**0.33**	**-**	**1.78**

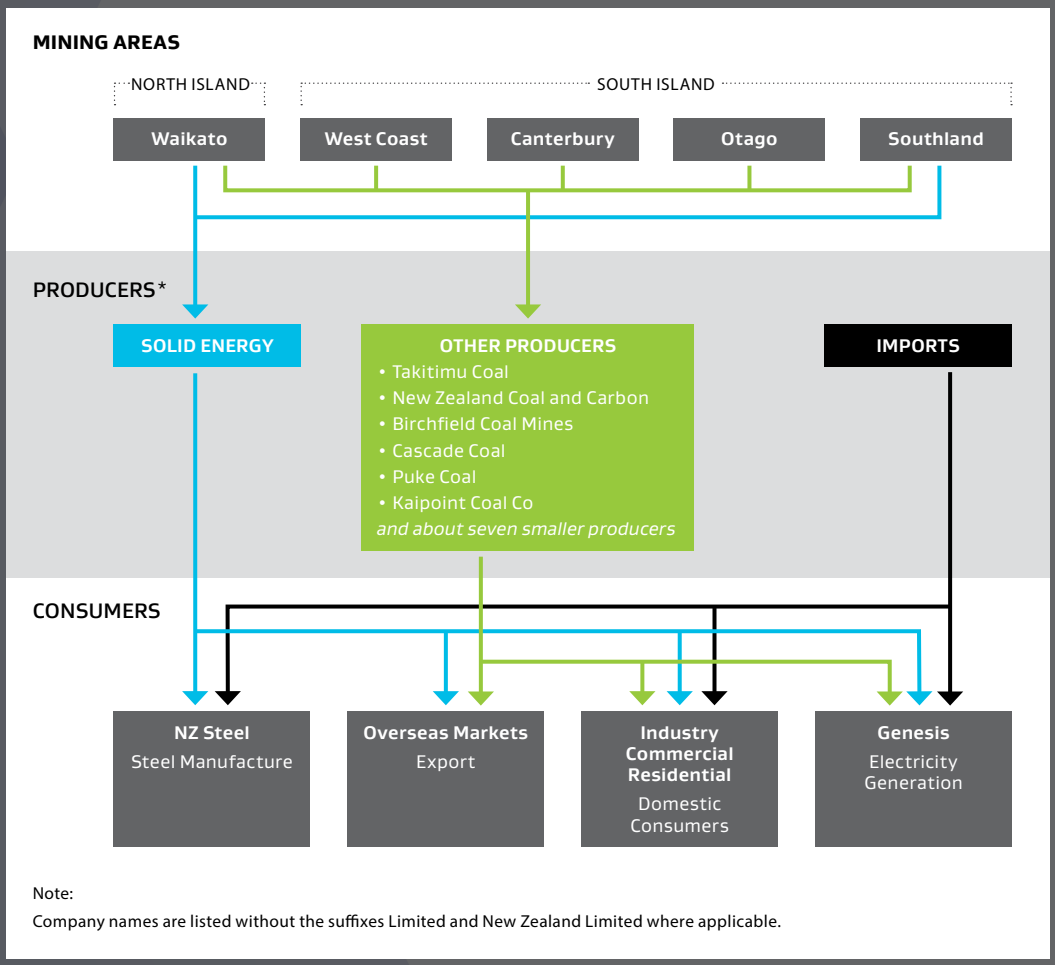
	NATURAL GAS	RENEWABLES								ELECTRICITY	WASTE HEAT	TOTAL
	Total	Hydro	Geothermal	Solar	Wind	Liquid Biofuels	Biogas	Wood	Total	Total	Total	
	188.09	88.30	203.92	0.48	8.48	0.13	3.30	58.94	**363.55**		**1.36**	**735.49**
												345.42
												135.98
	-2.12											**-16.33**
												54.39
	190.21	**88.30**	**203.92**	**0.48**	**8.48**	**0.13**	**3.30**	**58.94**	**363.55**		**1.36**	**906.87**
	-62.98	**-88.30**	**-196.47**	**-0.12**	**-8.48**	**-0.13**	**-2.97**	**-4.84**	**-301.31**	**143.58**	**-1.36**	**-271.82**
	-41.22	-88.30	-194.76	-0.12	-8.48		-2.09		**-293.76**	**149.74**		**-197.25**
	-15.22		-1.70				-0.88	-4.84	**-7.42**	**9.27**	**-1.36**	**-22.72**
	-					-0.13			**-0.13**			**-7.61**
												-11.84
	-6.54									**-15.43**		**-32.39**
	-50.18											**-62.93**
	77.04		**7.45**	**0.36**	**-**	**-**	**0.33**	**54.10**	**62.24**	**143.58**	**-**	**572.12**
	1.65		**0.60**						**0.60**	**10.17**		**34.18**
	1.65		0.60						**0.60**	**9.29**		**27.06**
	0.00									**0.72**		**3.81**
	-									**0.16**		**3.31**
	61.58		**4.01**				**0.05**	**45.94**	**50.00**	**53.56**		**206.26**
	0.07									**1.46**		**4.43**
	17.01									**8.80**		**43.09**
	0.50									**0.37**		**0.98**
	5.03									**9.53**		**14.99**
	34.05									**2.84**		**36.89**
	1.67									**1.16**		**7.35**
	2.38									**23.45**		**25.91**
	0.27									**0.67**		**0.94**
	0.44									**1.37**		**5.57**
	0.16		4.01				0.05	45.94	**50.00**	**3.90**		**66.12**
	8.84		**2.55**				**0.28**		**2.83**	**34.24**		**53.17**
	0.02						**-**		**-**	**0.22**		**213.85**
	6.78		**0.30**	**0.36**				**8.16**	**8.82**	**45.08**		**64.21**
	78.87	**-**	**7.45**	**0.36**	**-**		**0.33**	**54.10**	**62.24**	**143.28**	**-**	**571.67**
	-1.83		**0.00**	**-**	**-**		**-**	**-**	**-**	**0.30**	**-**	**0.44**

C. COAL

INTRODUCTION

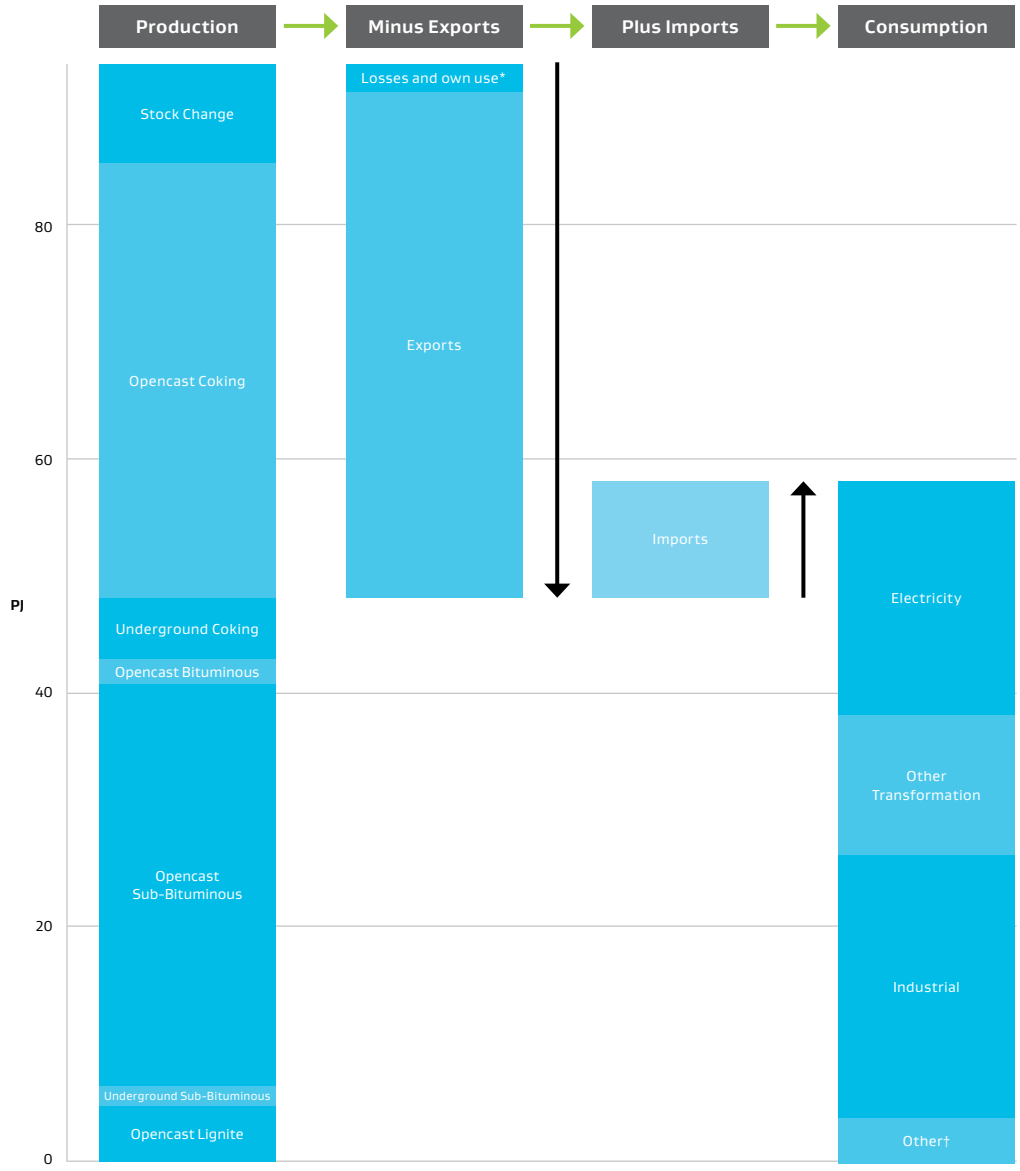
This section contains information about coal production (supply) and sales to consumers (demand). Information on coal is presented for the 2015 calendar year. Background information on New Zealand's coal industry can be found on the New Zealand Petroleum and Minerals website: http://www.nzpam.govt.nz/cms/investors/our-resource-potential/minerals/coal

Figure C.1: Coal Industry Summary for 2015



Note:
Company names are listed without the suffixes Limited and New Zealand Limited where applicable.

Figure C.2: Coal Energy Flow Diagram for 2015



* Includes use at production sites and distribution losses.

† Includes commercial, residential, agriculture and transport.

Resources

New Zealand has extensive coal resources, mainly in the Waikato and Taranaki regions of the North Island, and the West Coast, Otago and Southland regions of the South Island. It has been estimated that national in-ground resources for all coal types are over 15 billion tonnes, although 80% of this is lignite within the South Island.

Sub-bituminous and bituminous in-ground resources are around 4 billion tonnes, but economic reserves are much smaller and depend on:

- geological conditions;
- technical constraints to mining;
- mining economics;
- land access;
- resource consents;
- market size and certainty;
- market price; and
- transport costs.

Production

New Zealand produced 3.4 million tonnes (85 PJ) of coal in 2015, a 15% decrease from 2014 and the lowest annual production since 1998. Driving this were companies responding to sustained low international coal prices through reducing production, or putting mines into care and maintenance.

Despite lignite making up 80% of national coal resources, it only accounted for 10% of total production in 2015. Lignite has a low energy content and is mined a long distance from the main centres of energy demand.

Coal production is centred in the Waikato (1.0 million tonnes, mainly for several major industrial users and the Huntly Power Station), on the West Coast (1.6 million tonnes, mainly for export) and in Southland (0.7 million tonnes, mainly for local industrial markets). The remaining production occurs within Otago and Canterbury. All lignite is produced in the lower South Island, and all bituminous coal is from the West Coast. The North Island only produces sub-bituminous coal.

There were 18 coal mines operating in 2015. Only two of these were underground; one has since been placed in care and maintenance, and the other has closed. The two largest open-cast operations, at Stockton and Rotowaro, accounted for 58% of national production. Solid Energy was responsible for about 73% of national production, but was placed in voluntary administration in August 2015. A number of smaller private coal mining companies produce the remainder.

There are currently 57 permits and 12 licences granted by New Zealand Petroleum and Minerals to mine coal, some of which are not producing. Additionally, there is one granted coal prospecting permit and 53 granted coal exploration permits. The Crown does not own all of New Zealand's coal resources. Mining of privately owned coal is not subject to the Crown Minerals Act 1991, although preceding legislation covers mining of some privately owned coal.

Figure C.3: Annual Coal Production by Rank and Mining Method

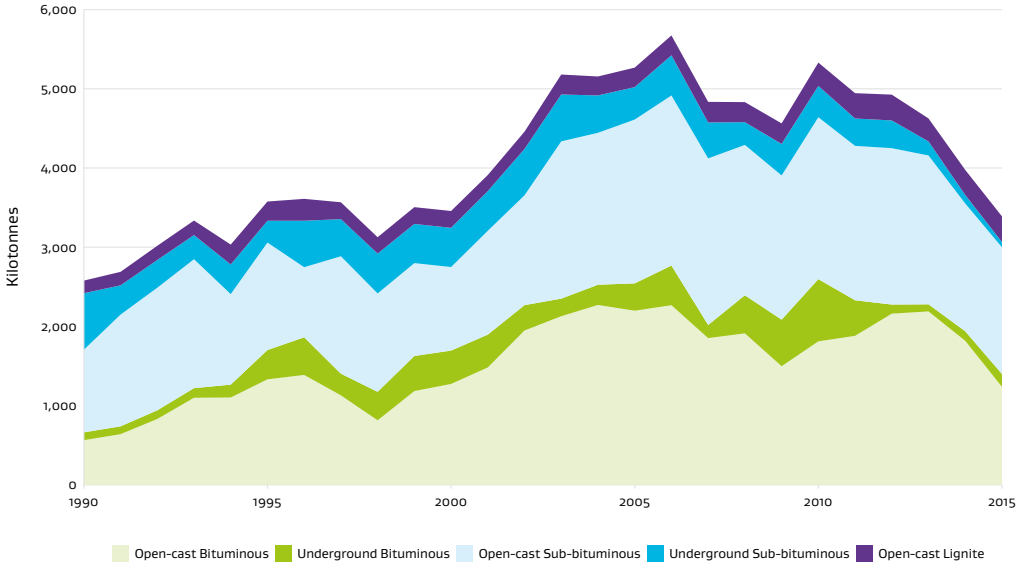
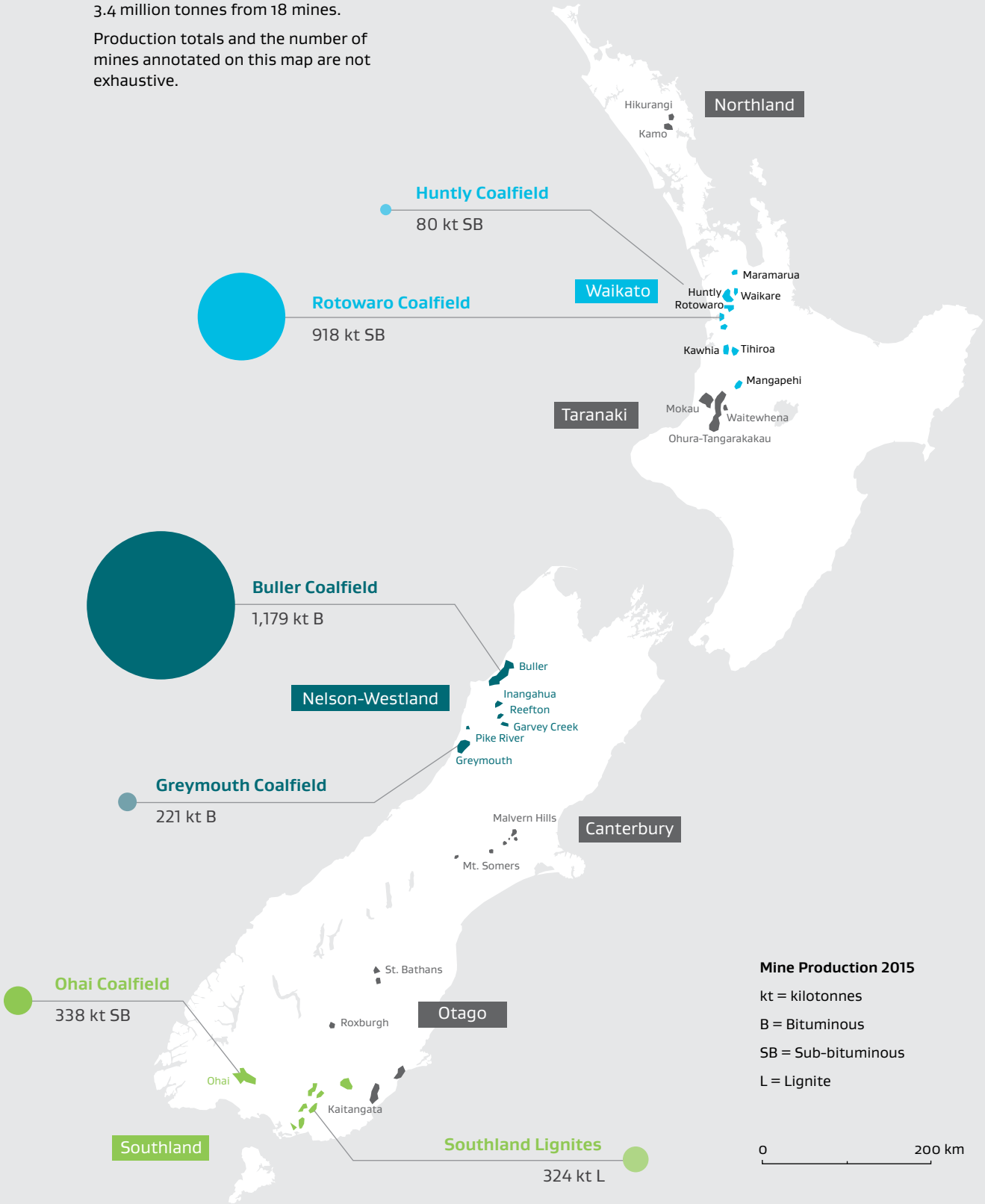
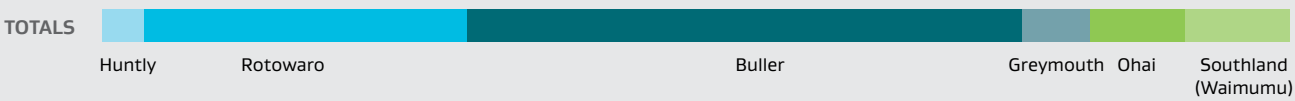


Figure C.4: Location of New Zealand Coal Resources and 2015 Coal Production

2015 national coal production totalled 3.4 million tonnes from 18 mines.

Production totals and the number of mines annotated on this map are not exhaustive.



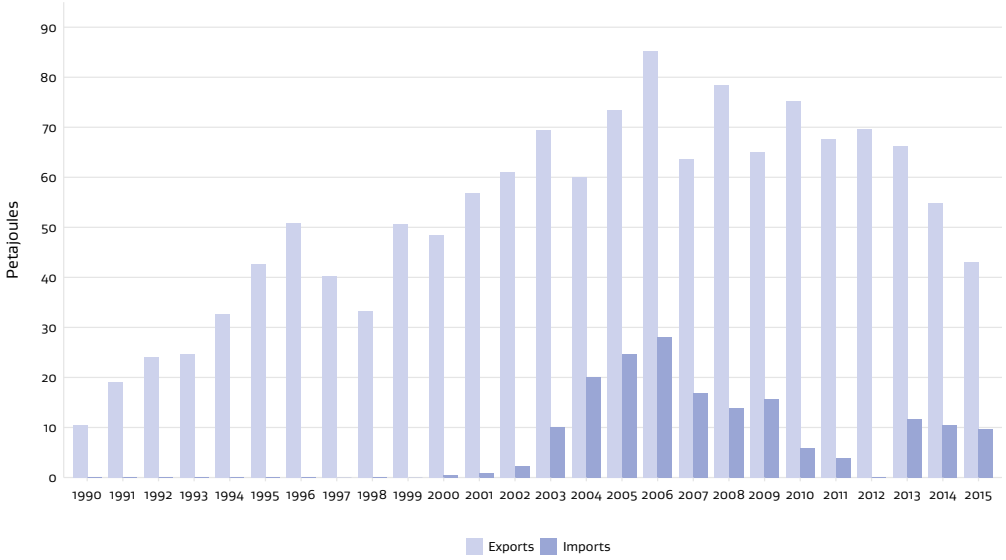


Exports and Imports

In 2015, New Zealand exported 1.4 million tonnes (43 PJ) of coal and imported 0.4 million tonnes (10 PJ).[3] Coal exports were down 21% from the previous year due to a continued decline in international coal prices and production cuts at key export mines, such as Stockton.

Most of New Zealand's bituminous coal production is exported, accounting for 97% of total coal exports in 2015. These coals are valued internationally for their low ash contents, and other characteristics such as high swelling, fluidity and reactivity, which allow them to be blended with other coals for use in the steel industry.[4] New Zealand coal is exported mainly to India and Japan, with smaller quantities in 2015 going to China and Chile. Most exports are of coking coal, with smaller amounts of thermal and specialist coals.

Figure C.5: Coal Imports and Exports



Consumption

Total coal supplied was 2.8 million tonnes (60 PJ) in 2015, a decrease of 1.3% from the previous year.

New Zealand's biggest individual users of coal in 2015 were the Glenbrook steel mill and the Huntly Power Station. The Glenbrook steel mill consumed just over 0.9 million tonnes. The Huntly Power Station consumed around 0.6 million tonnes, 9.2% less than in 2014, as coal-fired electricity generation fell to its lowest level since 2000. In August 2015, Genesis Energy announced its intention to close the Huntly Power Station.[5]

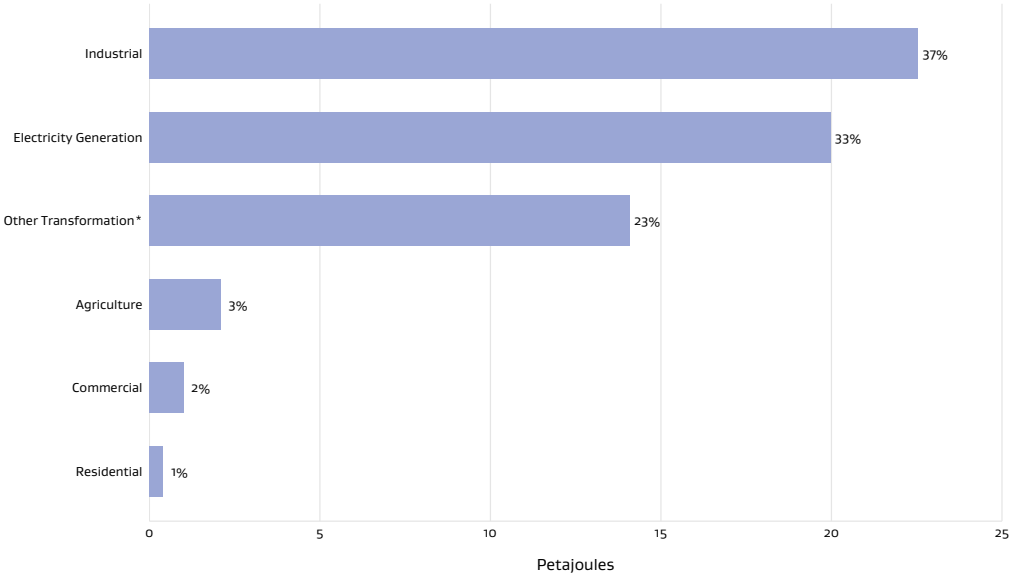
The industrial sector accounted for 37% of total consumption in 2015. Industrial coal use is primarily for meat, dairy, and cement, lime and plaster manufacturing. Use by the dairy manufacturing sector continued to grow, exceeding 0.7 million tonnes in 2015. Despite dairy manufacturing's increase, falling use in other manufacturing activities meant that total coal use by the industrial sector was down 1.9% from 2014.

3 Complete import data were not available, so the Ministry has imputed coal imports using reported sales and usage.

4 West Coast bituminous coals are not suitable for use at the New Zealand Steel plant in Glenbrook, Auckland.

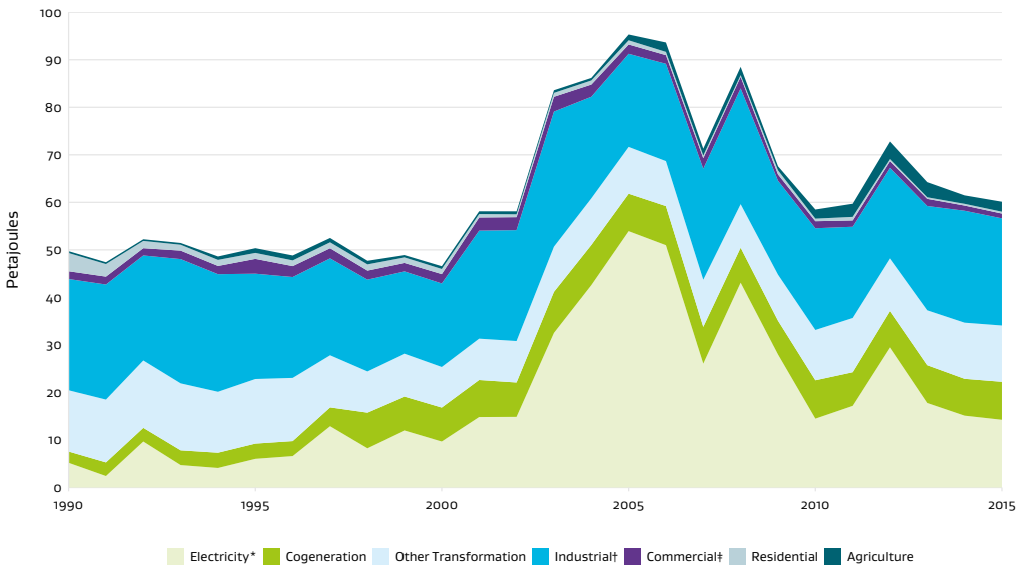
5 It was initially announced that the remaining units at the Huntly Power Station would be closed at the end of 2018. As at the time of publication, Genesis Energy has extended the closure date to the end of 2022.

Figure C.6: Coal Consumption by Sector for 2015



* Includes coal used as a reductant in steel manufacturing

Figure C.7: Summary of Observed Coal Consumption by Sector



* Includes losses and own use
† Excludes cogeneration
‡ Includes Transport

D. OIL AND GAS

This section contains information on New Zealand's oil and gas industry, presented for the 2015 calendar year. Oil and gas reserves are presented first, followed by oil and gas supply and demand.

More information on oil and gas exploration in New Zealand can be found on the New Zealand Petroleum and Minerals website: http://www.nzpam.govt.nz/cms/investors/our-resource-potential/petroleum

Percentage changes in this section are calculated based on petajoules. This controls for differences in the energy content of different oil product types, and gas produced from different fields.

Liquified petroleum gas (LPG) data is presented in the Oil section.

Exploration and Development

- Total expenditure in 2015 was $1.327 billion, down 36% from 2014 which was the highest expenditure in a decade. The decrease in expenditure in 2015 was due to lower levels of exploration and development drilling.
- Production permit expenditure was $1141 million in 2015, down 29% from the previous year. Approximately $360 million was spent on well drilling activities.
- Total exploration permit expenditure was $187 million, 58% lower than the record set in 2014. The 2014 year saw the highest exploration permit expenditure on record, as a result of two major deep-water drilling operations. While exploration drilling activity was lower than in 2014, expenditure on seismic acquisition increased.
- There were 10 wells drilled in 2015 compared to 33 in 2014.
- Seismic data acquisition increased from 2014. 3D seismic acquisition was up 17% to 6,699 square kilometres, and 2D seismic acquisition reached its highest level since 2008. 3D processing rose to 2,706 square kilometres, up from 212 square kilometres in 2014.

Permits

- Nine exploration permits were granted under Block Offer 2015, with an overall acreage of 12,111 square kilometres.
  - Three of these permits were in onshore Taranaki (all awarded to Petrochem, 100 per cent owned by Greymouth Petroleum).
  - There were six offshore permits awarded, all in the Taranaki Basin. Four of these permits were awarded to OMV, and Todd Exploration and Mont d'Or Resources were each awarded one permit.
- Two Petroleum Prospecting Permits (PPPs) were granted in 2015. No Petroleum Mining Permits (PMPs) were granted.
- The number of granted PPPs and Petroleum Exploration Permits (PEPs) fell by eight to 51. The number of granted PMPs and Petroleum Mining Licences (PMLs) remained unchanged at 25.

Figure D.1: Taranaki Oil and Gas Fields

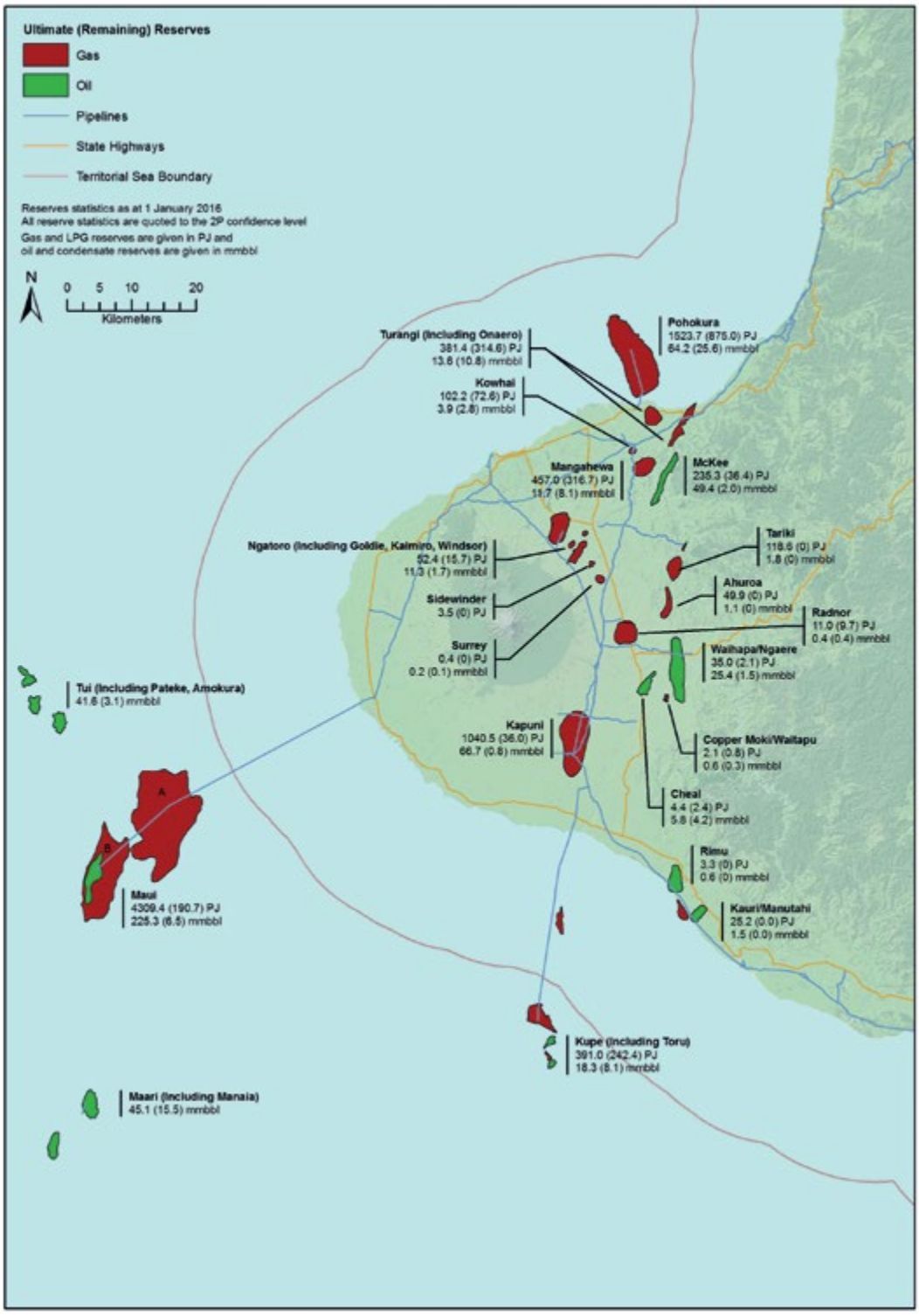


Table D.1: National Summary of Activity and Expenditure (All Petroleum Exploration and Mining Permits/Licenses)

National Totals – Activity Statistics Combined for PPPs, PEPs, PMPs and PMLs	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Exploration Wells									18	22	1
Appraisal Wells									5	1	1
Development Wells									9	10	8
Total Wells Drilled	**34**	**30**	**43**	**34**	**37**	**45**	**52**	**33**	**32**	**33**	**10**
Exploration Well Metres Made									43104	51572	2811
Appraisal Wells Metres Made									17482	2943	689
Development Wells Metres Made									32842	44660	24128
Total Metres Made	**87,533**	**112,369**	**99,854**	**51,037**	**64,596**	**76,026**	**63,669**	**72,177**	**93,428**	**99,176**	**27,628**
Exploration Well Expenditure ($NZDm)									$206.78	$468.69	$19.01
Appraisal Well Expenditure ($NZDm)									$93.82	$114.28	-$0.52
Development Well Expenditure ($NZDm)									$358.15	$540.93	$341.27
Total Well Expenditure ($NZDm)									**$658.76**	**$1,123.90**	**$359.76**
2-D Seismic Acquired (km)	3,764	13,240	14,424	25,749	12,058	9,751	8,353	220	315	15,524	22,455
2-D Seismic Reprocessed (km)	14,707	30,627	20,019	11,411	6,989	21,512	7,911	6,387	5,917	11,299	14,783
3-D Seismic Acquired (km^2)	3,120	2,360	935	991	1,151	204	6,864	164	6,825	5,743	6,699
3-D Seismic Reprocessed (km^2)	247	2,147	407	432	457	1,244	1,214	9,484	1,113	212	2,706
Acquisition Expenditure									$66.12	$95.52	$106.04
Reprocessing Expenditure									$3.95	$2.76	$3.60
Total Seismic Expenditure ($NZDm)									**$70.07**	**$98.28**	**$109.64**
PEP & PPP National Expenditure ($NZDm)	$186	$133	$200	$314	$191	$246	$159	$212	$313	$449	$187
PMP/PML National Expenditure ($NZDm)	$553	$574	$1,359	$963	$1,202	$1,095	$1,084	$1,267	$1,265	$1,616	$1,141
Expenditure, All Permits – National Total ($NZDm)	**$739**	**$707**	**$1,559**	**$1,277**	**$1,393**	**$1,341**	**$1,243**	**$1,479**	**$1,577**	**$2,065**	**$1,327**

National Totals – Activity Statistics Combined for PPPs, PEPs, PMPs and PMLs	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
PPPs Granted								1	0	3	2
PEPs Granted	5	16	19	15	9	10	3	16	11	15	9
PMPs Granted	5	2	2	0	2	1	0	1	0	1	0
Total Permits Granted	**10**	**18**	**21**	**15**	**11**	**11**	**3**	**18**	**11**	**19**	**11**
Permits surrenderred									12	9	15
Permits expired									3	2	2
Permits revoked									0	0	2
Total Permits Ended	**14**	**25**	**20**	**13**	**21**	**11**	**14**	**13**	**15**	**11**	**19**
Number of PEPs & PPPs at Granted Status	104	79	76	89	71	70	73	56	52	59	51
Number of PMPs and PMLs at Granted Status	19	21	23	23	24	23	23	24	24	25	25

PEPs = Petroleum exploration permits.
PPPs = Petroleum prospecting permits.
PMPs = Petroleum mining permits (production permits).
PMLs = Petroleum mining licences (production permits).

Reserves

- **Reserves** are the estimated total amounts of oil and gas that are able to be recovered from a known petroleum reservoir. **Ultimate recoverable reserves** are the total economically recoverable reserves before any oil or gas is produced. **Remaining reserves** are ultimate recoverable reserves, less production to date. The most certain reserves figures are presented as "proved" (**1P**), followed by "proved plus probable" (**2P**), then "proved plus probable plus possible" (**3P**).
- Oil and condensate remaining recoverable reserves (2P) decreased 21% to 91 mmbbl from 1 January 2015. Remaining reserves fell at both Maari (down 34%) and Maui (down 54%), while reserves at Turangi rose 57% over the same period.
- Oil and condensate ultimate recoverable reserves (2P) increased 8% to 587 mmbbl. This was mainly due to the addition of historical reservoir data at the Maui field, which rose 30% to 225 mmbbl.
- Natural gas and LPG remaining recoverable reserves fell 9% to 2116 PJ. Despite a 56% fall at Maui, there was a net increase of 14 PJ from 1 January 2015. The largest increases were at Turangi (up 48%) and Mangahewa (up 13%).
- Natural gas and LPG ultimate recoverable reserves (2P) were up 0.3%. Turangi rose 44% and Mangahewa rose 15%, while reserves at Maui fell 4%.
- Further data are also available on 3P reserves, LPG reserves, contingent resources, oil and gas initially in place and system deliverability at: http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand

Table D.2: Oil and Condensate Reserves

Field	Type	Ultimate Recoverable (1P)			Ultimate Recoverable (2P)			Remaining Reserve (1P) as at 1 January 2016			Remaining Reserve (2P) as at 1 January 2016		
		Mm^3	mmbbls	PJ	Mm^3	mmbbls	PJ	Mm^3	mmbbls	PJ	Mm^3	mmbbls	PJ
Pohokura	Condensate	9.6	60.5	336.2	10.2	64.2	356.5	3.5	21.9	121.9	4.1	25.6	142.2
Maari	Crude Oil	6.2	38.7	251.8	7.2	45.1	293.3	1.4	9.1	59.0	2.5	15.5	100.5
Turangi	Condensate	1.4	8.6	43.0	2.2	13.6	68.3	0.9	5.7	28.7	1.7	10.8	54.0
Mangahewa	Condensate	1.3	7.9	50.2	1.9	11.7	74.4	0.7	4.3	27.3	1.3	8.1	51.5
Kupe	Condensate	2.4	14.8	81.7	2.9	18.3	100.8	0.7	4.6	25.2	1.3	8.1	44.4
Maui	Condensate	35.5	223.4	1263.6	35.8	225.3	1274.3	0.7	4.6	26.0	1.0	6.5	36.6
Cheal	Crude Oil	0.5	3.2	19.0	0.9	5.8	34.8	0.2	1.5	9.2	0.7	4.2	25.0
Tui	Crude Oil	6.4	40.0	246.7	6.6	41.6	256.3	0.3	1.6	9.7	0.5	3.1	19.4
Kowhai	Condensate	0.3	1.9	11.9	0.6	3.9	24.0	0.1	0.9	5.3	0.4	2.8	17.4
McKee	Crude Oil	7.6	47.6	288.5	7.9	49.4	299.4	0.0	0.2	1.2	0.3	2.0	12.1
Waihapa/ Ngaere	Crude Oil	4.0	24.9	149.3	4.0	25.4	152.0	0.2	1.0	6.2	0.2	1.5	8.9
Ngatoro	Crude Oil	1.6	10.3	50.7	1.8	11.3	55.3	0.1	0.8	3.9	0.3	1.7	8.5
Kapuni	Condensate	10.5	66.2	360.9	10.6	66.7	363.5	0.1	0.3	1.7	0.1	0.8	4.4
Radnor	Crude Oil	0.0	0.2	1.3	0.1	0.4	2.1	0.0	0.2	0.9	0.1	0.4	1.8
Copper Moki	Crude Oil	0.1	0.5	2.8	0.1	0.6	3.9	0.0	0.1	0.7	0.0	0.3	1.8
Surrey	Crude Oil	0.0	0.2	1.1	0.0	0.2	1.2	0.0	0.0	0.2	0.0	0.1	0.3
Tariki	Crude Oil	0.3	1.8	10.5	0.3	1.8	10.5	0.0	0.0	0.0	0.0	0.0	0.0
Kauri/ Manutahi	Crude Oil	0.2	1.5	9.4	0.2	1.5	9.4	0.0	0.0	0.0	0.0	0.0	0.0
Ahuroa	Crude Oil	0.2	1.1	6.4	0.2	1.1	6.4	0.0	0.0	0.0	0.0	0.0	0.0
Rimu	Crude Oil	0.1	0.6	3.9	0.1	0.6	3.9	0.0	0.0	0.0	0.0	0.0	0.0
Moturoa	Crude Oil	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total†		**88.1**	**554.0**	**3189.1**	**93.6**	**588.5**	**3390.7**	**9.0**	**56.9**	**327.2**	**14.5**	**91.3**	**528.8**
All Fields#		**92.1**	**579.3**	**3325.5**	**93.6**	**588.5**	**3390.7**	**13.1**	**82.2**	**471.9**	**14.5**	**91.3**	**528.8**

† Arithmetic total.

The All Fields 1P values were estimated based on probabilistic summation using a Monte Carlo simulation. Arithmetic summation of 1P values will return a number with a much lower probability of occurring (0.1^n). 2P values may be totalled safely using arithmetic summation since they are the mid-point of the probability distribution.

Figure D.2a: Oil and Condensate Remaining Reserves (2P)

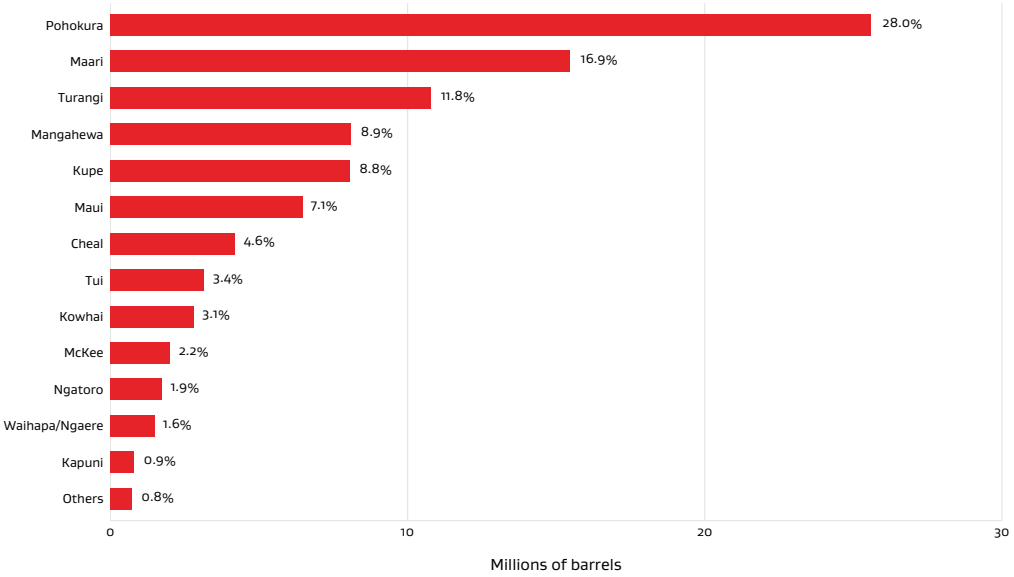
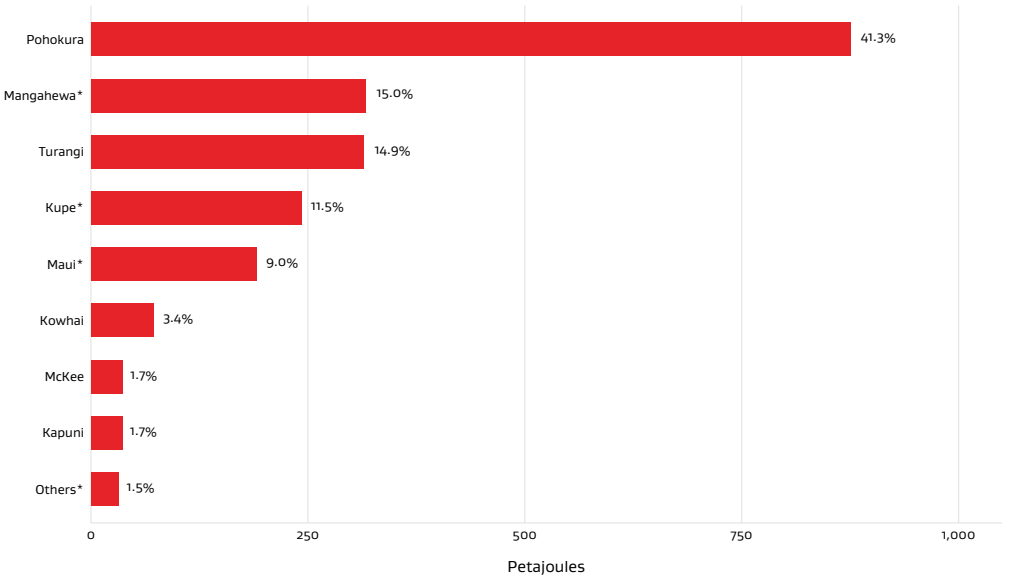


Figure D.2b: Natural Gas and LPG Remaining Reserves (2P)



* Includes LPG

Table D.3: Natural Gas

Field	Ultimate Recoverable (1P)			Ultimate Recoverable (2P)			Remaining Reserve (1P) as at 1 January 2016			Remaining Reserve (2P) as at 1 January 2016		
	Mm^3	Bcf	PJ	Mm^3	Bcf	PJ	Mm^3	Bcf	PJ	Mm^3	Bcf	PJ
Pohokura	34919.7	1233.2	1445.7	36804.1	1299.7	1523.7	19251.9	679.9	797.0	21136.4	746.4	875.0
Mangahewa	7685.2	271.4	299.3	11635.5	410.9	453.2	4100.3	144.8	159.7	8050.5	284.3	313.6
Turangi*	5847.6	206.5	239.2	9324.6	329.3	381.4	4213.9	148.8	172.3	7690.9	271.6	314.6
Kupe	6121.0	216.2	247.9	7967.9	281.4	322.7	3081.5	108.8	124.8	4928.4	174.0	199.6
Maui	103834.0	3666.8	4101.4	105216.3	3715.7	4156.0	3240.5	114.4	128.0	4622.8	163.3	182.6
Kowhai	1336.5	47.2	53.7	2544.9	89.9	102.2	599.6	21.2	24.1	1808.0	63.8	72.6
McKee	5125.4	181.0	209.9	5745.5	202.9	235.3	269.0	9.5	11.0	889.2	31.4	36.4
Kapuni	37625.0	1328.7	1019.2	38435.0	1357.3	1040.5	562.0	19.8	14.7	1373.0	48.5	36.0
Ngatoro	1525.2	53.9	47.3	1691.5	59.7	52.4	341.1	12.0	10.6	507.4	17.9	15.7
Radnor	180.5	6.4	6.3	315.5	11.1	11.0	143.5	5.1	5.0	278.5	9.8	9.7
Cheal(1)	80.8	2.9	3.9	123.8	4.4	6.0	25.0	0.9	1.2	68.0	2.4	3.3
Waihapa/ Ngaere	852.9	30.1	34.4	868.3	30.7	35.0	35.5	1.3	1.4	50.9	1.8	2.1
Copper Moki	32.6	1.2	1.6	43.4	1.5	2.1	5.4	0.2	0.3	16.2	0.6	0.8
Tariki	2809.0	99.2	118.6	2809.0	99.2	118.6	0.0	0.0	0.0	0.0	0.0	0.0
Ahuroa	1296.9	45.8	49.9	1296.9	45.8	49.9	0.0	0.0	0.0	0.0	0.0	0.0
Kauri	587.0	20.7	24.2	587.0	20.7	24.2	0.0	0.0	0.0	0.0	0.0	0.0
Sidewinder	97.1	3.4	3.5	98.7	3.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Rimu	67.4	2.4	2.8	67.4	2.4	2.8	0.0	0.0	0.0	0.0	0.0	0.0
Surrey	8.6	0.3	0.3	9.8	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Moturoa	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total†	**210032.7**	**7417.2**	**7909.1**	**225585.5**	**7966.4**	**8521.0**	**35869.3**	**1266.7**	**1450.2**	**51420.3**	**1815.9**	**2062.0**
All Fields#	**224470.7**	**7927.1**	**8290.8**	**225585.5**	**7966.4**	**8521.0**	**49672.6**	**1754.2**	**1834.6**	**51420.3**	**1815.9**	**2062.0**

*Includes LPG

† Arithmetic total.

The All Fields 1P values were estimated based on probabilistic summation using a Monte Carlo simulation. Arithmetic summation of 1P values will return a number with a much lower probability of occurring (0.1^n). 2P values may be totalled safely using arithmetic summation since they are the mid-point of the probability distribution.

Table D.4: LPG Reserves

Field	Ultimate Recoverable (1P)		Ultimate Recoverable (2P)		Remaining Reserve (1P) as at 1 January 2016		Remaining Reserve (2P) as at 1 January 2016	
	kt	PJ	kt	PJ	kt	PJ	kt	PJ
Kupe	1048.0	52.3	1368.3	68.3	536.4	26.8	856.7	42.8
Maui	3278.3	151.0	3328.4	153.3	126.5	5.8	176.6	8.1
McKee/Mangahewa	60.0	2.9	77.8	3.8	46.9	2.3	64.7	3.2
Kauri	20.7	1.0	20.7	1.0	0.0	0.0	0.0	0.0
Rimu	10.4	0.5	10.4	0.5	0.0	0.0	0.0	0.0
Cheal	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Total†	**4417.7**	**207.8**	**4805.9**	**227.0**	**709.8**	**34.9**	**1098.0**	**54.1**
All Fields#	**4471.4**	**210.9**	**4805.9**	**227.0**	**767.4**	**38.0**	**1098.0**	**54.1**

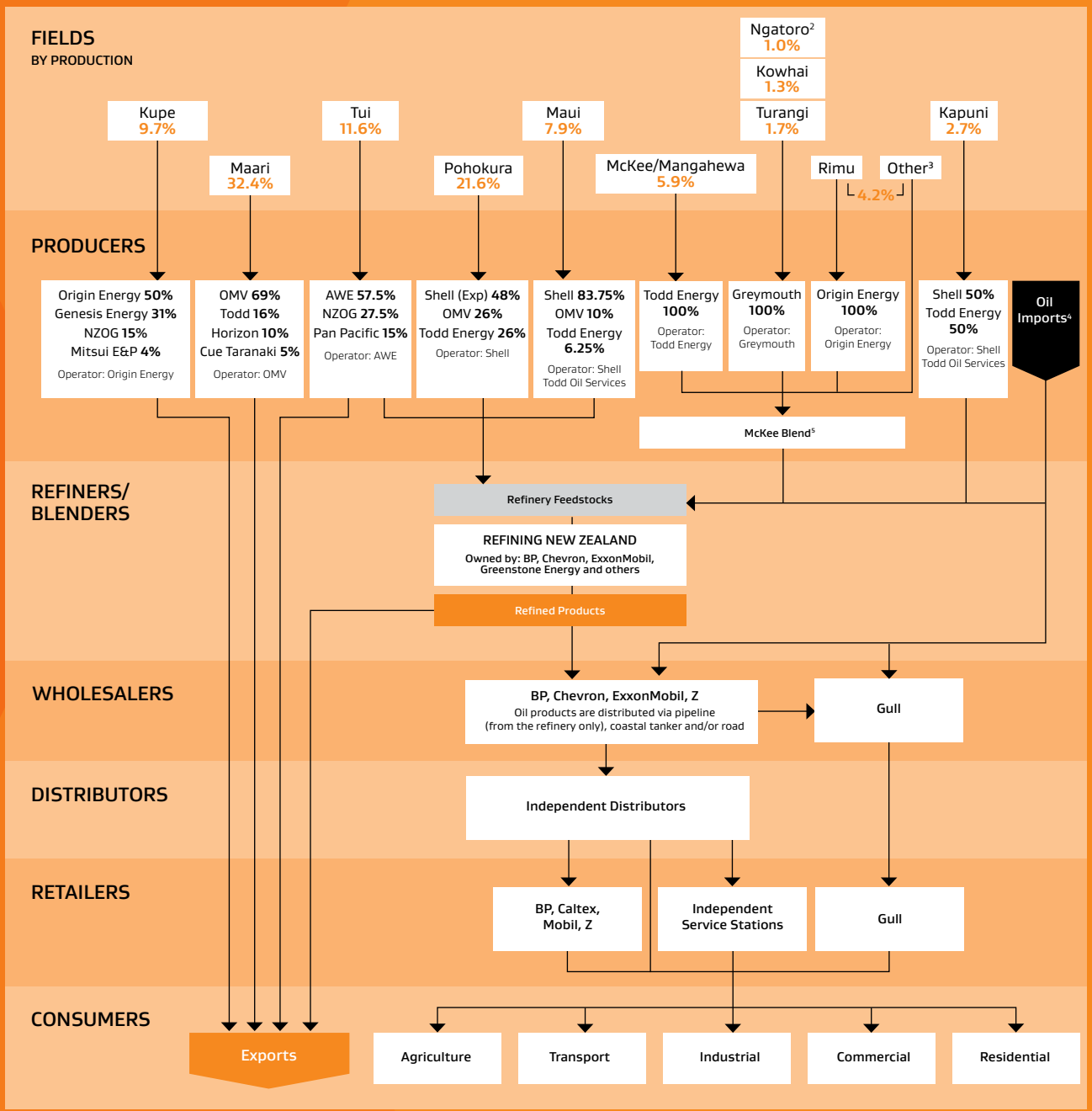
† Arithmetic total.

The All Fields 1P values were estimated based on probabilistic summation using a Monte Carlo simulation. Arithmetic summation of 1P values will return a number with a much lower probability of occurring (0.1^n). 2P values may be totalled safely using arithmetic summation since they are the mid-point of the probability distribution.

Oil and Gas

OIL

Figure D.3: Oil Flows for the 2015 Calendar Year[1]



Company names are listed without the suffixes "Limited" and "New Zealand Limited" where applicable and subsidiaries are listed as the parent company. The companies are: AWE is Australian Worldwide Exploration Limited, Chevron is Chevron NZ (includes Caltex New Zealand Limited), Greymouth is Greymouth Petroleum Holdings Limited, Mitsui E&P is Mitsui E&P Australia Pty, ExxonMobil is ExxonMobil New Zealand Holdings (includes Mobil Oil New Zealand Limited), NZOG is New Zealand Oil and Gas, OMV is OMV New Zealand Limited (Österr Mineralöl Verwaltung), Origin Energy is Origin Energy New Zealand Ltd and Contact Energy (51% owned by Origin), Shell is Shell NZ Limited (includes Shell Exploration NZ Limited, Shell (Petroleum Mining) Energy Petroleum Holdings Limited, Energy Petroleum Investments Ltd, Energy Petroleum Taranaki Ltd and Taranaki Offshore Petroleum Company), TWN comprises the Tariki, Waihapa and Ngaere fields.

Notes:

1 Ownership as at 31 December 2015.

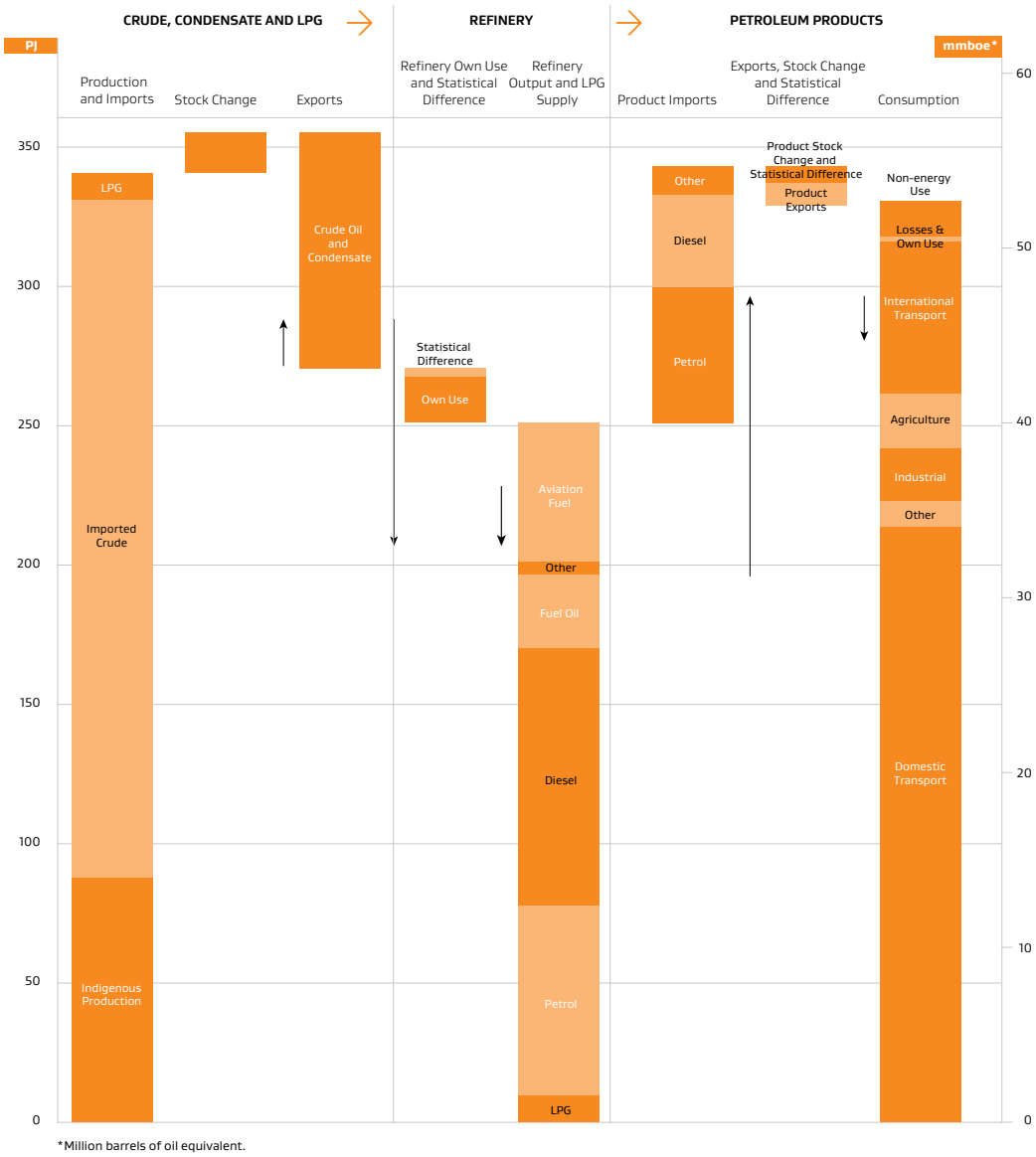
2 Kaimiro, Ngatoro and Windsor fields were combined as a single permit area in 2010. All these fields are included here, as is Moturoa.

3 Includes Cheal, Sidewinder, Copper Moki, TWN, Surrey, Onaero and Puka fields, and Radnor well . Cheal and Sidewinder are owned by Tag Oil Limited. Surrey and Onaero are owned and operated by Greymouth Petroleum. Copper Moki is owned by New Zealand Energy Corp. TWN is jointly owned by New Zealand Energy Corp and L&M Energy, and operated by New Zealand Energy Corp. Puka is owned by Kea Petroleum Holdings and MEO Australia and operated by Kea Petroleum Holdings.

4 Crude and refined product are imported by the four large oil companies. Refined product is imported by Gull Petroleum.

5 Source: Shell NZ Limited.

Figure D.4: Oil Energy Flow Summary for 2015



*Million barrels of oil equivalent.

Indigenous crude production

Indigenous production of crude oil, condensate, naphtha and natural gas liquids (herein, collectively referred to as 'crude oil') increased to its highest level since 2011. Crude oil production in 2015 was 40,900 bbl/day[6] (88 PJ), 4.8% higher than 2014. OMV completed a major redevelopment project at the Maari field in July 2015. Production at Maari was up 59% in 2015 to 12,300 bbl/day (28 PJ) of crude oil. Despite production from the Pohokura field falling 21% from 2014 to 9,200 bbl/day (19 PJ), it was the second largest producing field in 2015. Tui (4,600 bbl/day or 10 PJ), Kupe (4,200 bbl/day or 8 PJ) and Maui (3,400 bbl/day or 7 PJ) complete the five largest producing oil fields in 2015.

In 2015, New Zealand's crude oil exports rose 4.2% to 37,400 bbl/day (82 PJ). Only a small portion of New Zealand's locally produced crude oil is processed in the Marsden Point refinery. Australian refineries purchase a large amount of New Zealand's indigenous crude oil and condensate.

Figure D.5a: Oil Production by Field in 2015

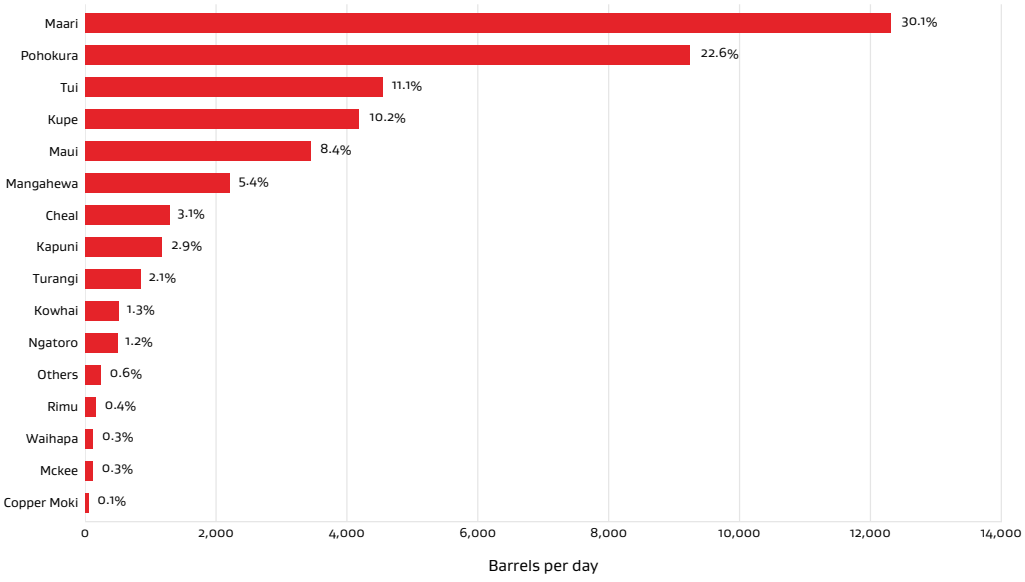
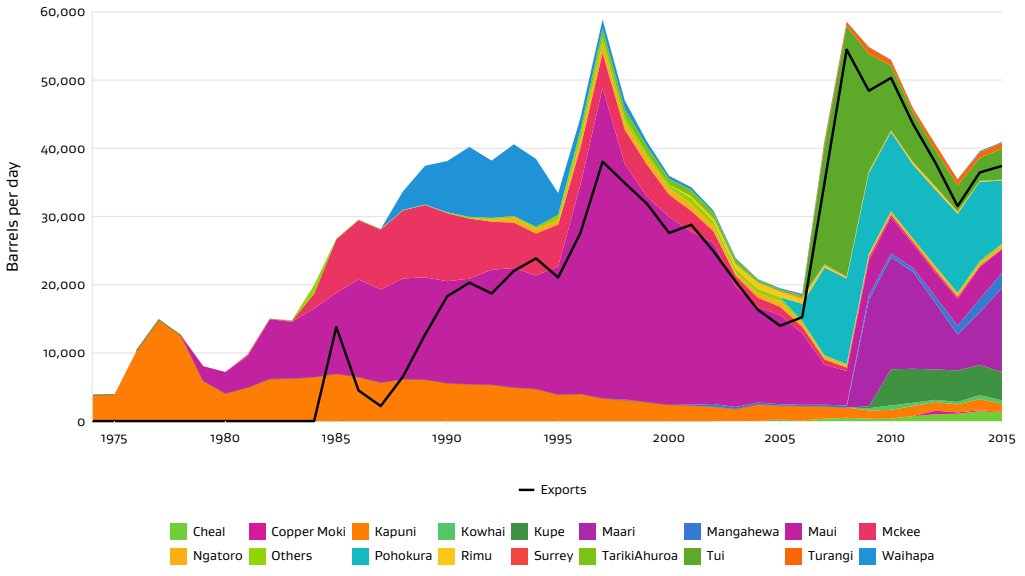


Figure D.5b: Annual Crude, Condensate, Naphtha and Natural Gas Liquids Production by Field



6 The unit 'bbl/day' refers to barrels per day. A barrel is 159 litres

Refinery

The 2015 year witnessed record intake and output from the Marsden Point refinery. The refinery processed an average of 115,600 bbl/day (258 PJ) in 2015, up 7.8% from 2014. Output of oil products averaged 110,500 bbl/day (241 PJ), up 7.7% over the same period. Refinery output of diesel and jet fuel in 2015 were the highest on record, up 8.3% and 11.6% from 2014 respectively. Petrol output reached its highest level since 2008, at 33,000 bbl/day (68 PJ) in 2015.

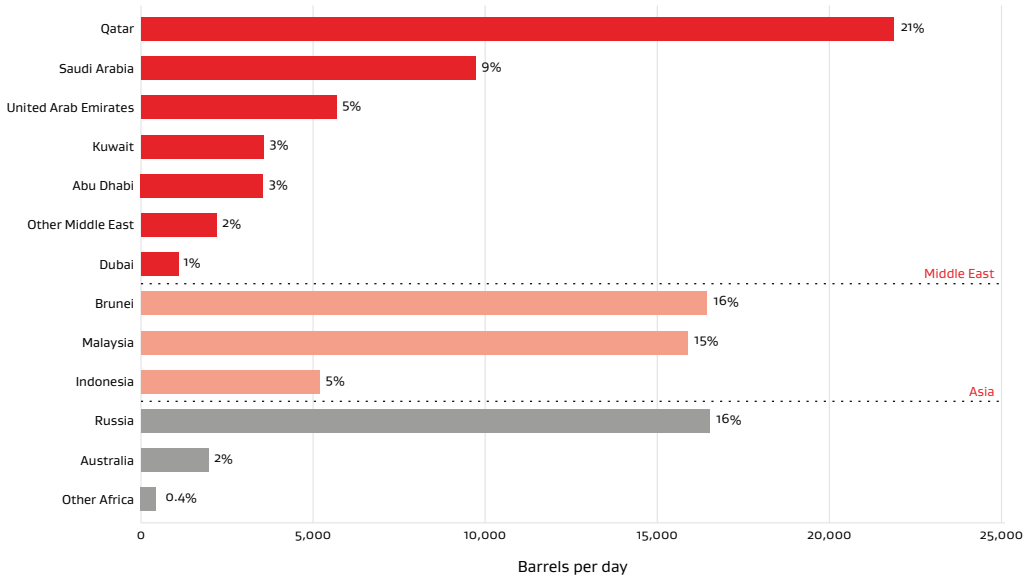
The refinery satisfied 65% of domestic demand (excluding non-energy use) in 2015, up from 62% in 2014.[7] A major $365 million upgrade project, Te Mahi Hou, was completed in 2015 and saw the replacement of the platformer with a continuous catalyst regeneration reformer (CCR).[8] The CCR reformer will allow the refinery to process a wider range of crudes and produce more petrol.

Imports

Imports of crudes and blendstocks were up 3.6%, relative to 2014. The Middle East and Asia supplied 82% of New Zealand's crude oil imports in 2015. Russia was also a significant source, accounting for 16% of imports.

Oil product imports were down 6.4% in 2015, as a result of Marsden Point's record output. Almost 90% of New Zealand's oil product imports in 2015 came from Singapore and South Korea. The USA contributed 6.0% of New Zealand's oil product import.

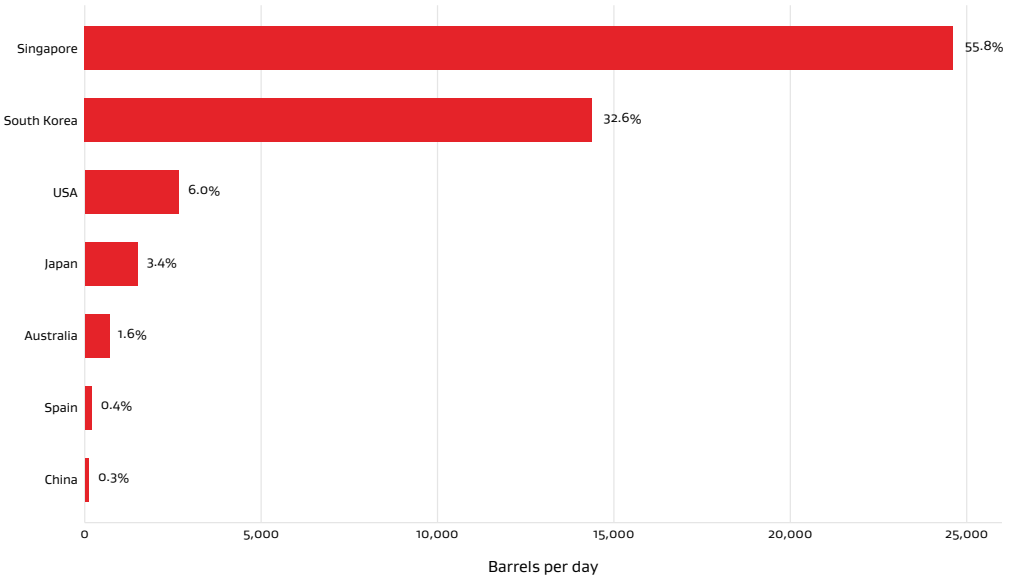
Figure D.6a: 2015 Crude Oil Imports by Country of Origin



7 Percentage is calculated as: $\frac{\text{(Refinery output - Product exports - International transport}}{\text{Domestic oil product consumption}}$

8 For more information on the CCR project, visit http://www.refiningnz.com/investor-centre/growth/ccr-project.aspx

Figure D.6b: 2015 Oil Product Imports by Country of Origin

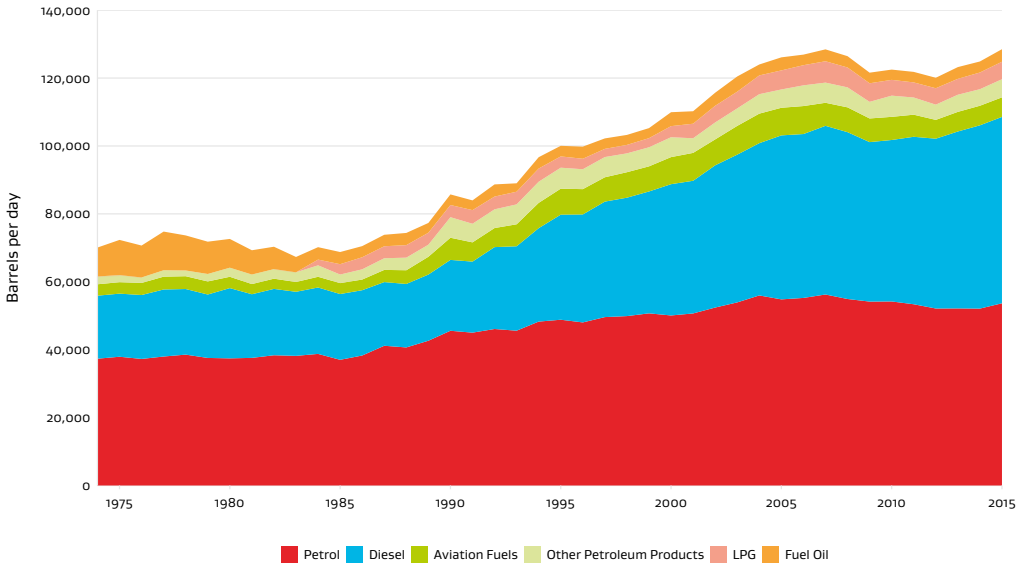


Consumption

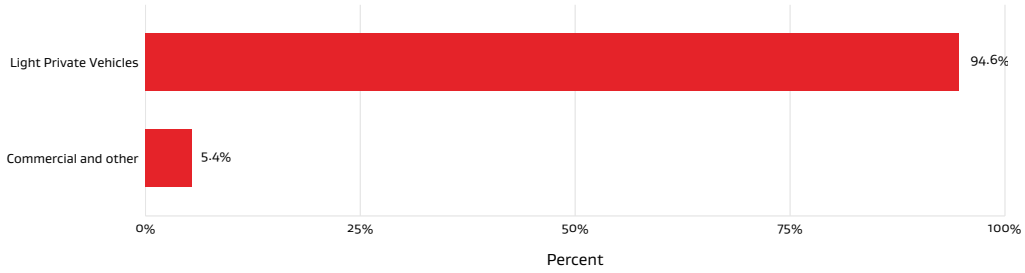
Domestic fuel consumption was at its highest level since 2007. Observed domestic consumption of refined oil products (excluding non-energy use) rose 2.7% in 2015 to 123,200 bbl/day (261 PJ). Fuel consumed for international transport (such as shipping or aviation) rose 8.0% to 24,500 bbl/day (54 PJ).

Diesel consumption increased 1.9% to 54,900 bbl/day (123 PJ). Diesel is the primary fuel for commercial land transport and tends to be strongly linked to economic performance. Petrol is used mainly for private consumption and petrol consumption increased 2.9% to 53,800 bbl/day (110 PJ).

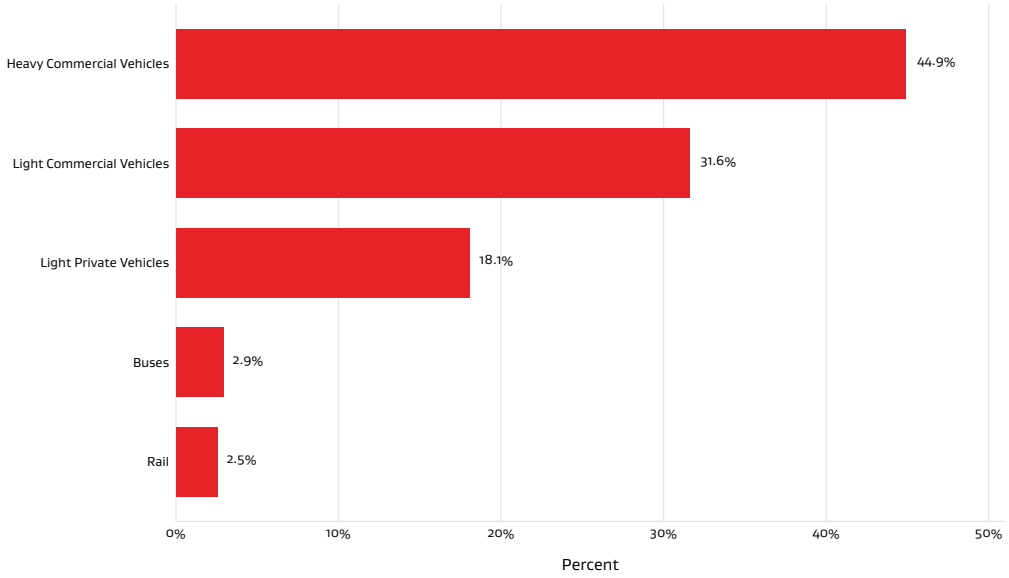
Figure D.7: Observed Oil Products Consumption



Figures D.8a: Transport Petrol by Mode in 2015*



Figures D.8b: Transport Diesel by Mode in 2015*



*Data is estimated by disaggregating transport fuel use using data from the Ministry of Transport's Vehicle Fleet Model.

Stock Requirements

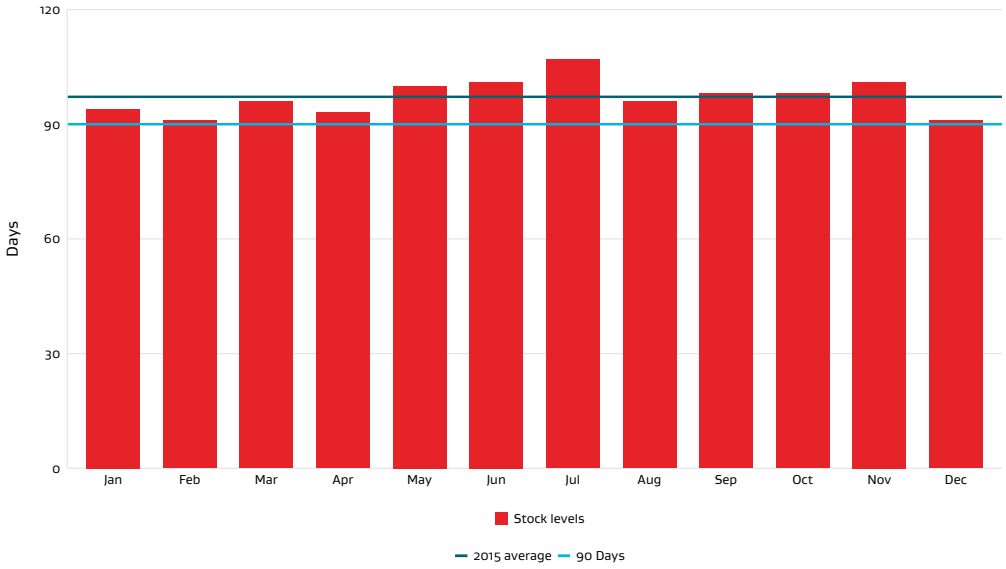
New Zealand has officially been a member of the International Energy Agency (IEA) since 1976. The IEA was set up in 1974 in response to the major oil market disruptions of 1973-74. Member countries must demonstrate they have access to stocks of crude oil and/or oil products equivalent to not less than 90 days of their prior year's average net oil imports.[9]

To help meet this requirement, governments can purchase stock tickets which allow access to oil stocks held overseas, should the need arise.

The average monthly stock holding level for New Zealand in 2015 was 97 days of net oil imports. The main stock-holders in New Zealand include the main oil companies, the Marsden Point refinery, and some large companies which import and hold large stocks of oil products for their own use. Lower month-end stock levels (such as in November) can occur, for example, in the event of a delayed arrival of a ship bringing oil into New Zealand.

9 Net oil imports are imports less exports and stock change

Figure D.9: Oil Stocks for 2015



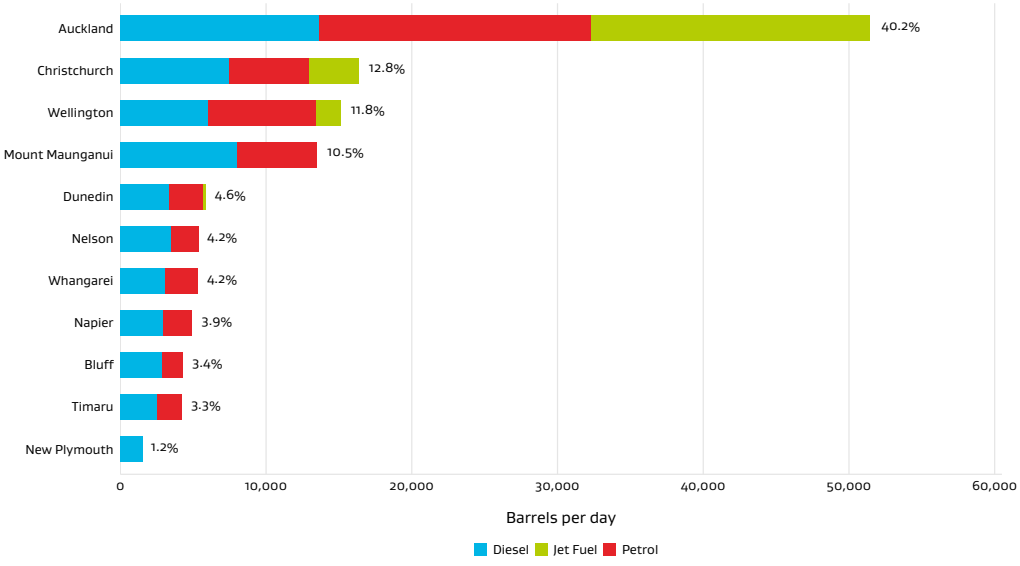
Port Offtakes

Figure D.10 shows port offtakes of petrol, diesel and jet fuel in bbl/day during 2015. While ports have been grouped by regions, it should be noted that some regions, such as Whangarei and Auckland, include multiple port terminals.

While port offtakes of petrol, diesel and jet fuel can be thought of as a rough measure of regional demand for these fuels, it is important to note that the oil network in New Zealand often involves deliveries between regions. For example, New Plymouth is often served by Wellington (Seaview), whereas Mount Maunganui supplies some retail sites throughout the North Island. Figures should therefore be interpreted with care.

Auckland, with about a third of the national population and a major airport (a pipeline connects the airport to a terminal in Wiri), had 51,400 bbl/day of diesel, petrol and jet fuel offtakes in 2015. Christchurch was next with 16,300 bbl/day, with Wellington third on 15,100 bbl/day.

*Figure D.10: Diesel, Petrol and Jet Fuel Offtakes by Port in 2015**

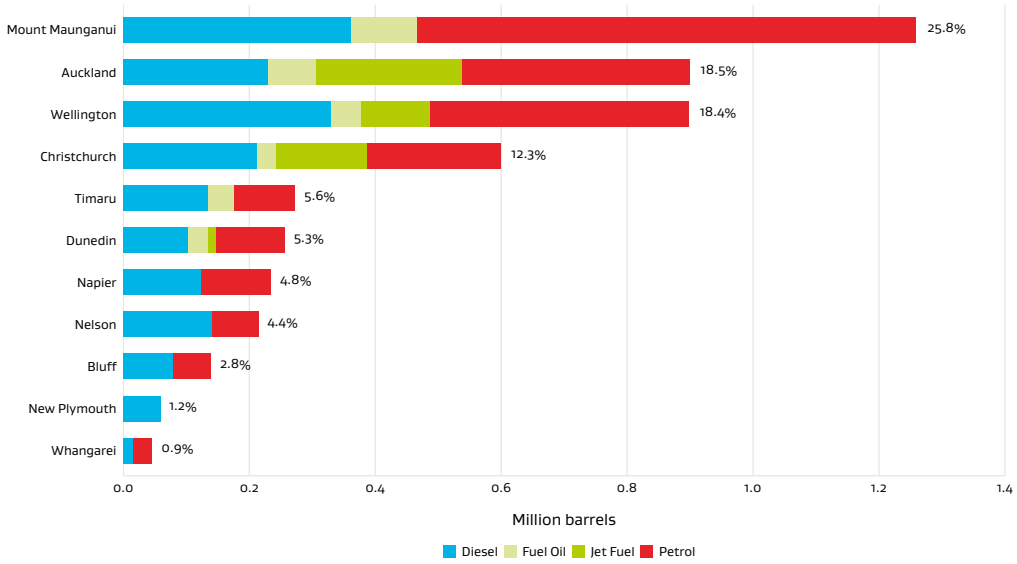


*Data is sourced from Coastal Oil Logistics Ltd, which is jointly owned by BP, Z, Exxon Mobil and Chevron (Caltex).

Terminal Fuel Storage

Figure D.11 shows available storage of fuel at terminals around the country. Storage tanks are categorised for storage of a certain type of fuel, though these categories can change over time. Figures are gross capacity, which includes a small proportion of fuel which is unavailable for extraction (at the bottoms of tanks).

Figure D.11: Terminal Fuel Storage by Port in 2015*

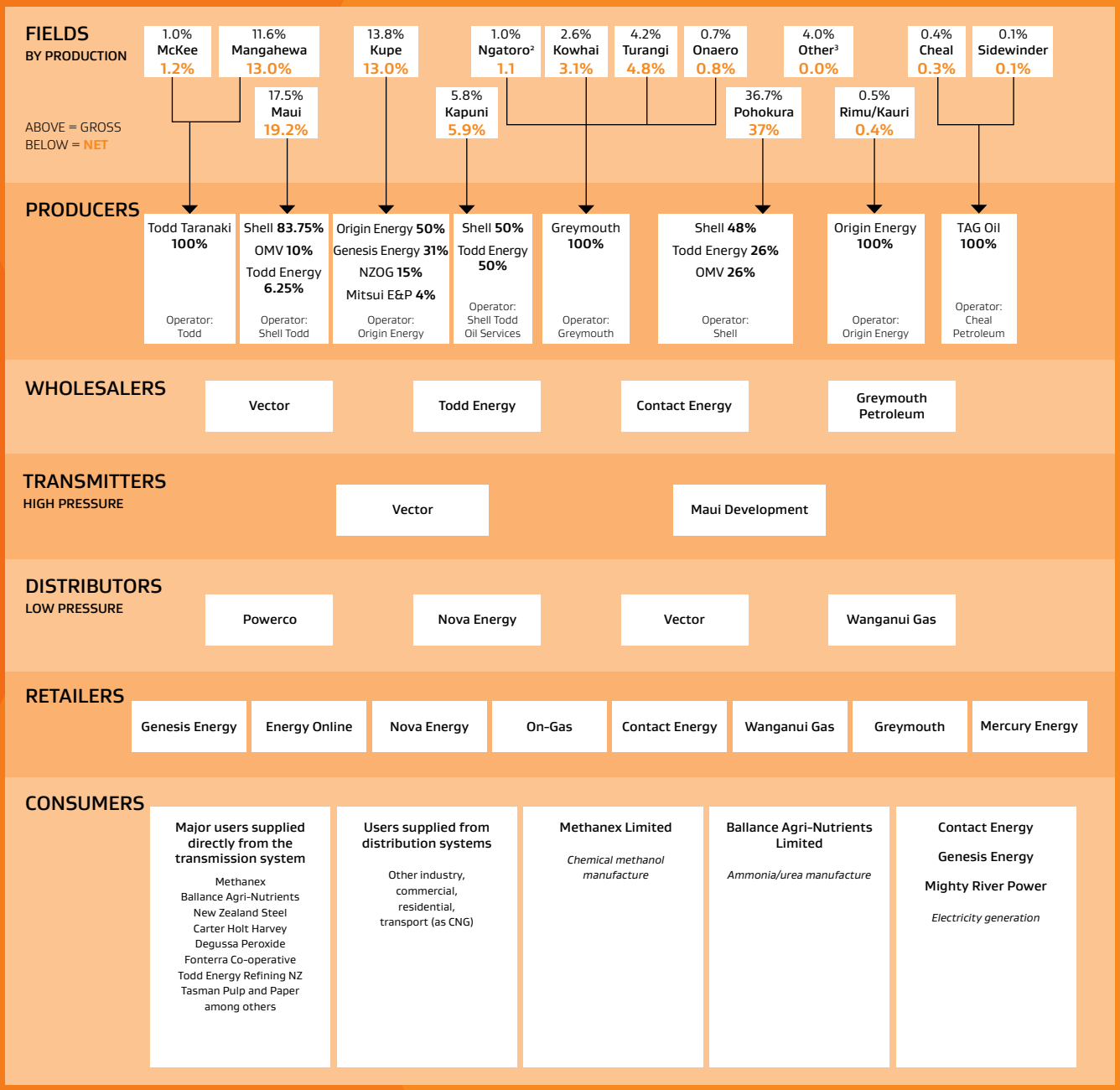


*Data is in gross capacity

Oil and Gas

GAS

Figure D.12: Natural Gas Industry Summary for 2015



Company names are listed without the suffixes "Limited" and "New Zealand Limited" where applicable. **AWE** is Australian Worldwide Exploration Limited, **Greymouth** is Greymouth Petroleum Limited, **Mitsui E&P** is Mitsui E&P New Zealand Limited, **NZOG** is New Zealand Oil & Gas Limited, **OMV** is OMV New Zealand Limited, **Contact Energy** is Contact Energy Limited, **Origin Energy** is Origin Energy New Zealand Ltd and **Contact Energy** (51% owned by Origin), **Pan Pacific** is Pan Pacific Petroleum, **Shell** is Shell NZ Limited (includes Shell Exploration NZ Limited, Shell (Petroleum Mining) Co Limited, Energy Petroleum Holdings Limited, Energy Petroleum Investments Ltd, Energy Petroleum Taranaki Ltd, Energy Finance New Zealand Limited and Taranaki Offshore Petroleum Company), **TWN** comprises the Tariki, Waihapa and Ngaere fields, **Todd Energy** is Todd Energy Limited and includes Nova Gas, Vector is Vector Limited and includes OnGas, **Wanganui Gas** is Wanganui Gas Company Limited. **Nova Energy** is Nova Energy Limited.

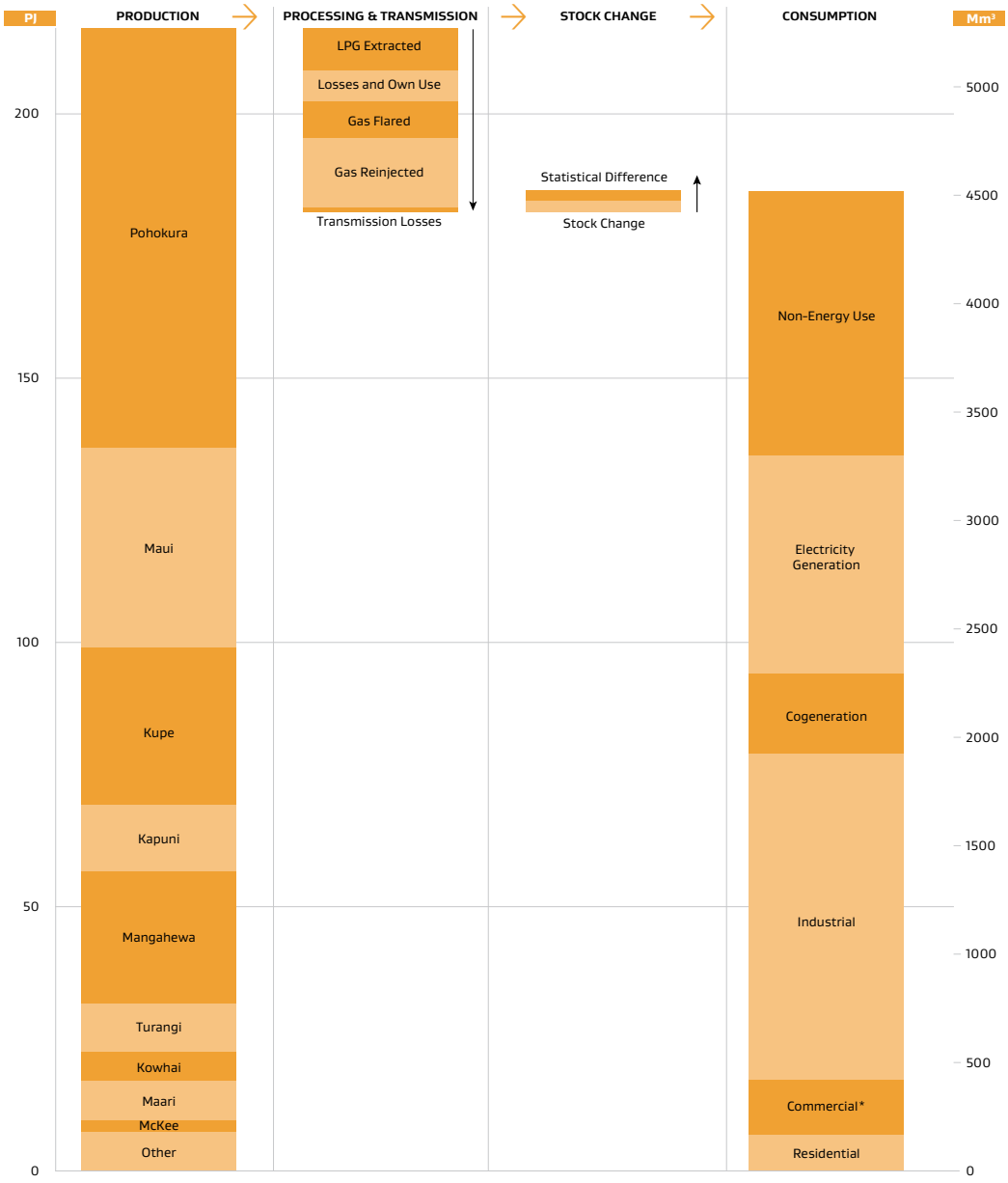
Notes:

1 Gas ownership as at 31 December 2015; excludes LPG.

2 Includes Kaimiro, Windsor and Goldie wells.

3 Includes Maari, Tui, TWN, Copper Moki, Puka and Surrey fields. Maari is owned by OMV, Todd, Horizon, and Cue Taranaki and operated by OMV. Tui is owned by AWE, NZOG and Mitsui E & P and operated by AWE. TWN is owned by New Zealand Energy Corp and L & M Energy and operated by New Zealand Energy Corp. Copper Moki is owned by New Zealand Energy Corp. Surrey is owned and operated by Greymouth. Puka is owned by Kea Petroleum Holdings and MEO Australia and operated by Kea Petroleum Holdings.

Figure D.13: Natural Gas Flow Summary for 2015



* Includes transport, agriculture, forestry and fishing.

Supply

Gas is produced entirely in the Taranaki region, with reticulated gas only available in the North Island. The calculated supply of gas to consumers fell 8% (16 PJ) to 182 PJ. This was similar to 2013, but lower than the 198 PJ reached in 2014.

Leading this fall were large decreases at New Zealand's two largest gas-supplying fields: Pokokura and Maui. Supply from the Maui field fell 27% in 2015, to 35 PJ. These falls were partially offset by 2 PJ increases in supply from both Mangahewa and Turangi, supplying 24PJ and 9PJ in 2015 respectively.

Mangahewa is operated by Todd Energy and is a major supplier to Methanex's three methanol production trains. Mangahewa's increase resulted in the field's highest annual gas production on record, and follows on from a major expansion project at the Todd Energy-owned Mangahewa and McKee fields. In May 2014, Todd Energy officially opened a new gas processing train which will (nominally) increase annual natural gas processing capacity from 20 PJ to 45 PJ.

Total production continues to be dominated by Pohokura and Maui, responsible for over half of domestic gas production, as shown in Figure D14.

Figure D.14: Gross Natural Gas Production by Field for 2015

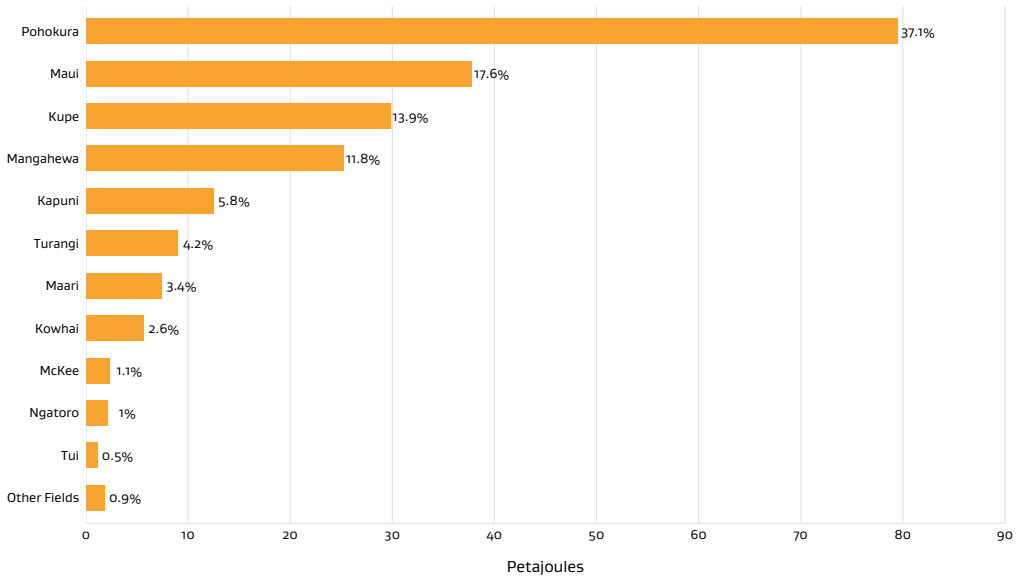
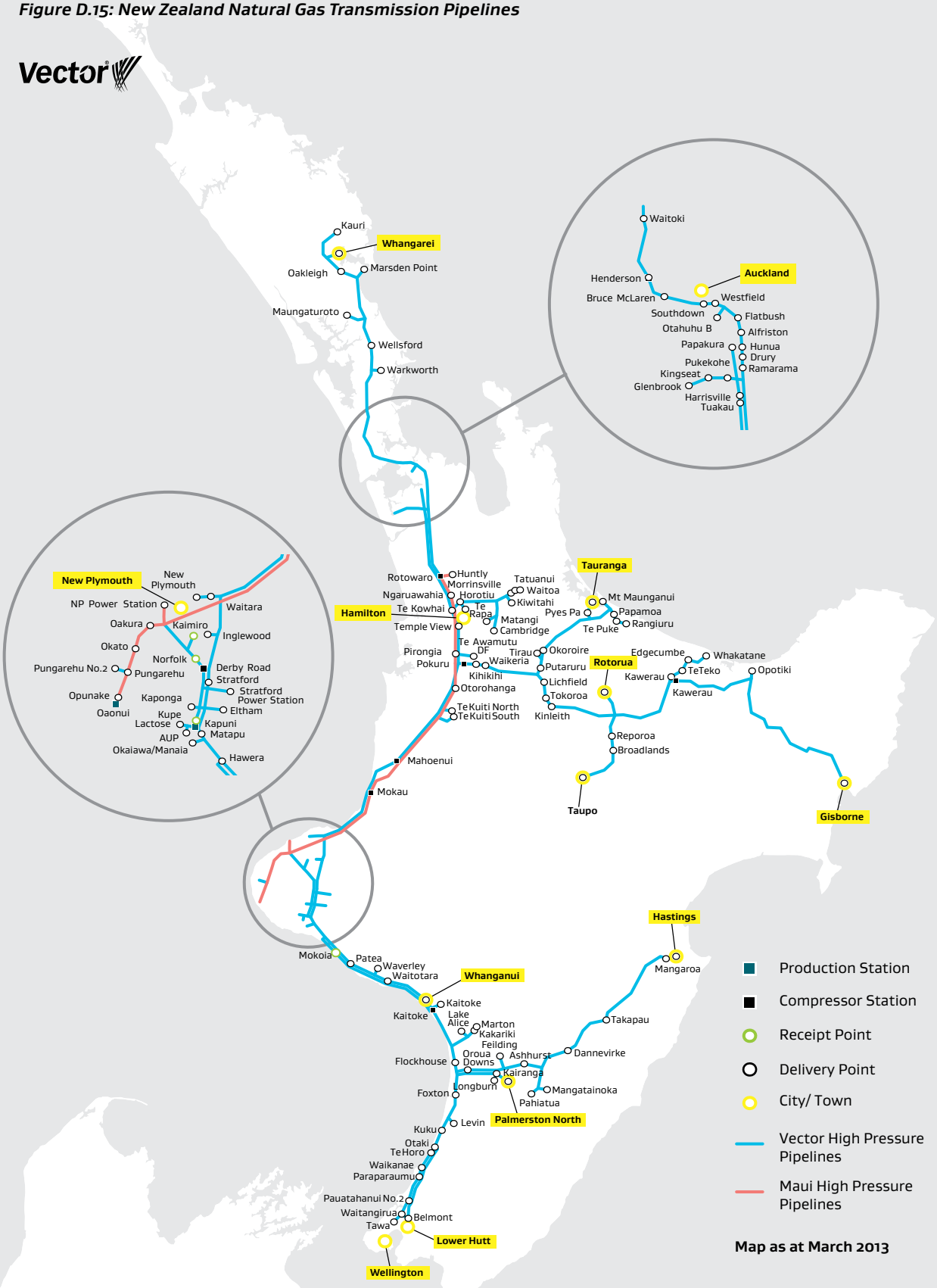


Figure D.15: New Zealand Natural Gas Transmission Pipelines



Consumption

Total observed gas consumption (including for electricity generation, cogeneration and non-energy use) fell 8.4% to 185 PJ. The main drivers of this were falls in non-energy (feedstock) gas use and industrial gas use, both down 15% from 2015.

The fall in industrial gas consumption was driven by the petrochemicals industry, down 15% from 2014 to 34PJ. In 2015, the petrochemicals industry accounted for 33% of piped gas consumption. The second-largest industrial sector, food processing, was up 7% from 2014 to its highest level on record. Consumption by all other industrial sectors fell relative to 2014.

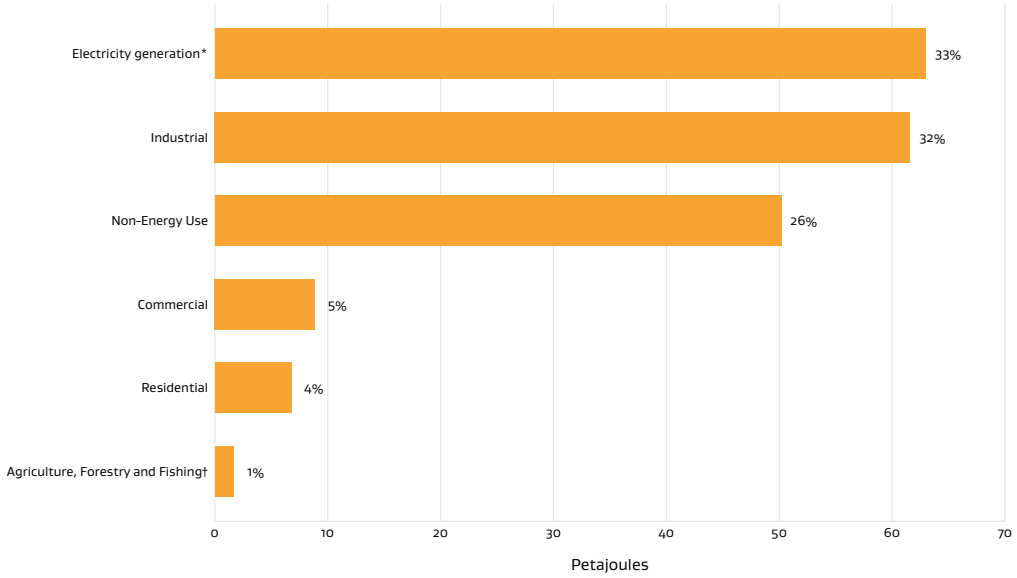
Non-energy gas use was down during the year, falling to 50 PJ and accounting for 27% of piped gas consumption. Figure A.2e in Section A shows non-energy use of natural gas. Mechanical issues at Methanex, which led to an increase in the number of shutdown days in 2015, contributed to a decline in natural gas consumption. Production of methanol was down 15% to 1,856kt, or 76% of Methanex New Zealand's capacity.[10] Gas consumed by petrochemical companies is classified as either industrial demand or non-energy demand (i.e. feedstock). The main consumer of feedstock gas is Methanex, whose total gas consumption (both industrial and non-energy) would be about 90 PJ if it was operating at full capacity. Feedstock used for the manufacture of ammonia/urea was also down in 2015.

Gas used for electricity generation and cogeneration dropped 3.0% (2 PJ) to 56 PJ. This is the third year in a row that gas used for electricity generation and cogeneration has fallen. Consequentially, the share of electricity generated from renewable sources has continued rise (see F – Electricity).

The 2015 year saw the closure of two natural gas-fired electricity generators, Contact Energy Limited's Otahuhu B plant and Might River Power's Southdown power station. The two main electricity generators in New Zealand using natural gas are Genesis Energy Limited (Huntly – including the unit 5 combined cycle plant known as E3P) and Contact Energy Limited (Taranaki Combined Cycle, Te Rapa, and Stratford).

In 2015, gas consumption by the commercial sector was the highest on record. The commercial sector, with around 14,000 customers, accounted for 5% (or 9 PJ) of piped gas consumption. There were around 253,000 residential consumers in 2015, accounting for 4% (or 7 PJ) of piped gas consumption. There were around 1,800 industrial consumers in 2015.

Figure D.16: Natural Gas Consumption by Sector for 2015



* Includes cogeneration

† Includes Transport

10 For more information see Methanex Corporation's 2015 annual report, available at https://www.methanex.com/financial-reports/annual-reports/

E. RENEWABLES

INTRODUCTION

Renewable energy sources discussed in this section include hydro, wind, geothermal, solar, woody biomass, biogas and liquid biofuels. Information on renewable energy is presented for the 2015 calendar year.

Detailed information is available on the renewable energy sources utilised by large electricity generators; however, information on the direct use of renewable energy and use for distributed generation is more difficult to obtain. Renewable energy sources (e.g. geothermal or the sun) are often used without being purchased, hence are not well recorded in energy statistics. Where actual information on the direct use of renewable energy is not available, estimates have been made based on research and the knowledge of experts in this field.

Figure E.1: Renewable Energy Flow Summary for 2015

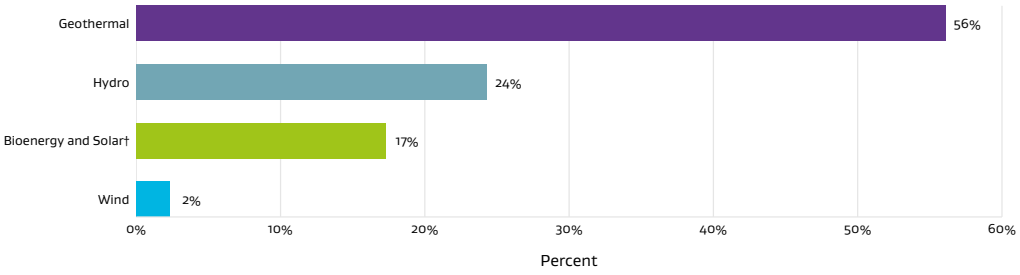
* Bioenergy in this instance refers to biogas, woody biomass and liquid biofuel.
† A very small amount of liquid biofuel is produced in New Zealand and sent to the transformation sector under oil production. This is included in bioenergy but is too small to distinguish on this figure.

Supply

The proportion of New Zealand's primary energy supply sourced from renewable resources was 40.1% (364 PJ) in 2015.[11] This is the highest renewable energy proportion since records began. New Zealand uses high levels of hydro and geothermal energy for electricity generation and had the third highest renewable primary energy supply in the OECD after Iceland and Norway in 2014.[12]

The share of renewable sources in primary energy supply in 2015 increased from 39.3% in 2014, with an additional 9.3 PJ of renewable energy supplied. As in 2014, this was mainly due to increased geothermal generation, with the geothermal contribution at 56% of total renewable primary energy for the year.

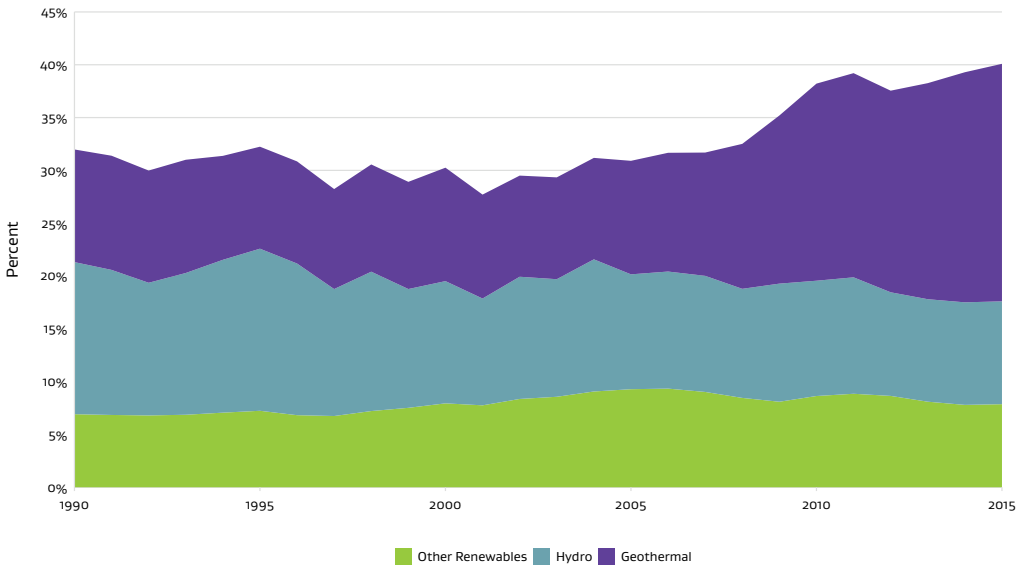
Figure E.2: Renewable Primary Energy for 2015*



* Energy from liquid biofuels and solar is not shown being less than 0.2% of the total

† Includes energy from woody biomass, biogas, Solar PV and Solar Thermal

Figure E.3: Renewable Percentage of New Zealand Total Primary Energy Supply by Fuel Type



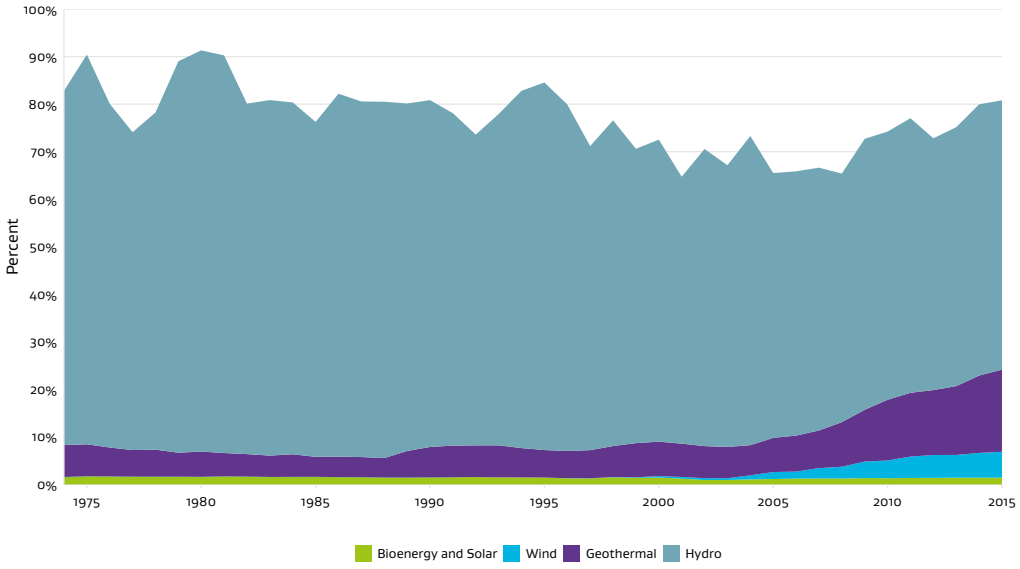
11 Data on direct use of geothermal energy was reviewed in 2016. This has resulted in revisions to previously published data, with a small decrease in historical total primary energy supply.

12 Source: IEA (2016), *Renewables Information 2016, OECD Publishing, Paris.*

Electricity Generation

Most of New Zealand's renewable energy is used for electricity generation. In 2015, a total of 80.8% of electricity generation came from renewable resources. Figure E.4 shows how the percentage of electricity generation from renewables has changed over time.

Figure E.4: Percentage of New Zealand Electricity Generation from Renewable Sources



Solar Use

The use of solar photovoltaic (PV) panels to generate electricity is a small but growing proportion of total renewable primary energy. Installed capacity at the end of December 2014 was 37.7 MW. The total generation from small solar PV panels in 2015 was estimated to be 33 GWh (120 TJ), more than double the 2014 figure.[13] This was calculated using total installed capacity of solar PV, and does not include unregistered solar or off the grid generation.[14] Total solar generation, including both PV and thermal, remains a small proportion of total primary renewable energy at 0.1%. For more details about the treatment of Solar PV in the Energy Balance tables, please refer to Section B.

Liquid Biofuels

Estimated indigenous production of liquid biofuels was 5.1 million litres in 2015, a 19% increase from 2014. Biodiesel production of 0.6 million litres remains low when compared to the levels reached whilst the Biodiesel grant scheme was in place. Bioethanol production continues to be the major biofuel produced, accounting for 89% of New Zealand's liquid biofuel production in 2015 at 4.6 million litres.[15]

In New Zealand, bio-ethanol is produced and imported from sustainable sources. Bioethanol is

13 Data is available from the Electricity Authority at http://www.emi.ea.govt.nz

14 Solar generation is estimated using total installed capacity data (including both <10kW and >10kW systems) from the Electricity Authority, and a capacity factor of 14%.

15 Liquid biofuels are included under Oil in the balance tables.

produced by fermenting whey, a cheese by-product, with some of the resulting ethanol purchased by fuel companies. This, along with imported ethanol produced from sustainable sugarcane, is blended with regular petrol. A typical blend is 10% ethanol, which results in a 5-6.5% reduction in greenhouse gas emissions per litre compared with those from regular petrol.[16]

Direct Use of Renewable Energy

In 2015, an estimated 62 PJ of renewable energy was used for direct-use heat applications around New Zealand. The vast majority of this was in the form of woody biomass, 87%, with geothermal for heating mainly in commercial and industrial applications the other significant contributor at 12%.

Geothermal energy is used directly as a heat source in small quantities in the central North Island in the timber and tourism industries. It is also used in small quantities for domestic heating.

Direct use of woody biomass occurs mainly in the timber industry which burns residue wood to provide process heat. Wood is also burned to heat many private homes in New Zealand, with the 2013 Census reporting over 36% of New Zealand households use wood to heat their homes.[17]

16 ECCA biofuels information, available at https://www.eecabusiness.govt.nz/technologies/renewable-energy/biofuels/sustainable-biofuels-information/

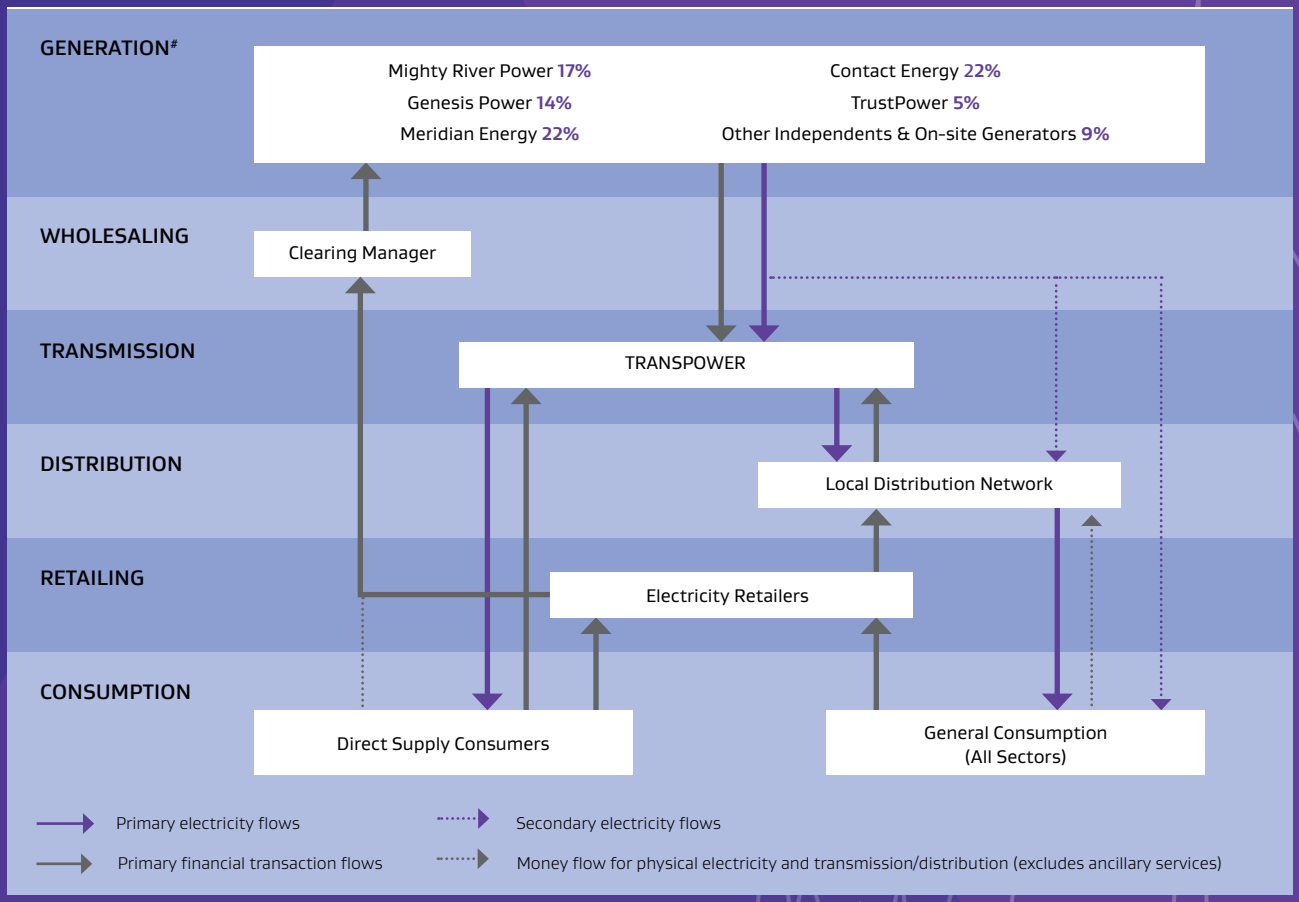
17 Information on the 2013 census can be found at http://www.stats.govt.nz/Census/2013-census.aspx

F. ELECTRICITY

INTRODUCTION

This section contains information about electricity generation/ supply, transmission and distribution, and demand. Annual figures are for the calendar year, with the exception of electricity costs, which are presented on a March year basis.

Figure F.1: Electricity Industry Summary for 2015*



* Company names are listed without the suffixes "Limited" and "New Zealand Limited" where applicable.

"Primary" refers to the most common or typical way that electricity or money flows through the Electricity Industry

"Secondary" refers to flows of money or electricity which do occur, but are not typical of most participants in the industry.

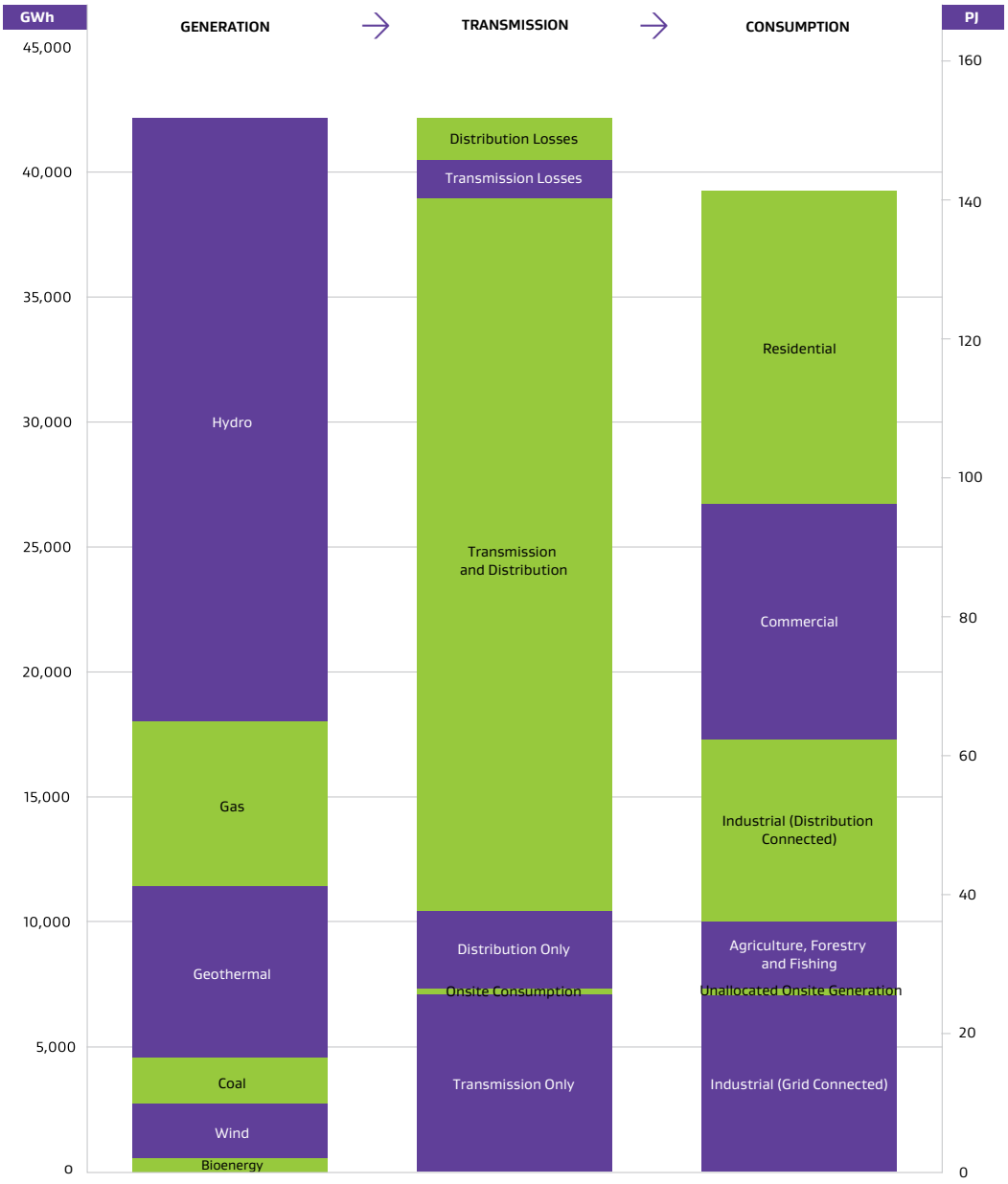
As an example, all customers in the "The Lines Company" distribution network area pay distribution charges directly to the local distribution network as shown by the black dotted line between the 'General Consumption' box and 'Local Distribution Network' box. This is not typical nationwide as most consumers pay their lines charges through their retailer as shown by the dense black line between 'General Consumption' and 'Electricity Retailers' which partly continues onto the 'Local Distribution Network'.

The thickness of the lines in Figure 1 in no way indicates the physical amount of money or electricity which passes through or is used by a particular participant or group of participants.

Both the Commerce Commission and Electricity Authority have key roles in the electricity market. The Commerce Commission has regulatory oversight of distribution and transmission pricing while the Electricity Authority has regulatory oversight of the retail and wholesale markets, and transmission contracts. The Electricity Authority also has contracts with service providers for market operation services such as that of the Clearing Manager.

Embedded (distributed) generators can choose to sell their electricity directly to retailers trading on the same grid exit point.

Figure F.2: Electricity Flow Diagram for the 2015 Year



Generation

In 2015, 42,876 GWh (154 PJ) of electricity was generated in New Zealand. Net generation increased 1.6% from the previous year.

The share of electricity generated from renewable energy sources in 2015 was 80.8%, the highest annual share since 1995. This increase was led by geothermal, hydro and wind generation, reducing the need for generation from fossil fuels.

Figure F.3 shows continued growth in geothermal generation. Geothermal generation set a new record in 2015 of 7,411 GWh, once again the second largest generation source in New Zealand. Wind generation also increased 6.4% to 2,333 GWh in 2015. Hydro, the country's largest electricity generation source, was up 0.9% from 2014 due to consistent inflows to hydro dams across the country.

Two major gas generation plants closed in 2015, Otahuhu B and Southdown power plants. Genesis Energy has also indicated their intention to close the Huntly Power Station in the near future.

Other renewable sources for electricity generation include bioenergy, solar energy and marine energy. Of these, bioenergy is the largest contributor to electricity generation in New Zealand. Bioenergy is predominantly from woody biomass consumed at a number of cogeneration plants located at wood processing factories and also from biogas produced from digesting waste at wastewater treatment plants and landfills.

The five major generating companies provided 91% of New Zealand's electricity generation in the 2015 year. These companies are Meridian Energy (33%), Contact Energy (22%), Genesis Energy (14%), Mighty River Power (17%) and Trustpower (5%).

Figure F.3: Annual Electricity Generation by Fuel Type

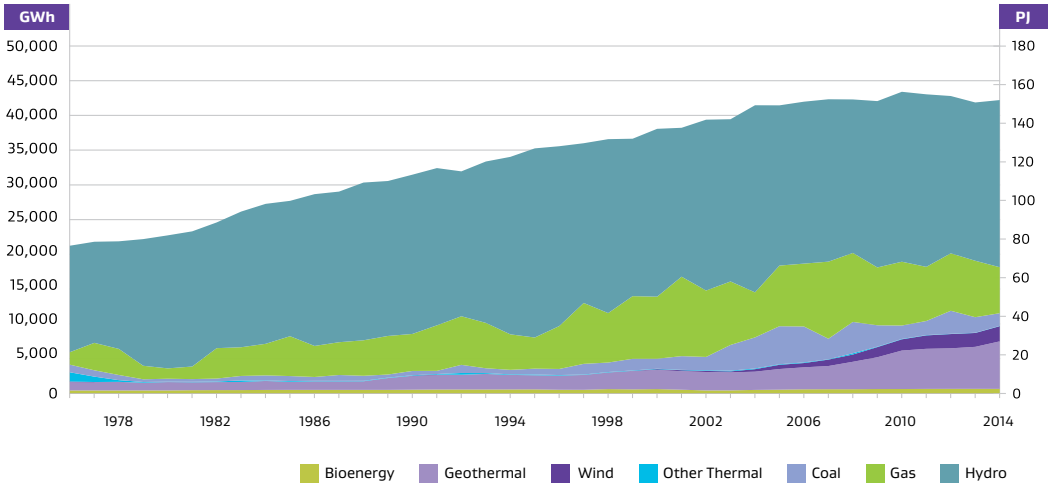
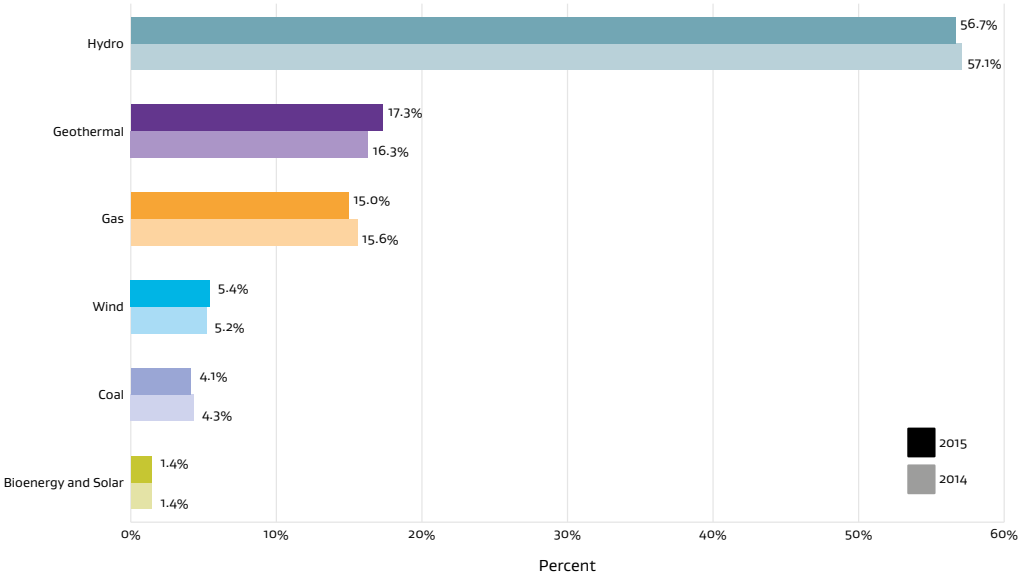


Figure F.4: Electricity Generation by Fuel Type, 2014 and 2015 Years



Transmission and Distribution

Transpower operates the national transmission grid, which conveys electricity from most of the major power stations around the country to local distribution lines. It also conveys electricity directly to major users, such as the New Zealand Aluminium Smelter.

There are 29 local distribution network companies in New Zealand, with a variety of ownership models from publicly listed companies to local community-owned trusts. These companies convey electricity to users within their network areas.

Consumption

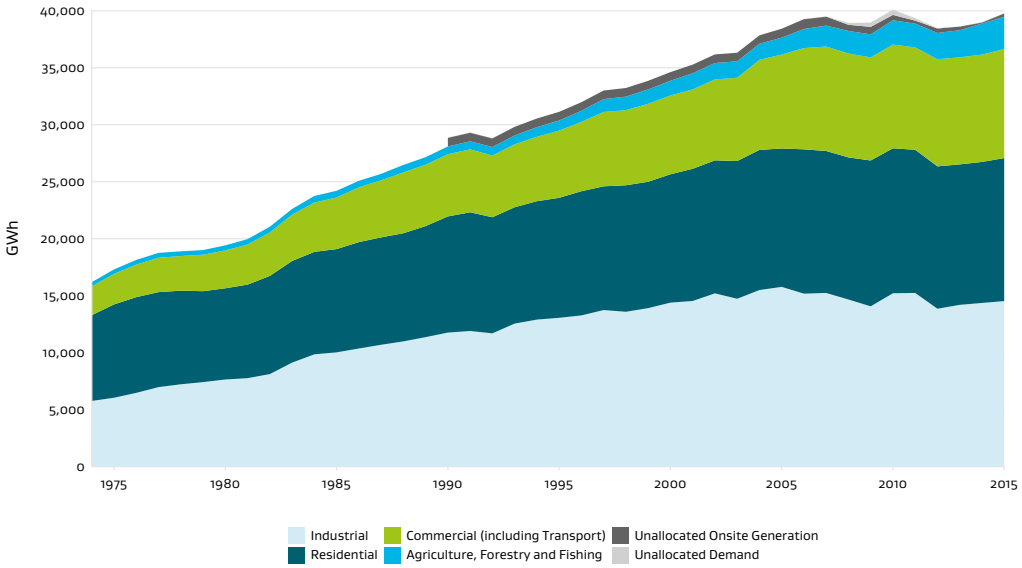
The Ministry improved its method for calculating annual electricity consumption in 2014. Previously, weightings were calculated using grid export demand data from the Electricity Authority and applied to March year consumption data collected by the Ministry to calculate both quarterly and calendar year figures. Following a review of the collection of electricity retail sales data, the data is now directly collected on a quarterly basis. This means that actual calendar year data is available for 2014 onwards. The Ministry is reviewing the impact of this change in methodology to the continuity of the consumption time series, but this is only possible with more data points. For consistency in discussing trends over time, Figure F.5 refers to data using the historical methodology. Figures F.2 and F.6 are based on data collected under the new method.

Electricity consumption continued to grow, up 2.0% from 2014 to 39,768 GWh (143 PJ). Figure F.5 shows annual electricity consumption by sector since 1975. Residential consumption grew to its highest level in four years, up 1.4% from 2014. Industrial consumption was up 1.1%, driven by the food processing and chemical sectors. Electricity use for irrigation was up significantly in the March quarter, as dry conditions in the South Island continued, contributing to the 4.1% increase in consumption by the agricultural, forestry and fishing sector. Consumption by the commercial sector, which has been relatively flat in recent years, was up 1.4% from 2014 due to growth in the services sector.

The industrial sector accounted for the largest share of consumption in 2015 at 37%, with the residential sector accounting for a third (32%).

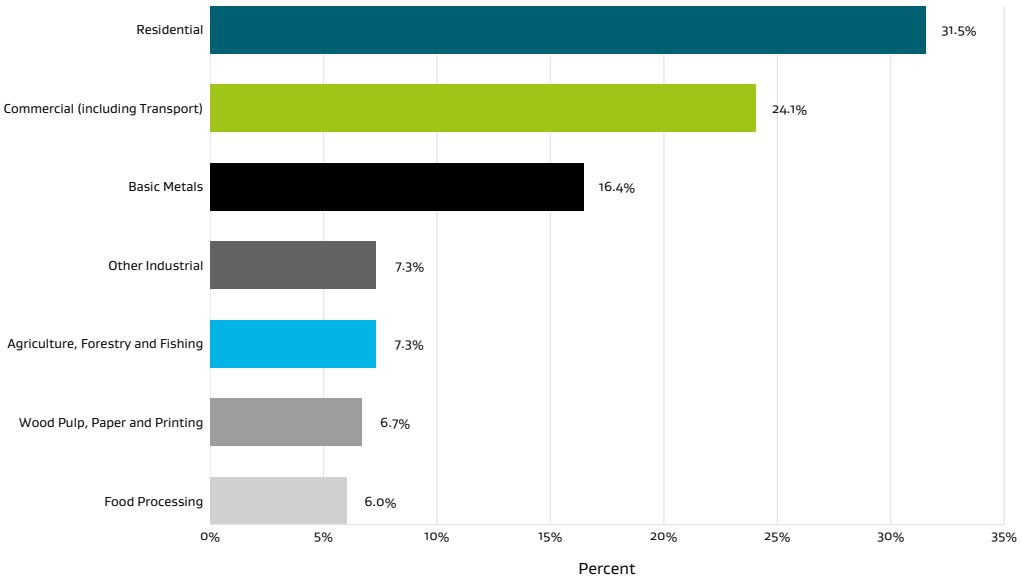
Demand by region is shown in Figure F.7. The Central and South Auckland region has the highest share of national demand due to its large population. The New Zealand Aluminium Smelter at Tiwai Point is excluded from the Otago/Southland region and is shown separately.

*Figure F.5: Electricity Consumption by Sector**



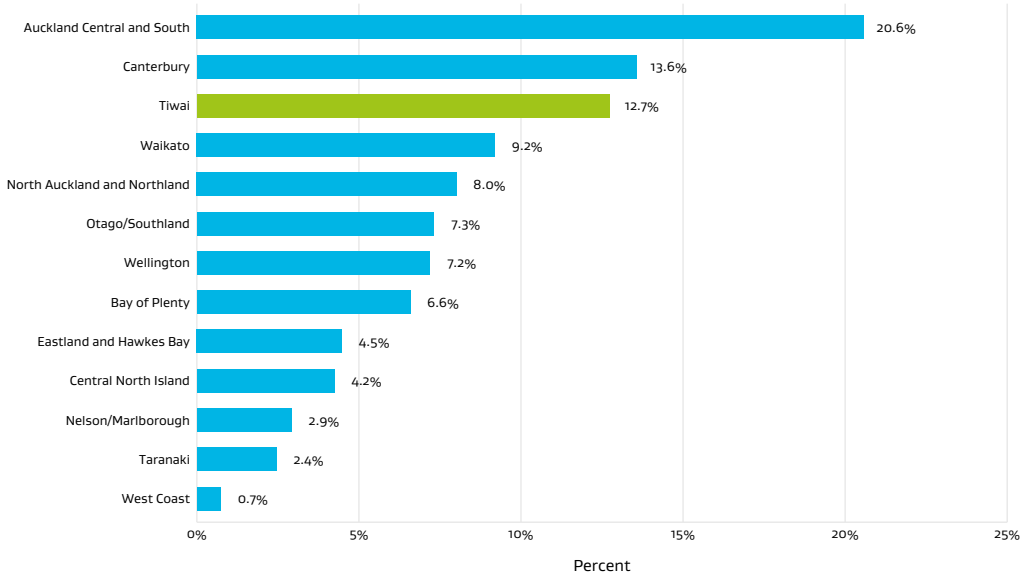
* Electricity consumption in this figure excludes calculated onsite consumption.

*Figure F.6: Electricity Consumption by Sector for the 2015 Year**



* Consumption excludes calculated onsite consumption and unallocated demand.

*Figure F.7: Approximate Share of National Demand by Region for the 2015 Year**



* Source: Electricity Authority, http://www.emi.ea.govt.nz/

Retail Electricity Market

Comprehensive information on New Zealand's retail electricity market, including market share and customer switching trends, can be found on the Electricity Authority's website. http://www.emi.ea.govt.nz/

G. PRICES

INTRODUCTION

This section presents information about New Zealand's energy prices. International price comparisons are also made with New Zealand's major Organisation for Economic Cooperation and Development (OECD) trading partners, for which information is available.

Prices are presented inclusive of all applicable taxes and levies.

Commercial and industrial prices exclude Goods and Services Tax (GST), as these sectors can generally reclaim the GST component.

Wholesale prices are assumed to relate to the commercial sector so exclude GST.

Residential customers generally cannot reclaim GST, and therefore residential prices include the GST component.

Oil Prices

Petrol and diesel retail prices are collected by Statistics New Zealand. Wholesale diesel data are produced using data collected each quarter from New Zealand's four largest oil companies (BP, Z, Chevron and ExxonMobil).

Retail Prices

International crude oil prices recovered slightly at the beginning of 2015 from the lows reached at the end of the previous year. However, a continued growth in excess oil supply saw crude oil prices end 2015 at their lowest levels in 11 years.

Figure G.1A shows petrol and diesel prices in real 2015 terms. Retail prices are influenced by a range of factors including the importer cost, importer margins and taxes and levies. Prices which consumers pay at the pump can vary greatly both across and within regions due to regional price variations and discounts offered by fuel retailers.

Falling crude oil prices led to lower importer costs, pushing down retail prices. The average petrol retail price for the 2015 year was the lowest since 2010, while the average diesel retail price was the lowest since 2009.

Excise duty on petrol (both premium and regular) increased by 3 cents a litre from the 1st of July 2015. An equivalent reduction in the Accident Compensation Corporation (ACC) levy meant that the total duties and direct levies on petrol were unchanged during the year. Road user charges (RUC) on diesel were increased by an average of 5.3%, an equivalent rate to the increase in petrol excise duty. RUC are charged on a per-kilometre basis and depend on the vehicle.

Importer Costs and Margins

The Ministry monitors liquid fuel prices and gross importers margins on a weekly basis. This report shows the composition of the retail price of petrol and diesel.[18]

The gross importer margin is the margin available to retailers to cover transport, distribution and retailing costs within New Zealand, as well as their own margin. Importer margins are calculated from retail prices less taxes, levies and import costs. New Zealand import costs are calculated using the Singapore spot market price plus allowances for international freight, wharfage fees and insurance costs. Import costs are predominantly driven by movements in the international price of crude oil and the USD to NZD exchange rate.

Figure G.1B shows regular petrol and diesel importer margins in real 2015 terms. Importer margins fell in the first half of the year, before reaching their highest levels in 17 years in the September quarter. Annual average real importer margins in 2015 increased by 6.3% for regular petrol and 6.0% for diesel, relative to 2014. The average importer cost of fuel for petrol and diesel fell by 23% and 28% respectively over the same period, to their lowest levels since 2005.

18 Available at http://www.mbie.govt.nz/info-services/sectors-industries/energy/liquid-fuel-market/weekly-oil-price-monitoring

Figure G.1A: Petrol and Diesel Prices (Real 2015 Prices)

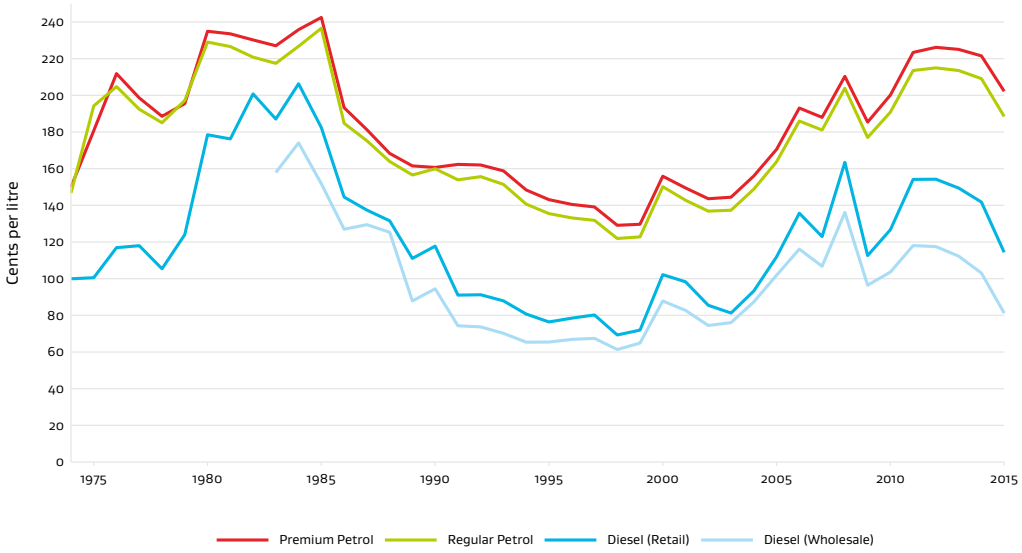
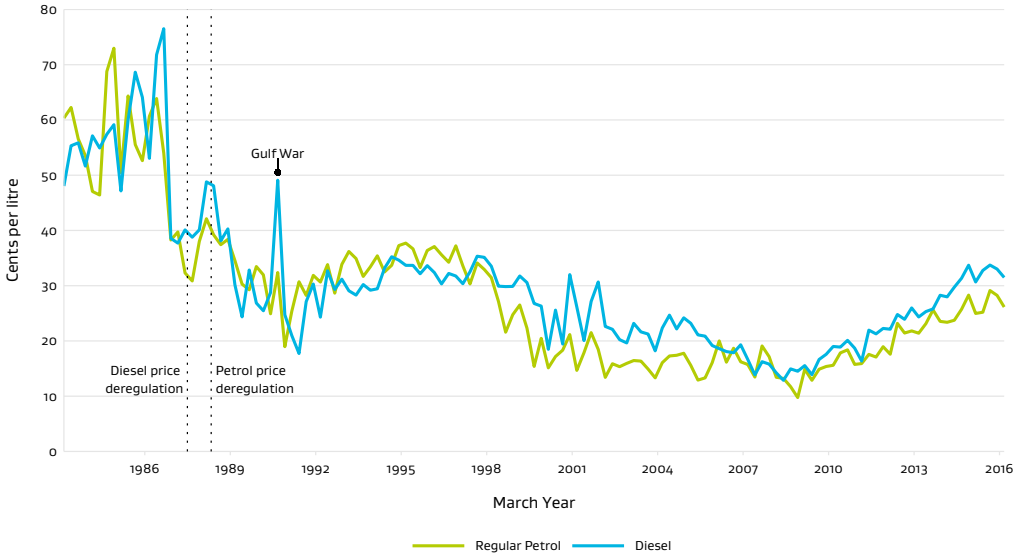


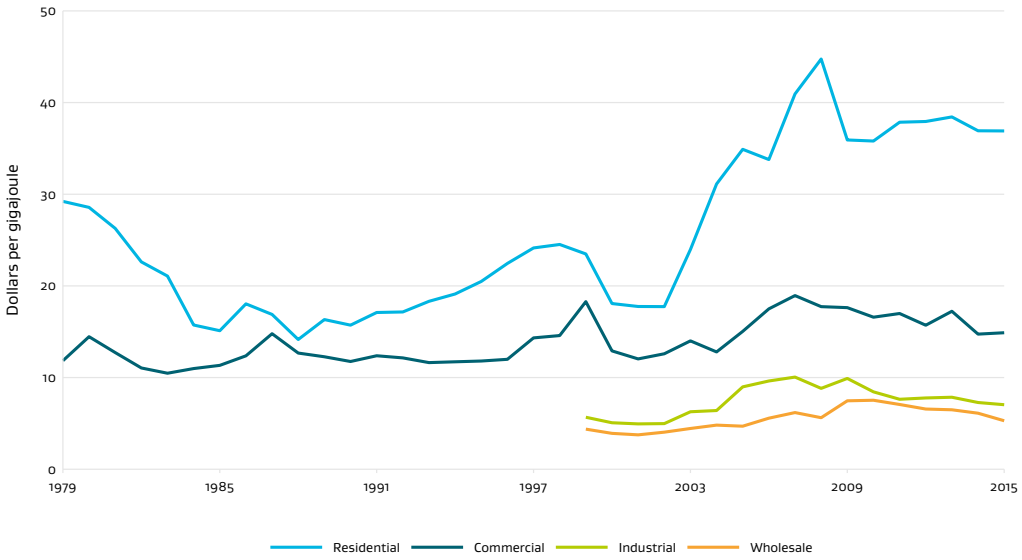
Figure G.1B: Importer Margins (Real 2015 Prices)



Natural Gas Prices

Natural gas prices are calculated by dividing income data by consumption data for each of the commercial, industrial and residential sectors. These data are collected quarterly from gas retailers. Gas sold for electricity generation has been excluded from the industrial sector, as the actual price paid by the generators is reflected in the wholesale price. Quarterly residential gas prices are calculated as a rolling average over the last year to smooth out seasonal variations as a result of fixed charges.

Figure G.2: Natural Gas Prices (Real 2015 Prices)



Electricity Costs

Sales-based data is used to calculate average residential, commercial and industrial electricity costs. This data is collected from electricity retailers and calculated by dividing total net income from electricity sales by the total volume of electricity sold for each sector. This is referred to as the cost per unit, as it is what was actually paid relative to the quantity of electricity used.
The term 'cost' is used to distinguish the data from the electricity price indicator series that the Ministry produces, the Quarterly Survey of Domestic Electricity Prices (QSDEP), which shows how residential electricity tariffs have changed over time.[19]

Figure G.3 presents electricity costs on a March year basis, with real costs expressed in March 2016 terms. Average electricity costs fell in the March year 2016, with the residential electricity cost falling for the first time in 15 years. The fall in the average residential electricity cost was driven by increased discounting activity and customer incentive and retention credits.

19 For more information on sales-based electricity costs and the QSDEP, visit http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/statistics/prices/electricity-prices

Figure G.3A: Real and Nominal Sales-based Residential Electricity Costs

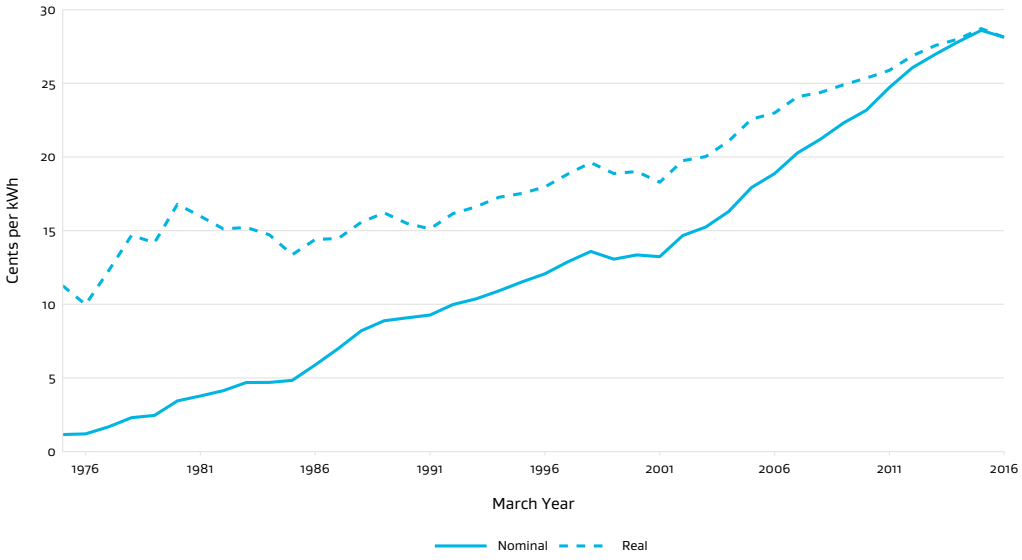
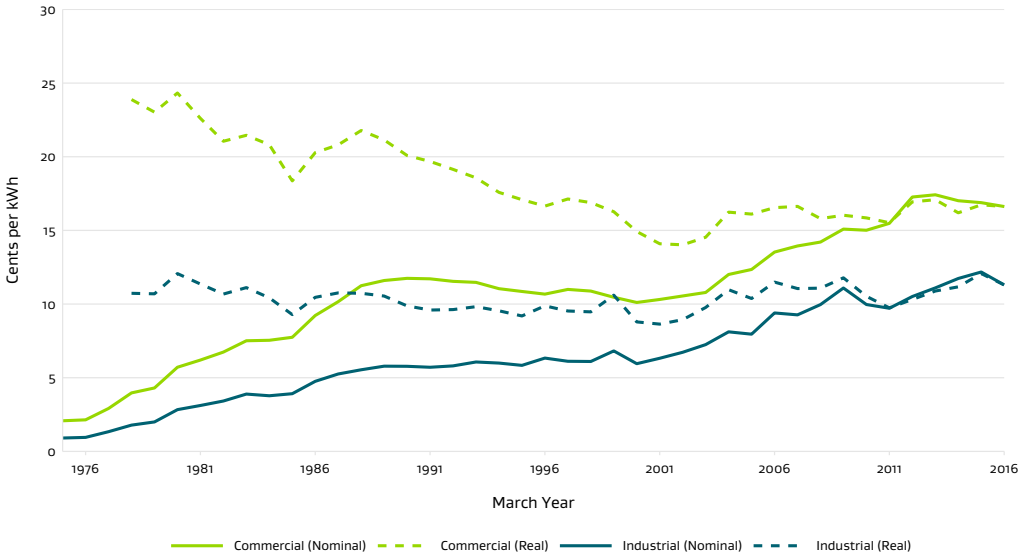


Figure G.3B: Real and Nominal Sales-based Commercial and Industrial Electricity Costs



International Comparisons

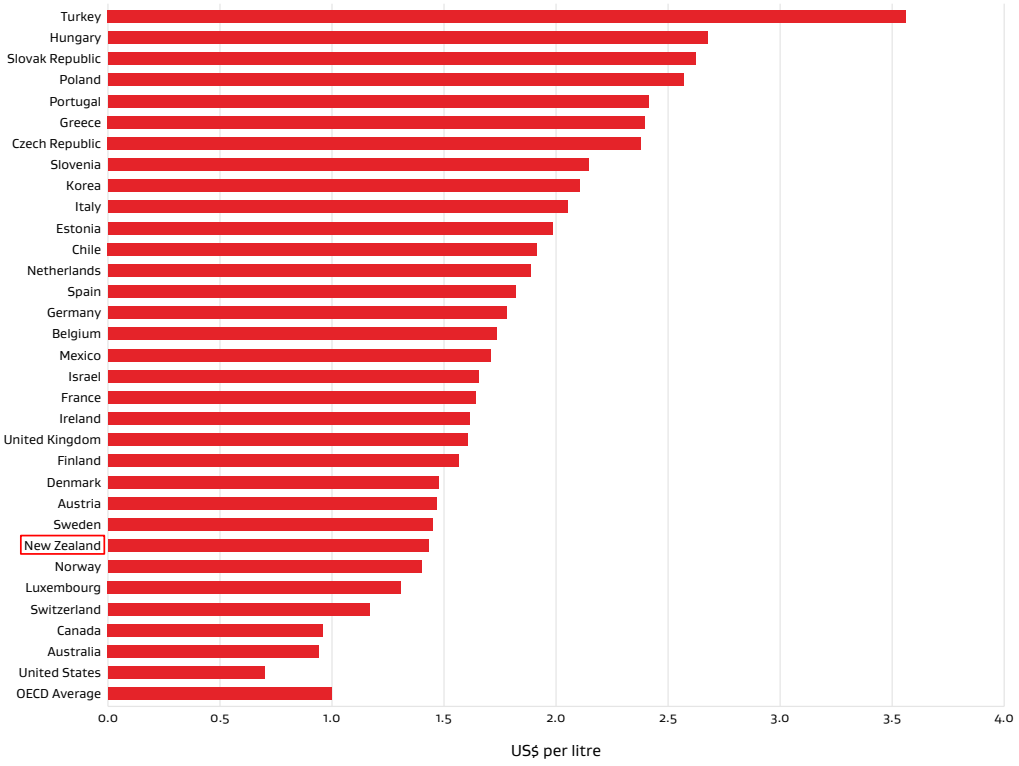
Figures G.4 to G.7 show international energy prices for 2015 expressed in US dollars per unit using purchasing power parity (PPP).[20]

Care is needed in interpreting the data, as product specifications, statistical methodologies and the information available can differ considerably among countries. Taxation forms a large component of some energy prices, notably for petrol (around 50% or more for most countries, except for the North American countries, for which the share is closer to 30%).

New Zealand's liquid fuel prices in 2015 were among the lowest in the OECD. Figure G.4 compares premium petrol prices, as many regular OECD countries do not have regular petrol. New Zealand's diesel retail prices are at the bottom of the OECD range, however only taxes paid at the pump are included in the data. This means that RUC for diesel are excluded.

Natural gas prices for the residential sector in 2015 were around the middle of the OECD range, and higher than the OECD average. Residential electricity costs were around the middle of the OECD range.

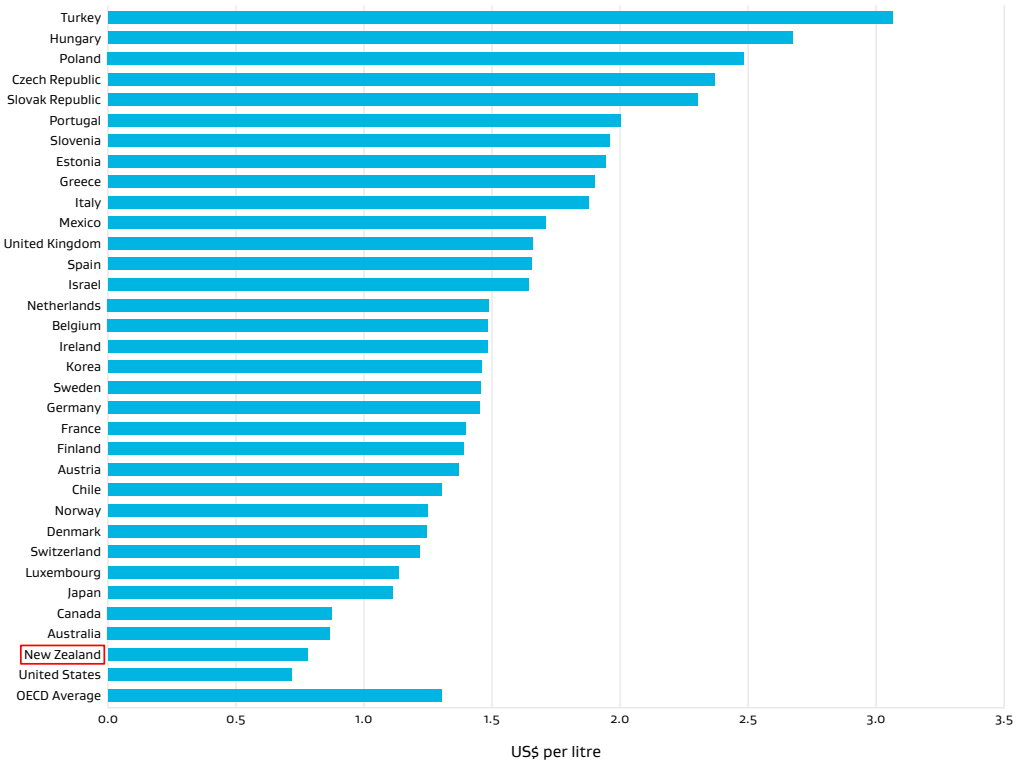
Figure G.4: Premium Petrol Retail Prices (using Purchasing Power Parity) in OECD Countries for 2015*



* Source: IEA (2016), *Energy Prices and Taxes, Volume 2016 Issue 2: Second Quarter 2016*, IEA, Paris.

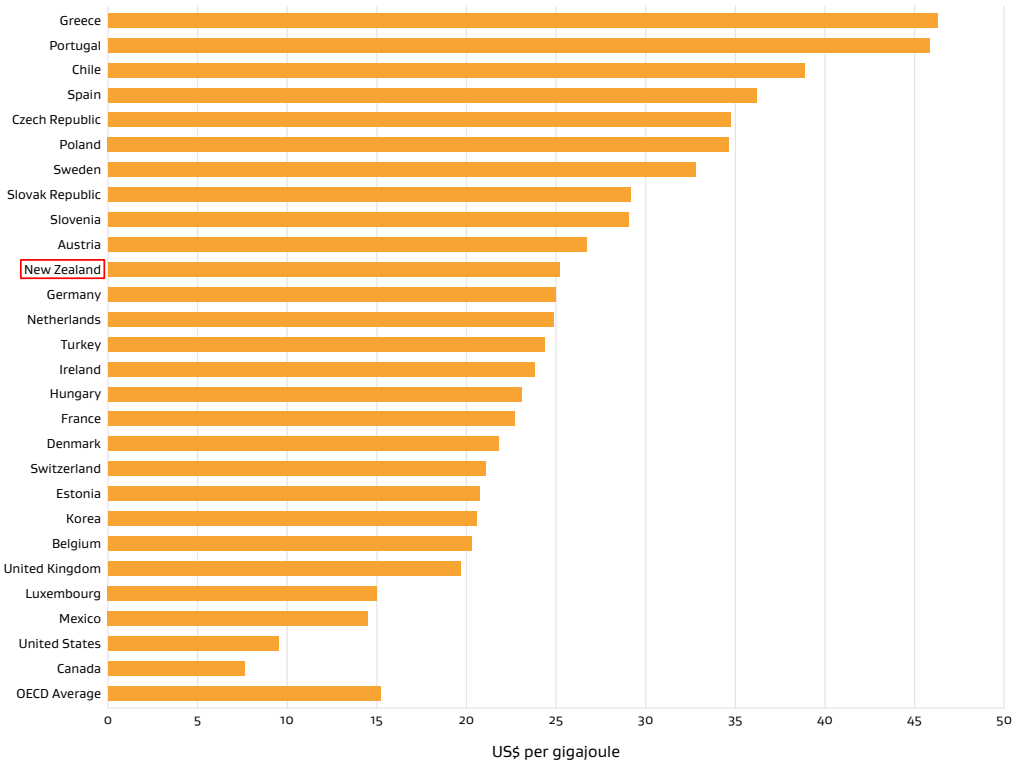
20 For more information on purchasing power parity, visit http://www.oecd.org/std/prices-ppp/purchasingpowerparities-frequentlyaskedquestionsfaqs.htm

Figure G.5: Automotive Diesel Retail Prices (using Purchasing Power Parity) in OECD Countries for 2015*



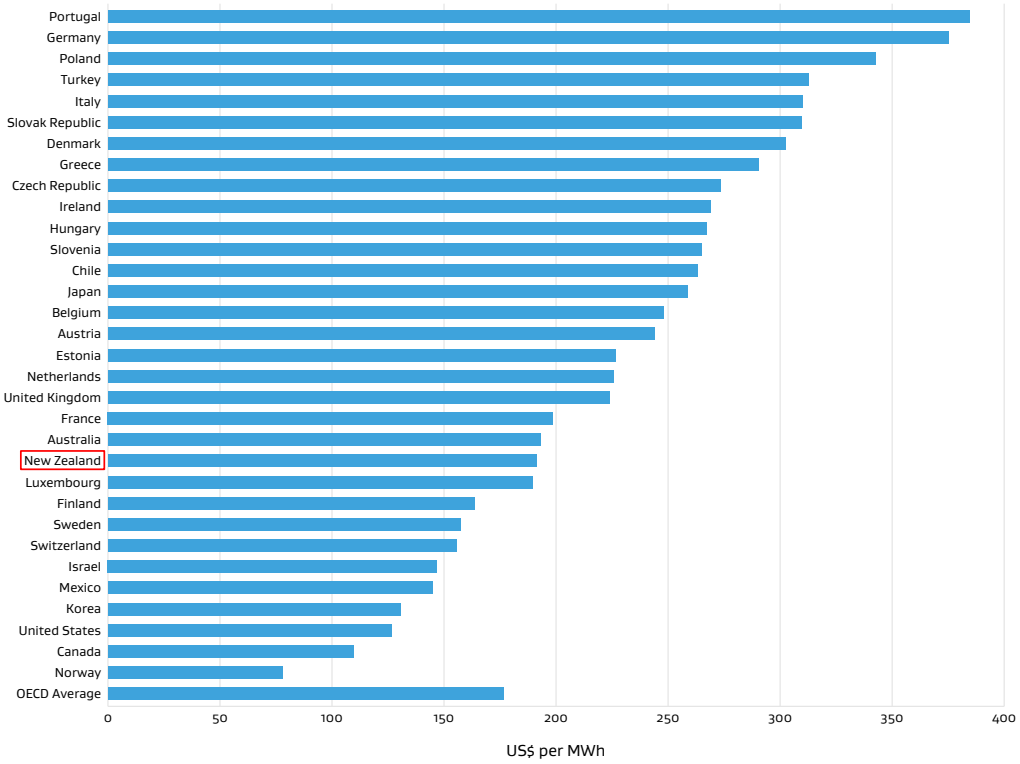
* Source: IEA (2016), *Energy Prices and Taxes, Volume 2016 Issue 2: Second Quarter 2016*, IEA, Paris.

Figure G.6: Residential Natural Gas Prices (using Purchasing Power Parity) in OECD Countries for 2015



* Source: IEA (2016), *Energy Prices and Taxes, Volume 2016 Issue 2: Second Quarter 2016*, IEA, Paris.

Figure G.7: Residential Electricity Costs (using Purchasing Power Parity) in OECD Countries for 2015*



* Source: IEA (2016), *Energy Prices and Taxes, Volume 2016 Issue 2: Second Quarter 2016*, IEA, Paris.

FURTHER READING

www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/

Energy and building Trends Energy Publications

Energy in New Zealand provides comprehensive information and analysis on New Zealand's energy supply, demand, reserves and prices, mostly as national aggregates.

New Zealand Energy Greenhouse Gas Emissions provides detailed inventory information on carbon dioxide equivalent emissions from New Zealand's energy sector and industrial processes for the calendar years 1990–2013.

New Zealand's Energy Outlook explores the long-term future for energy supply, demand, prices and energy sector greenhouse gas emissions in New Zealand.

New Zealand Energy Snapshot provides a handy pocket-sized overview and insight into New Zealand's energy sector.

New Zealand Energy Quarterly provides quarterly energy statistics and trend data on the supply of major fuel types, electricity generation and the associated greenhouse gas emissions, and fuel prices.

Changes in Energy Use provides annual trend data and analysis of changes in the way energy is used.

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