MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

MODELLING AND SECTOR TRENDS

13

2012 CALENDAR YEAR EDITION

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

Energy in New Zealand

newzealand.govt.nz

Energy in New Zealand 2013

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Modelling & Sector Trends

Infrastructure and Resource Markets

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ISSN 2324-5913

Important

Energy in New Zealand focuses on commercial energy – energy forms that are usually produced and sold as fuel. Other forms of energy, such as photovoltaic generation, are not included because there are insufficient reliable data.

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Acknowledgements

The authors are grateful to the individuals, companies and organisations that provided information and gave generously of their time to assist with the work reported here.

Authorship

This publication was prepared by the Modelling and Sector Trends team of the Ministry of Business, Innovation & Employment (MBIE). Principal contributors were Michael Smith, Cary Milkop, Nathan Young, Elvira Skoko, Julie Loke, James Kerr and Bryan Field. The authors are grateful to New Zealand Petroleum and Minerals for their assistance with reserves information and the MBIE design team for publication layout.

Availability

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Energy in New Zealand is a new publication which replaces the Energy Data File. The 2013 edition includes information up to the end of the calendar year 2012.

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

http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/energy-in-new-zealand-2013

CONTENTS

Facts

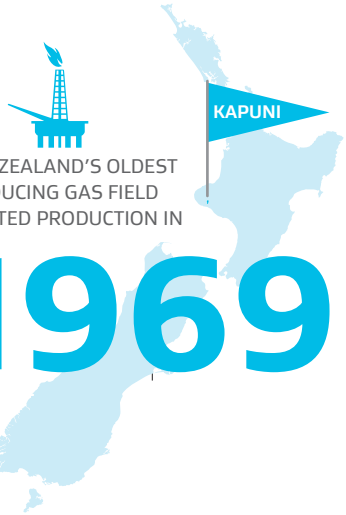
New Zealand produced

15 million

barrels of oil in 2012

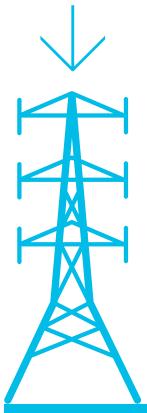
THIS LED TO OIL SELF-SUFFICIENCY OF

31%



NEW ZEALAND'S OLDEST PRODUCING GAS FIELD STARTED PRODUCTION IN

1969



Electricity demand fell

1%

in 2012

New Zealand is

3rd

in the World for percent renewables in primary energy supply

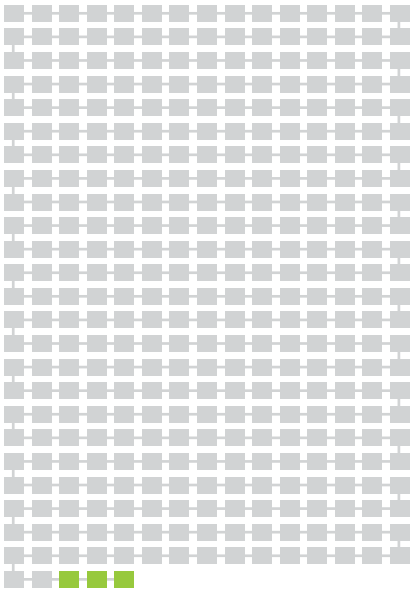
90%

of coal production from opencast mines in 2012

AVERAGE PRICE OF PETROL IN 2012

213.37 c/L

THE AVERAGE PRICE FOR NEW ZEALAND CRUDE ON THE INTERNATIONAL MARKET IN 2012 WAS $US109

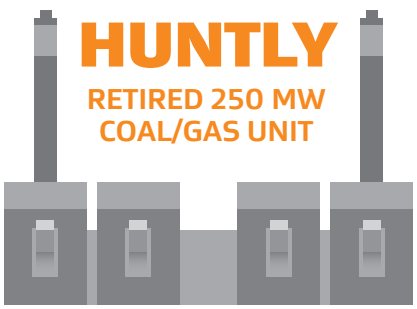


New Zealand Annual Primary Energy Supply would supply the U.S. for approximately 3 days

PEAK ELECTRICITY DEMAND

45%

HIGHER THAN AVERAGE DEMAND IN 2012



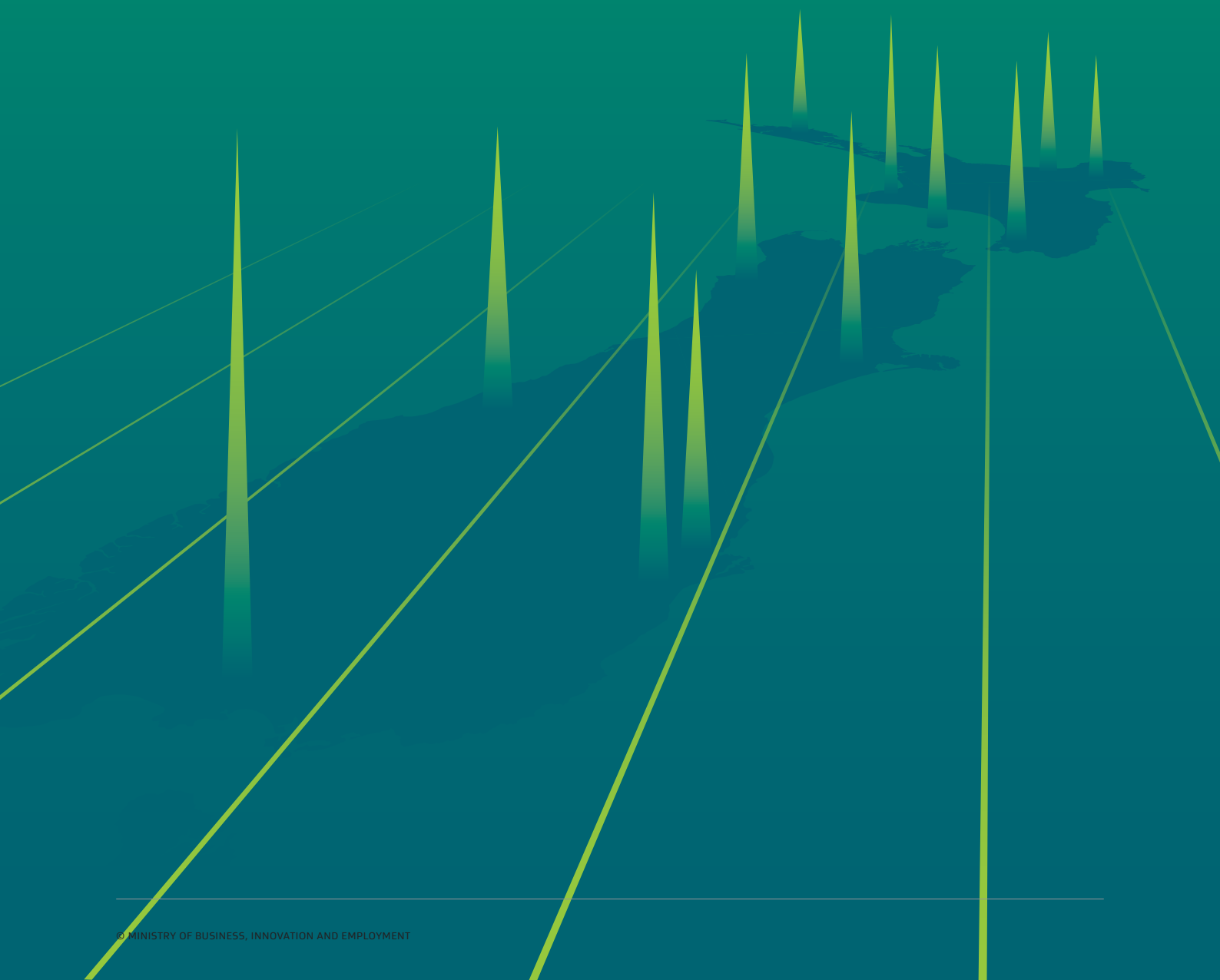
HUNTLY

RETIRED 250 MW COAL/GAS UNIT

A. ENERGY OVERVIEW

INTRODUCTION

This section presents an overview of New Zealand's key energy statistics, primary energy supply, energy transformation and energy consumption. It draws on information presented in the Energy Balances section, and the other sections. In the second half of this chapter, we present energy sector performance indicators.



Energy overview

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 1974. In 2012, renewable energy made up 37% of New Zealand's TPES. This level of contribution from renewable energy was down on last year's record value of 39%. The latest international comparison shows that New Zealand has the third highest contribution of renewable energy to TPES in the Organisation for Economic Cooperation and Development (OECD) (behind Iceland and Norway).[1]

The rapid increase in renewable energy's share of TPES in the last few years 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 when compared with most other countries.

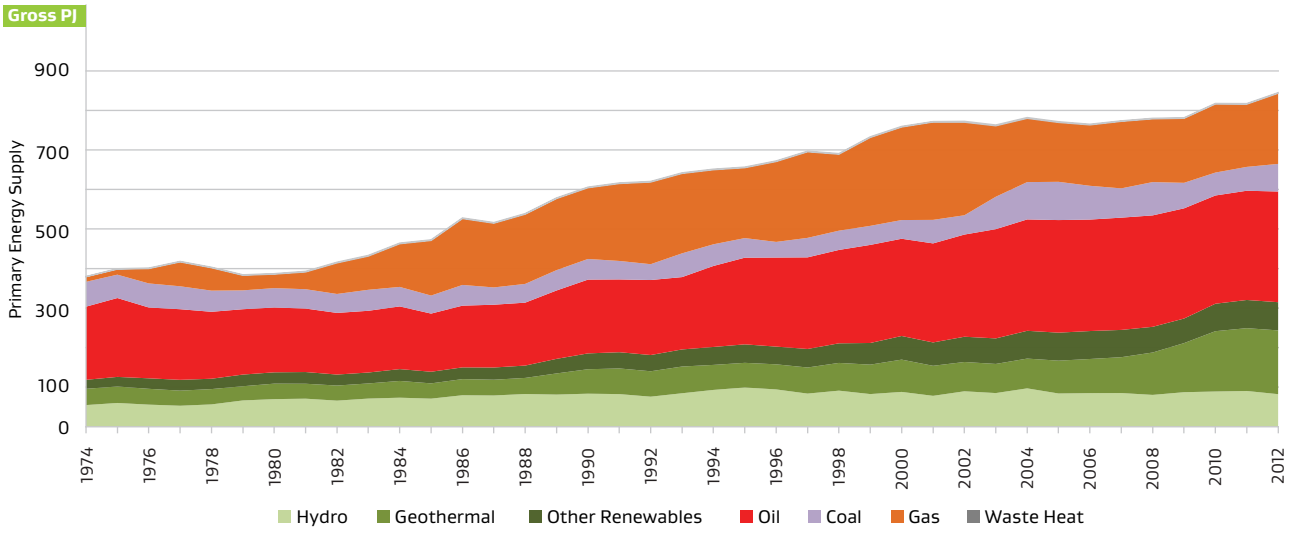
Although geothermal energy's share has increased rapidly over the last five years, oil continues to dominate New Zealand's TPES. In 2012, oil accounted for 33%, gas for 21% and geothermal energy for 19%. TPES was up by 3.1% in 2012, and has increased by an average 1.9% per annum since 2008.

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 losses. By convention, energy recorded as an input to energy transformation is recorded as negative, and energy output from energy transformation is recorded as positive (e.g. gas used for generating electricity is negative, and the electricity generated from gas is positive). For more analysis of oil refining and electricity generation, please read the oil and gas section and the electricity section.

Figure A.2 shows the total energy transformation by fuel from 1990 to 2012. This figure highlights the growth in renewables mainly because of increased geothermal electricity generation over the last five years. Geothermal electricity generation requires about seven kWh of geothermal heat to generate one kWh of electricity because of the relatively low temperature of geothermal steam (and therefore low efficiency). Oil energy transformation is very small due to very little oil being lost in the process of oil refining. Total energy transformation is a negative value, and has become more negative over the period shown, especially since the strong uptake of geothermal electricity generation since 2008. In 2012 total energy transformation was -252 PJ, which is 4.6% larger (more negative) than in 2011. Since 2008, total energy transformation has grown by an average of 4.3% per year.

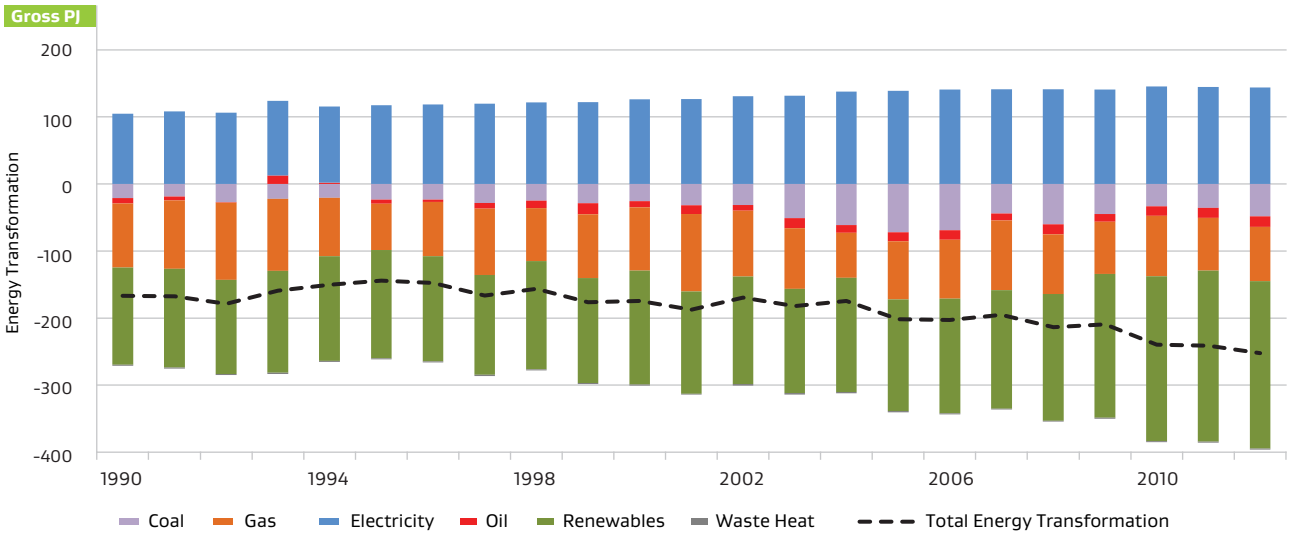
Figure A.1: Total Primary Energy Supply by Fuel



1. International Energy Agency, Renewables Information 2013. The most recent year for which data were available was 2011.

Energy overview

Figure A.2: Energy Transformation by Fuel



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 2012 fell by 0.4% to 532 PJ. The following figures show the time series of consumer energy demand by fuel (Figure A.3a) and by sector (Figure A.3b). The flat consumer energy demand in 2012 was a result of drops in the transport sector (down 2.7%) and industrial sector (down 0.8%) balanced by growth in the agriculture, forestry and fishing sector (up 6.7%), commercial and public services sector (up 4.2%) and residential (up 0.9%).

Oil (46.1%) and electricity (25.7%) made up the bulk of consumer energy demand in 2012, with the other fuels making up the balance (see Figure A.3c). The transport (37.6%) and industrial (34.7%) sectors consumed the bulk of consumer energy in 2012 (see Figure A.3d). Neither the split by fuel nor the split by sector were significantly different to 2011.

Figure A.3a: Consumer Energy Demand by Fuel

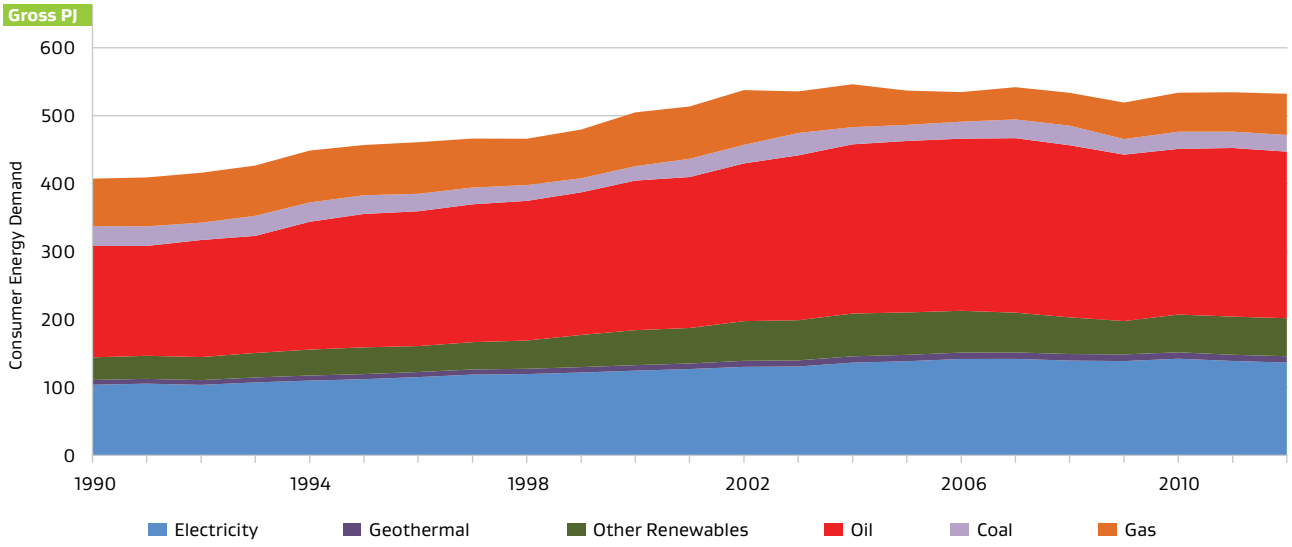
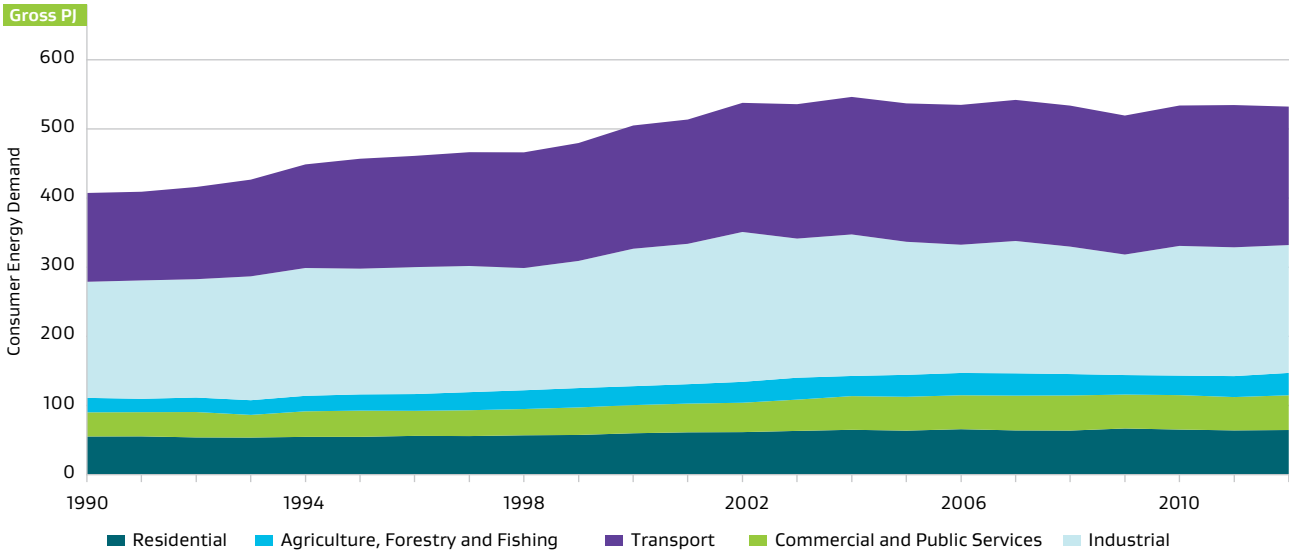


Figure A.3b: Consumer Energy Demand by Sector



Non-energy Use

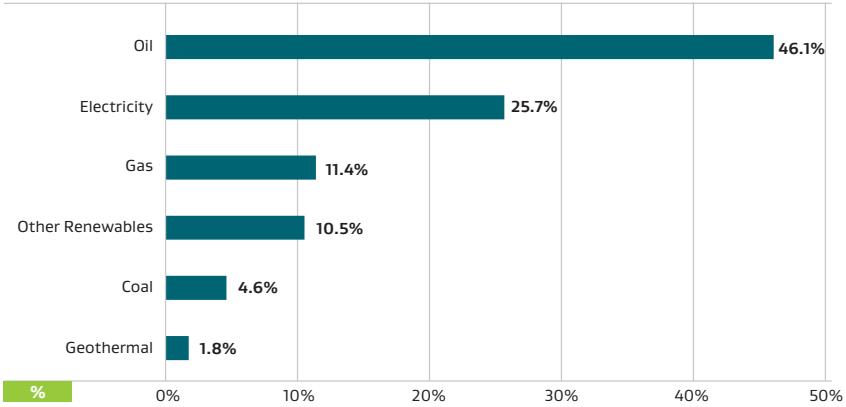
Non-energy use refers to use of fuels to produce non-energy products. Non-energy products are products where neither the raw energy source used to produce the product nor the product itself is combusted.

In recent years, non-energy use in New Zealand has been typically about one-third oil (e.g. bitumen for roads) and two-thirds natural gas (conversion of natural gas to methanol or urea). In 2012, total non-energy use was 42.3 PJ, 10.6 PJ of which was from oil and 31.7 PJ was from natural gas. Figure A.3e shows a time series of non-energy use by fuel since 1990. Non-energy use of gas peaked in 2000 when the Maui gas field was producing strongly.

Non-energy use of natural gas was up by 15% in 2012 mostly due to the restarting of the second methanol production train at Methanex NZ's Motunui plant in mid-2012 after the signing of a 10-year gas supply agreement with Todd Energy. Methanex NZ announced plans to restart their mothballed Waitara Valley methanol production plant in March 2013, so non-energy use of gas is expected to continue to grow over the next few years.

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

Figure A.3c: Consumer Energy Demand Share by Fuel in 2012



Energy overview

Figure A.3d: Consumer Energy Demand Share by Sector in 2012

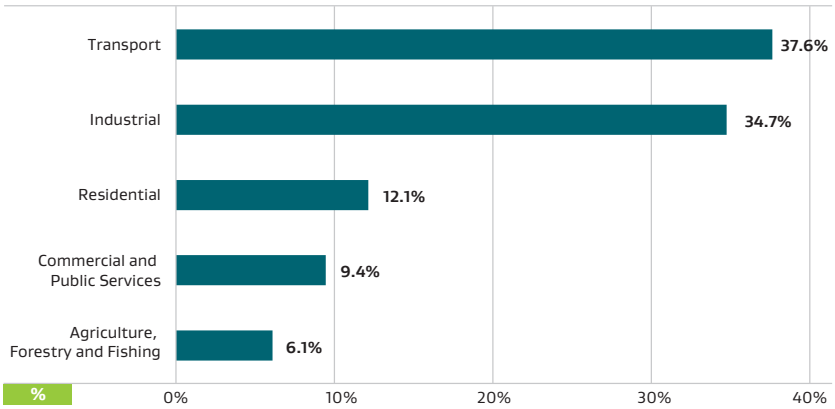
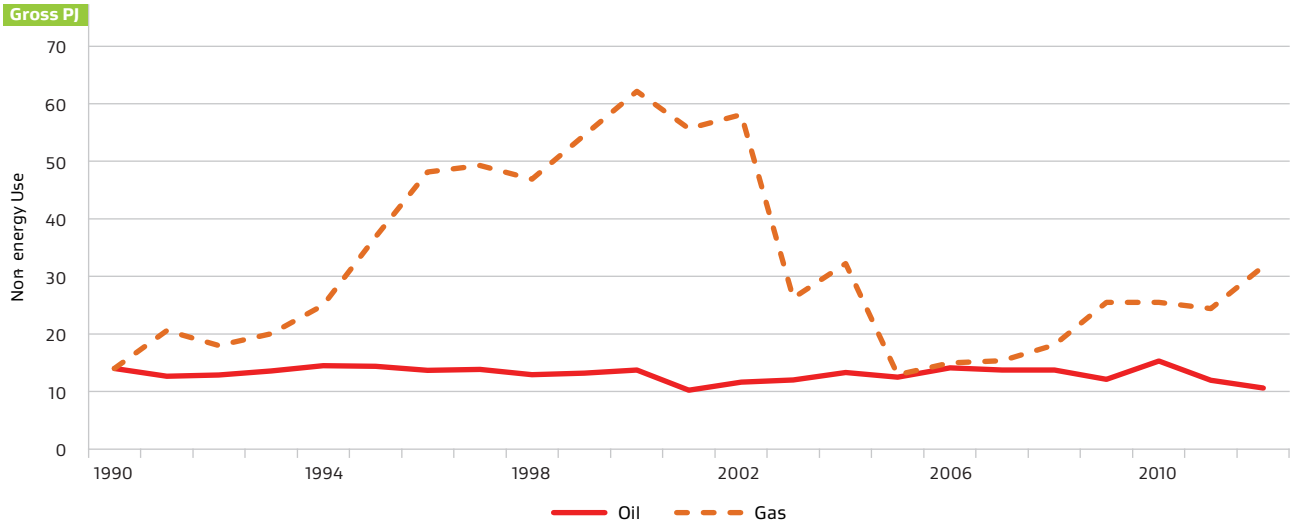


Figure A.3e: Non-Energy Use by Fuel



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, emissions intensity, energy self-sufficiency and household energy affordability indicators.

Energy Intensity

Energy intensity is a measure of the energy used (in MJ) per unit of gross domestic product (GDP, in real 95/96 New Zealand dollars). It is influenced by both the composition of industry within the economy and improvements in energy efficiency. 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

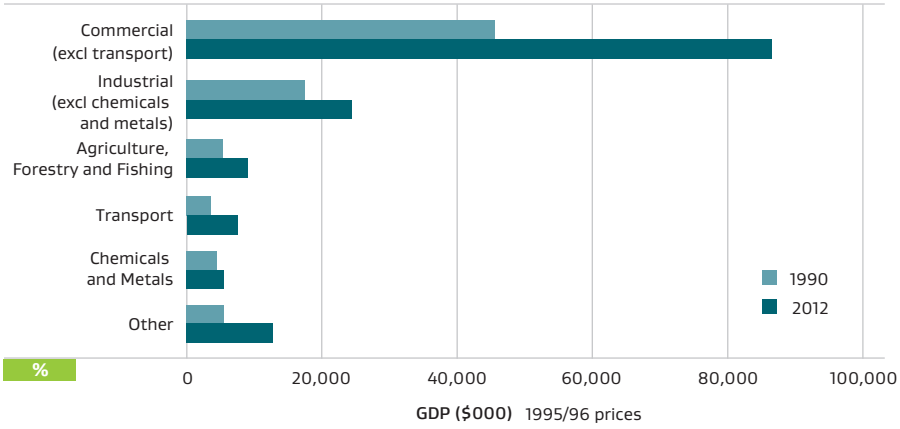
Since 1990, the overall energy intensity of the economy has improved in real terms by an average rate of 1.4% per annum to 3.6 MJ per (95/96) dollar in 2012. The most significant factor in this almost 27% improvement in energy intensity has been the rapid growth of the commercial sector (low energy intensity) relative to the industrial sector (high energy intensity). Figure A.4a shows real GDP by sector in 1990 and 2012, which shows that the commercial sector GDP (excluding transport), has nearly doubled since 1990.

Figure A.4b shows a time series of the energy intensity of industries within the New Zealand economy. In this chart, the dashed lines refer to individual industries, whereas the solid blue line is the average energy intensity of New Zealand. The individual industries within the New Zealand economy all showed improvements in energy intensity since 1990. The agriculture, forestry and fishing sector's energy intensity has been relatively flat, but quite variable since 1990. The variability of the energy intensity is largely seen in the GDP data, and is related to agricultural production volatility. The commercial sector is the least energy intensive sector at 0.6 MJ per dollar in 2012; this has improved steadily at a rate of 1.2% per annum since 1990. The energy intensity of the industrial sector (including chemical and metals manufacturing) has improved at an average rate of 1.0% per annum since 1990. It was relatively flat until 2002, when Methanex NZ's Waitara Valley methanol production facility was mothballed. Industrial energy intensity increased in 2011, but has since fallen again in 2012. Factors affecting industrial energy use in 2012 included:

- Methanex NZ restarting a second methanol production train at their Motunui plant in mid-2012 after signing a 10-year gas supply agreement with Todd Energy;
- Production of aluminium at the Tiwai Point aluminium smelter was lower in 2012 than in 2011;
- Production dropped in the wood, pulp and paper manufacturing sector.

Transport is New Zealand's most energy intensive sector, at 27 MJ per dollar in 2012. The energy intensity of transport has improved by 1.4% per annum since 1990.

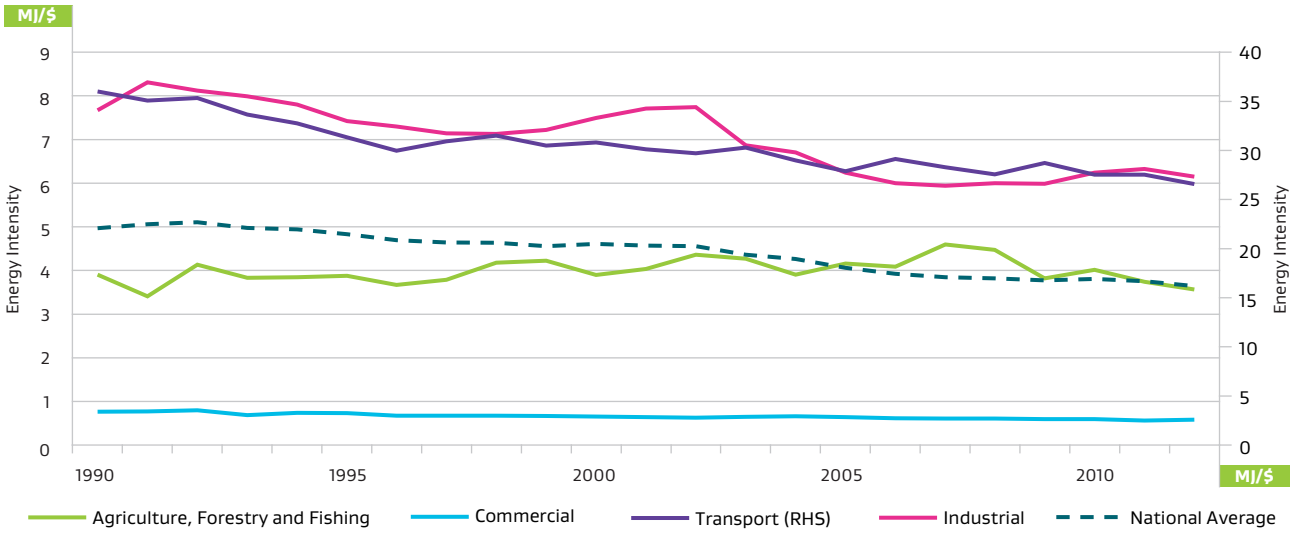
Figure A.4a: New Zealand GDP (Real 95/96 prices) by Sector in 1990 and 2012[3]



2. http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/changes-in-energy-use

3. Data from Statistics New Zealand. Table reference SND012AA.

Figure A.4b: Energy Intensity of New Zealand Industries



International Comparison of Primary Energy Supply per Capita

TPES per capita is the total amount of energy supply of a country, divided by its population. In an international context, New Zealand's TPES per capita is about the OECD average. Countries with strong industrial sectors, such as the United States, have generally higher TPES per capita.

Both New Zealand and Australia showed an increase in TPES per capita since 2010, whereas the other countries shown displayed a drop in TPES per capita. A reason for Australia and New Zealand's increase in TPES per capita in 2012 could be that the economies of these countries performed relatively well compared with the other countries shown in Figure A.4c during 2012.

Emissions Intensity

The production, supply and consumption of energy have a variety of impacts on the environment. In particular, the pressure on the global climate from the increasing concentration of greenhouse gasses in the Earth's atmosphere is an important factor to monitor. This section compares how New Zealand's energy sector greenhouse gas emissions compare with some other Annex 1 countries[4] in terms of emissions intensity (carbon dioxide equivalent (CO_2-e) emissions per capita). Greenhouse gas emissions data (and population) figures for this section were sourced from the United Nations Framework Convention on Climate Change[5]. European Union (15) population figures were sourced from Eurostat[6], and Demographia[7]. The latest greenhouse gas data that were available were for the 2011 calendar year.

Overall Energy Sector Greenhouse Gas Emissions Intensity

Energy sector emissions in New Zealand generally account for almost half of New Zealand's total greenhouse gas emissions, with most of the remainder coming from the agricultural sector.

Figure A.5a shows the total greenhouse gas emissions per capita for the energy sector for a selection of Annex 1 countries. New Zealand sits at the bottom of this selection due to its low carbon electricity system. In 2011, New Zealand's energy sector greenhouse gas emissions per capita were 0.2% lower than in 1990. New Zealand's per capita emissions in 2000 and 2005 were higher due to strong growth in the transport sector, and electricity sector, driven by strong economic and population growth throughout the 2000s.

The United States of America (USA) has reduced per capita emissions by 12.4% since 1990, whereas per capita emissions in Australia have grown by 15.8% over the same period. The European Union (15) has per capita emissions 0.9% lower than in 1990. Japan's per capita emissions have grown by 6.2% from 1990 levels.

Electricity Generation and Transport Emissions Intensity

The majority of energy sector greenhouse gas emissions for most countries are made up of electricity generation and transport emissions. This section compares the selection of countries from Figure A.5a for both electricity generation emissions and transport emissions.

4. Annex 1 countries are developed nations that are Parties to the United Nations Framework Convention on Climate Change (UNFCCC). These countries generally have the highest quality greenhouse gas emissions statistics because of their reporting obligations as parties to the UNFCCC.

5. http://unfccc.int/di/FlexibleQueries/Event.do?event=selectPageItem

6. http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/main_tables

7. http://www.demographia.com/db-eu-pop.htm

Figure A.4c: Total Primary Energy Supply per Capita of New Zealand and Selected OECD Trading Partners[8]

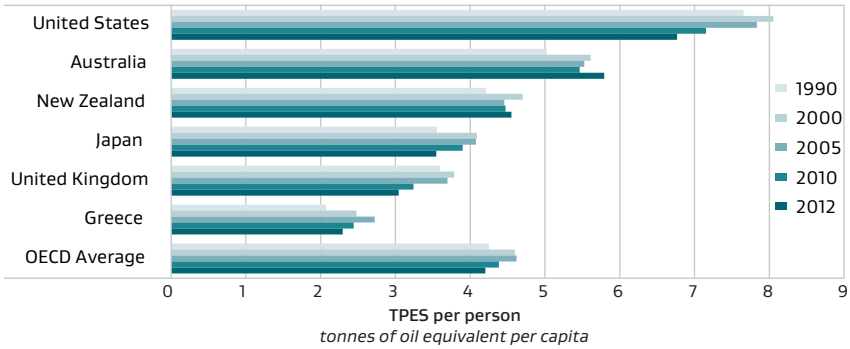
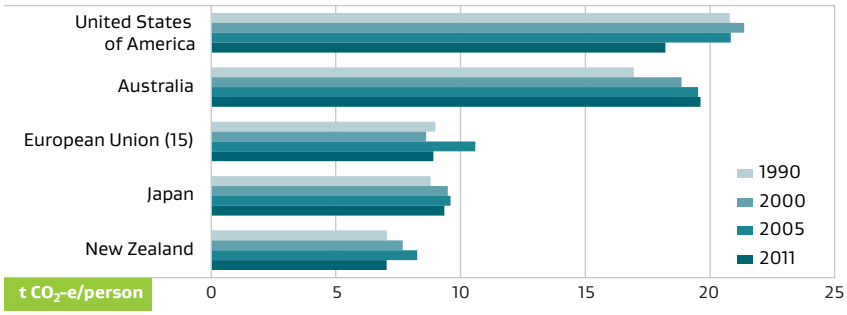


Figure A.5a: Energy Sector Greenhouse Gas Emissions per Capita of Selected Annex 1 Countries



8. Data for this chart were sourced from the International Energy Agency. Energy Statistics of OECD Countries, 2013 edition.

Energy overview

Figure A.5b shows the per capita electricity generation emissions of Annex 1 countries. New Zealand has very low per capita electricity generation emissions due to the high proportion of low carbon generation technologies (such as hydro, geothermal and wind generation). New Zealand's share of electricity generation from renewable energy sources rates consistently in the top three nations in the OECD (behind Iceland and Norway).[9] This figure also highlights the difference between countries with fossil fuel dominated electricity systems (such as the USA and Australia) and countries with a high proportion of nuclear energy in their electricity systems (such as the European Union (15) and Japan).

Figure A.5c shows transport sector emissions per capita from five Annex 1 countries. New Zealand sits about the middle of the pack for per capita transport emissions. New Zealand has the second highest private car ownership in the OECD at 592 cars per thousand people in 2011.[11] It is second only to the USA on this statistic. New Zealand also has a relatively old private vehicle fleet, the average age of a New Zealand car was 13.0 years in 2011, compared with the USA at 11.1 years and Australia at 10.0 years in 2011.[12] Additionally, freight transport in New Zealand has moved away from rail and coastal shipping, and is now predominantly moved by road truck,[13] which is a more energy (and emissions) intensive mode. The growth in New Zealand's per capita transport emissions since 1990 is related to changes in the way freight is moved (as previously mentioned) and the influx of inexpensive Japanese SUVs into the NZ market in the mid- to late 1990s.

Energy Self-Sufficiency

Energy self-sufficiency is the ratio of indigenous production of energy 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 use such as natural gas used as a feedstock to manufacture methanol). A self-sufficiency value of 100% would indicate New Zealand produces all the energy it needs, whereas values above or below indicate that New Zealand is a net exporter or importer of energy (respectively). New Zealand meets all of its gas, renewables and waste heat supply needs by indigenous production.

Figure A.6 shows a time series of New Zealand's energy self-sufficiency. Overall, New Zealand's total energy self-sufficiency was 84% in 2012. This series peaked in 2010 at 91% due to a combination of historically high oil, gas and coal production. The minimum self-sufficiency occurred in 2005 at 74%.

Figure A.5b: Electricity Generation Greenhouse Gas Emissions per Capita of Selected Annex 1 Countries[10]

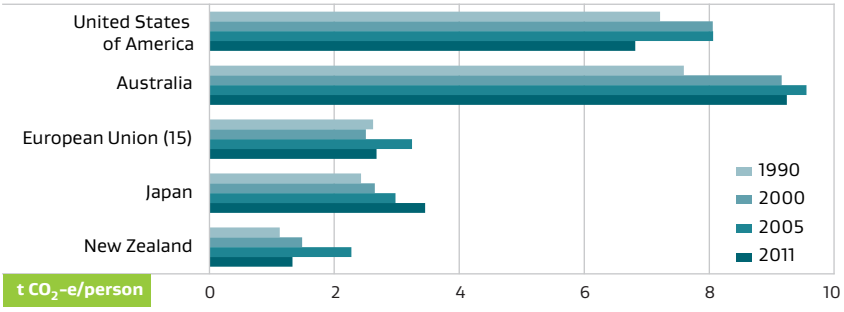
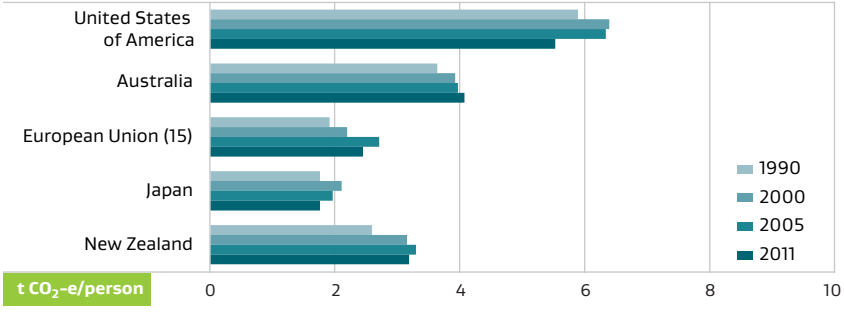


Figure A.5c: Transport Greenhouse Gas Emissions per Capita of Selected Annex 1 Countries



9. IEA Renewables Information 2012, Table 3 on page 57.

10. The UNFCCC carbon accounting rules do not count fugitive emissions from geothermal electricity generation in electricity emissions. However, for the purposes of this analysis these are included in Figure A.5b for New Zealand due to its high proportion of geothermal electricity generation.

11. Ministry of Transport Vehicle Fleet Statistics, 2012 (http://www.transport.govt.nz/research/newzealandvehiclefleetstatistics/).

12. Ministry of Transport Vehicle Fleet Statistics, 2012 (http://www.transport.govt.nz/research/newzealandvehiclefleetstatistics/).

13. MBIE, Changes in Energy Use – New Zealand, 1990–2011 (http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/changes-in-energy-use).

Energy overview

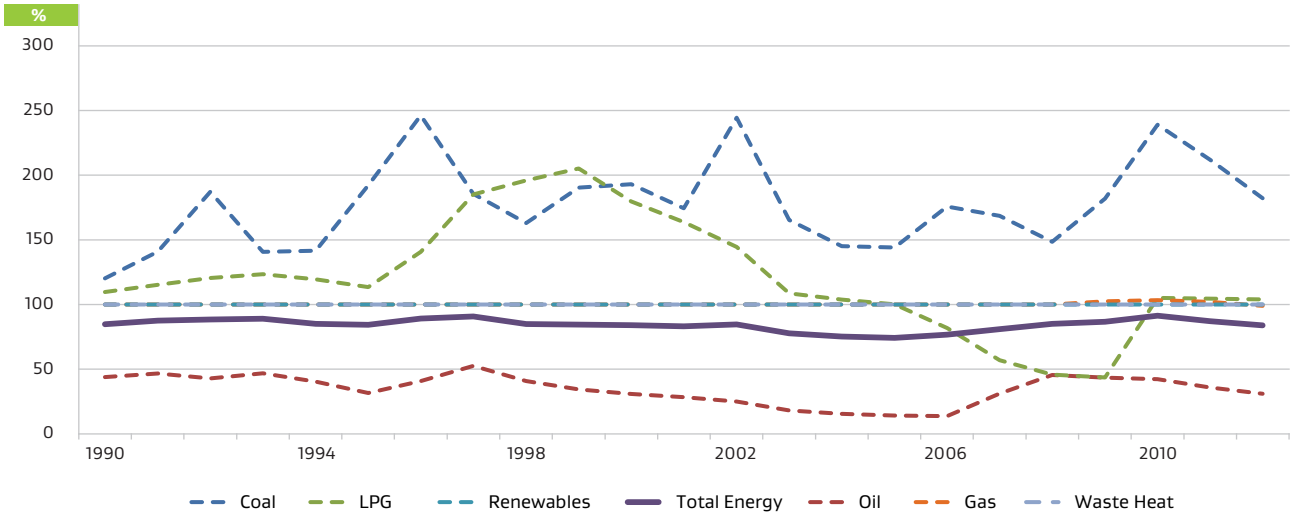
New Zealand is a net exporter of coal. Premium quality coking coal is exported from the West Coast of the South Island and is largely used for steel manufacturing in Asia. New Zealand is also a net exporter of LPG (except during the period 2006–09). Self-sufficiency for LPG peaked in 1999 when the Maui 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. This is because New Zealand crude oil is very high quality (low density and sulphur content) and fetches a premium price on the international market. Cheaper foreign oil is imported to refine at the Marsden Point refinery. Oil self-sufficiency peaked in 1997 at 52%. 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.

Household Energy Affordability Indicator

The household energy affordability indicator is an important indicator for interpreting whether or not energy has become more or less affordable over time. The household energy affordability indicator is calculated by multiplying the energy price by a representative quantity of energy, and dividing this by average income. A higher indicator implies worse affordability. Technical notes on the construction of this indicator are included at the end of this chapter. It should be noted that this indicator is not a direct measure of energy affordability because it ignores the movements in the relative prices of other goods and services that people may purchase.

Figure A.6: Energy Self-sufficiency for New Zealand by Fuel



Energy overview

Household Energy Affordability Indicator by Fuel

The household energy affordability indicators for regular petrol, diesel, natural gas and electricity are shown in Figure A.7a. This figure shows that energy prices have increased more than the national average income over the last 12 years.

The difference in level between regular petrol and diesel is almost solely due to the higher level of excise duty on petrol; this difference should be treated with care, because diesel vehicles are subject to road user charges (RUC) in New Zealand. RUCs are charged on a per kilometre basis and if an estimate of these were included in the diesel price, these two series would converge. Also of note is the high level of variability in the petrol and diesel series. This is due to the variability in the international oil price over the period shown. The household energy affordability indicators for petrol and diesel peaked in mid-2008 when the international price of oil peaked at almost US$150 per barrel. Since 2000, the regular petrol and diesel household energy affordability indicators grew by 2.3% and 3.2% per annum respectively.

The household natural gas and electricity affordability indicators are much smoother than the petrol and diesel indicators, with the electricity series being smoother than the gas series. The residential natural gas price peaked in 2008 after a strong period of growth (2003–2008), and is yet to reach that level again. The strong growth in the gas price was due to tightening of the supply-demand balance, and the expiry of some historical gas contracts. In comparison, the electricity price grew fairly smoothly. The household energy affordability indicators for gas and electricity since 2000 grew by 3.0% and 1.6% per annum respectively.

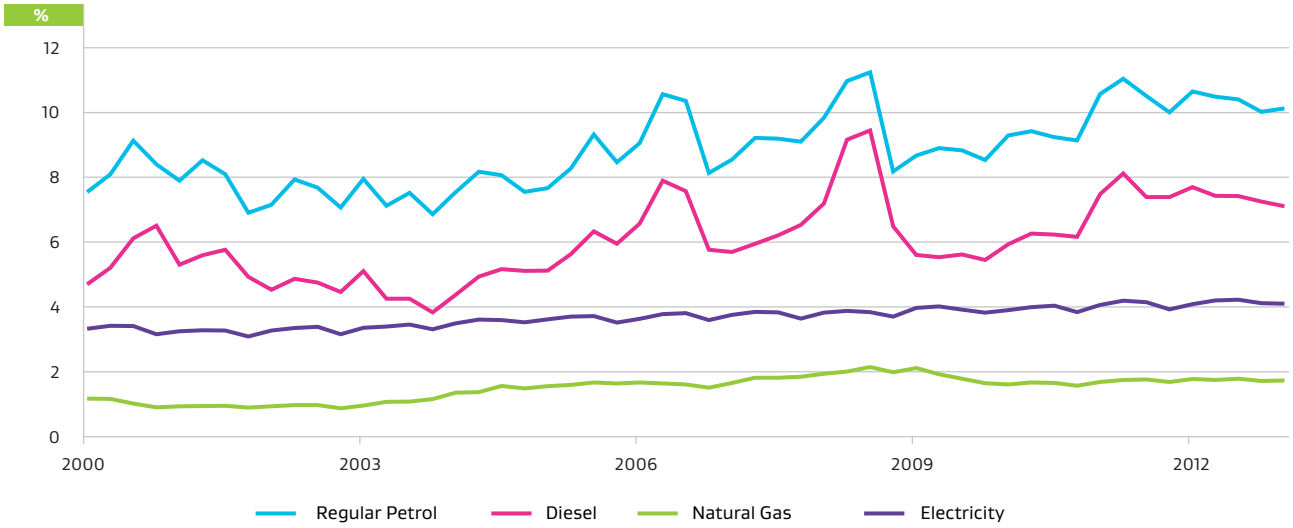
Regional Household Energy Affordability Indicator

The information presented in the section above was about national average household energy affordability indicators. In this section, we explore how these indicators compare on a regional basis for fuels where this information is available (petrol and electricity).

Figure A.7b shows household petrol affordability indicators for Auckland, Wellington and Christchurch, as well as the national average. Price information for this chart was sourced from Statistics New Zealand. Because there is very little difference between the retail petrol price between the three centres (on average, less than a 0.4% difference from the national average price), the higher level of the Christchurch household petrol affordability indicator is a result of lower than average incomes in Christchurch. Conversely, the Auckland and Wellington household petrol affordability indicators are below the national average because those regions have higher income relative to the national average.

Figure A.7c shows the regional spread in the household electricity affordability indicator. Price data for this analysis are from the Ministry's Quarterly Survey of Domestic Electricity Prices (QSDEP). These prices are modelled for a customer who uses 8,000 kWh per annum.[14] Most of the regions in New Zealand have a higher household electricity affordability indicator than

Figure A.7a: Household Energy Affordability Indicator by Fuel



14. For further technical information on the assumptions used in the QSDEP, please visit: http://www.med.govt.nz/sectors-industries/energy/electricity/prices/electricity-tariff-surveys/quarterly-survey/quarterly-survey-notes.

Energy overview

the national average, and only Auckland and Wellington regions have lower than average household electricity affordability indicators. This reflects the higher incomes in Wellington and Auckland relative to the other regions (see Figure A.7c) and lower electricity prices. Gisborne and the West Coast regions have the highest household electricity affordability indicators because these regions have lower than average incomes and higher than average electricity prices compared with other regions of New Zealand.

Figure A.7b: Regional Household Petrol Affordability Indicator

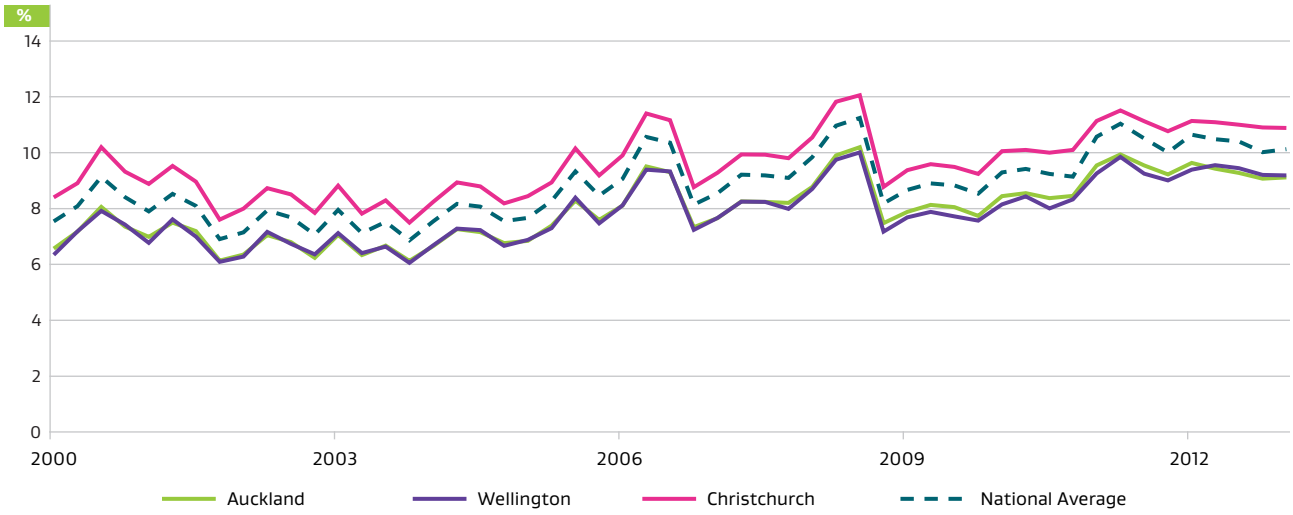
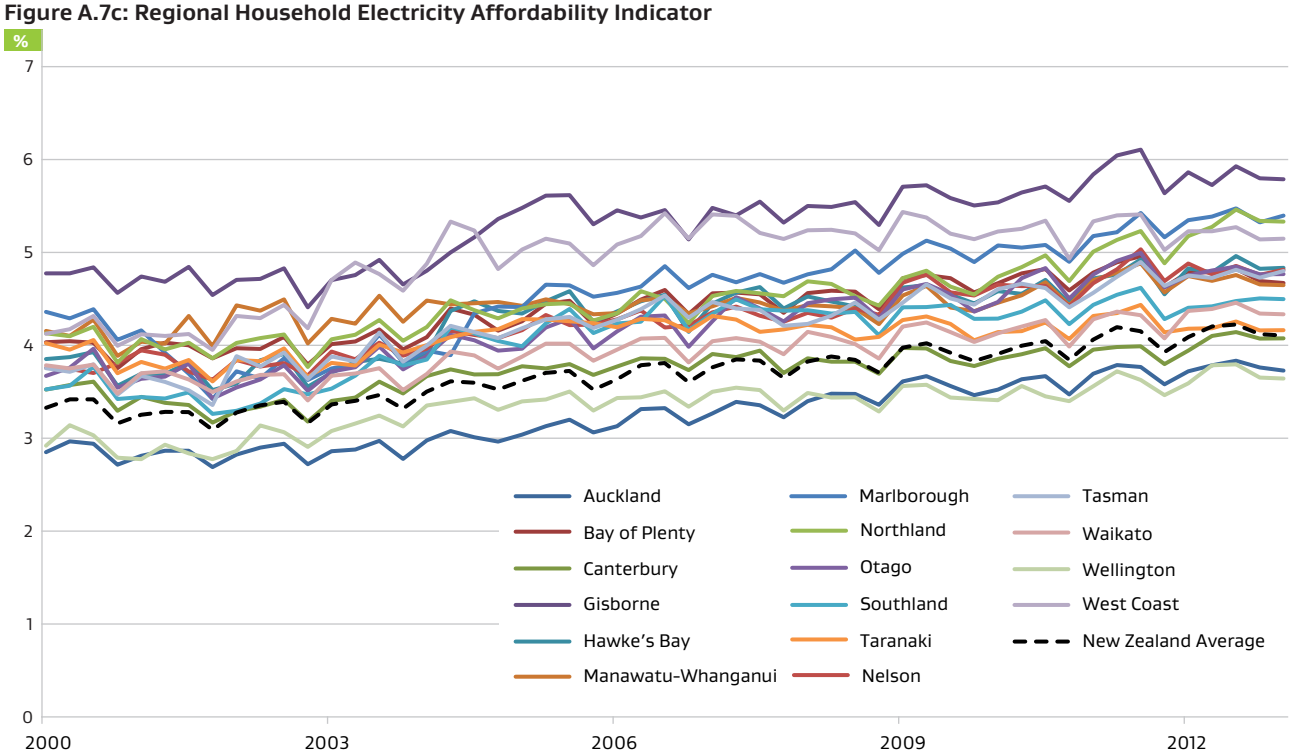


Figure A.7c: Regional Household Electricity Affordability Indicator



Energy overview

Technical notes on the Household Energy Affordability Indicator

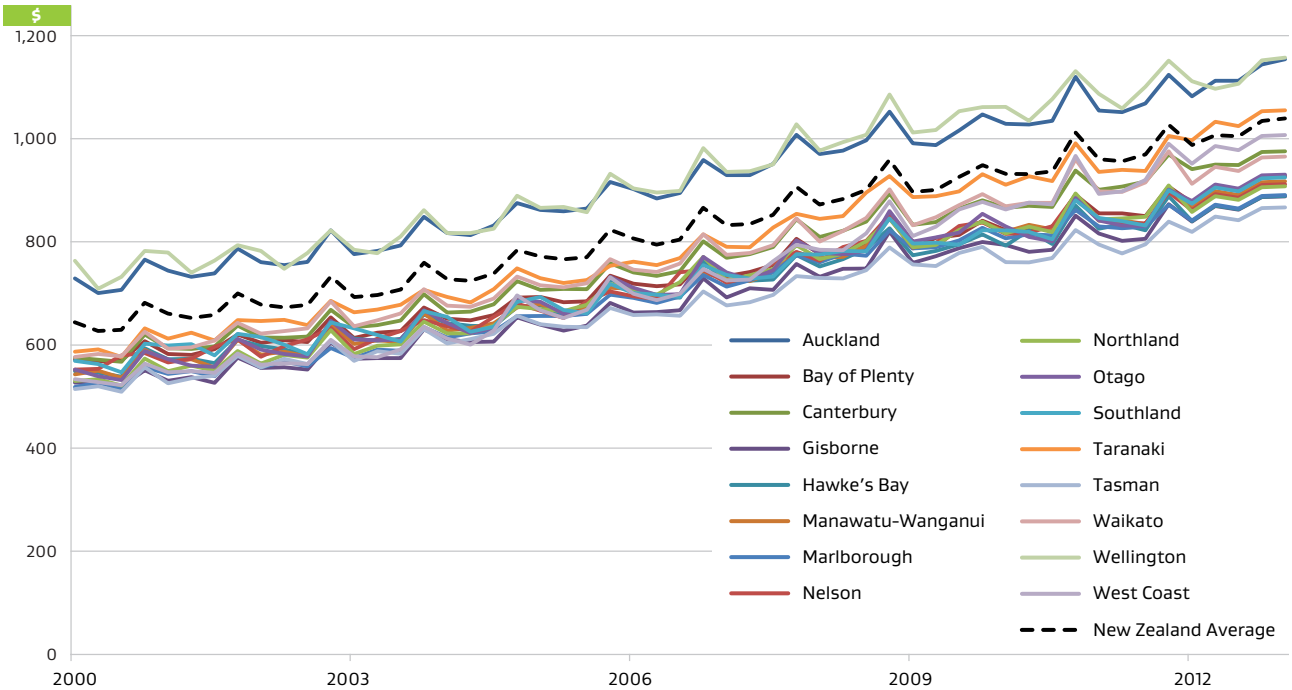
The weekly cost of purchasing energy depends on the price, and the quantity of the fuel purchased. This will vary greatly from region to region, and person to person, depending on their circumstances. Therefore, the following representative quantities of the following fuels used in this analysis are shown in table A.1.

Income data for these purposes are sourced from Statistics New Zealand's Linked Employer-Employee Dataset (LEED), which are released quarterly at a regional council level. Because the LEED data are released about 18 months behind real time, the most recent four periods of data are estimated using a statistical error correction model. In this model, Statistics New Zealand's Quarterly Employment and Earnings Survey was used as an explanatory variable. Figure A.8 shows the income series that were used for this analysis.

Table A.1: Assumptions used in the household energy affordability indicator

Fuel Type	Assumed Weekly Quantity	Comment
Regular Petrol and Diesel	50 litres	Approximate capacity of the fuel tank of a medium-sized car
Natural Gas	134 kWh	Average annual gas consumption per installation control point (ICP) since 2007, divided by 52
Electricity	154 kWh	8,000 kWh divided by 52. The average household consumption of electricity in New Zealand has been about 8,000 kWh for many years.

Figure A.8: Average Weekly Income by Regional Council Area in New Zealand



B. ENERGY BALANCES

INTRODUCTION

This section presents annual energy supply and demand balance tables for New Zealand. Energy balances using gross caloric values (GCV)[1] are presented in petajoules for 2012 (Table B.2). The 2012 table is also displayed using net calorific values[2] (Table B.3). The energy balances focus on commercial energy – energy forms that are typically produced and sold as a fuel. There are not enough reliable data to include other forms of energy, such as passive solar heating. The entry "0.00" in an energy balance table indicates the figure is less than 0.005 PJ but greater than 0 PJ, with zero PJ indicated by a blank entry (this includes where no reliable data are available).

1. Also known as higher heating value
2. Also known as lower heating value

Energy balances

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 is given after any gas is flared or reinjected and any 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, which is 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 made up of actual data from major generators and the Electricity Authority. Estimates are made where actual data are unavailable at the time of publishing.

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[3], this also appears in the energy transformation under oil production.

Losses and Own Use in the energy balances include losses both before and after transformation, losses and own use in production, transmission and distribution losses, electricity 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 thermal energy used for purposes other than combustion: e.g. bitumen for roads and natural gas used as feedstock for the production of methanol and ammonia/urea.

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, 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 (ANZSIC) 2006 definitions.

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

Where the energy 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.1: Default Electrical Transformation Factors[1]

Fuel	Net to Gross Factor	Default Efficiency
Biogas	1.07	30%
Coal	1.07	30%
Gas (Single Cycle)[2]	1.07	30%
Geothermal[3]	1.06	15%
Hydro	1.01	100%
Oil	1.07	30%
Waste Heat	1.07	15%
Wind	1.01	100%
Wood	1.07	25%

Notes to table B.1

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

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

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

3. A very small amount of liquid biofuel is consumed unblended. However, insufficient data is available on use of unblended liquid biofuel to include in this publication.

Energy balances

Table B.2: Energy Supply and Demand Balance Calendar Year 2012

	Converted into Petajolues using Gross Calorific Values	COAL			OIL							
		Bituminous & Sub-bitum.	Lignite	Total	Crudes/ Feedstocks/NGL	LPG	Petrol	Diesel	Fuel Oil	Av. Fuel/ Kero	Others	Total
SUPPLY	Indigenous Production	122.27	5.00	127.27	86.55	7.20						93.75
	+ Imports	0.04	0.00	0.04	247.70	0.43	51.24	21.72	0.89	1.22	5.41	328.61
	- Exports	69.43	-	69.43	82.60	0.64	-	-	11.11	-	-	94.35
	- Stock Change	-11.96	-0.01	-11.98	-5.96	0.06	4.90	0.19	1.85	0.81	0.16	2.01
	- International Transport						-	1.54	8.77	35.78	-	46.08
	TOTAL PRIMARY ENERGY	**64.84**	**5.02**	**69.86**	**257.62**	**6.93**	**46.34**	**19.99**	**-20.85**	**-35.36**	**5.25**	**279.92**
	ENERGY TRANSFORMATION	**-47.97**	**-0.24**	**-48.21**	**-255.48**	**-0.00**	**61.92**	**91.62**	**32.25**	**48.40**	**5.34**	**-15.96**
	Electricity Generation	-29.32	-	-29.32				-0.04	-			-0.04
	Cogeneration	-7.42	-0.24	-7.66								
	Oil Production				-255.48		63.89	92.54	31.51	48.46	13.29	-5.79
	Other Transformation	-11.06	-	-11.06								
	Losses and Own Use	-0.17	-	-0.17	-	-0.00	-1.97	-0.88	0.74	-0.06	-7.95	-10.13
Non-energy Use											**-10.59**	**-10.59**
CONSUMER ENERGY (calculated)		**16.87**	**4.78**	**21.65**	**2.14**	**6.92**	**108.26**	**111.61**	**11.40**	**13.03**	**-**	**253.36**
DEMAND	**Agriculture, Forestry and Fishing**	**3.66**	**0.02**	**3.68**		**0.06**	**1.46**	**15.56**	**2.33**	**0.31**		**19.73**
	Agriculture	3.66	0.02	3.68		0.06	1.45	10.53	-	0.31		12.36
	Forestry and Logging	-	-	-			0.00	3.11	-	0.00		3.11
	Fishing	-	-	-			0.00	1.93	2.33	0.00		4.26
	Industrial	**14.78**	**4.23**	**19.01**		**2.67**	**0.08**	**12.18**	**0.97**	**0.12**		**16.02**
	Mining	0.00	0.00	0.00			0.00	3.53	0.02	0.00		3.55
	Food Processing	9.93	4.21	14.13			-	-	-	-		-
	Textiles	0.08	-	0.08								
	Wood, Pulp, Paper and Printing	0.74	0.01	0.75								
	Chemicals	-	-	-								
	Non-metallic Minerals	3.54	0.01	3.55								
	Basic Metals	0.03	-	0.03			-	-	-	-		-
	Mechanical/Electrical Equipment	0.04	0.00	0.04								
	Building and Construction	0.03	-	0.03			0.00	4.19	0.01	0.08		4.29
	Unallocated	0.39	-	0.39		2.67	0.07	4.46	0.93	0.03		8.17
	Commercial	**0.75**	**0.63**	**1.38**		**1.11**	**0.17**	**4.03**	**0.01**	**0.51**		**5.83**
	Transport	**0.00**	**0.00**	**0.01**		**0.37**	**104.42**	**80.02**	**4.00**	**11.15**		**199.96**
	Residential	**0.26**	**0.18**	**0.44**		**2.72**	**-**	**0.29**	**-**	**0.62**		**3.63**
CONSUMER ENERGY (observed)		**19.46**	**5.06**	**24.52**	**-**	**6.92**	**106.14**	**112.09**	**7.31**	**12.71**	**-**	**245.17**
Statistical Differences		**-2.59**	**-0.29**	**-2.88**	**2.14**	**-**	**2.12**	**-0.48**	**4.09**	**0.32**	**-**	**8.19**

Energy balances

NATURAL GAS	RENEWABLES								ELECTRICITY	WASTE HEAT	
Total	Hydro	Geothermal	Solar	Wind	Liquid Biofuels	Biogas	Wood	Total	Total	Total	TOTAL
176.73	82.25	161.28	0.36	7.39	0.28	3.09	60.22	314.87		1.52	714.14
											328.65
											163.77
-1.95											-11.92
											46.08
178.68	**82.25**	**161.28**	**0.36**	**7.39**	**0.28**	**3.09**	**60.22**	**314.87**		**1.52**	**844.85**
-80.67	**-82.25**	**-151.95**		**-7.39**	**-0.28**	**-2.76**	**-4.95**	**-249.59**	**143.66**	**-1.52**	**-252.29**
-53.58	-82.25	-150.65		-7.39		-1.95		-242.24	149.40		-175.78
-19.34		-1.31				-0.82	-4.95	-7.08	10.24	-1.52	-25.36
-					-0.28			-0.28			-6.07
											-11.06
-7.74									-15.99		-34.03
-31.74											**-42.33**
66.27		**9.33**	**0.36**	**-**	**-**	**0.33**	**55.26**	**65.28**	**143.66**	**-**	**550.23**
1.56		**0.79**						**0.79**	**6.59**		**32.35**
1.54		0.79						0.79	5.91		24.27
0.03									0.16		3.30
-									0.52		4.78
44.85		**5.90**					**47.98**	**53.89**	**51.02**		**184.79**
0.00									1.44		5.00
10.87									6.75		31.75
0.38									0.36		0.83
5.45									11.03		17.24
22.57									2.60		25.18
0.70									0.91		5.16
3.08									23.24		26.35
1.62									0.60		2.27
0.05									0.60		4.99
0.11		5.90					47.98	53.89	3.48		66.03
7.89		**2.32**				**0.28**		**2.60**	**32.52**		**50.22**
0.03						**-**		**-**	**0.22**		**200.22**
6.28		**0.31**	**0.36**				**7.28**	**7.96**	**46.21**		**64.51**
60.61	**-**	**9.33**	**0.36**	**-**		**0.28**	**55.26**	**65.23**	**136.57**	**-**	**532.10**
5.66		**-**	**-**	**-**		**0.05**	**-**	**0.05**	**7.09**	**-**	**18.13**

Energy balances

Table B.3: Net Energy Supply and Demand Balance, Calendar Year 2012

	Converted into Petajolues using Gross Calorific Values	COAL			OIL							
		Bituminous & Sub-bitum.	Lignite	Total	Crudes/ Feedstocks/NGL	LPG	Petrol	Diesel	Fuel Oil	Av. Fuel/ Kero	Others	Total
SUPPLY	Indigenous Production	116.21	4.48	120.69	80.23	6.64						86.87
	+ Imports	0.04	0.00	0.04	229.62	0.39	47.80	20.39	0.83	1.15	5.13	305.31
	- Exports	66.65	-	66.65	76.57	0.59	-	-	10.47	-	-	87.62
	- Stock Change	-11.23		-11.23	-5.52	0.05	4.57	0.18	1.74	0.76	0.15	1.93
	- International Transport						-	1.45	8.26	33.56	-	43.27
	TOTAL PRIMARY ENERGY	**60.83**	**4.48**	**65.31**	**238.81**	**6.39**	**43.23**	**18.76**	**-19.64**	**-33.18**	**4.98**	**259.36**
	ENERGY TRANSFORMATION	**-45.04**	**-0.22**	**-45.26**	**-236.83**	**-0.00**	**57.77**	**86.00**	**30.38**	**45.40**	**5.06**	**-12.22**
	Electricity Generation	-27.53	-	-27.53				-0.04	-			-0.04
	Cogeneration	-6.97	-0.22	-7.18								
	Oil Production				-236.83		59.60	86.87	29.68	45.46	12.60	-2.62
	Other Transformation	-10.38	-	-10.38								
	Losses and Own Use	-0.16	-	-0.16	-	-0.00	-1.84	-0.83	0.69	-0.06	-7.54	-9.57
Non-energy Use											**-10.04**	**-10.04**
CONSUMER ENERGY (calculated)		**15.78**	**4.27**	**20.05**	**1.99**	**6.38**	**101.00**	**104.77**	**10.74**	**12.23**	**-**	**237.10**
DEMAND	**Agriculture, Forestry and Fishing**	3.44	0.02	3.46			1.36	14.61	2.19	0.29		18.46
	Agriculture	3.44	0.02	3.46			1.36	9.89	-	0.29		11.53
	Forestry and Logging	-	-	-			0.00	2.91	-	0.00		2.92
	Fishing	**-**	**-**	**-**			**0.00**	**1.81**	**2.19**	**0.00**		**4.01**
	Industrial	13.93	3.80	17.73		2.46	0.07	11.44	0.91	0.11		15.00
	Mining	0.00	0.00	0.00			0.00	3.31	0.02	0.00		3.33
	Food Processing	9.32	3.77	13.10			-	-	-	-		-
	Textiles	0.08	-	0.08								
	Wood, Pulp, Paper and Printing	0.69	0.01	0.70								
	Chemicals	-	-	-								
	Non-metallic Minerals	3.36	0.01	3.38								
	Basic Metals	0.02	-	0.02			-	-	-	-		-
	Mechanical/Electrical Equipment	0.04	0.00	0.04								
	Building and Construction	0.03	-	0.03			0.00	3.94	0.01	0.08		4.03
	Unallocated	0.37	-	0.37		2.46	0.07	4.19	0.88	0.03		7.63
	Commercial	**0.71**	**0.56**	**1.27**		**1.02**	**0.16**	**3.79**	**0.01**	**0.48**		**5.45**
	Transport	**0.00**	**0.00**	**0.01**		**0.34**	**97.42**	**75.11**	**3.77**	**10.46**		**187.10**
	Residential	**0.24**	**0.16**	**0.40**		**2.51**	**-**	**0.27**	**-**	**0.58**		**3.36**
CONSUMER ENERGY (observed)		**18.33**	**4.54**	**22.87**	**-**	**6.33**	**99.02**	**105.22**	**6.88**	**11.92**	**-**	**229.37**
Statistical Differences		**-2.55**	**-0.27**	**-2.82**	**1.99**	**0.06**	**1.98**	**-0.45**	**3.85**	**0.30**	**-**	**7.73**

Energy balances

NATURAL GAS	RENEWABLES								ELECTRICITY	WASTE HEAT	
Total	Hydro	Geothermal	Solar	Wind	Liquid Biofuels	Biogas	Wood	Total	Total	Total	TOTAL
157.47	82.25	161.28	0.36	7.39	0.26	2.80	47.15	301.49		1.06	667.58
											305.35
											154.27
-1.73											-11.03
											43.27
159.20	**82.25**	**161.28**	**0.36**	**7.39**	**0.26**	**2.80**	**47.15**	**301.49**		**1.06**	**786.43**
-71.87	**-82.25**	**-151.95**		**-7.39**	**-0.26**	**-2.50**	**-3.88**	**-248.23**	**143.66**	**-1.06**	**-234.99**
-47.74	-82.25	-150.65		-7.39		-1.76		-242.05	149.40		-167.95
-17.24		-1.31				-0.74	-3.88	-5.92	10.24	-1.06	-21.16
-					-0.26			-0.26			-2.88
											-10.38
-6.90									-15.99		-32.61
-28.28											**-38.32**
59.05		**9.33**	**0.36**	**-**	**-**	**0.30**	**43.27**	**53.26**	**143.66**	**-**	**513.12**
1.39		0.79						0.79	6.59		30.69
1.37									5.91		22.27
0.02									0.16		3.10
-									**0.52**		**4.53**
39.96		5.90					37.57	43.48	51.02		167.18
0.00									1.44		4.78
9.68									6.75		29.52
0.34									0.36		0.78
4.86									11.03		16.60
20.11									2.60		22.71
0.62									0.91		4.91
2.75									23.24		26.01
1.44									0.60		2.09
0.05									0.60		4.71
0.10		5.90					37.57	43.48	3.48		55.05
7.03		**2.32**				**0.25**		**2.57**	**32.52**		**48.85**
0.03						**-**		**-**	**0.22**		**187.36**
5.59		**0.31**	**0.36**				**5.70**	**6.38**	**46.21**		**61.95**
54.00	**-**	**9.33**	**0.36**	**-**		**0.25**	**43.27**	**53.21**	**136.57**	**-**	**496.02**
5.05		-	-	-		0.05	-	0.05	7.09	-	17.10

C. COAL

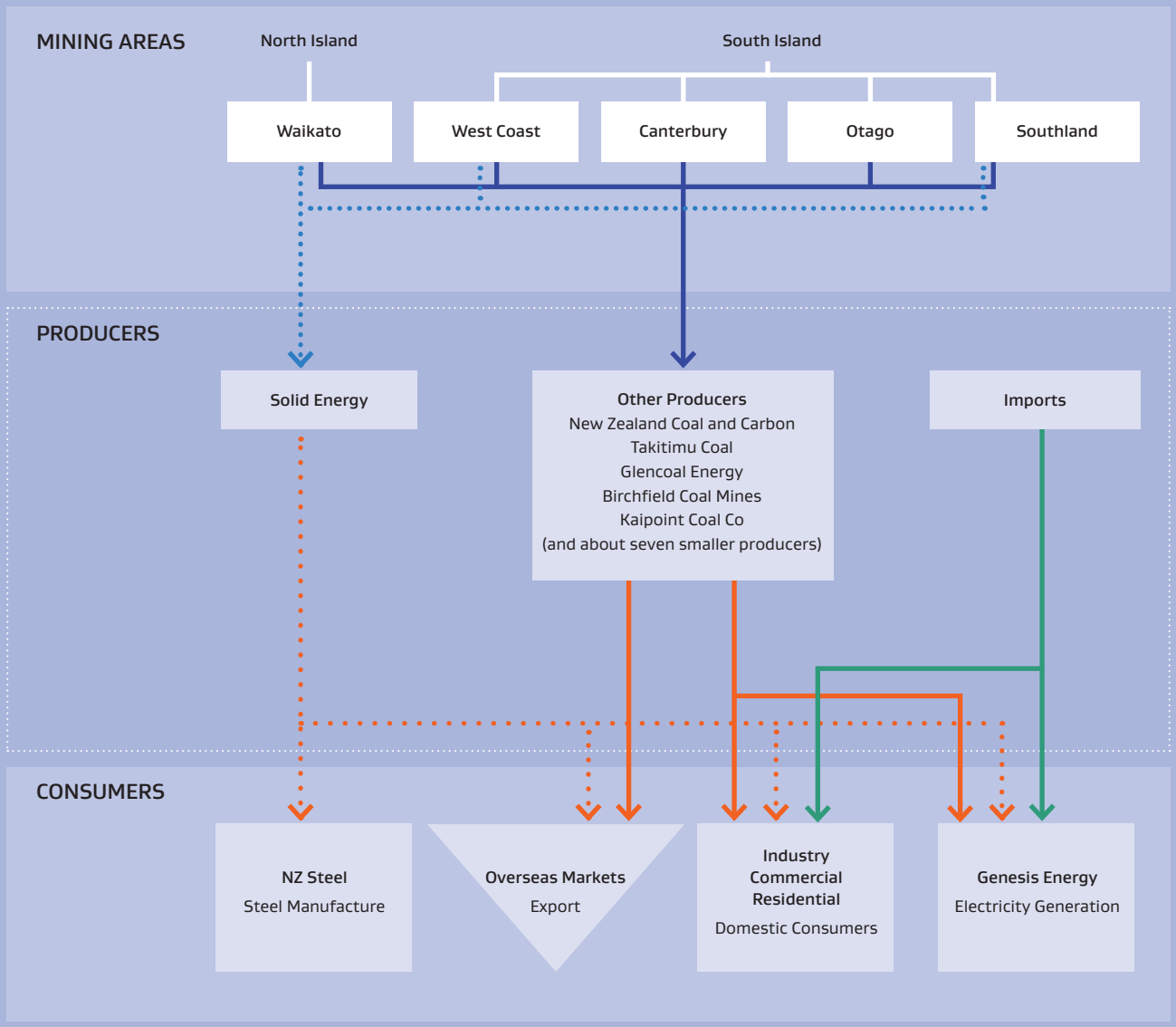
INTRODUCTION

This chapter contains information about coal production (supply) and sales to consumers (demand). Information on coal is presented for the 2012 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/coal

Coal

Figure C.1: Coal Industry Summary for 2012



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

Coal

Overview of New Zealand's Coal Industry

Introduction

The 2012 year was difficult for coal exporters. Low global coal prices and a high New Zealand dollar saw Solid Energy cut production and jobs, and review its operations. The Spring Creek underground mine was closed and other Solid Energy projects such as the Mataura lignite briquette plant are in doubt. Solid Energy production was flat for the year, with the Stockton and Strongman open-cast mines picking up production to offset the closure of Spring Creek.

In 2012, New Zealand produced 4.9 million tonnes of coal. Over 2.2 million tonnes of this was exported. Total coal supplied in 2012 totalled 3.2 million tonnes, an increase of 15% over the year. More coal was used at Huntly Power station because of low hydro lakes in 2012. Demand over and above local production was mostly met by stock piled coal as only 1,000 tonnes were imported over the year.

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 of all coal are over 15 billion tonnes, of which 80% are South Island lignites.

Lignite is New Zealand's largest fossil fuel energy resource. The main deposits are well known, with technically and economically recoverable quantities in the 10 largest deposits established at over 6 billion tonnes.

Sub-bituminous and bituminous in-ground resources are around 3.5 billion tonnes, but recoverable quantities of these coals are uncertain.

Recoverable coal estimates are dependent on assessment of a complex mix of factors including:

- resource size and location;
- geological conditions;
- technical constraints to mining;
- mining economics;
- access to resources;
- project consents;
- market size and certainty;
- market price, which is itself partly set by import substitute price for some markets; and
- distribution costs and infrastructure.

Recoverable coal quantities are thus not simple to assess and will change depending on market conditions and as a result of ongoing exploration and feasibility studies to convert resources to reserves.

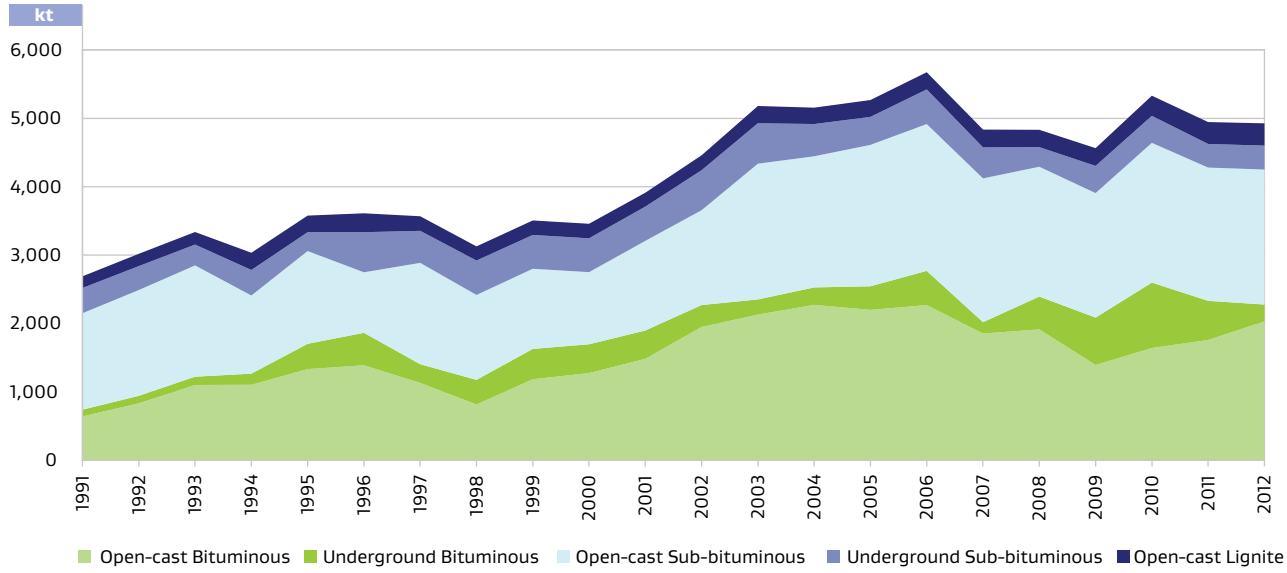
Production

New Zealand coal production in 2012 was 4.9 million tonnes (127PJ), unchanged from 2011.

Over 93% of all production is of bituminous and sub-bituminous coals. Even though lignite makes up 80% of national coal resources it represented only 7% of total production in 2012, mostly as a consequence of its low energy content and distance from the main centres of energy demand.

Production is centred in the Waikato (1.8 million tonnes, mainly for several major industrial users and the Huntly power station), on the West Coast (2.5 million tonnes, mainly for export) and in the Southland (0.5 million tonnes, mainly for local industrial markets).

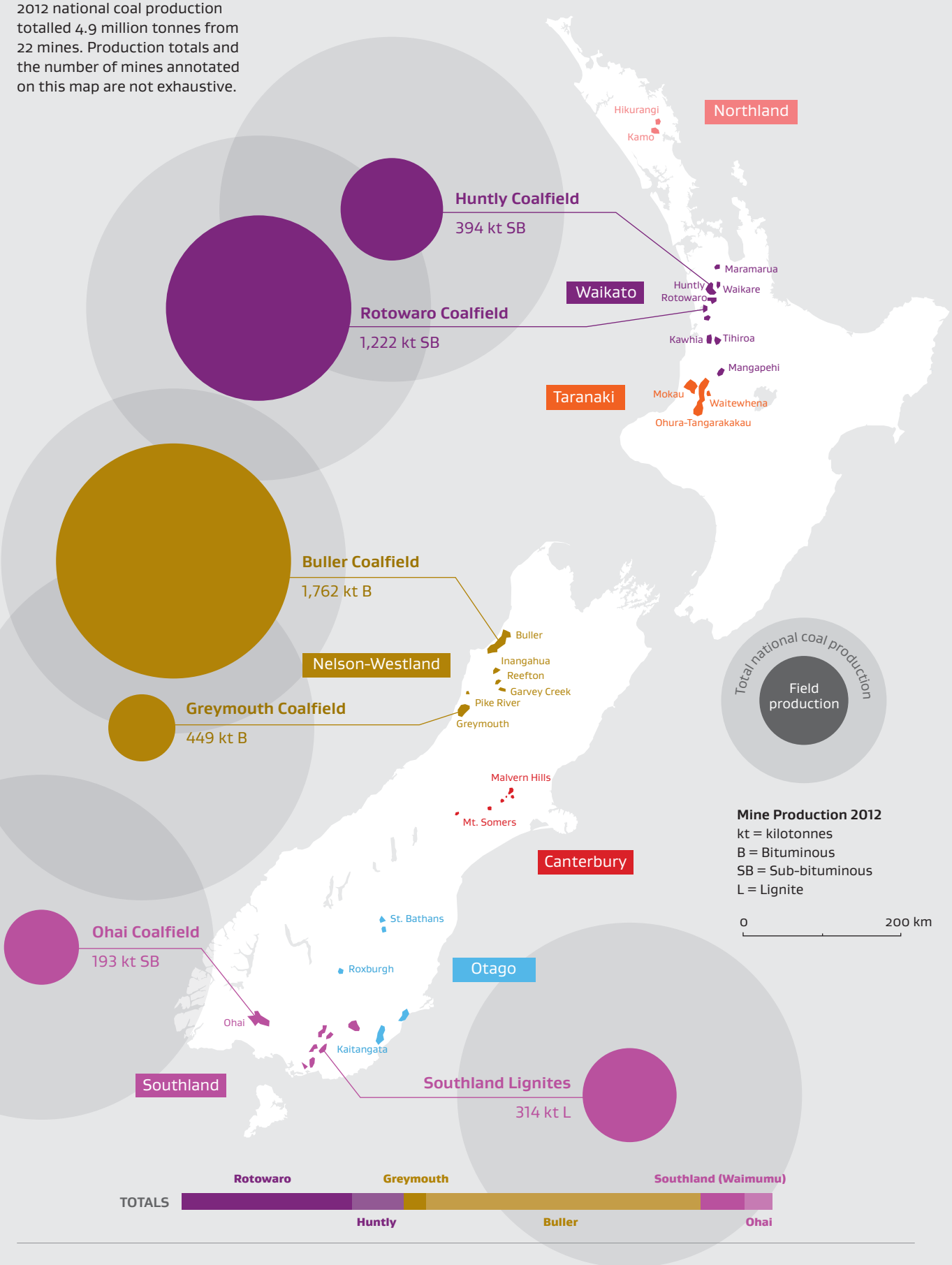
Figure C.2: Annual Coal Production by Rank and Mining Method



Coal

Figure C.3: Location of New Zealand Coal Resources and 2012 Coal Production

2012 national coal production totalled 4.9 million tonnes from 22 mines. Production totals and the number of mines annotated on this map are not exhaustive.



Coal

The remaining production is from 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. Table C.1 shows coal production by mining method, rank and region in 2012.

There were four underground and 18 open-cast mines operating in 2012. Over 60% of national production was from two large open-cast operations, at Rotowaro and Stockton. State-owned Solid Energy was responsible for over 80% of national production. A number of smaller private coal mining companies produced the remainder.

There are currently 44 permits and 21 licences granted by New Zealand Petroleum and Minerals to mine coal, many of which cover small mines that are not producing. In addition, there are 50 granted coal exploration permits. The Crown owns only about half of New Zealand's coal resources, and mining of privately owned coal is not subject to the Crown Minerals Act 1991, although preceding legislation covers mining of some privately owned coal.

Exports and Imports

Exports of bituminous coal, produced entirely from the West Coast, were 2.2 million tonnes (69.4 PJ) for 2012, up 2% from 2011 levels.

Most of New Zealand's premium bituminous coal production is exported. These coals are valued internationally for their low ash and sulphur 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.[1] New Zealand coal is exported mainly to India and Japan, with smaller quantities going to Chile, South Africa, Brazil, China, USA and Australia. Most exports are of coking coal, with smaller amounts of thermal and specialist coals.

In 2012, only 1,000 tonnes of coal were imported, down from 170,000 tonnes in 2011.

Consumption

Coal accounts for approximately 5% of New Zealand's total consumer energy supply. Total supply of coal in 2012 was 3.2 million tonnes (69.9 PJ), an increase of 15% on the previous year. Just over 0.5 million tonnes came from stock piled coal.

New Zealand's biggest users of coal are the Huntly power station and the Glenbrook steel mill. In 2012 Huntly power station consumed around 1.3 million tonnes, almost double what it consumed in 2011. The Glenbrook steel mill consumed around 0.8 million tonnes.

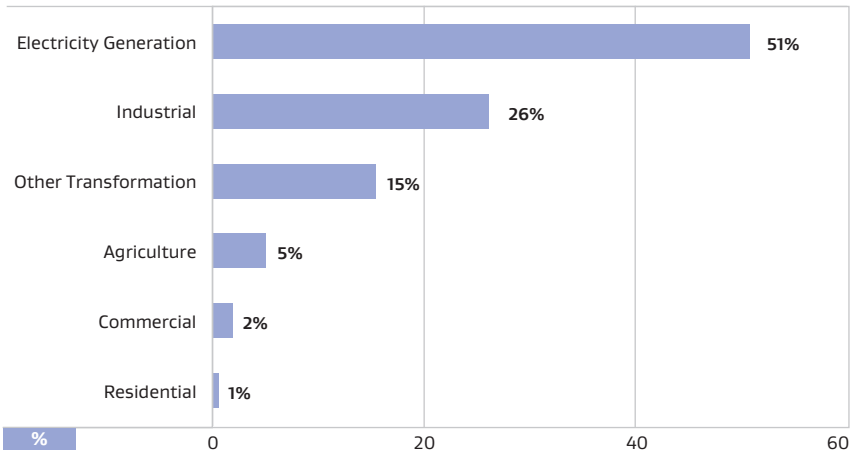
Figure C.5 shows coal consumption by sector. In 2012 electricity generation (including cogeneration) accounted for 51% of domestic coal use, followed by industrial sector use at 26%. Industrial coal use is primarily for meat, dairy, and cement, lime and plaster manufacturing.

A large portion of New Zealand's coal production for domestic use in 2012 was from the Waikato, underlining the regional interdependence of coal supply, industry and electricity supply. Waikato coal resources are becoming increasingly difficult and expensive to access, and remaining resources for open-cast mining are limited.

More information on the New Zealand coal industry is available on the New Zealand Petroleum and Minerals website: www.nzpam.govt.nz/cms/coal/

Figure C.4: Coal Imports and Exports

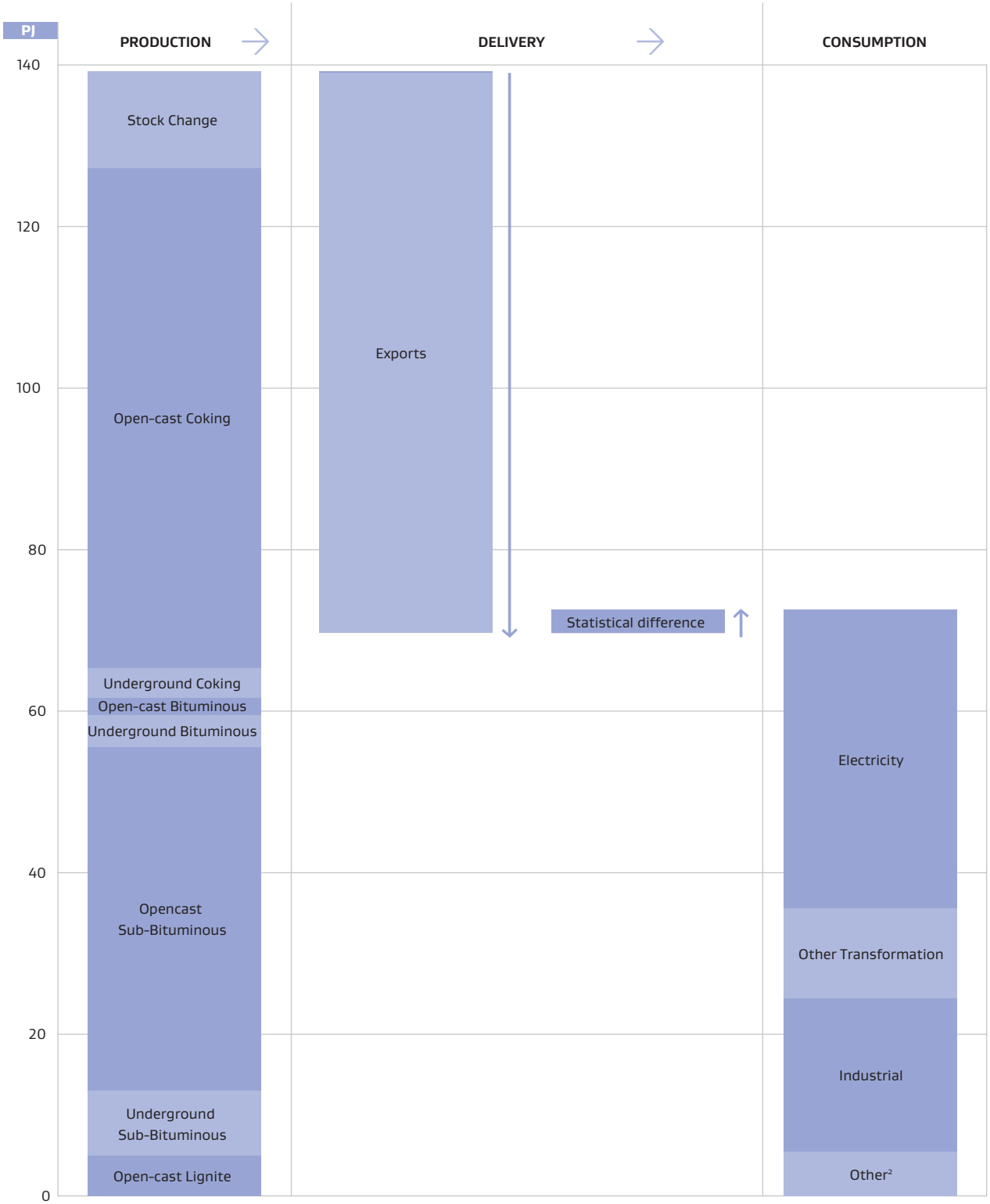
Figure C5: Coal Consumption by Sector for 2012



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

Coal

Figure C.6: Coal Energy Flow Diagram for 2012

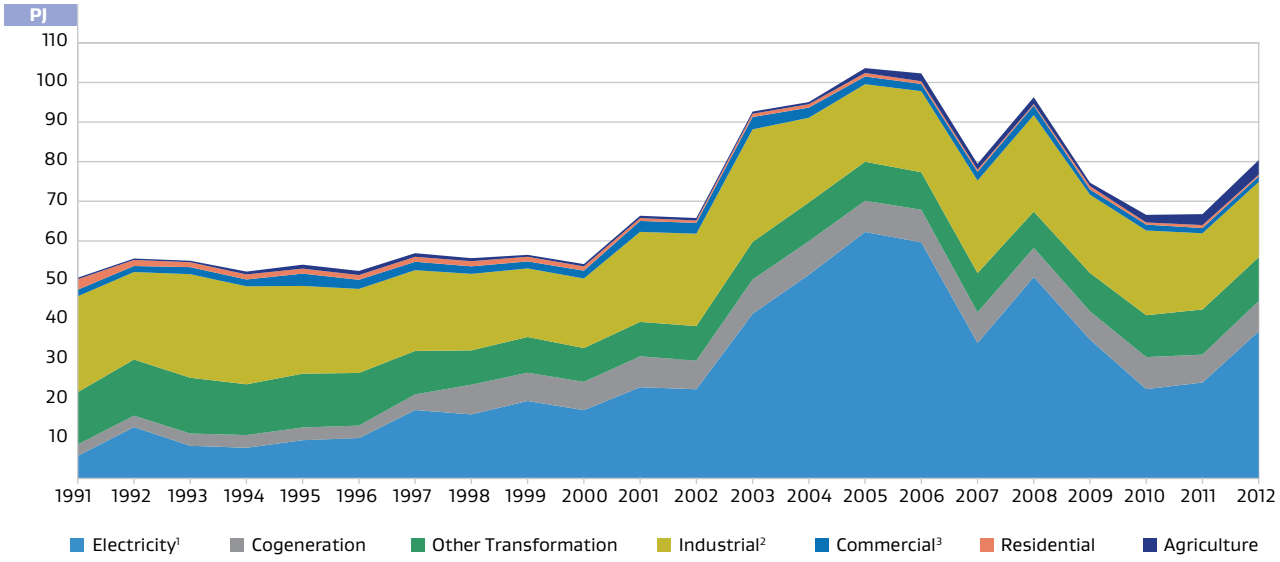


Notes to Figure C.6:

1. Includes use at production sites and distribution losses.
2. Includes commercial, residential, agriculture and transport.

Coal

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



Notes:

1. Includes losses and own use
2. Excludes cogeneration
3. Includes transport

D. OIL AND GAS

EXPLORATION

- Total expenditure for 2012 was $1.479 billion dollars, which is an increase of 19% from 2011, despite a decrease in the number of wells drilled and the amount of seismic data that were acquired.
- A total of 33 wells were drilled in 2012, a significant decrease from the 52 wells drilled in 2011. Wells were drilled in a number of basins in 2012, including onshore and offshore Taranaki Basin and onshore Great South, East Coast and Southland Basins. Offshore well drilling remained the same as 2011, with two wells drilled in Taranaki.
- 220 km of 2D and 164 km^2 of 3D seismic data were acquired in 2012. This was a significant decrease from 2011 where 8,353 km of 2D and 6,864 km^2 of 3D seismic data were acquired.

PERMITS

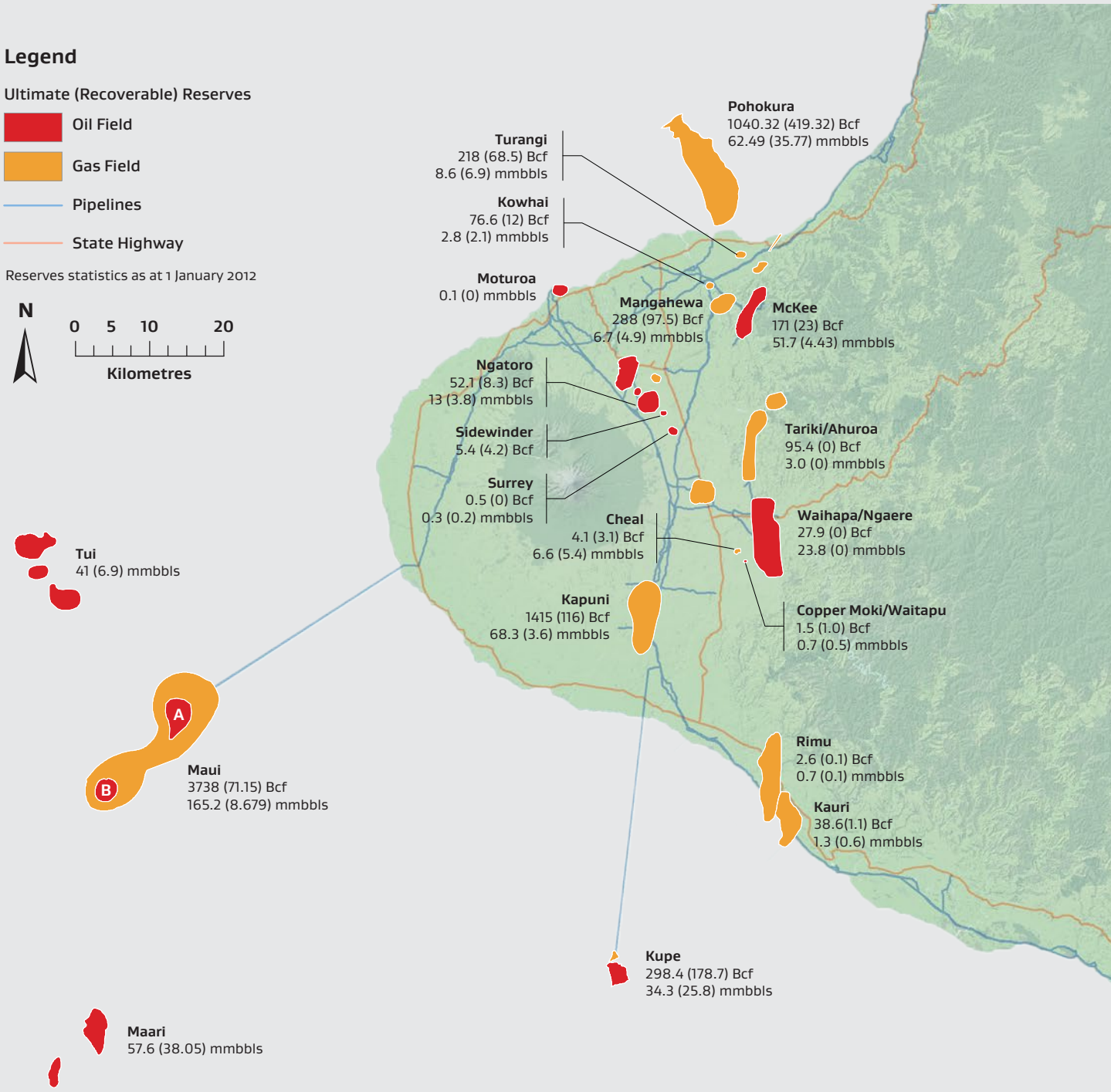
- The 2012 block offer covered over 40,000 km^2 offshore and over 3,000 km^2 onshore in Waikato, Taranaki, Tasman, the West Coast and Southland. From 2012, there will be an annual round of block offers[1].
- New Zealand Petroleum & Minerals granted 10 Petroleum Exploration Permits ('PEPs') in 2012 as a result of Block Offer 2012. These permits are located in the Taranaki, Pegasus and Great South Basins.
- In addition to this, six PEPs located in the East Coast, Canterbury and Taranaki Basins were awarded outside of the Block Offer 2012 round.
- One Petroleum Prospecting Permit ('PPP') was granted in offshore North Taranaki.
- One Petroleum Mining Permit ('PMP') was granted in 2012, covering 2.89 km^2 in the onshore Taranaki Basin. PMP 53803 was granted to TAG Oil (NZ) Limited to develop and produce from the Sidewinder field.

  Most of the mining permits and licences for the large fields are jointly held, with the bulk of investment coming from foreign companies. There were no significant changes in the companies holding permits at producing fields in 2012. A full breakdown of (producing) fields by company is shown in Figure D.1a for Oil and Figure E.1a for Gas.

1. Further information on gas exploration is available on the New Zealand Petroleum and Minerals website www.nzpam.govt.nz

Oil and Gas

Figure D.1: Taranaki Oil and Gas Fields



Oil and Gas

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

National Totals – Activity Statistics Combined for PPPs, PEPs, PMPs and PMLs	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wells Drilled	17	21	16	33	34	30	43	34	37	45	52	33
Metres Made	48,541	36,958	35,201	78,237	87,533	112,369	99,854	51,037	64,596	76,026	63,669	72,177
2-D Seismic Acquired (km)	7518	141	2455	5466	3764	13,240	14,424	25,749	12,058	9751	8353	220
2-D Seismic Reprocessed (km)	1504	9927	10,829	23,808	14,707	30,627	20,019	11,411	6989	21,512	7911	6387
3-D Seismic Acquired (km^2)	50	483	444	39	3120	2360	935	991	1151	204	6864	164
3-D Seismic Reprocessed (km^2)		566	961	410	247	2147	407	432	457	1244	1214	9484
PEPs and PPPs Granted	14	29	18	29	5	16	19	15	9	10	3	17
PMPs Granted	1	1	-	2	5	2	2	-	2	1	0	1
Total Permits Granted	**15**	**30**	**18**	**31**	**10**	**18**	**21**	**15**	**11**	**11**	**3**	**18**
PEPs and PPPs Surrendered, Revoked, Relinquished or Expired	7	14	10	6	14	25	20	13	21	11	6	13
Number of PEPs & PPPs at Granted Status	59	82	86	105	104	79	76	89	71	70	67	56
Number of PMPs and PMLs at Granted Status	11	12	12	14	19	21	23	23	24	23	23	24
PEP & PPP National Expenditure (Million NZD)	$203	$186	$159	$280	$186	$133	$200	$314	$191	$246	$159	$212
PMP/PML National Expenditure (Million NZD)	$128	$218	$195	$182	$553	$574	$1359	$963	$1,202	$1,095	$1,084	$1,267
Expenditure, All Permits – National Total (Million NZD)	**$331**	**$404**	**$354**	**$462**	**$739**	**$707**	**$1559**	**$1277**	**$1393**	**$1341**	**$1243**	**$1479**

PEPs = Petroleum Exploration Permits

PPPs = Petroleum Prospecting Permits

PMPs = Petroleum Mining Permits (production permits)

PMLs = Petroleum Mining Licences (production permits)

OIL

Reserves

- Reserves are estimated total amounts of oil and gas that are able to be produced from a known petroleum reservoir. Ultimate recoverable reserves are the total reserves before any oil or gas is produced. Remaining reserves are ultimate recoverable reserves, less production to date.
- Total oil and condensate remaining reserves (P50) from producing and non-producing fields remained relatively the same, only decreasing by 0.85% on the previous year. This was a combination of increases of ultimate recoverable reserves of oil and condensate and ongoing production which have balanced out and resulted in little effect on total Remaining Reserves of oil and condensate.
- Ultimate recoverable reserves (P50) of oil increased by 2.65%. This was mainly due to increases at McKee, Mangahewa, Maui and Turangi. These increases were a result of ongoing development projects at the fields. The addition of Copper Moki/Waitapu also contributed to the increase.

Overview

Units of volume (usually million barrels, or mmbls[2]) are used for the discussion of oil production statistics alongside the energy units.

Energy units (PJ) are used for discussions of transformation and consumption statistics because this allows comparisons among the different oil product types (a litre of petrol and a litre of diesel have different energy contents).

Percentage changes between annual statistics were calculated from gross petajoules for consistency.

Table D.2: Oil and Condensate Reserves

Field	Ultimate Recoverable (P90)			Ultimate Recoverable (P50)			Remaining Reserve (P90) as at 1 January 2013			Remaining Reserve (P50) as at 1 January 2013		
	Mm³	mmbbls	PJ	Mm³	mmbbls	PJ	Mm³	mmbbls	PJ	Mm³	mmbbls	PJ
Maari	6.3	39.6	237.8	9.2	57.6	345.7	3.2	20.1	128.8	6.0	38.1	244.4
Pohokura	7.8	49.2	282.8	9.9	62.5	359.4	3.6	22.5	129.1	5.7	35.8	205.7
Kupe	3.2	20.2	137.5	5.5	34.3	166.5	3.0	17.7	91.5	4.1	25.8	126.1
Maui	25.4	159.8	884.5	26.3	165.2	914.8	0.5	3.2	17.8	1.4	8.7	48.1
McKee	7.6	48.0	285.6	8.2	51.7	295.3	0.1	0.8	27.1	0.7	4.4	47.2
Tui	6.0	37.6	231.3	6.5	41.0	252.3	0.6	3.5	21.5	1.1	6.9	42.5
Turangi	0.7	4.3	25.5	1.4	8.6	51.9	0.4	2.5	15.3	1.1	6.9	41.6
Cheal	0.6	3.7	24.0	1.0	6.6	42.7	0.4	2.5	16.3	0.9	5.4	35.2
Mangahewa	0.5	3.3	21.1	1.1	6.7	42.8	0.3	1.6	10.2	0.8	4.9	31.3
Ngatoro	1.6	10.0	59.8	2.1	13.0	77.8	0.1	0.8	5.1	0.6	3.8	23.0
Kapuni	10.7	67.3	383.2	10.9	68.3	388.9	0.4	2.6	14.8	0.6	3.6	20.5
Kowhai	0.2	1.0	5.8	0.4	2.8	16.7	0.0	0.3	1.8	0.3	2.1	12.8
Copper Moki/ Waitapu	0.1	0.5	3.2	0.1	0.7	4.1	0.1	0.3	2.0	0.1	0.5	2.9
Kauri	0.1	0.8	4.2	0.2	1.3	6.8	0.0	0.1	0.4	0.1	0.6	2.7
Surrey	0.0	0.2	1.3	0.1	0.3	1.9	0.0	0.1	0.4	0.0	0.2	1.1
Rimu	0.1	0.6	3.6	0.1	0.7	3.8	0.0	0.0	0.2	0.0	0.1	0.4
Moturoa	0.0	0.1	0.7	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Tariki/Ahuroa	0.5	3.0	15.4	0.5	3.0	15.4	0.0	0.0	0.0	0.0	0.0	0.0
Waihapa/ Ngaere	3.8	23.8	139.0	3.8	23.8	139.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**75.3**	**473.0**	**2746.1**	**87.2**	**548.2**	**3126.3**	**12.6**	**78.4**	**482.4**	**23.5**	**147.7**	**885.4**

2. A barrel is 159 litres

Oil and Gas

The data used to compile this section are available online.[3]

Domestic production

Total indigenous oil production[4] fell 13% in 2012, though it sits at levels similar to those throughout the 1990s. Production in 2012 of 40,300 bbl/day (87 PJ) is similar to 2007 (41,100 bbl/day or 88 PJ). Production has been falling since 2008, though 2008 was the largest year of production on record at 58,600 bbl/day (128 PJ). LPG production in 2012 was 7 PJ, down 2% from 2011.

Pohokura and Maari again dominated oil production in 2012; these fields produced 53% of New Zealand's oil (21,000 bbl/day). While Pohokura's production was similar to the last few years (and up on 2011), Maari's production fell 31% in 2012.

Tui fell 26% in 2012. After hitting a high of 36,700 bbl/day in 2008, production has fallen 86% since then, to 5,300 bbl/day.

Refinery production of petroleum products increased 3% to 108,000 boe/day[5] (241 PJ) in 2012. This was driven by diesel production rising 10% to 41,300 boe/day.

Refining NZ produces a full range of petroleum products and satisfied approximately 70% of domestic consumption of petroleum products in 2012.[6]

Trade

Imports of refined petroleum products fell 3% to 35,900 boe/day. Imports of diesel (9,700 boe/day) fell to their lowest level since 2003 (6,800 boe/day, or 22 PJ).

Most of New Zealand's oil product imports come from Singapore and South Korea.

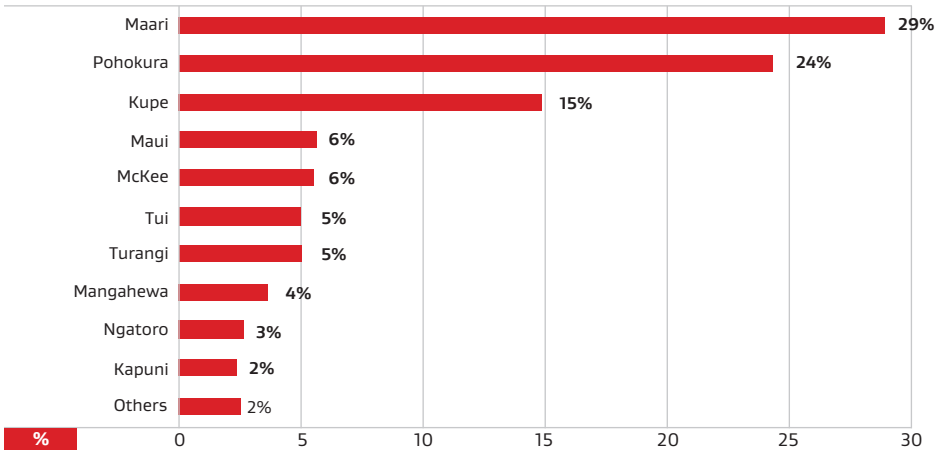
New Zealand exported 5,000 boe/day of fuel oil in 2012, down 4% from 2011. Fuel oil is often used as ship fuel and has been our consistently largest refined fuel export since 1999.

Figure D.1d shows imports of crude oil by country of origin for the 2012 calendar year. Over half (53%) of all imported oil to New Zealand in 2012 was produced in the Middle East. Asia overtook Russia as our second largest source of crude oil, now at 35% (up from 18% in 2011). Russia fell to 5% in 2012 (down from 21%). Australia and Nigeria provided the remainder.

Crude oil and blendstock imports in 2012 were up 3% to 40 mmbbls (248 PJ).

Exports of New Zealand's crude oil dropped 14% in 2012 to 13 mmbbls (83 PJ), due to decreased production across most fields. New Zealand's locally produced crude oil is generally exported because of its high quality and consequent high value on the international market. Australia purchases the majority of this oil.

Figure D.2: Remaining P50 Oil Reserves from Producing Wells at 1 January 2012



3. Available at www.med.govt.nz/sectors-industries/energy/energy-modelling/data/oil

4. Total oil production consists of condensate, naphtha, natural gas liquids and crude oil production from oil/gas fields.

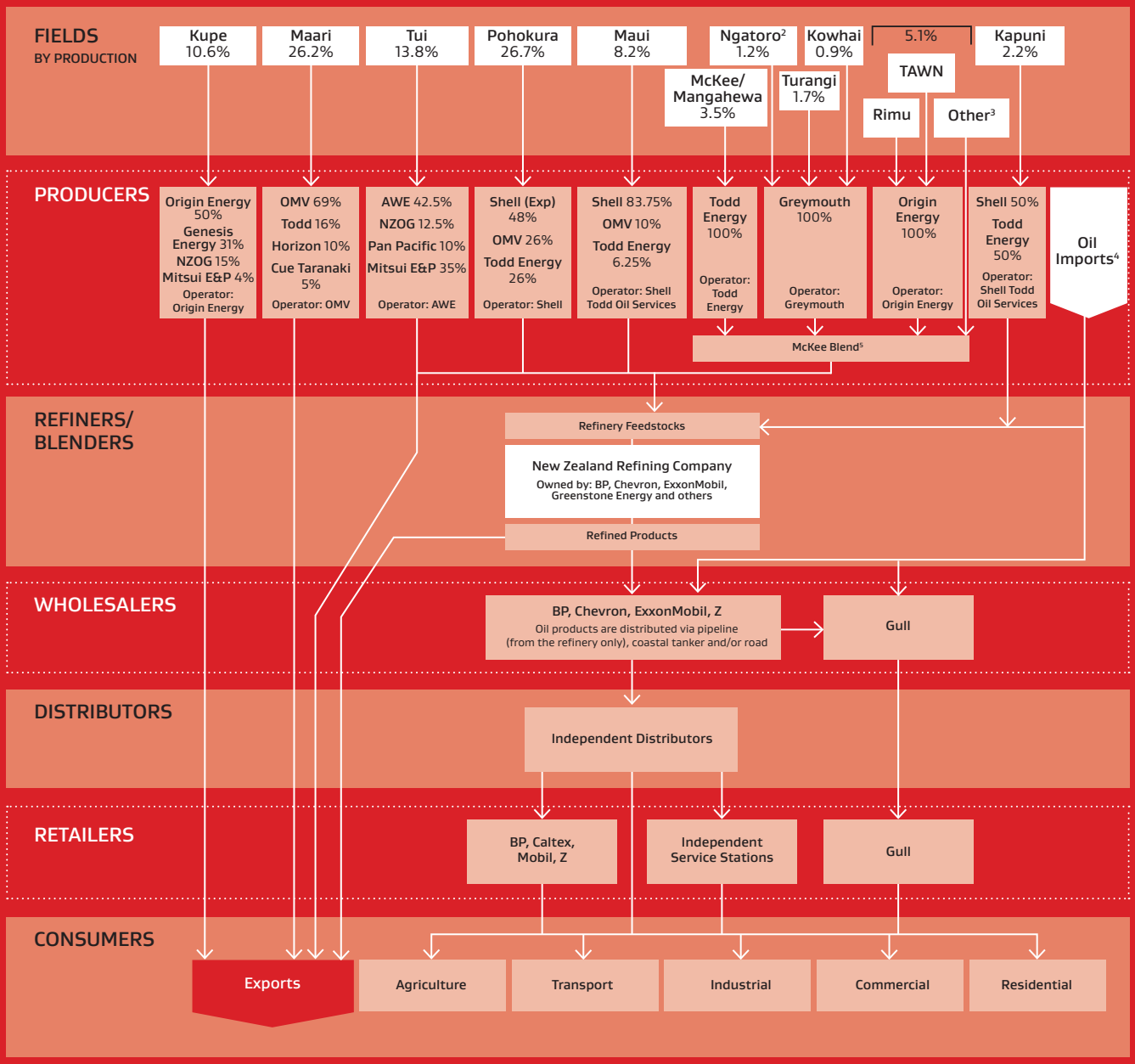
5. Barrel of oil equivalent per day: a unit of measure for energy content equivalent to one barrel of crude oil.

6. Percentage is calculated as:

$$\frac{\text{(refinery output – product exports – international transport)}}{\text{total oil product consumption}}$$

Oil and Gas

Figure D.3: Oil Flows for the 2012 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), *TAWN* comprises the Tariki, Ahuroa, Waihapa and Ngaere fields.

Notes to Figure D.3:

1. Ownership as at 31 December 2012.

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 and Surrey fields, and Radnor well . Cheal and Sidewinder are owned by Tag Oil Limited. Surrey is owned and operated by Greymouth Petroleum. Copper Moki is owned by New Zealand Petroleum.

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

Oil and Gas

Refinery

In 2012, the refinery processed an average of 114,000 bbl/day (42 mmbbls or 255 PJ), 2% of which was domestic oil. This is up 3% from 2011. Refinery production of oil products was up 3% to 107,800 bbl/day (241 PJ).

Consumption

Observed domestic consumption for refined oil products fell 2% in 2012 to 114,100 boe/day (256 PJ). However, consumption of diesel and LPG both rose 2%. The share of petrol and diesel continues to grow, now at 85% of total oil demand. Diesel's share rose from 42% to 44%, while petrol's fell from 42% to 41%.

Diesel demand in 2012 (50,000 boe/d or 112 PJ) and 2011 was up 10% and 9%, respectively, compared to a relatively low year in 2009, during the global economic down-turn. Diesel is the primary fuel for commercial land transport, so is strongly linked to economic performance (whereas petrol consumption tends to be more for private land transport).

The total consumption of biofuels in New Zealand in 2012 was 11 million litres (1.4 million litres of biodiesel and 9.5 million litres of bio-ethanol). Domestic consumption of biodiesel was down 39% while bio-ethanol was up 35%. Biodiesel is more expensive, per litre, to import than bioethanol. A government biodiesel grants scheme began mid-2009 and expired in mid-2012.

Independent distributors

In 2012, independent distributors delivered 25% (735 million litres) of New Zealand's diesel demand, and 7% (199 million litres) of petrol demand. Figure D.7 shows the time-series of the independent distributors' diesel deliveries from 1990 to 2012. Data before 2007 are estimates.

Oil Self-sufficiency

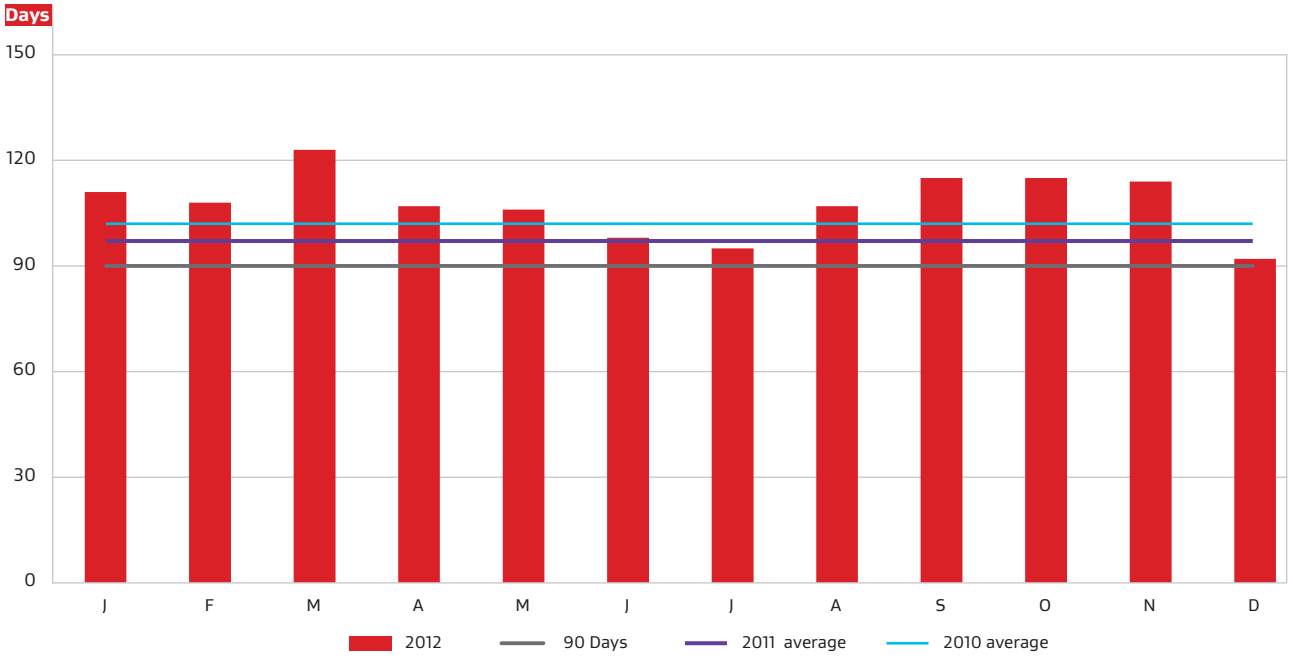
We define oil self-sufficiency here as being the ratio of domestic production to primary energy supply.[7] This indicator represents how much of a country's energy requirements are met through domestic production (taking into account trade, stock changes during the year, and fuel used for international transport by sea and air).

Typically, very little domestic oil is consumed in New Zealand (4 PJ in 2012) due to its high quality and consequent high value on the international market – it is beneficial for New Zealand to export valuable domestic oil and import cheaper, lower grade, foreign oil. Figure D.6 shows the oil self-sufficiency indicator for New Zealand since 1990. New Zealand became slightly more self-sufficient between 1990 and 1997, and exports almost doubled over this time. Between 1997 and 2006, New Zealand became less self-sufficient (below 20%) as oil production from the Maui field declined. The Tui and Pohokura fields boosted domestic production in 2007, and with the Maari field coming on-stream in 2009, self-sufficiency rose above 40%. In 2012, self-sufficiency sat at just over 30%.

Stock Requirements

New Zealand has officially been a member of the International Energy Agency (IEA) since 1977. The IEA was set up in 1974 in response to major oil market disruptions in 1973/74. Member countries must demonstrate they have access to reserves of crude oil and/or oil products equivalent to not less than 90 days of their prior year's average net oil imports.[8] To help meet this requirement, governments can purchase stock tickets which allow access to oil stocks held overseas, should the need arise.

Figure D.4: Oil Stocks for 2012



7. Primary energy supply is: domestic production + imports – exports – stock change – international transport

8. Net Oil Imports = Imports – Exports – Stock Change

Oil and Gas

Figure D.5a: Oil Production by Field in 2012

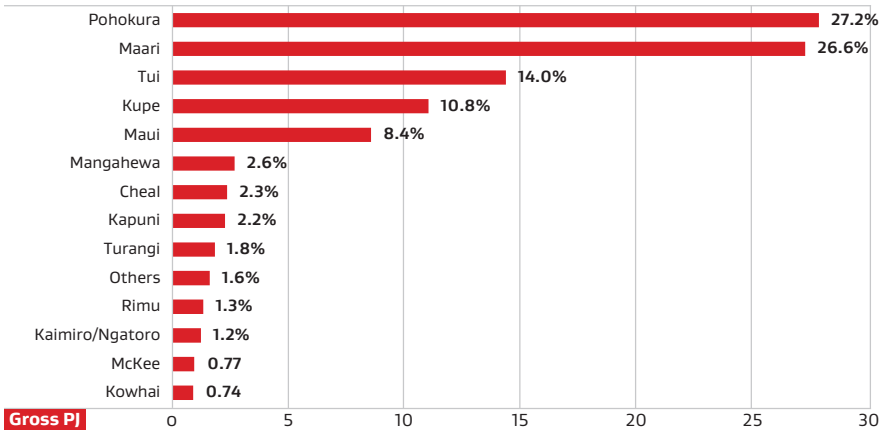


Figure D.5b: 2012 Crude Oil Product Imports by Country of Origin

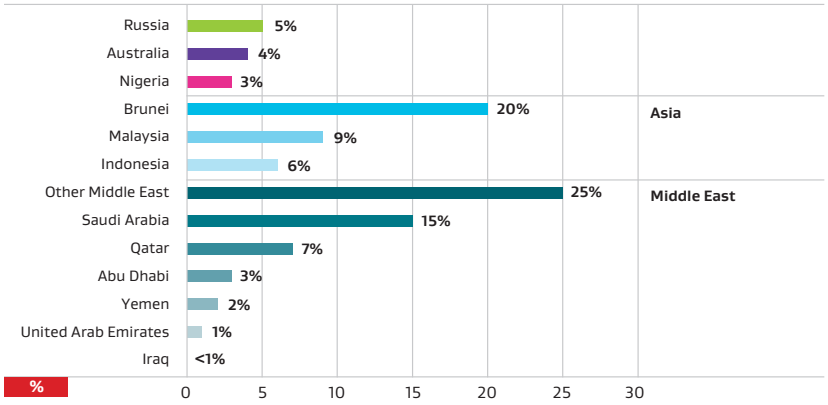
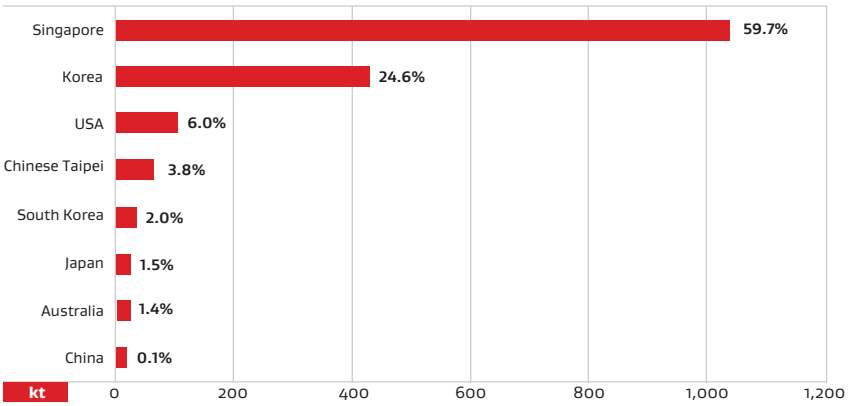


Figure D.5c: 2012 Oil Product Imports by Country of Origin



Oil and Gas

Figure D.6: Oil Self-Sufficiency

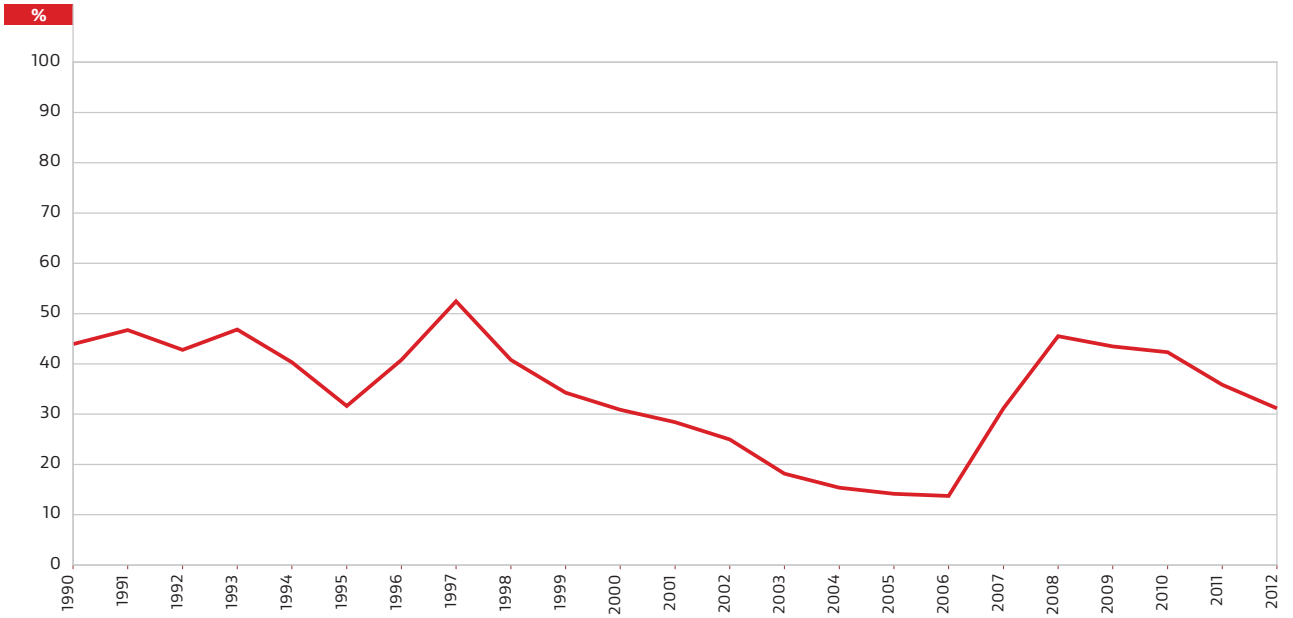


Figure D.7: Independent Distribution Companies' Diesel Deliveries by Sector

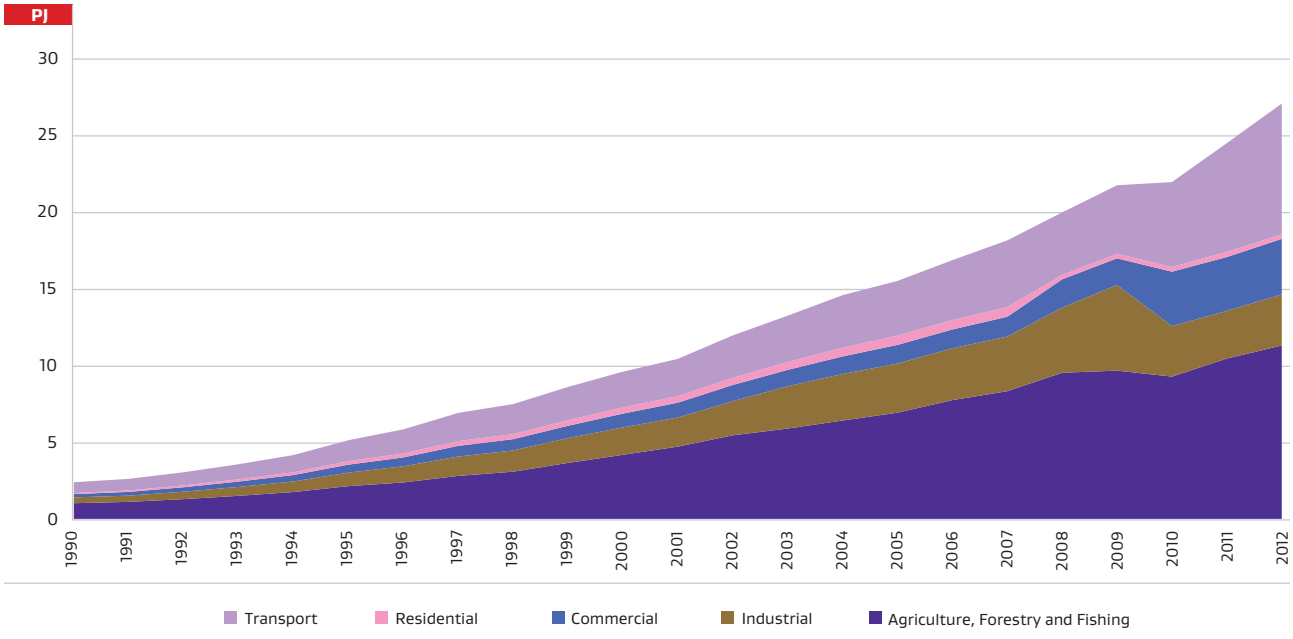
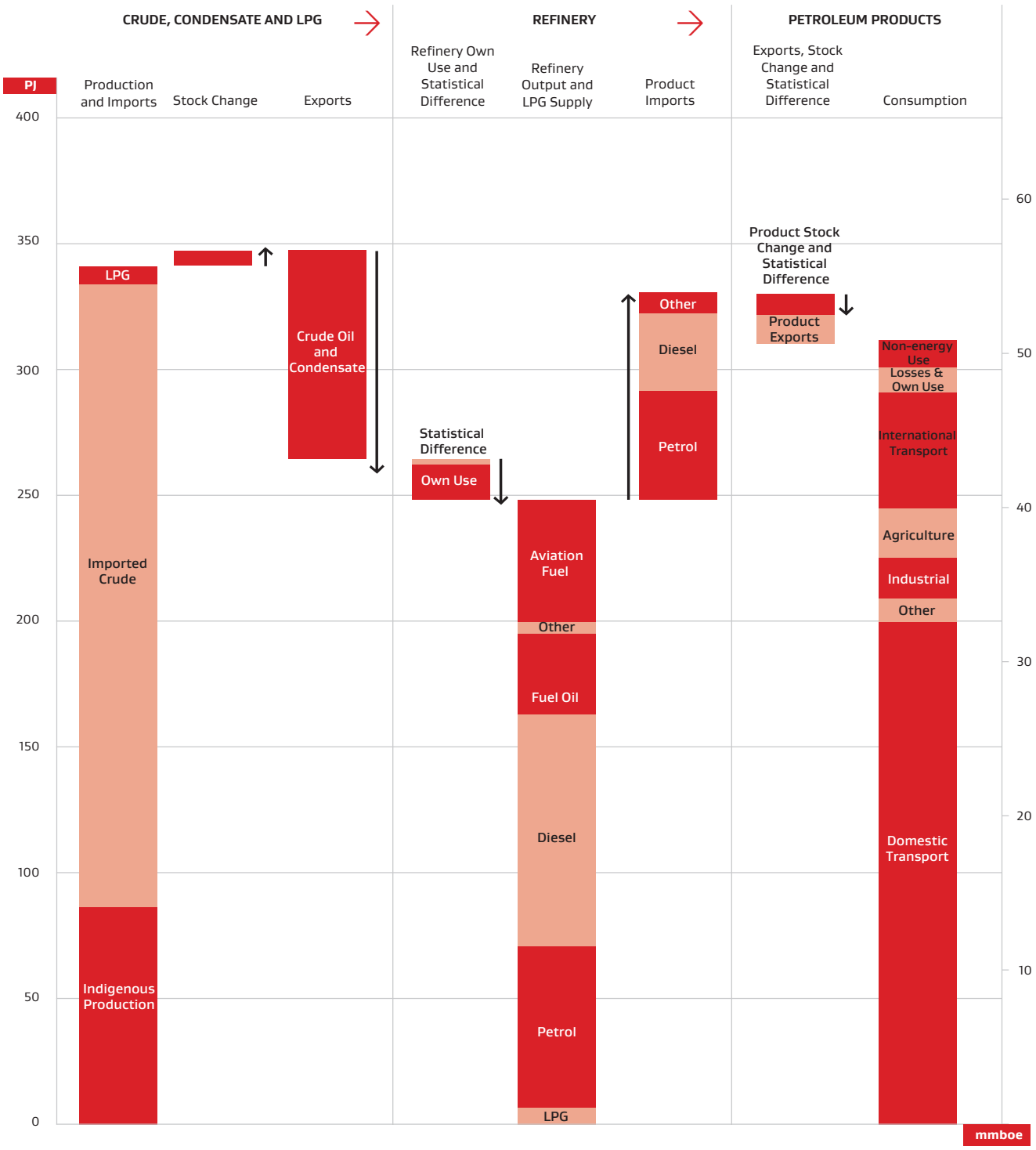


Figure D.8: Oil Energy Flow Summary for 2012



Oil and Gas

Figure D.9a: Annual Crude Oil, Condensate, Naphtha and Natural Gas Liquids Production by Field

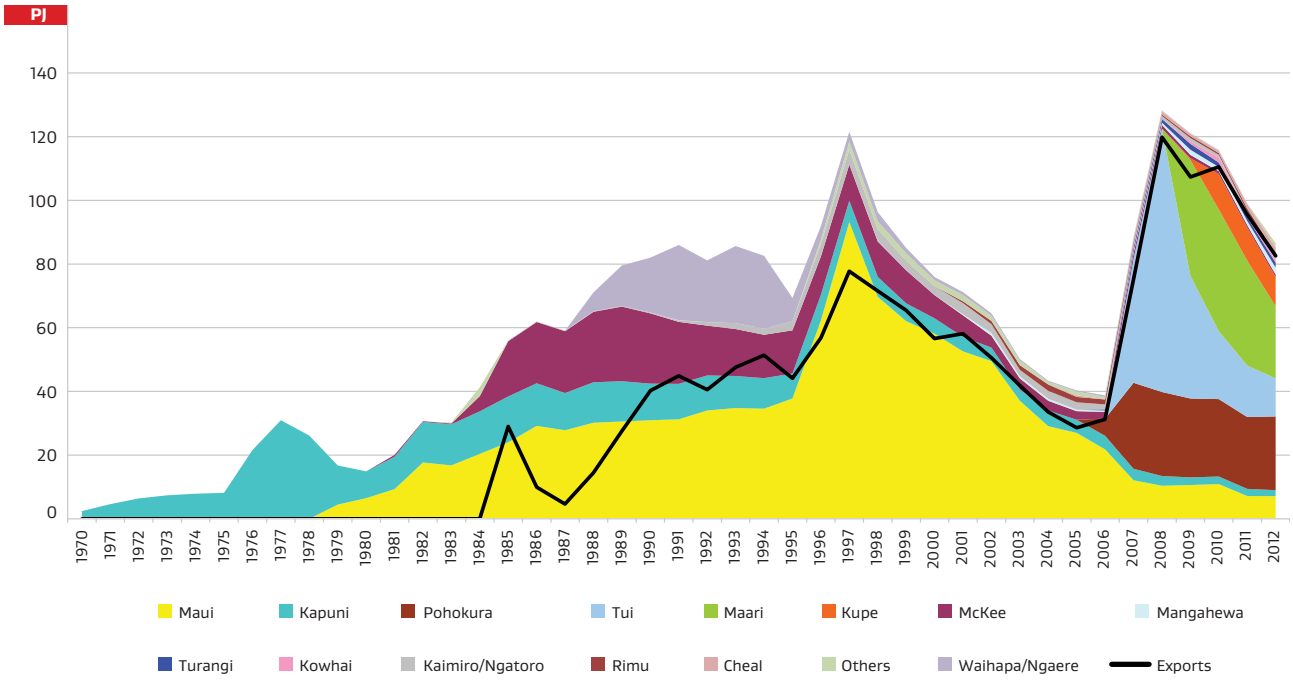
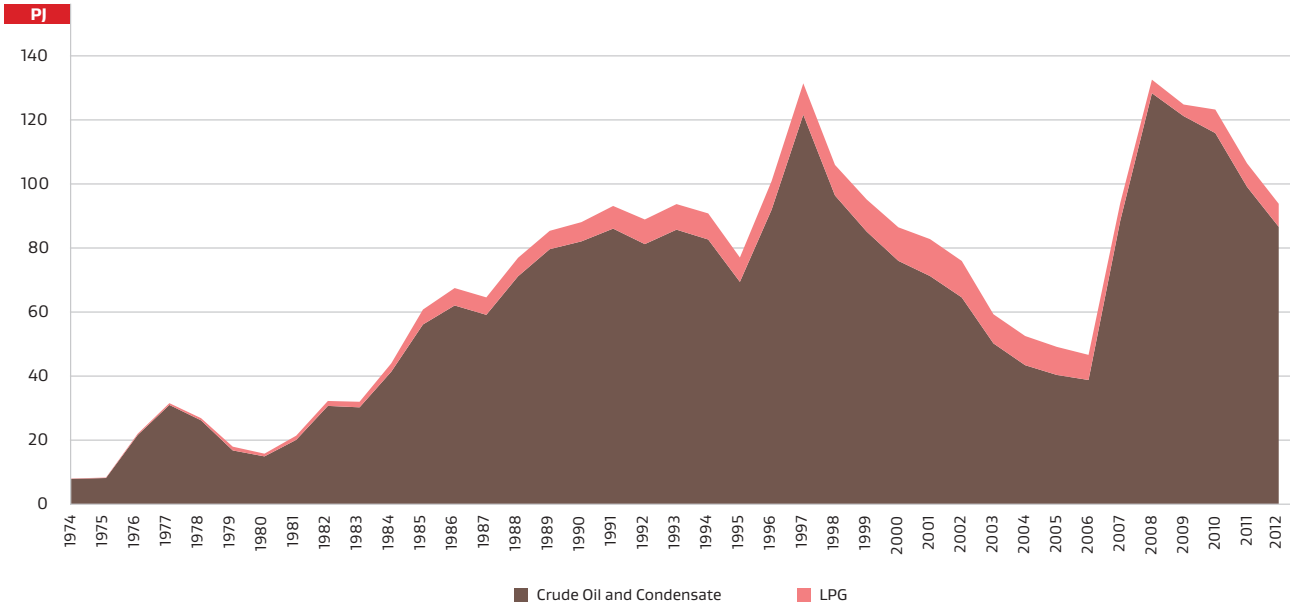


Figure D.9b: Indigenous Oil Production



Oil and Gas

Figure D.9c: Production of Oil Products

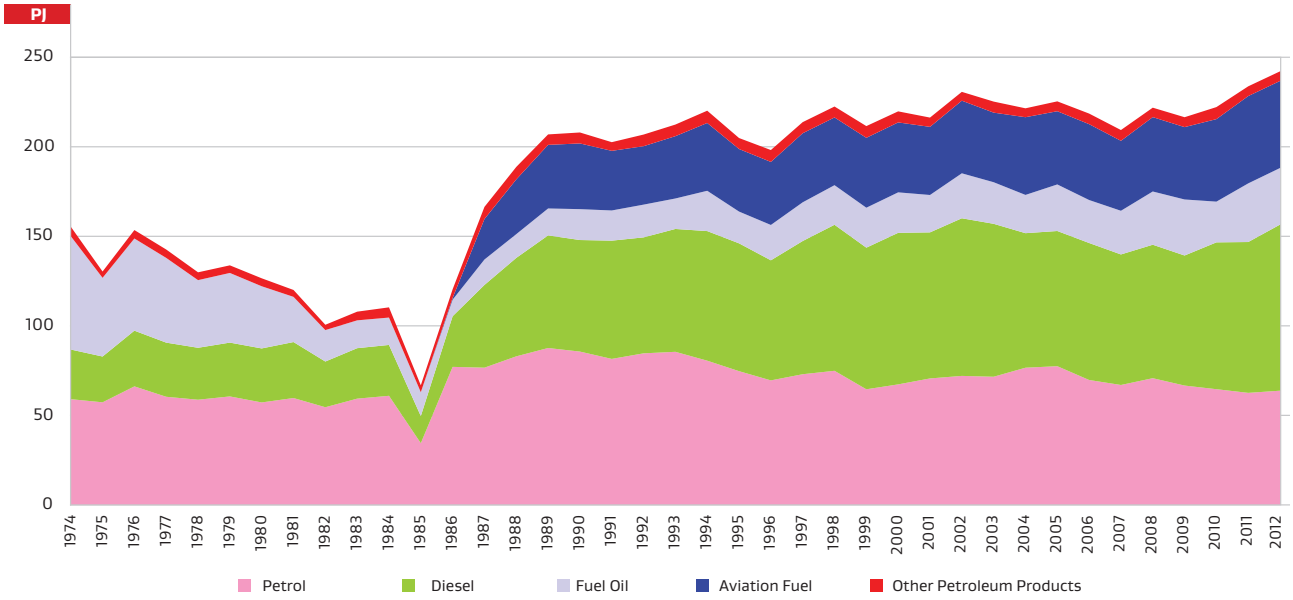
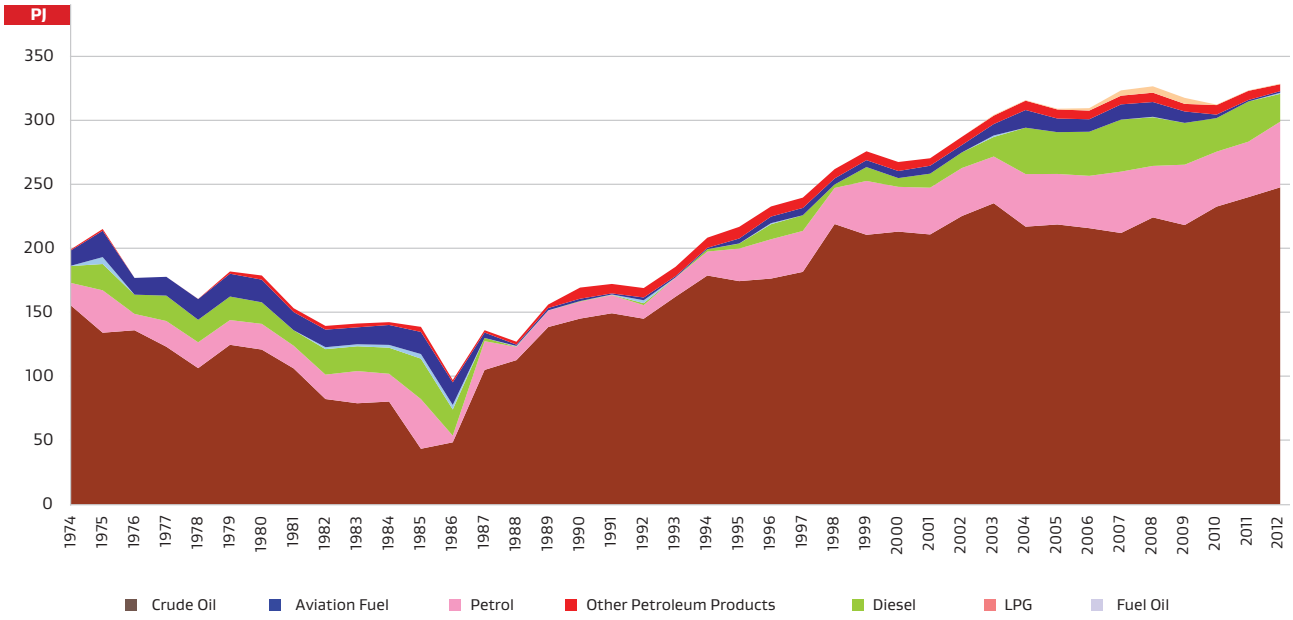


Figure D.9d: Imports of Crude Oil and Oil Products



Oil and Gas

Figure D.9e: Exports of Crude Oil and Oil Products

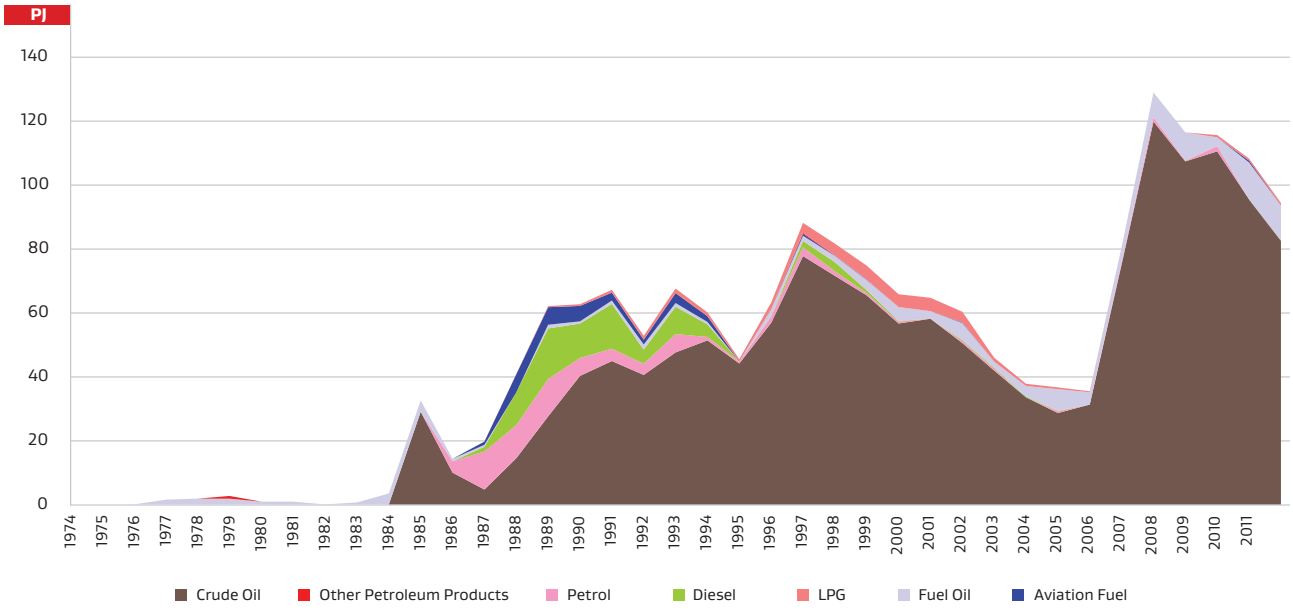
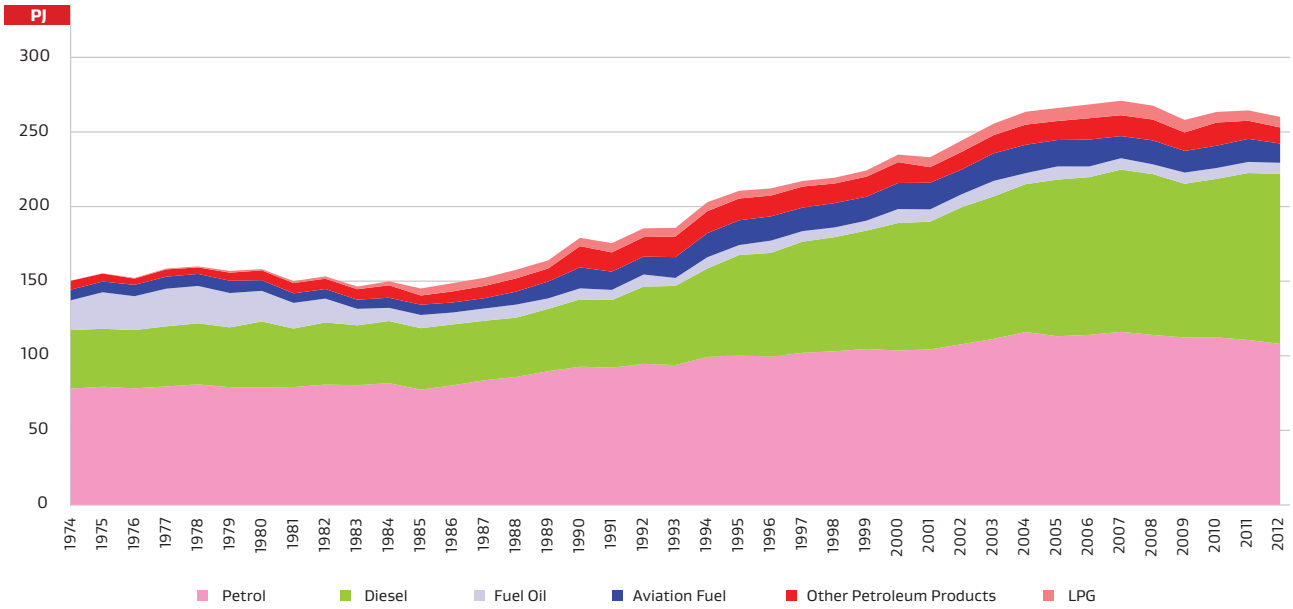


Figure D.9f: Observed Oil Products Consumption



Oil and Gas

Figure D.10a: Transport Petrol by Mode in 2012

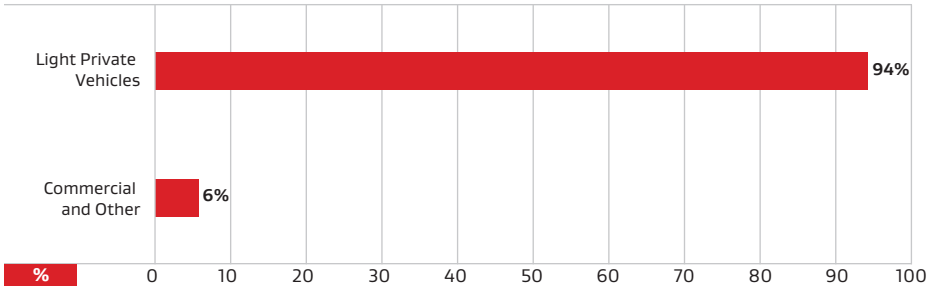
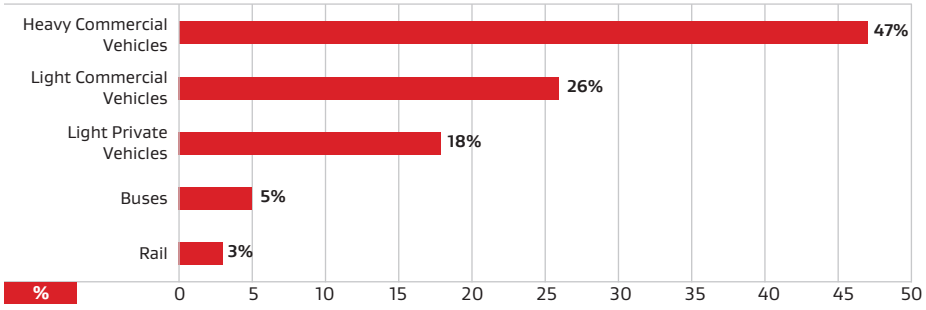
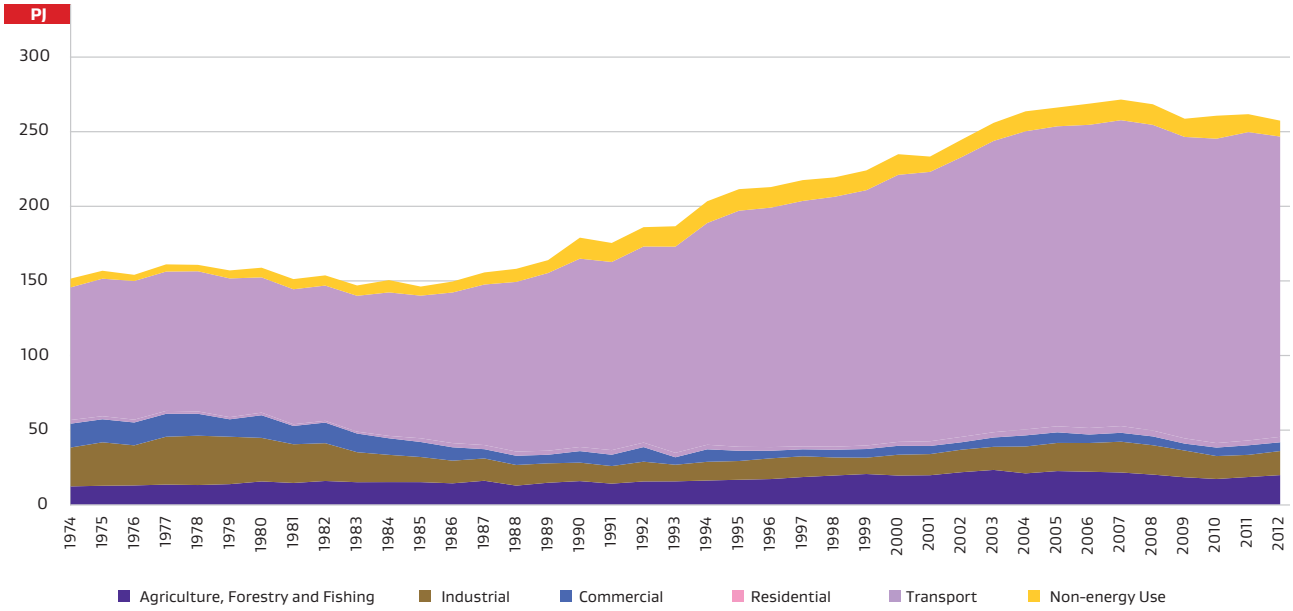


Figure D.10b: Transport Diesel Use by Mode in 2012



Oil and Gas

Figure D.10c: Observed Total Oil Consumption by Sector



Oil prices

Prices for petrol, diesel and fuel oil are collected each quarter from New Zealand's large oil companies (BP, Z, Chevron and ExxonMobil). These prices are then weight-averaged by sales to calculate the annualised prices.

Retail Importers' Cost and Margin

The New Zealand import cost is calculated using the Singapore spot market price plus allowances for international freight, wharfage fees and insurance costs. Singapore prices are used as they represent one of New Zealand's major markets for importing refined product (Australia and Korea being the others) and because Singapore is one of the world's largest refining centres. The Singapore price series is based on 95 octane petrol (premium petrol). A quality-related price adjustment is used to alter this price and make it comparable to 91 octane (regular petrol).

A statistically determined lag between the Singapore spot price and the New Zealand price was used to reflect delays in the pricing mechanism. These delays (or pricing lags) were due to market realities and have been reducing over time as more players enter the market and practices change. From January 1 2010, this lag was removed, as there was no longer any clear evidence to support its use.

This analysis does not allow for any effect of the growth in fleet discounting (the use of fleet cards) or bulk sales via commercial agreements. Furthermore, supermarkets, in conjunction with the oil companies, are offering discounted petrol and diesel to their customers via self-service stations and fuel discount vouchers. These discounts have not been incorporated in this section.

Figure D.11a shows both premium and regular petrol prices, both of which are subject to petrol excise duty. Excise duty on petrol increased by 2 cents a litre from the 1st of August 2012. Diesel is subject to Road User Charges (RUC), which is charged on a per-kilometre basis in New Zealand. RUC also increased by 4.1 per cent on average (depending on the vehicle). In 2008 and 2009, the international crude oil price was very volatile, which drove similar volatility in the petrol and diesel prices. In 2011 and 2012, petrol and diesel prices were much less volatile than in 2008 and 2009.

Figure D.11c shows the retail price of regular petrol (excluding GST), the New Zealand import price as well as the import cost. Regular petrol and New Zealand Import Price have reached the same highs in 2012 as those seen during 2008 during the GFC, with an increasingly widening gap between the importer cost and the retail and import prices of regular petrol. 2012 prices show both premium and regular petrol increasing slightly while diesel prices levelled off.

Figure D.11d shows that importer margins have significantly decreased since petrol prices were deregulated during the mid-1980s. Similarly, the entry of Gull and Challenge in the market in the late-1990s decreased margins further. 2012 importer margins reached highs not seen since the period shortly after Gull and Challenge entered the New Zealand Market.

Figures D.11e and D.11f show light and heavy fuel oil prices. Prices ($/GJ) for heavy and light fuel oil at the end of 2012 show a levelling off of the heavy fuel oil and a decrease in prices for the light fuel oil. Fuel oil prices in 2012 reached similar highs to those seen in 2008.

Oil and Gas

Figure D.11a: Nominal Petrol and Diesel Prices

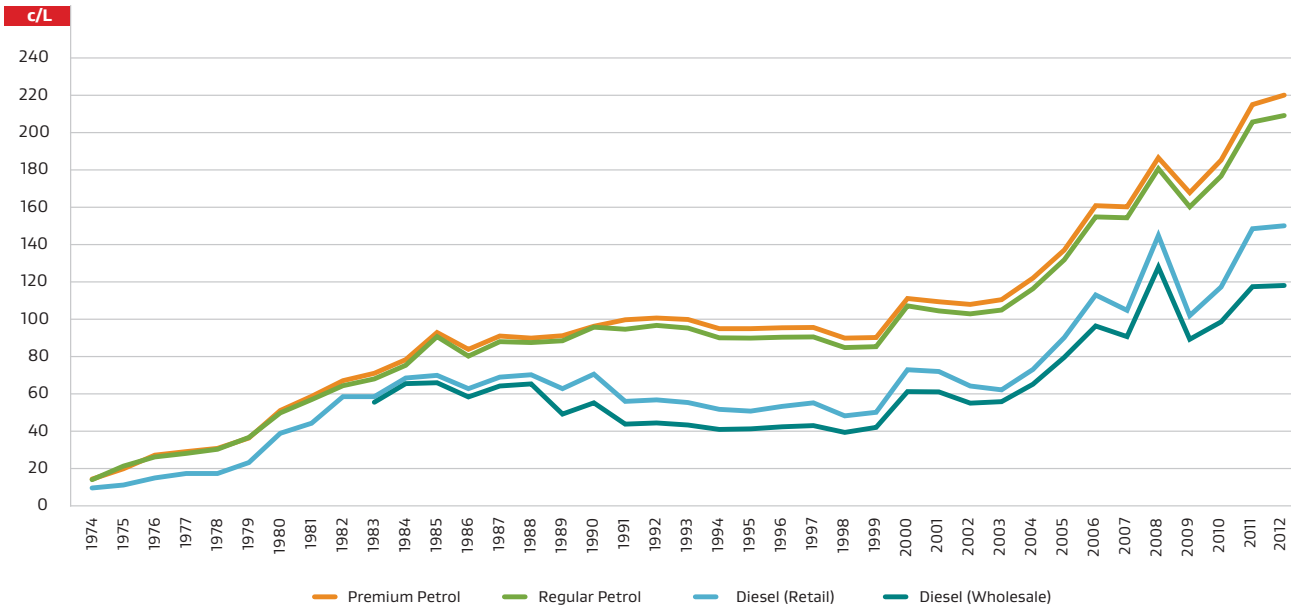


Figure D.11b: Petrol and Diesel Prices (Real 2012 Prices)

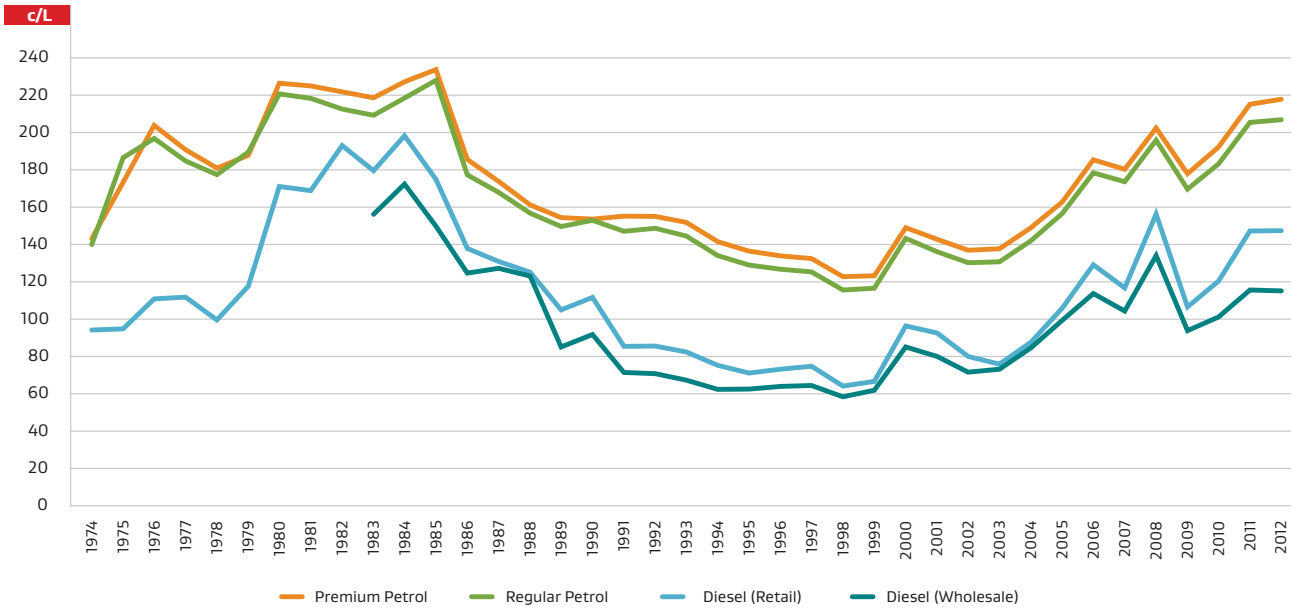


Figure D.11c: Retail and Import Prices (Nominal)

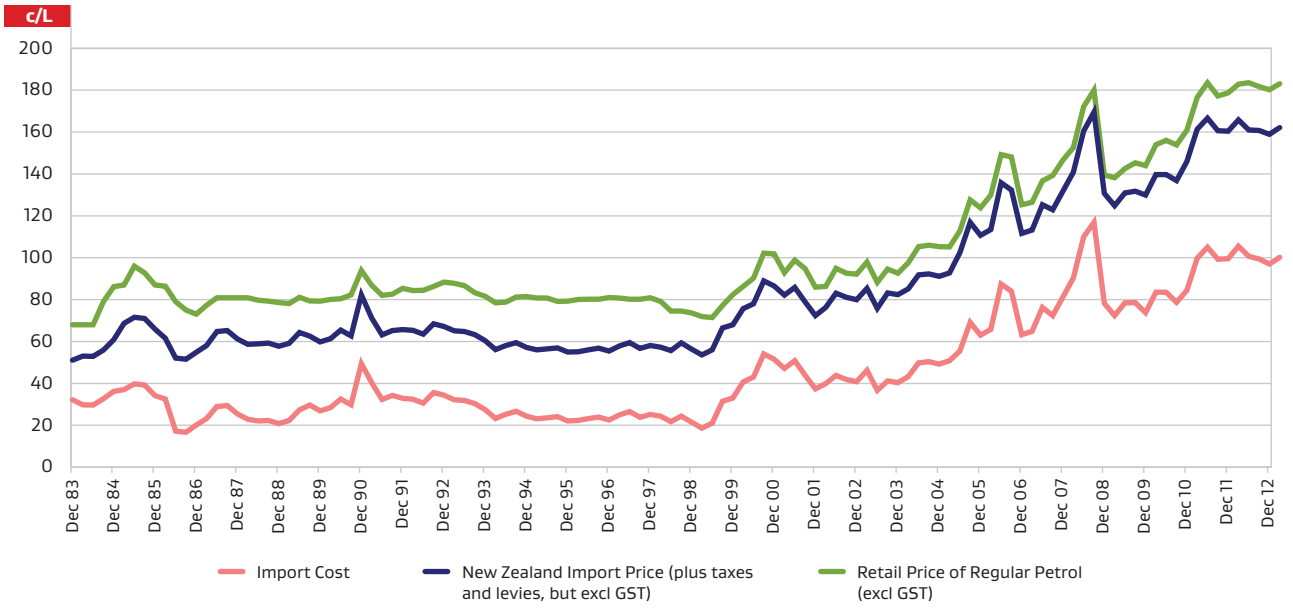
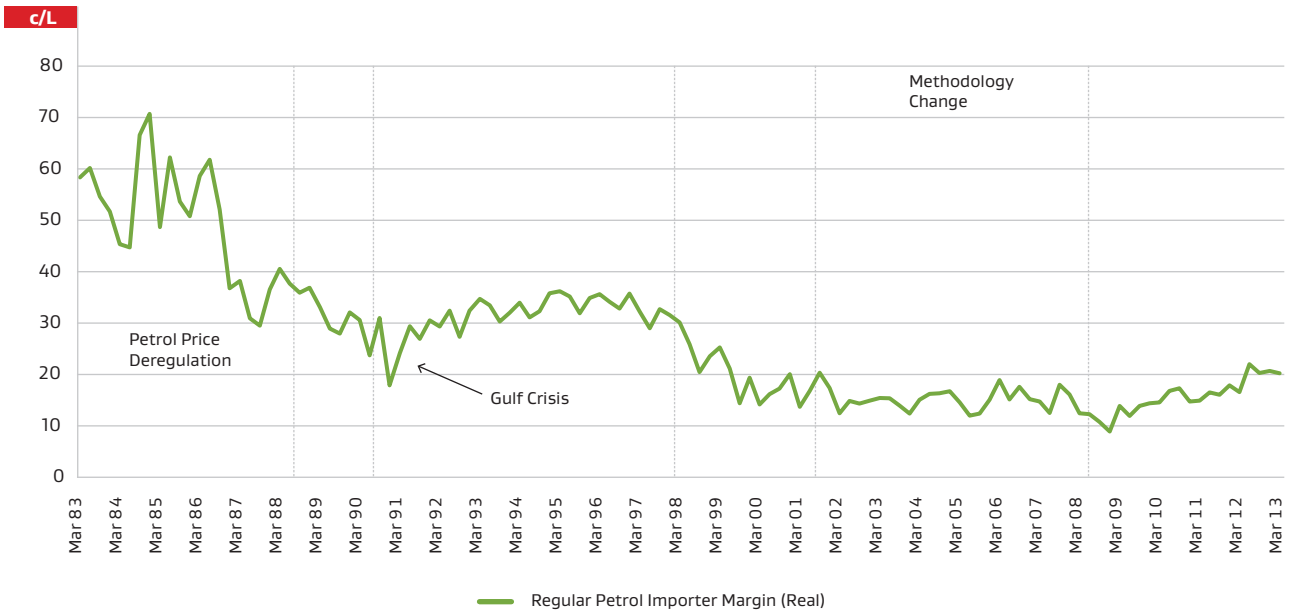


Figure D.11d: Importers' Margin (Real 2012 Prices)



Oil and Gas

Figure D.11e: Fuel Oil Prices (Nominal)

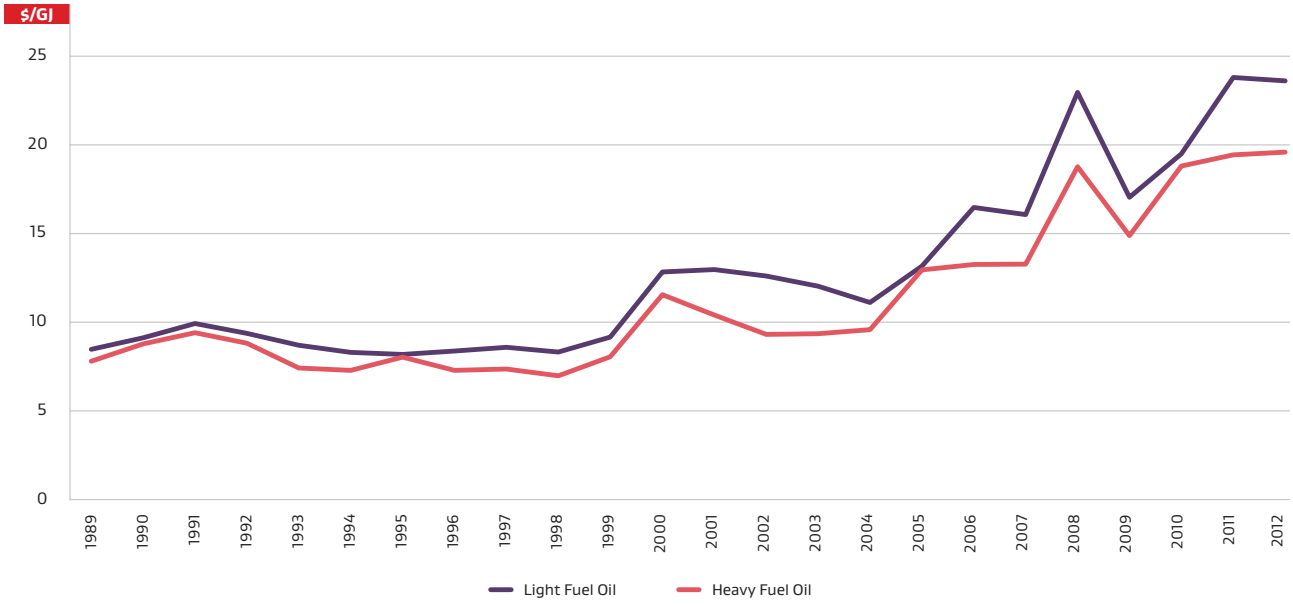
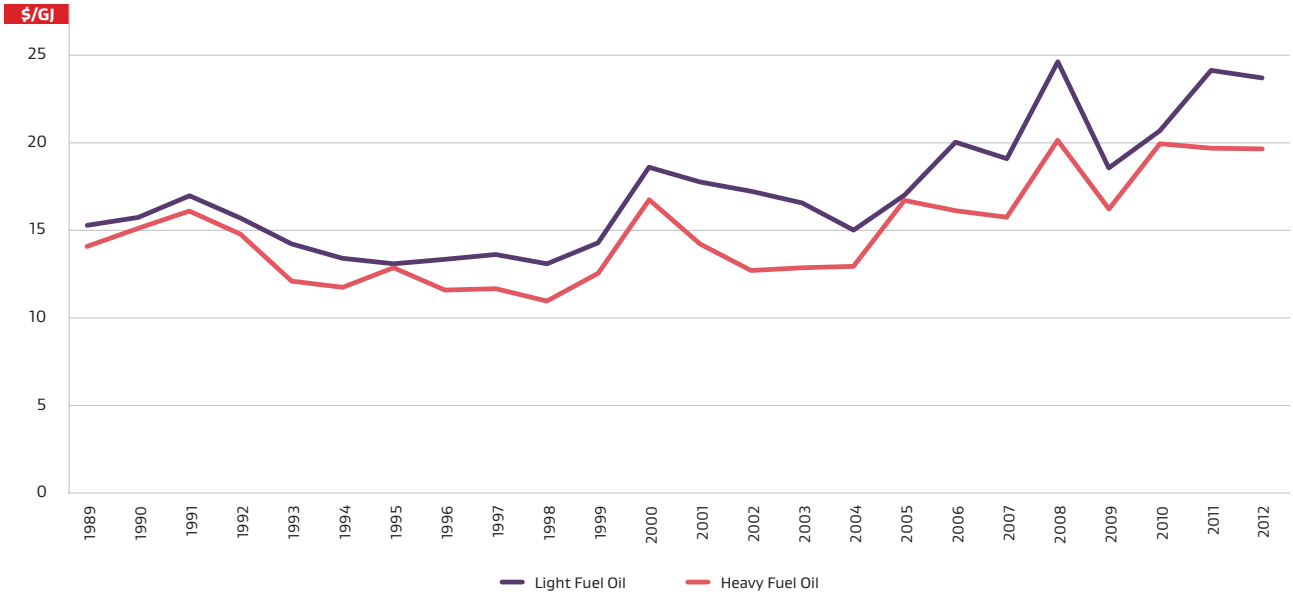


Figure D.11f: Fuel Oil Prices (Real 2012 Prices)



GAS

Reserves

- Reserves are the estimated total amounts of oil and gas that are able to be produced from a known petroleum reservoir. Ultimate recoverable reserves are the total reserves before any oil or gas is produced. Remaining reserves are ultimate recoverable reserves, less production to date.
- Increases of ultimate recoverable reserves of gas at Kupe, Mangahewa and Maui contributed to an increase in total remaining reserves of gas.

Overview

This section contains information about the production, transmission, distribution and sales to end consumers of natural gas. Customer numbers are at a specified time, and estimates are made where actual figures were not available at time of publishing.

All statistics apply to the 2012 calendar year. Comparisons are made with the 2011 calendar year, unless otherwise specified, and any percentage changes are calculated from energy units (PJ) rather than volume (Mm^3, or million cubic metres), due to the different energy properties of gas from different fields.

Production

Gas is produced entirely in the Taranaki region. Figure D.13 summarises the New Zealand gas industry in 2012, showing current producing fields and their percentage of total gas produced. Consumption by major user/supplier categories is also shown in this figure. Companies involved in the production of gas are also shown, with Shell and Todd Energy-owned subsidiaries controlling a large portion of the market.

There were 17 fields that produced sales gas in New Zealand in 2012. Total production was dominated by the Pohokura (38%) and Maui (19%) fields, as shown in Figure D14b. Total gas

Table D3: Gas Reserves

Field	Ultimate Recoverable (P90) (gross production)			Ultimate Recoverable (P50) (gross production)			Remaining Reserve (P90) as at 1 January 2013 (gross production)			Remaining Reserve (P50) as at 1 January 2013 (gross production)		
	Mm^3	Bcf	PJ	Mm^3	Bcf	PJ	Mm^3	Bcf	PJ	Mm^3	Bcf	PJ
Pohokura	22,390.0	791.3	927.1	29,440.0	1,040.3	1,218.9	11,870.0	419.3	491.3	18,910.0	668.3	783.0
Kupe	6,714.8	237.1	269.5	8,449.4	298.4	339.1	5,061.0	178.7	203.1	7,018.1	247.8	281.7
Mangahewa	5,918.8	167.6	187.3	10,170.7	288.0	324.9	3,443.2	97.5	112.0	7,691.6	217.8	250.0
Kapuni	38,745.0	1368.0	1048.5	40,064.0	1,415.0	1,083.0	3,279.0	116.0	85.9	4,598.0	162.0	120.5
Turangi	3,025.3	106.8	122.8	6,172.6	218.0	250.6	1,939.2	68.5	78.7	4,974.1	175.6	202.0
Kowhai	806.5	28.5	31.3	2,168.7	76.6	84.2	339.5	12.0	13.2	1,627.0	57.4	63.2
Maui	101,763.0	3612.0	4010.0	105,306.0	3,738.0	4,150.0	1,999.0	71.2	79.0	5,542.0	197.2	218.9
McKee	5,424.4	153.6	176.9	6,038.9	171.0	197.1	812.2	23.0	27.0	1,416.1	40.1	47.3
Ngatoro	1,047.6	37.0	40.7	1,476.3	52.1	57.3	233.8	8.3	9.1	615.5	21.7	23.9
Kauri	667.0	23.6	27.6	1,092.3	38.6	45.3	32.1	1.1	1.3	488.9	17.3	20.3
Cheal	69.5	2.5	3.3	116.3	4.1	5.6	40.2	1.4	1.9	87.1	3.1	4.2
Sidewinder	134.4	4.7	5.3	154.3	5.4	6.1	101.6	3.6	4.0	111.9	4.2	4.4
Tariki/Ahuroa	2,700.9	95.4	92.6	2,700.9	95.4	92.6	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
Surrey	11.3	0.4	0.4	14.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Rimu	66.3	2.3	2.7	73.6	2.6	3.0	1.6	0.1	0.1	5.5	0.2	0.2
Waihapa/Ngaere	788.7	27.9	26.5	788.7	27.9	26.5	0.0	0.0	0.0	0.0	0.0	0.0
Copper Moki/ Waitapu	32.1	1.1	1.7	41.4	1.5	2.2	17.8	0.6	0.9	27.1	1.0	1.4
Total	**190,305.9**	**6,659.8**	**6,974.3**	**214,268.6**	**7,473.3**	**7,886.8**	**29,170.2**	**1,001.3**	**1,107.4**	**53,112.9**	**1,813.7**	**2,020.9**

production rose almost 7%, with Maui up 6% on last year, after falling 26% the previous year. Between 1985 and 2004, Maui was annually producing about three to five times its 2012 production.

Storage

The Contact Energy Ahuroa gas storage facility had a net outgoing of 2 PJ during 2012. The storage facility supports the 200 MW gas-fired peaking electricity generation plant, which was opened in May 2011 on the Stratford site. Ahuroa is New Zealand's first large-scale gas storage facility. Gas can be stored during lower demand in summer, and then used to generate electricity during higher winter demand.

Retail

Approximate market share based on consumer connections is shown in Figure D14b. Genesis, along with its subsidiary Energy Online, held the largest share of the retail market at 42% in 2012. Market shares were similar in 2011.

Consumption

Total observed gas consumption (including electricity generation, cogeneration, total losses, own use, and non-energy use) increased from 159 PJ to 179 PJ. This was mostly due to an increase in non-energy use of gas (see Petrochemicals).

Figure D17 shows gas consumption by region. Over half the natural gas consumed is in the Taranaki region, which includes the Methanex and Ballance Agri-Nutrients petrochemical plants, as well as the Kupe gas treatment plant.

Gas consumption and gas sales revenue reported by gas retailers, broken down by sector for the recent calendar years to 2012, are used to derive average unit prices ($/GJ see under Natural Gas Prices). Gas price information presented in the Natural Gas Prices and International Comparisons should be treated as approximations only.

Electricity Generation

In total, 45% of New Zealand's natural gas consumption during 2012 was used for electricity generation (including cogeneration). Contact Energy Limited (Otahuhu B, Taranaki Combined Cycle and Stratford) and Genesis Energy Limited (Huntly – including the unit 5 combined cycle plant) are the main electricity generators in New Zealand using natural gas.

In 2012, gas consumption for electricity generation increased from 52 to 54 PJ and cogeneration increased from 18 to 19 PJ.

Industrial

In 2012, the industrial sector accounted for 26% of total gas consumption, down from 29% in 2011. This was mainly due to a drop in the dairy processing sector, from the record 2011 consumption.

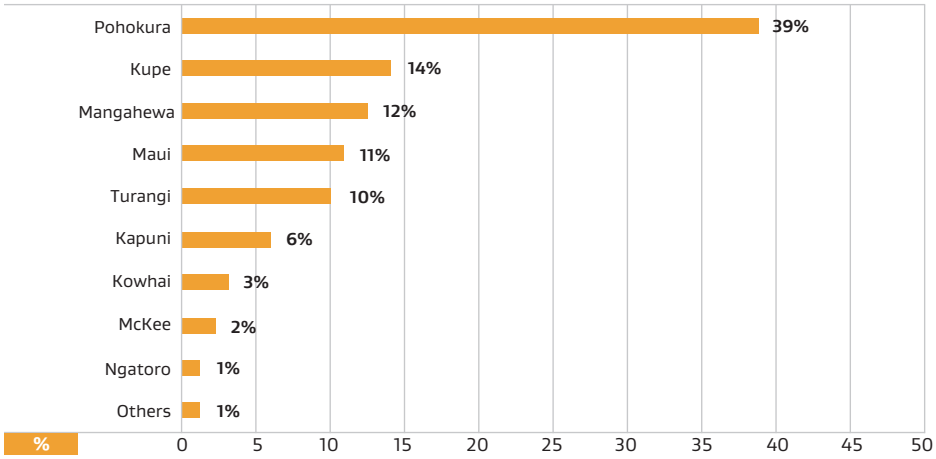
Petrochemicals

Gas used as a feedstock (i.e. non-energy use of gas) in the petrochemicals sector represented around 20% of New Zealand's natural gas consumption in 2012.

Natural gas was used in the Motunui methanol plant, the Ballance Agri-Nutrients ammonia/urea plant at Kapuni and the Degussa peroxide plant near Morrinsville.

Crude methanol is produced from natural gas and can be used in a variety of ways such as in adhesives or production of chemicals. Methanex New Zealand produced about 1,100 kilotonnes of methanol during 2012, about 33% up on 2011 (830kt)[8].

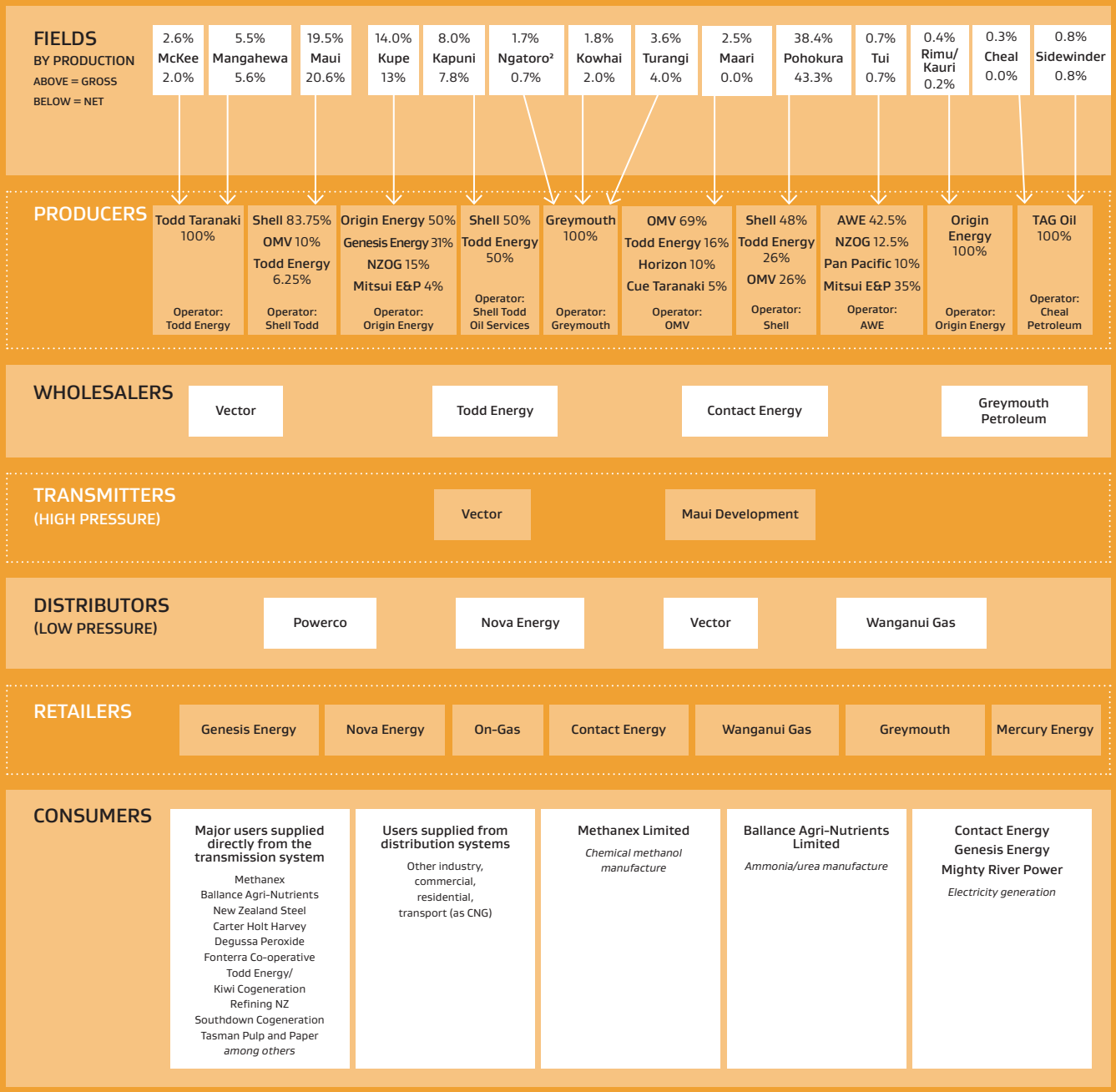
Figure D.12: Remaining P50 Gas Reserves from Producing Wells at 1 January 2013



8. See 2012 annual report, available at: http://www.methanex.com/investor/documents/2013/Methanex_Annual_Report_2012.pdf

Oil and Gas

Figure D.13: Natural Gas Industry Summary for 2012[1]



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); *TAWN* comprises the Tariki, Ahuroa, 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 year end 2012; excludes LPG.
2. Includes Kaimiro, Windsor and Goldie wells

Oil and Gas

Methanol production has been significantly higher in the last three years partly due to the larger capacity of the Motunui plant compared with the Waitara Valley plant, used for the majority of 2008, and more natural gas being available. In mid-2012 Methanex re-opened a second processing facility at Motunui.

In January 2012, a $750m+ expansion project for the onshore Mangahewa field was formally announced, along with a 10-year sales agreement with Methanex.

Ballance Agri-Nutrients (Kapuni) Limited (previously Petrochem Limited) manufactures ammonia/urea from natural gas. Gas consumption as a feedstock for ammonia/urea production is up on 2011, though still lower than the levels seen from 1999 to 2010.

The number of industrial consumers was around 1,500 in 2012.

Commercial

Around 5% of gas consumption came from the commercial sector in 2012. The number of commercial (including transport) consumers was around 14,000 in 2012.

Residential

In 2012, the residential sector accounted for around 4% of total gas consumption. The number of residential consumers was around 246,000 in 2012.

Taxation

There is a Gas Levy of 2 cents per gigajoule and, for fields which commenced production prior to 1986, an Energy Resources Levy of 45 cents per gigajoule.

The Gas Industry Company also levies industry participants to fund its operations. In FY2011/12 there was a wholesale levy of 1.74 (down from 1.84) cents per gigajoules applicable to all gas purchased from producers and a retail levy of $6.23 (down from $6.40) per interconnection point per annum.

Liquefied Petroleum Gas (LPG)

LPG statistics are included in the Oil section.

Compressed Natural Gas (CNG)

CNG is supplied to the automotive market through some North Island service stations. The CNG market has decreased markedly since government subsidies were removed in 1987.

Figure D.14a: Total Natural Gas Production by Field for 2012

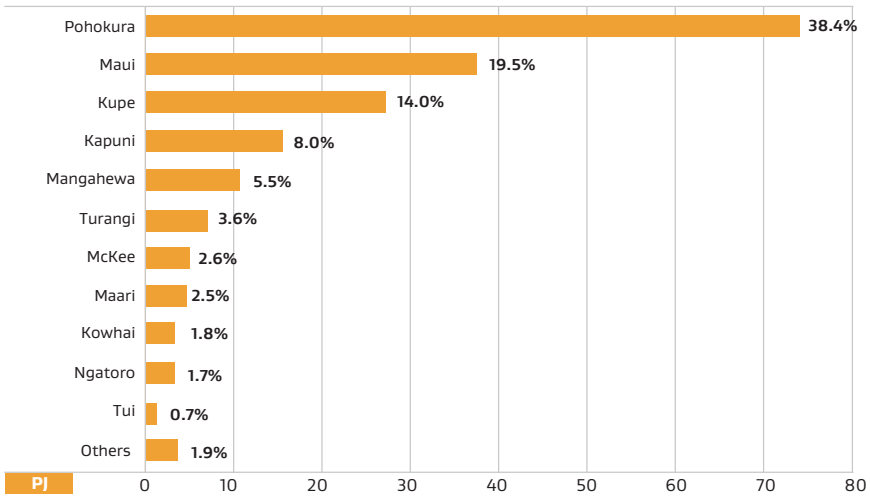
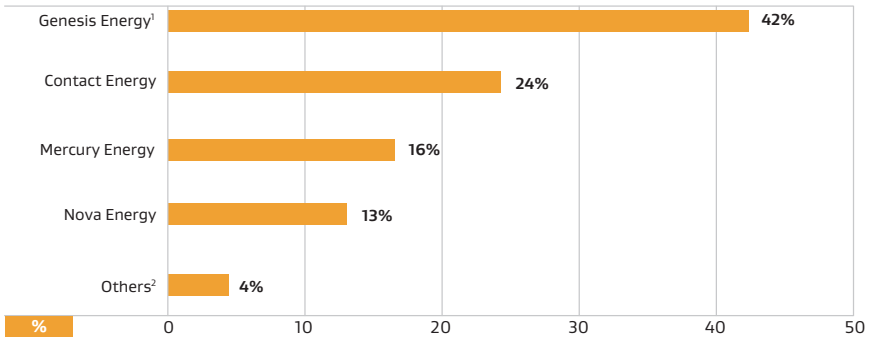


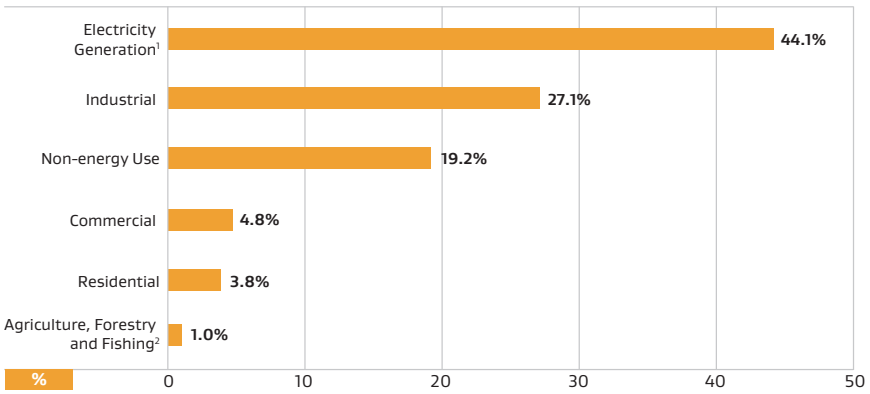
Figure D.14b: Retail Market Share as Determined by Consumer Connections at December 2012



Notes

1. Includes the Genesis Energy subsidiary Energy Online
2. Includes Energy Direct NZ, On Gas, and Greymouth Gas

Figure D.14c: Natural Gas Consumption by Sector for 2012

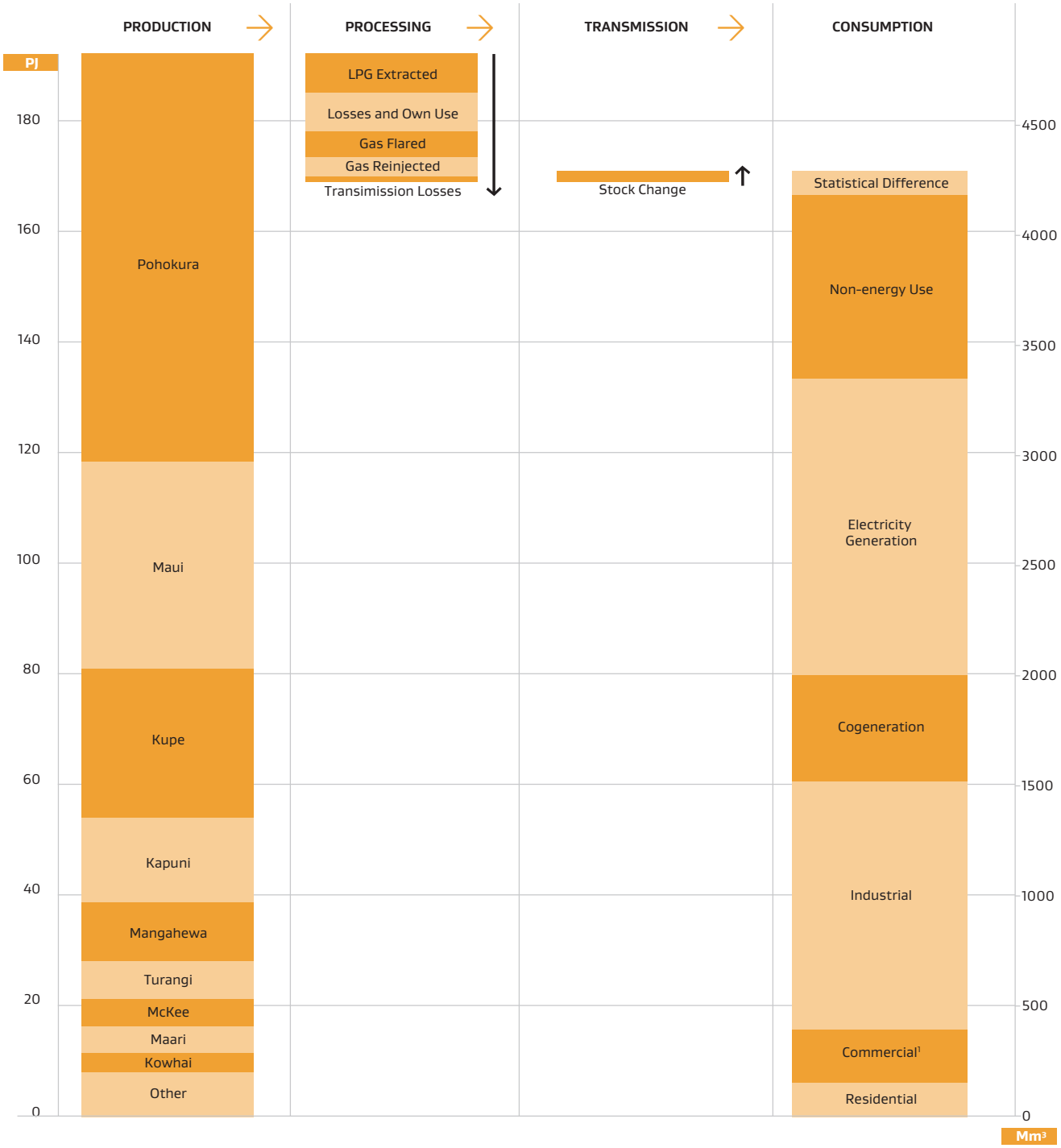


Notes

1. Includes cogeneration
2. Includes transport

Oil and Gas

Figure D.15: Natural Gas Flow Summary for 2012



Notes

1. Includes transport, agriculture, forestry and fishing

Oil and Gas

Figure D.16a: Total Natural Gas Production by Field

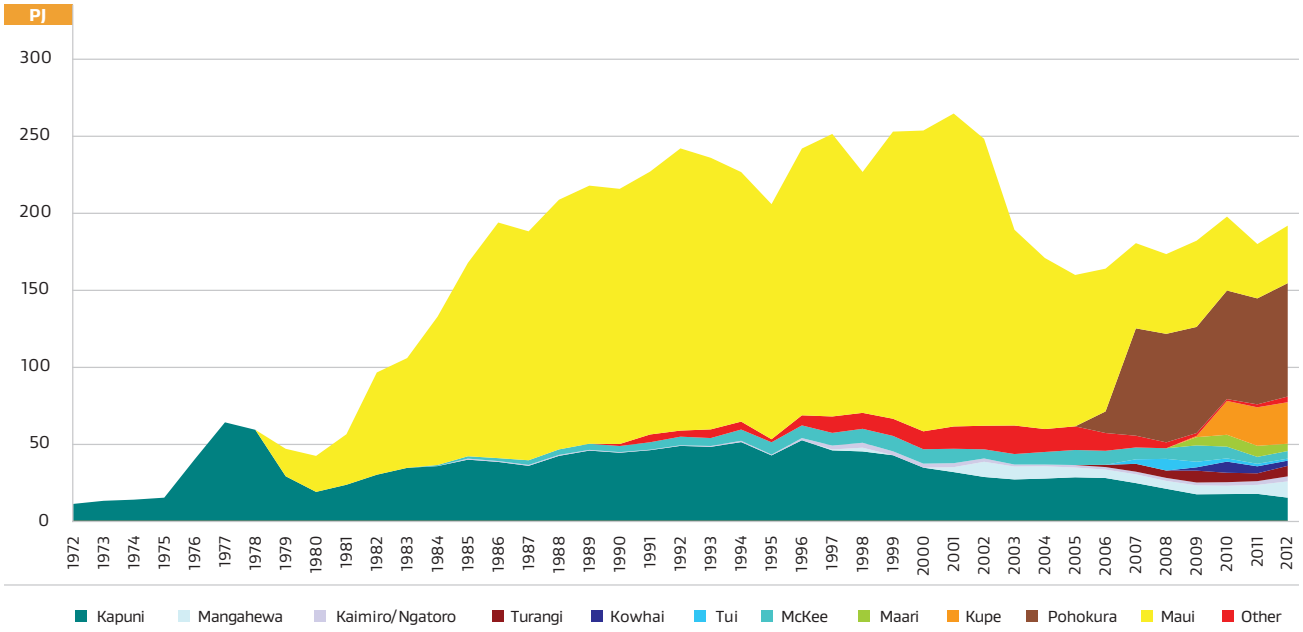
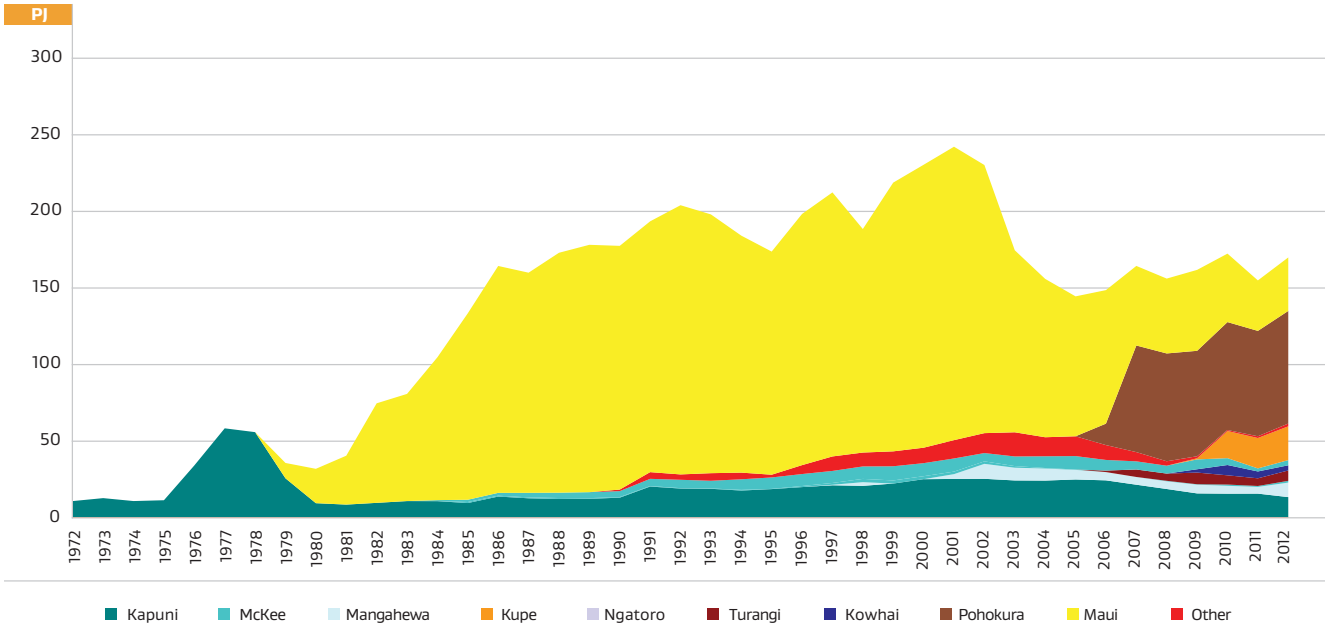


Figure D.16b: Net Natural Gas Production by Field (Gross PJ)



Oil and Gas

Figure D.16c: Natural Gas Production (Gross PJ)

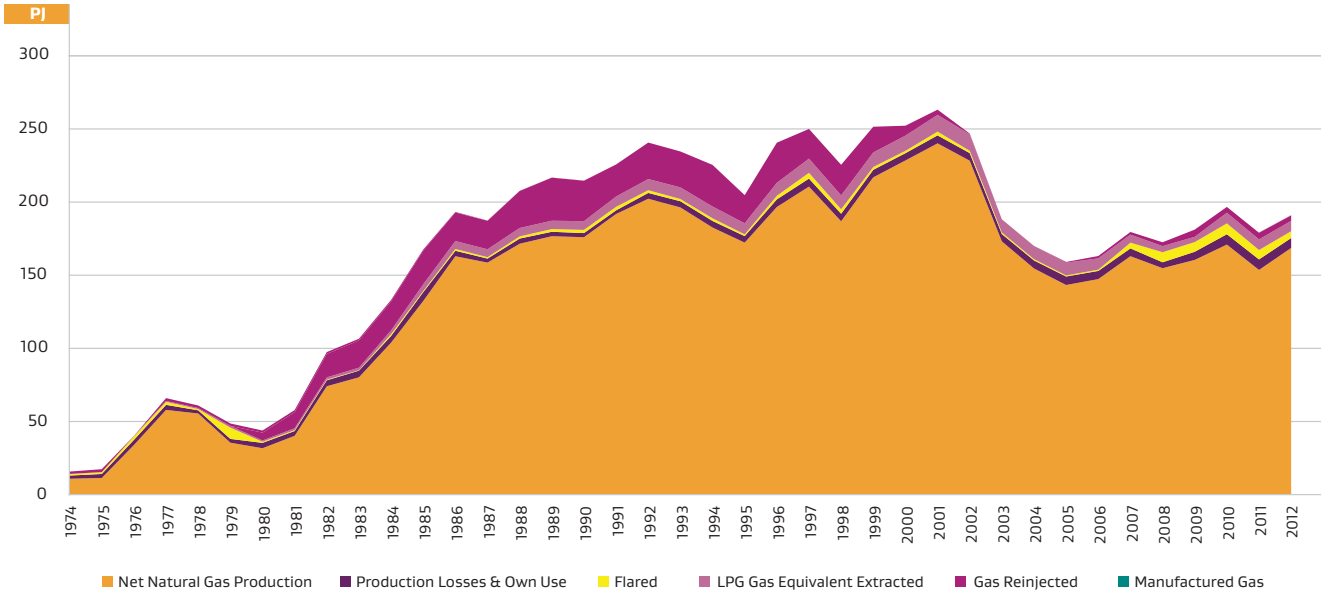
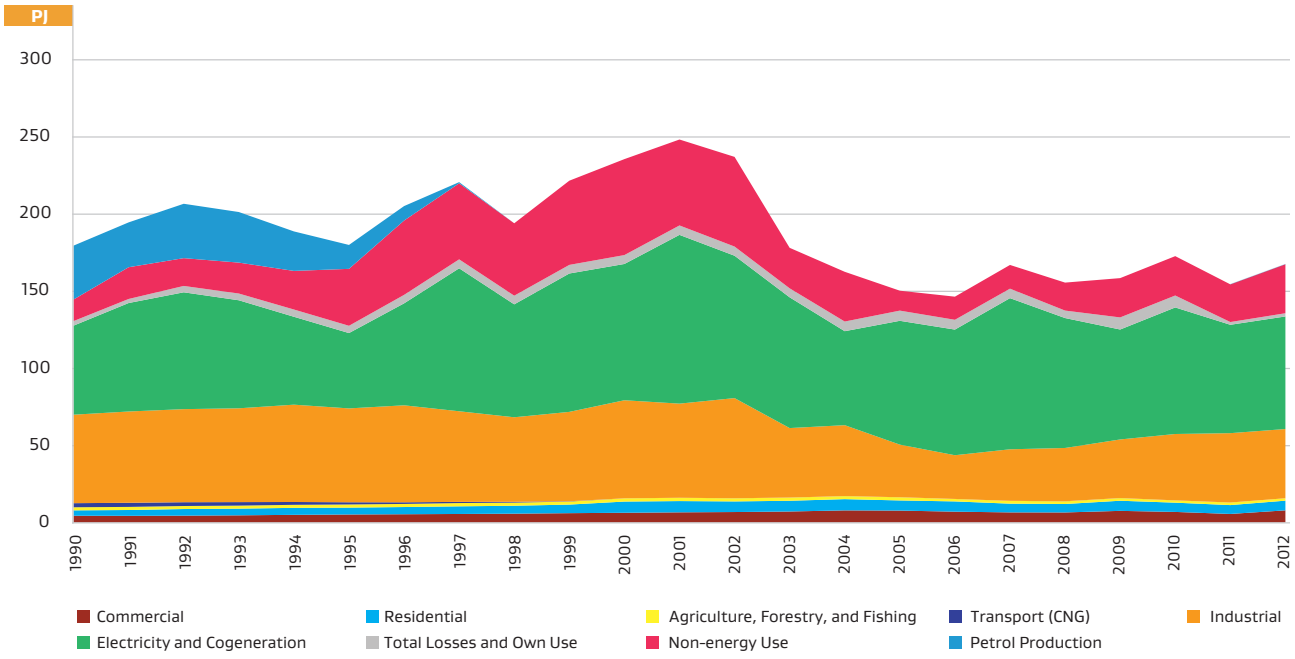


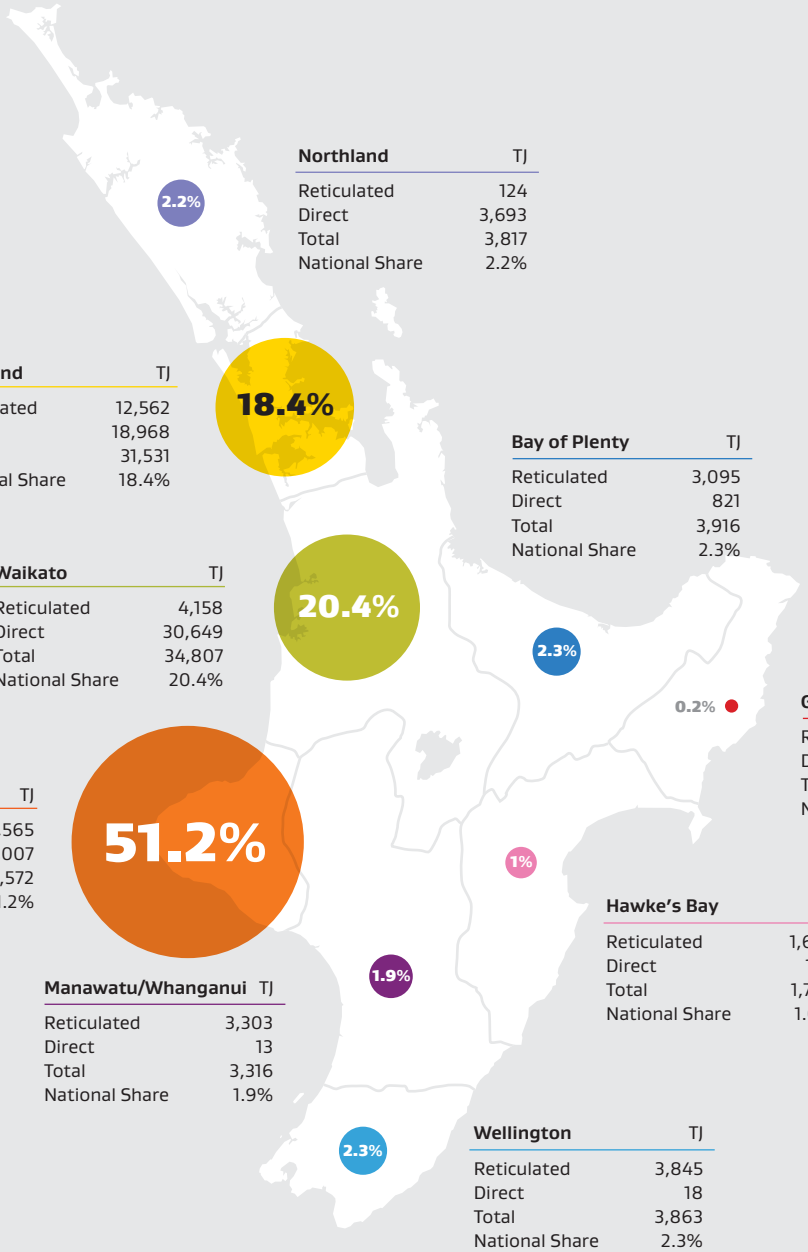
Figure D.16d: Natural Gas Use by Sector (Gross PJ)



Oil and Gas

Gas Consumption by Region

Figure D.17: Gas Consumption by Region for 2011 (Gross TJ)[1]



Northland	TJ
Reticulated	124
Direct	3,693
Total	3,817
National Share	2.2%

Auckland	TJ
Reticulated	12,562
Direct	18,968
Total	31,531
National Share	18.4%

Bay of Plenty	TJ
Reticulated	3,095
Direct	821
Total	3,916
National Share	2.3%

Waikato	TJ
Reticulated	4,158
Direct	30,649
Total	34,807
National Share	20.4%

Gisborne	TJ
Reticulated	408
Direct	-
Total	408
National Share	0.2%

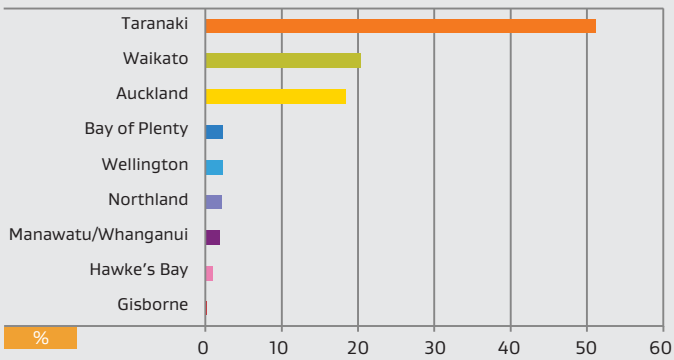
Taranaki	TJ
Reticulated	1,565
Direct	86,007
Total	87,572
National Share	51.2%

Hawke's Bay	TJ
Reticulated	1,605
Direct	104
Total	1,709
National Share	1.0%

Manawatu/Whanganui	TJ
Reticulated	3,303
Direct	13
Total	3,316
National Share	1.9%

Wellington	TJ
Reticulated	3,845
Direct	18
Total	3,863
National Share	2.3%

National Gas Consumption



TOTALS	TJ
Reticulated	30,665
Direct	140,273
Total	170,938
Share of National	100%

1. Numbers do not include losses and own use, flaring, LPG extracted, gas reinjected, and stock changes.

Oil and Gas

Figure D.18: New Zealand Natural Gas Transmission Pipelines

Vector

Oil and Gas

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 for smoothing purposes.

Significant gaps between residential, industrial and commercial prices arise in 2002 and peak in 2008. The commercial, industrial and wholesale gas prices for 2012 appear to be decreasing, while residential prices showed slight increases in 2012.

Figure D.19a: Natural Gas Prices (Nominal)

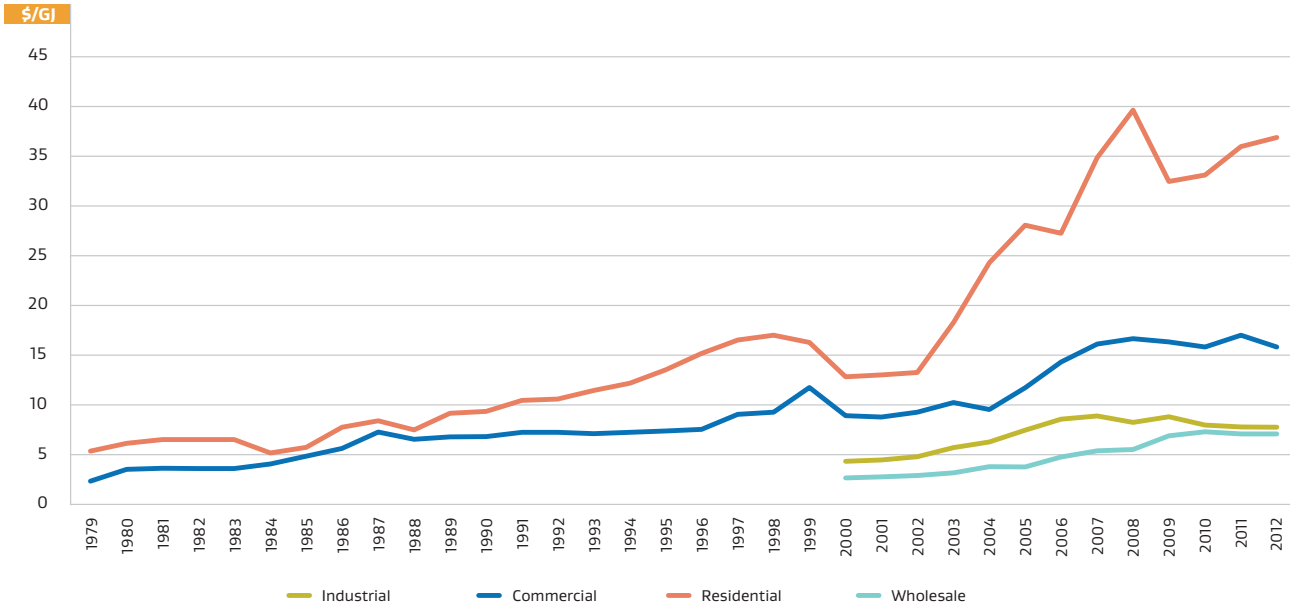
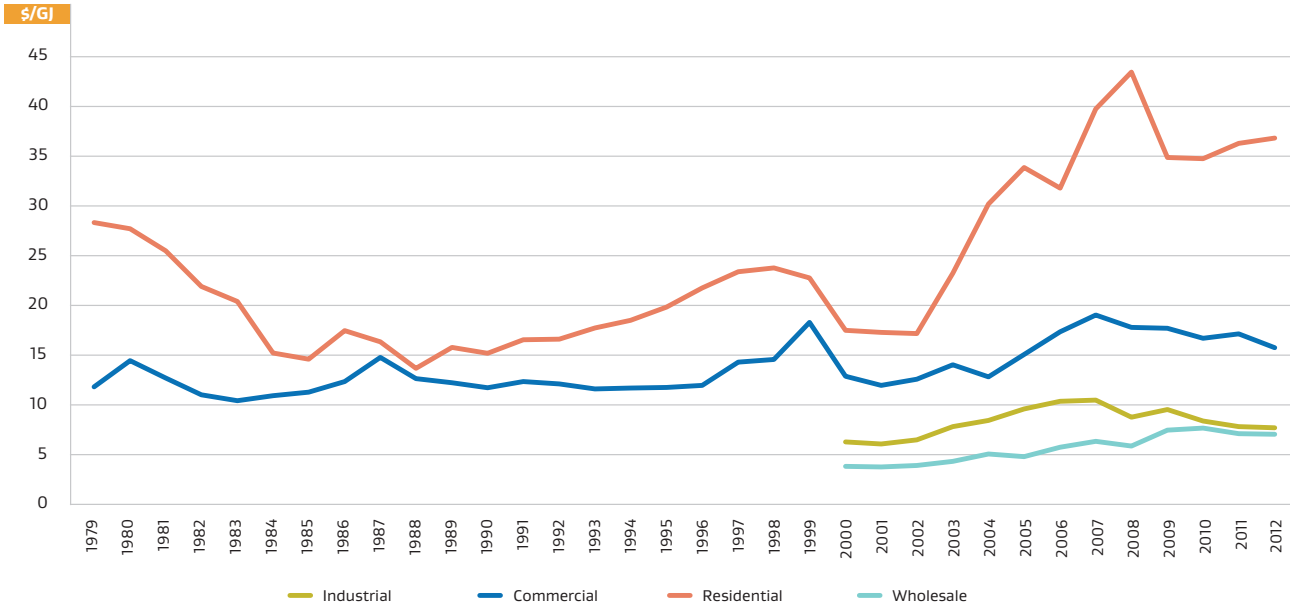


Figure D.19b: Natural Gas Prices (Real 2012 Prices)



E. RENEWABLES

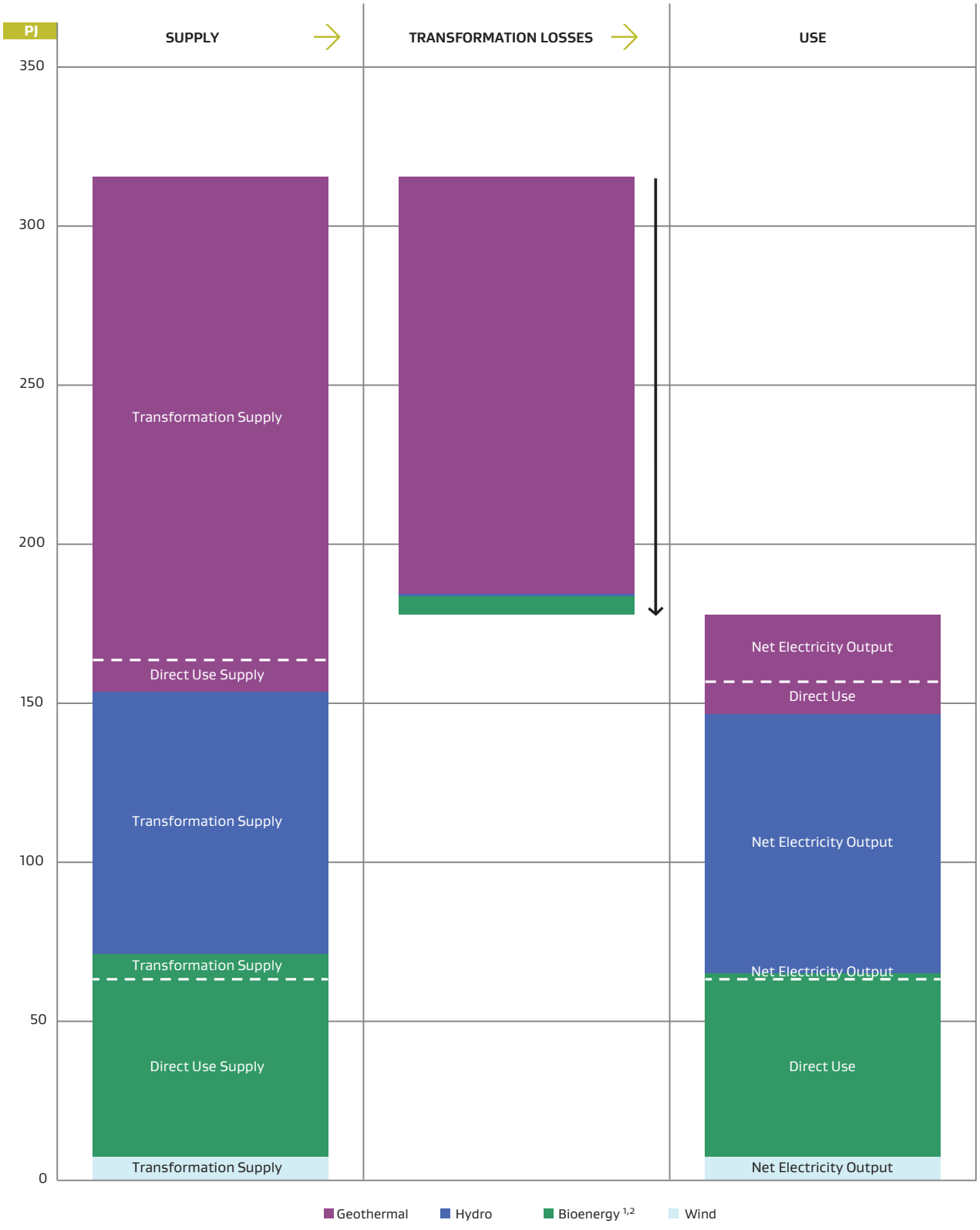
INTRODUCTION

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 2012 calendar year.

Detailed information is available on renewable energy used to generate electricity. However, information on the direct use of renewable energy is more difficult to obtain, given that it is often used without being purchased and hence it is not well recorded. 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.

Renewables

Figure E.1: Renewable Energy Flow Summary for 2012



1. Bioenergy in this instance refers to biogas, woody biomass and liquid biofuel.

2. 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.

OVERVIEW OF RENEWABLES IN NEW ZEALAND

Supply

The proportion of New Zealand's primary energy supply that came from renewable resources was 37% in 2012. It is the third highest in the OECD after Norway which is second and Iceland, which is first, according to the latest data available from the International Energy Agency. This is due to the high levels of hydro and geothermal energy used for electricity generation. Figure F.2 gives a breakdown of renewable primary energy supply for 2012.

The contribution of renewable sources to primary energy supply decreased in 2012 to 37%, from 39% in 2011 (shown in Figure F.3). This contribution fell because of low hydro supply in 2012, while other sources of energy supply increased over the year.

Electricity Generation

Most of New Zealand's production of renewable energy is used for electricity generation. In 2012, a total of 73% of electricity generation came from renewable resources, falling from 77% in 2011 – low lake levels meant more coal and gas was used. New Zealand's renewable percentage is the third highest in the OECD. Figure F.3 shows how the percentage of electricity generation from renewables has changed over time.

Direct Use of Renewable Energy

In 2012, an estimated 66 PJ of renewable energy was used for direct-use heat applications around New Zealand. This is mostly in the form of woody biomass and geothermal for heating in commercial and industrial applications.

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.

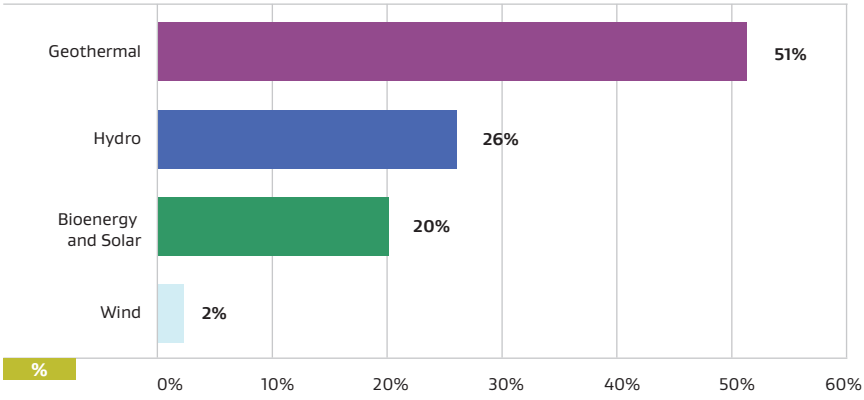
Woody biomass direct use is mainly in the timber industry, which burns residue wood to provide heat energy. Wood is also burned to heat many private homes in New Zealand.

Liquid Biofuels Production

Estimated production of liquid biofuel was flat over the year, remaining at 7 million litres in the 2012 year. Lower production of Bio-diesel was countered by higher production of Bio-ethanol in the 2012 year after the Bio-diesel Grant Scheme was not renewed. The Biodiesel Grants Scheme ran from 1 July 2009 to 30 June 2012.

In New Zealand, biodiesel is currently produced from tallow, oilseed rape and used cooking oil, resulting in life-cycle greenhouse gas emissions 40 to 50% lower than those from fossil diesel. As tallow and used cooking oil are by-products of other industries and oilseed rape is grown as a break crop on grain fields to increase soil quality, current New Zealand biodiesel does not compete with food production or compromise biodiversity or soil quality.

Figure F.2: Renewable Primary Energy for 2012



Renewables

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

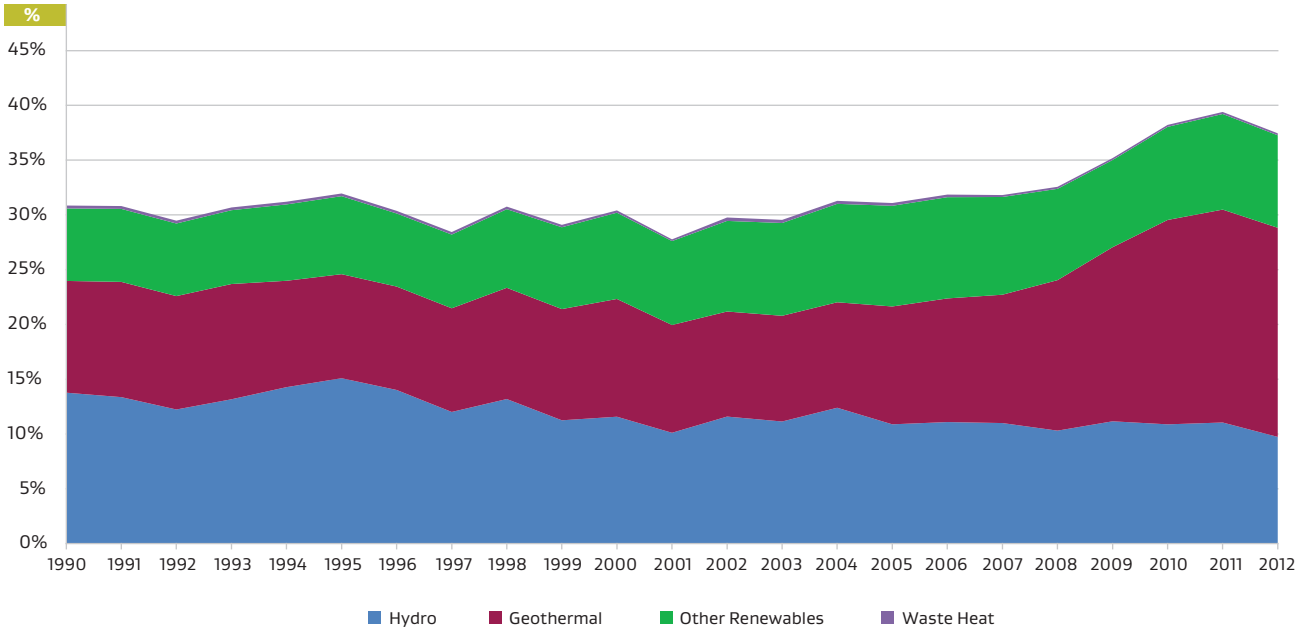
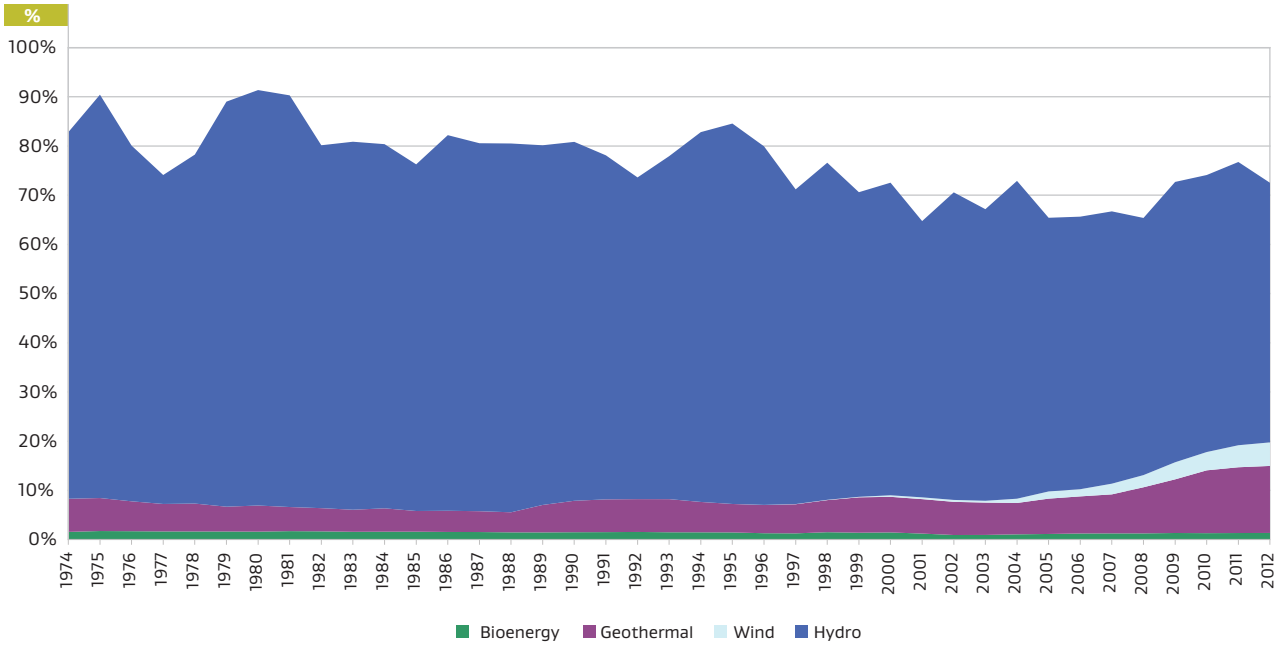


Figure F.4: Percentage of New Zealand Electricity Generation from Renewable Sources



F. ELECTRICITY

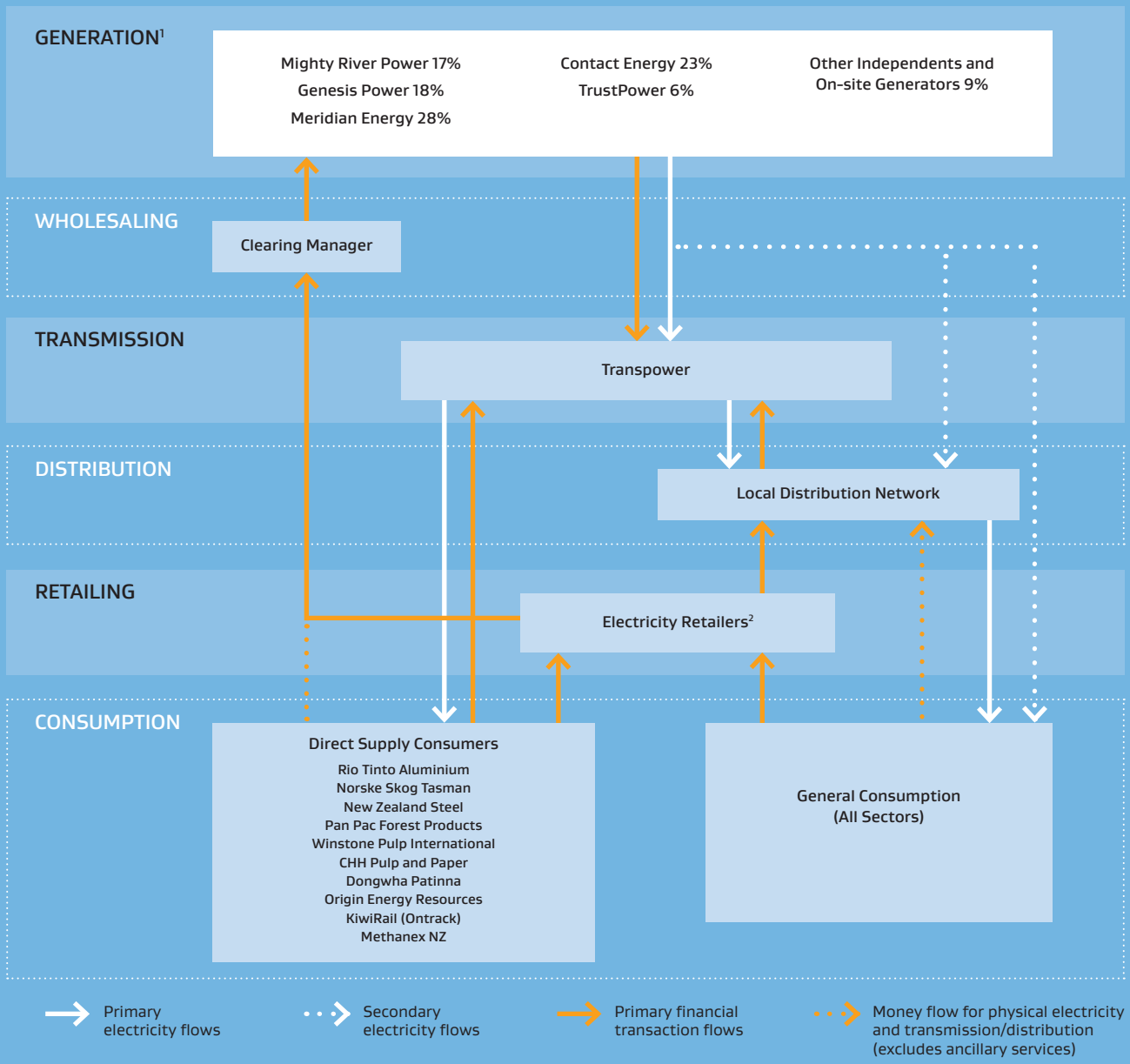
INTRODUCTION

This section contains information about electricity generation/supply, transmission and distribution, and consumption. All annual figures are calendar year unless it is clearly stated as March year in the title for the table or figure.

Sales and income information previously published in table G.6a will be released at a later date.

Electricity

Figure F.1a: Electricity Industry Summary for 2012



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 Lines Company" distribution network area pay distribution charges directly to the local distribution network as shown by the red 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 red line between "General Consumption" and "Electricity Retailers" which partly continues onto the "Local Distribution Network".

The thickness of the lines in Figure G.1a 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.

Notes to Figure G.1a:

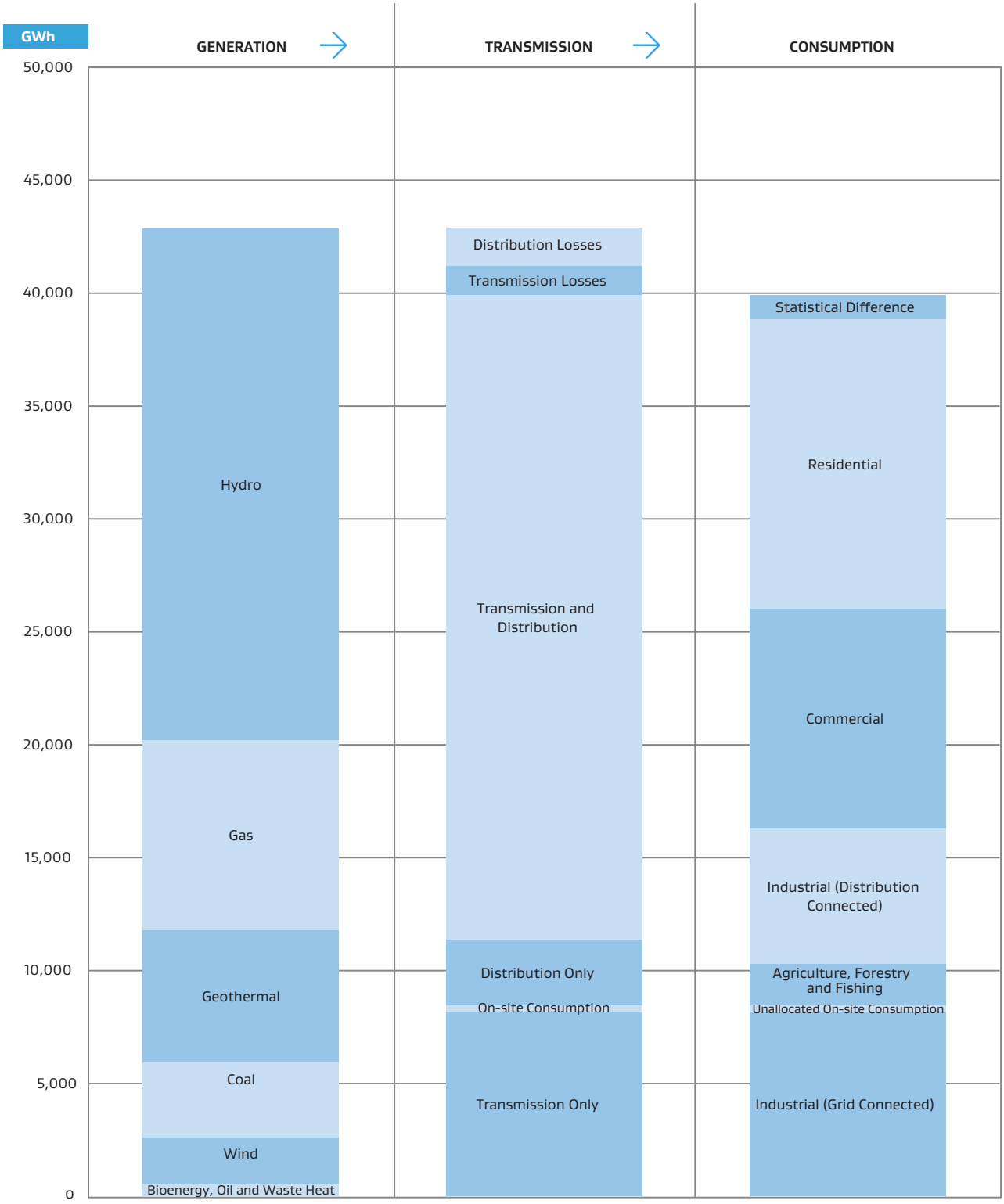
1. Embedded (distributed) generators can choose to sell their electricity directly to retailers trading on the same grid exit point.

2. Electricity retailers include Contact Energy (and its subsidiary Empower), Genesis Energy (and its subsidiary Energy Online), Meridian Energy (and its subsidiary Powershop), Mighty River Power (through its brands and subsidiaries of Mercury Energy, Bosco Connect and Tiny Mighty Power), TrustPower, Pulse Energy, Opunake Hydro – and the Todd Energy-owned, Bay of Plenty Energy and Auckland Gas, which trade together as Nova Energy.

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.

Electricity

Figure F.1b: Electricity Flow Summary for 2012



Electricity

Overview

Electricity demand in New Zealand fell 1% in total over the year. Heavy industrial electricity demand was particularly affected by production drops at Tiwai Point Aluminium Smelter, as well as in the wood, pulp, and paper industry. A flat demand outlook means it is unlikely that major new investment (not already committed) will occur until 2020.

The 2012 year was a year of low rainfall, which led to lower hydro generation and an increase in gas and coal generation. As a result, the share of generation from renewable sources decreased to 73% in 2012 from 77% in 2011.

Future Developments

At the end of 2012 the Electricity Authority (EA) outlined its proposals to improve the Transmission Pricing Methodology (TPM), which is the method used to recover costs to Transpower for providing transmission services. Making changes to the TPM is a contentious issue as it determines who pays the cost of transmission. Changes will affect where new generation is constructed, especially renewable generation in the South Island.

Transpower is currently upgrading the High Voltage Direct Current (HVDC) link between the North and South Islands to increase capacity and replace old technology that is no longer supported internationally. The project is expected to be finished in 2013 and, once completed, will add 1,000 MW of capacity to the inter-island link.

Overall renewable generation looks set to increase in the next few years with over 270 MW of geothermal generation, 60 MW of wind generation and 6 MW of hydro generation currently under construction.

Generation

In 2012, 42,900 GWh or 154 PJ of electricity was generated in New Zealand. Total generation was down 0.6% from 2011.

Figure G.2a compares the electricity generation breakdown by fuel type for the 2011 and 2012 years. It shows that hydro generation made up 53% of generation (down from 58% in 2011), and gas made up 20% (up from 18% in 2011).

Figure G.2b is a time series of generation by fuel type and shows continued growth in wind and geothermal generation. Figure G2c shows operational electricity generation capacity by plant type.

The five major generating companies provided 92% of New Zealand's electricity generation in the 2012 year. These were Meridian Energy (28%), Contact Energy (23%), Genesis Energy (18%), Mighty River Power (17%) and TrustPower (6%). Between 2011 and 2012 generation decreased for Meridian by 4% while it rose by 3% for Genesis.

Renewable Generation

The share of electricity generated from renewable energy sources decreased from 77% in 2011 to 73% in 2012. Lake levels were at record lows in 2012 due to low rainfall and this resulted in increased gas and coal generation over the year.

Geothermal energy continues to grow with an increase in generation of 1% over the year despite flat demand for electricity. Geothermal capacity is set to increase at the end of 2013 with the commissioning of the 82MW Ngatamariki plant.

Wind is another growing renewable energy technology. Generation rose 6% over the year to reach 2,053 GWh in 2012.

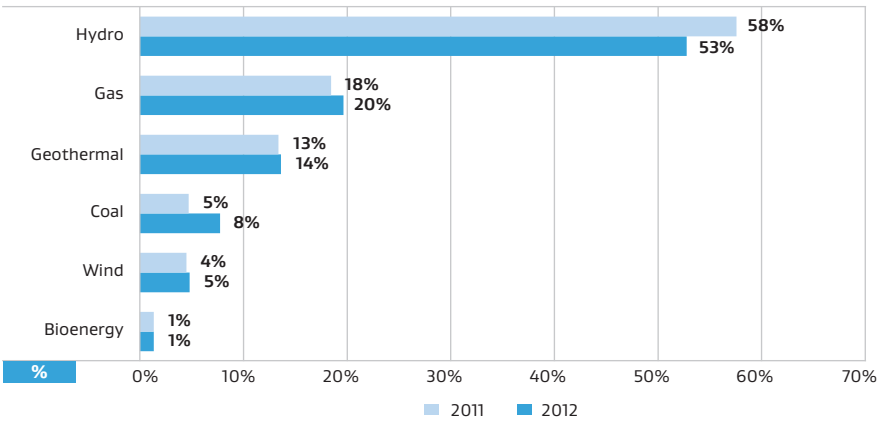
Other renewable sources for electricity generation include bioenergy, solar energy and marine energy. Of these, bioenergy is the largest contributor to electricity generation in New Zealand. Bioenergy is predominantly from woody biomass consumed at a number of cogeneration plants located at wood processing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

Fossil Fuel Generation

There was an increase in gas and coal generation in the 2012 year due to lower than normal rainfall. Coal generation increased from 2,026 GWh to 3,317 GWh, the highest it has been since 2008. Retirement of Huntly unit 3 (250 MW coal/gas fired plant) in 2012 reduced Coal/gas capacity by 25% from 1,000 MW to 750 MW.

Electricity generation from the combustion of coal, oil and gas plays a crucial role in New Zealand's electricity system by providing base-load, backup and peak supply.

Figure F.2a: Electricity Generation by Fuel Type for 2011 and 2012



Electricity

Figure F.2b: Annual Electricity Generation by Fuel Type

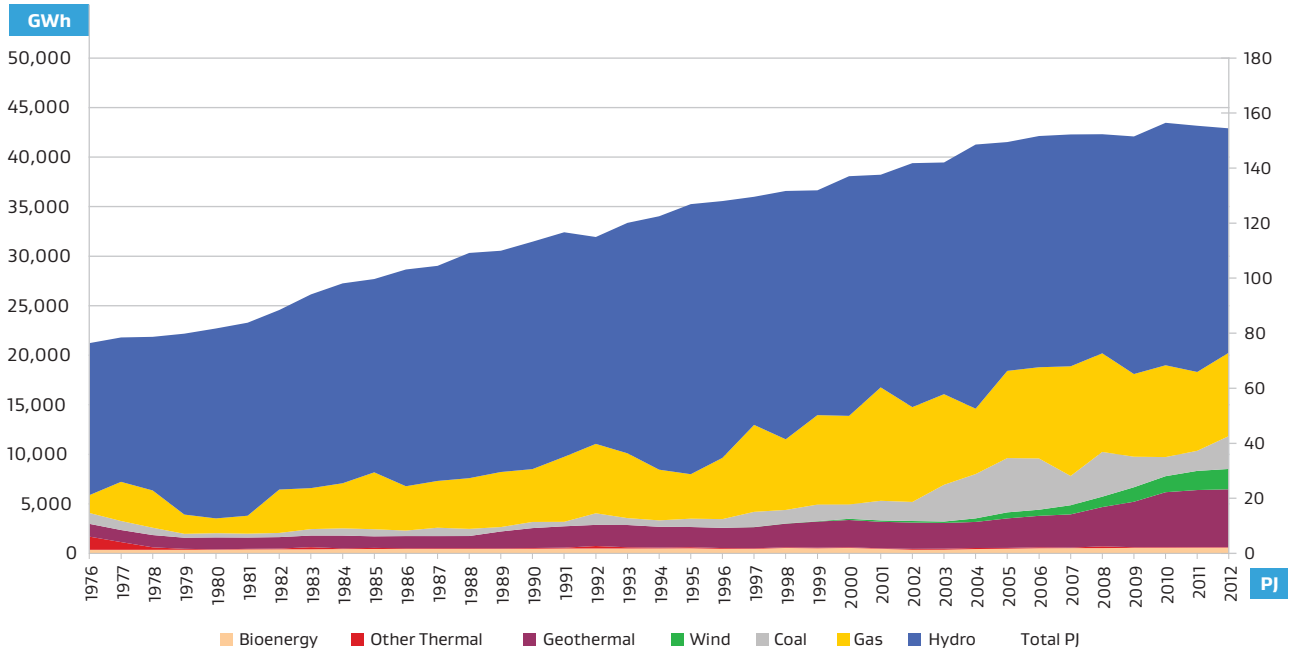
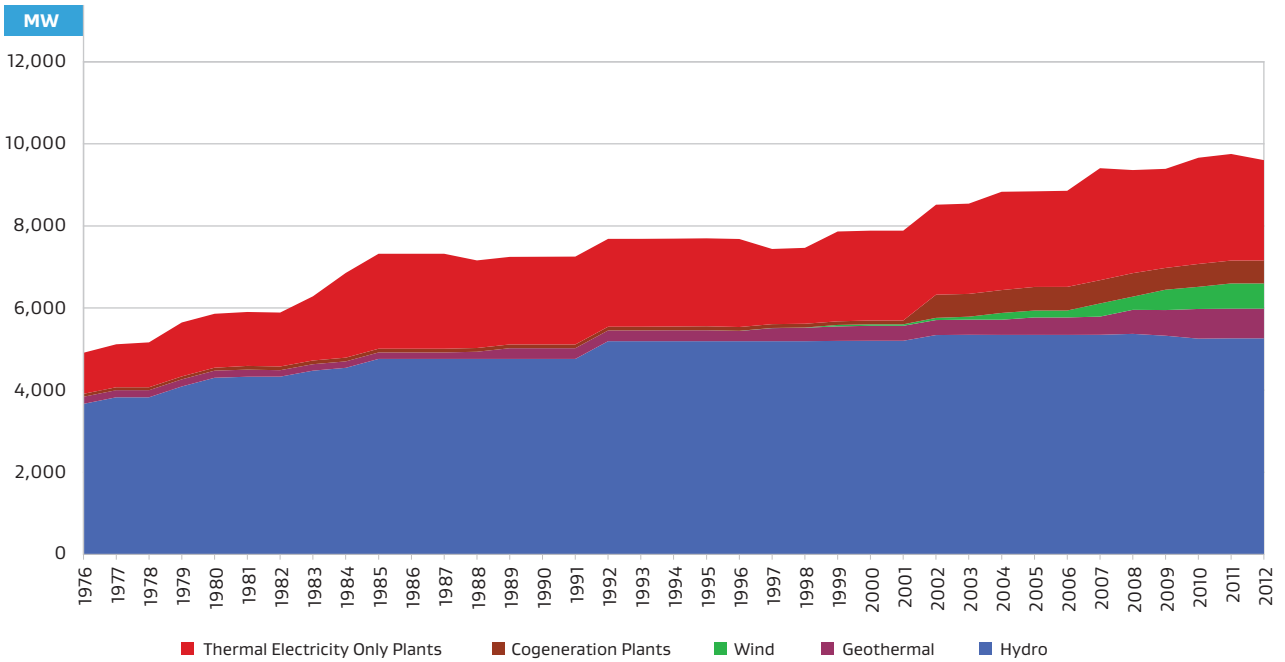


Figure F.2c: Operational Electricity Generation Capacity by Plant Type (MW)



Electricity

Consumption

Electricity consumption decreased by 1% to 38,564 GWh in 2012 from 39,143 GWh in 2011. Much of this fall is from reduced demand from the Tiwai Aluminium Smelter showing through in the basic metals industry and lower demand from the wood, pulp, paper, and printing industry. Residential consumption was flat over the year (see figure G.3c)

The MBIE Electricity Insight[1] showed under the business as usual (BAU) scenario total electricity demand grows on average by 1.1% per annum to 2040 (grid demand is over 50 TWh in 2040). In this scenario grid electricity demand peaks in 2010 close to 39 TWh per annum but doesn't go much above this level until 2016, and no new investment (other than projects already committed) takes place until 2020.

Investment is expected to remain subdued because of the flat demand outlook and the potential closure of Tiwai Point. The low demand outlook has caused a fall in futures prices on the Australia Securities Exchange. Consequently, construction of new generation is expected to be halted until it is economically viable to build. The Waitaki River Hydro Scheme is an example of this, with the project put on hold until new generation is needed.

Figure F.3a: Observed Electricity Consumption by Sector for 2012

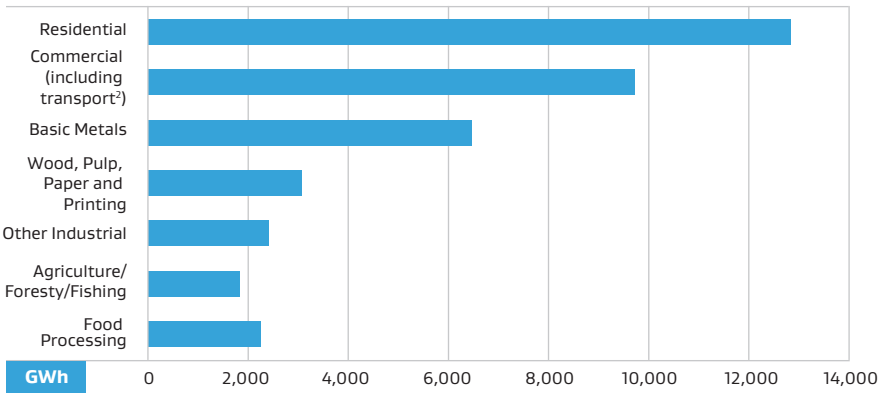


Figure F.3b: Electricity Demand by Region for 2012

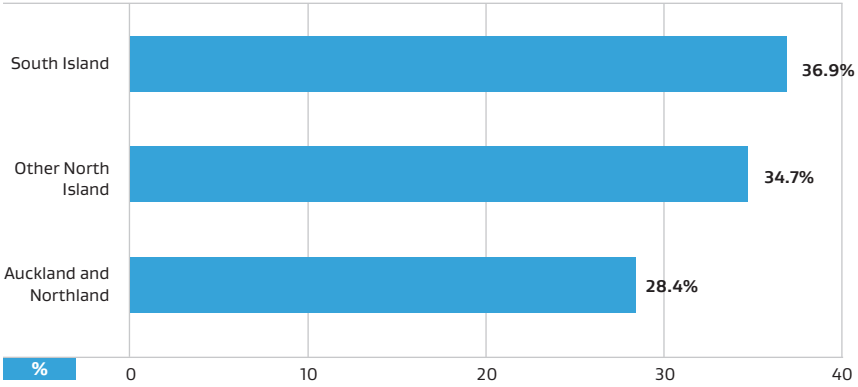
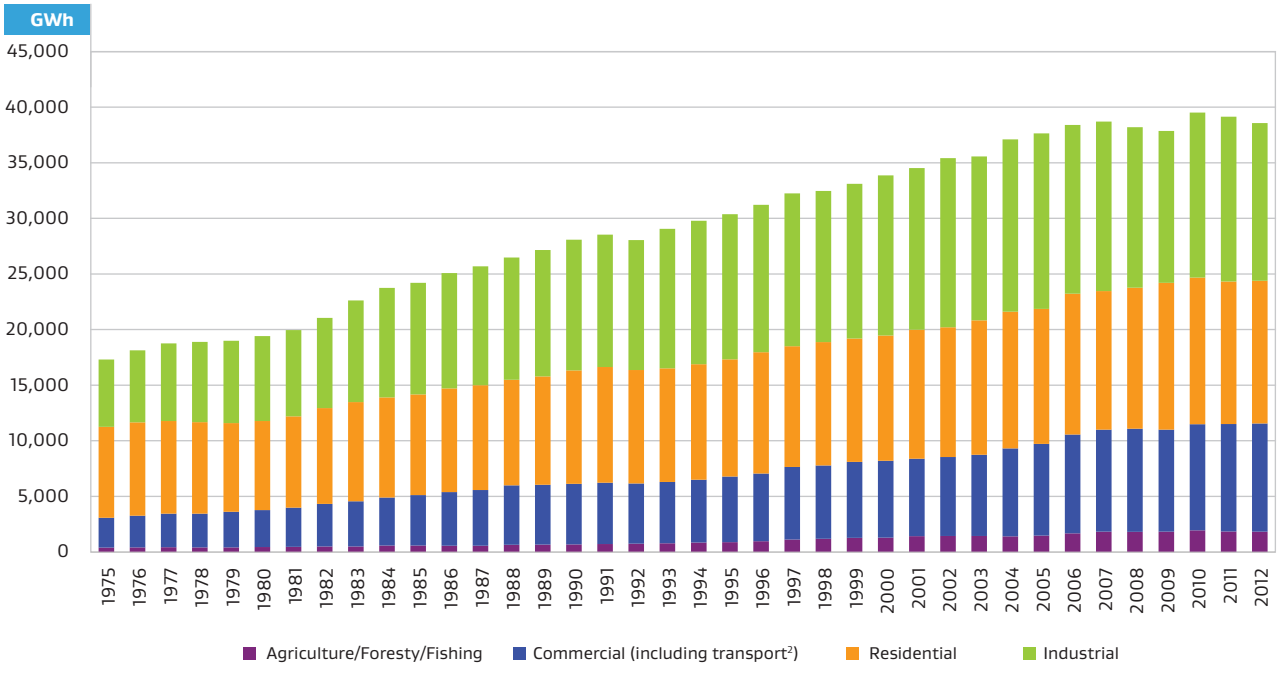


Figure F.3c: Observed Electricity Consumption by Sector



1. New Zealand's Energy Outlook Electricity Insight explores the long-term future for electricity in New Zealand. For more information please visit: http://www.med.govt.nz/sectors-industries/energy/energy-modelling/modelling/new-zealands-energy-outlook-electricity-insight

Wholesale Electricity

The buying and selling of wholesale electricity is done via a "pool", where electricity generators offer electricity to the market and retailers bid to buy the electricity at prices that are set half-hourly. Electricity generators and buyers can also enter into hedge contracts to manage the financial risks of trading electricity at spot prices. The market is operated under the Electricity Industry Participation Code under the Electricity Industry Act 2010.

On 12 June 2013 the first auctions of financial transmission rights (FTRs) kicked off. FTRs allow the holder to hedge price risk arising from price differences between injection and load points. For more information on FTRs see:

https://www.ftr.co.nz/

Retail Electricity market

Figure G.4a shows the market share of retailers since December quarter 2006. Over the last year the retail market share of Meridian and TrustPower slipped 0.3% and 0.4% respectively. In contrast, over the year the retail market share of both Mercury Energy and Nova Energy rose 0.4%. The total share of the five major generator/retailers combined was 94.5% in 2012, down from 95% in 2011.

Retail switching slowed in 2012 with only 19.1% of consumers choosing to switch retailers compared to a high of 20.7% in 2011 when the "What's My Number" campaign was introduced (see figure G.4b).

Figure F.3d Aproximate Share of National Demand by Region for 2012

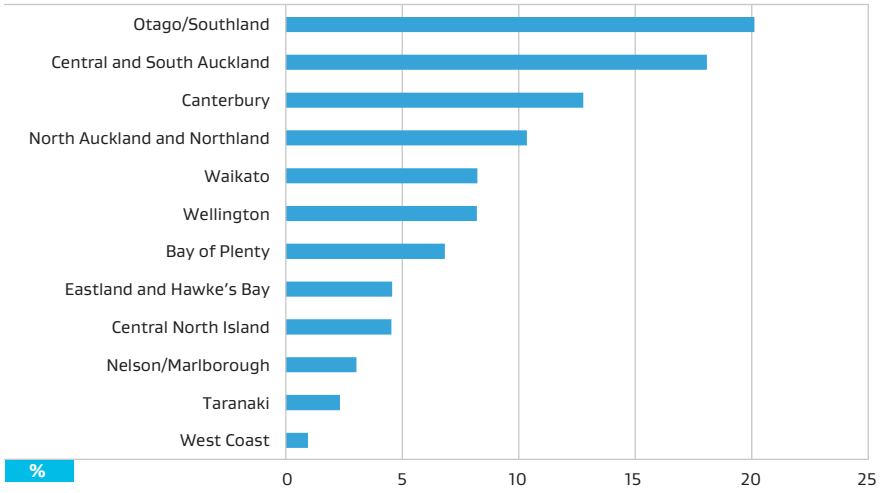
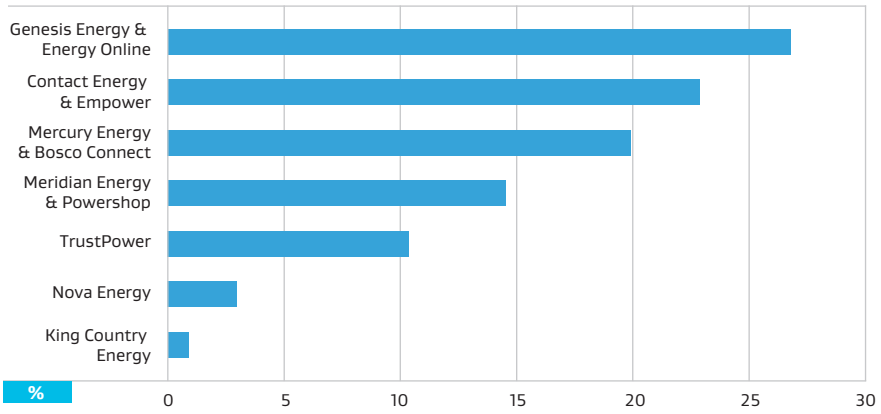


Figure F.4a: Approximate Market Share[2] Groupings Based on Registry Count of Active ICPs at December 2012



Notes to Figure G.4a:

1. Retailers have been aggregated into these multi retailer groupings based on ownership. Where one company fully owns more than one retail brand these have been added together from the raw data available from the EA. In addition to this, some retailers do not have ICP's registered under their own name but may use another retailers (e.g. Energy Direct NZ). All market share figures presented are only approximate and do not take account of demand or the size of consumers. Some retailers may have fewer customers than other retailers but have larger industrial use customers so actually supply a larger amount of electricity in GWh.

2. This data is sourced from the Electricity Authority (EA) Registry Statistics and is not collected by MBIE directly. For detailed information visit the Registry Statistics section of EC's website at: http://www.ea.govt.nz/industry/market/statistics-reports/

Electricity

Figure F.4b: Percentage of Consumers Switching in Year to Date

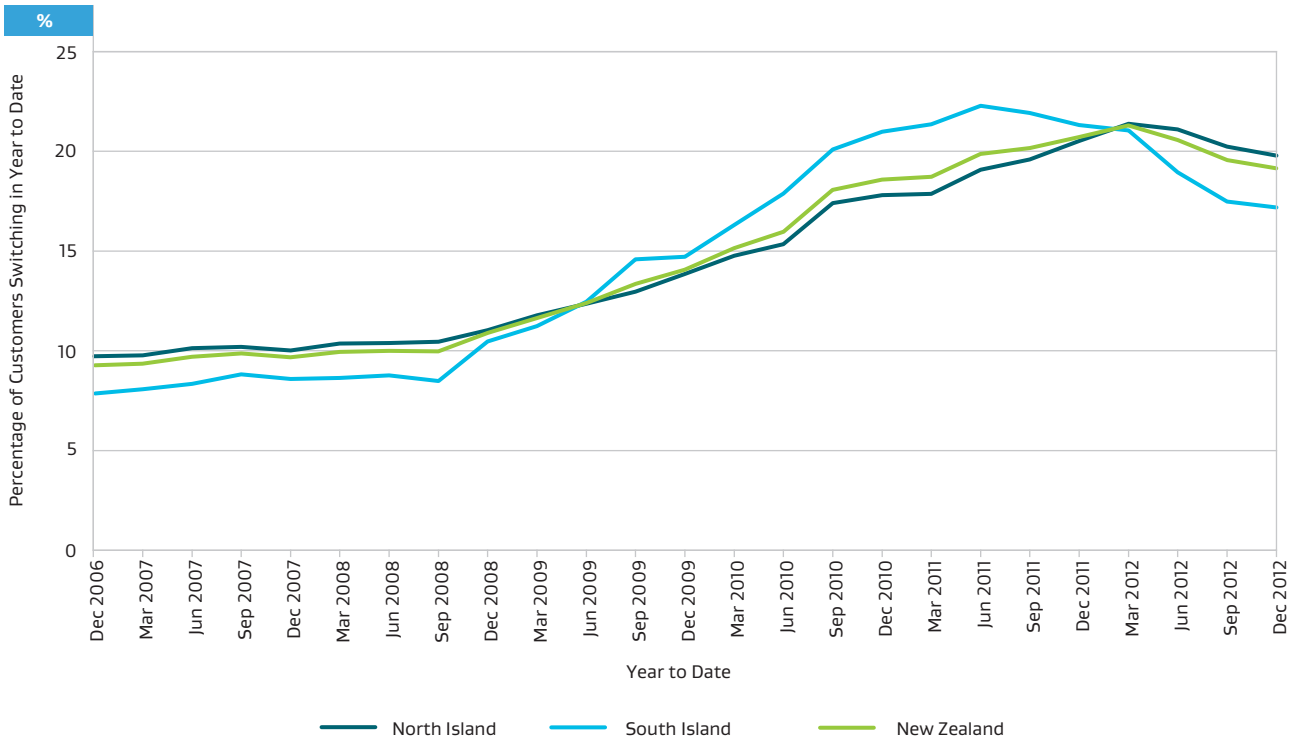
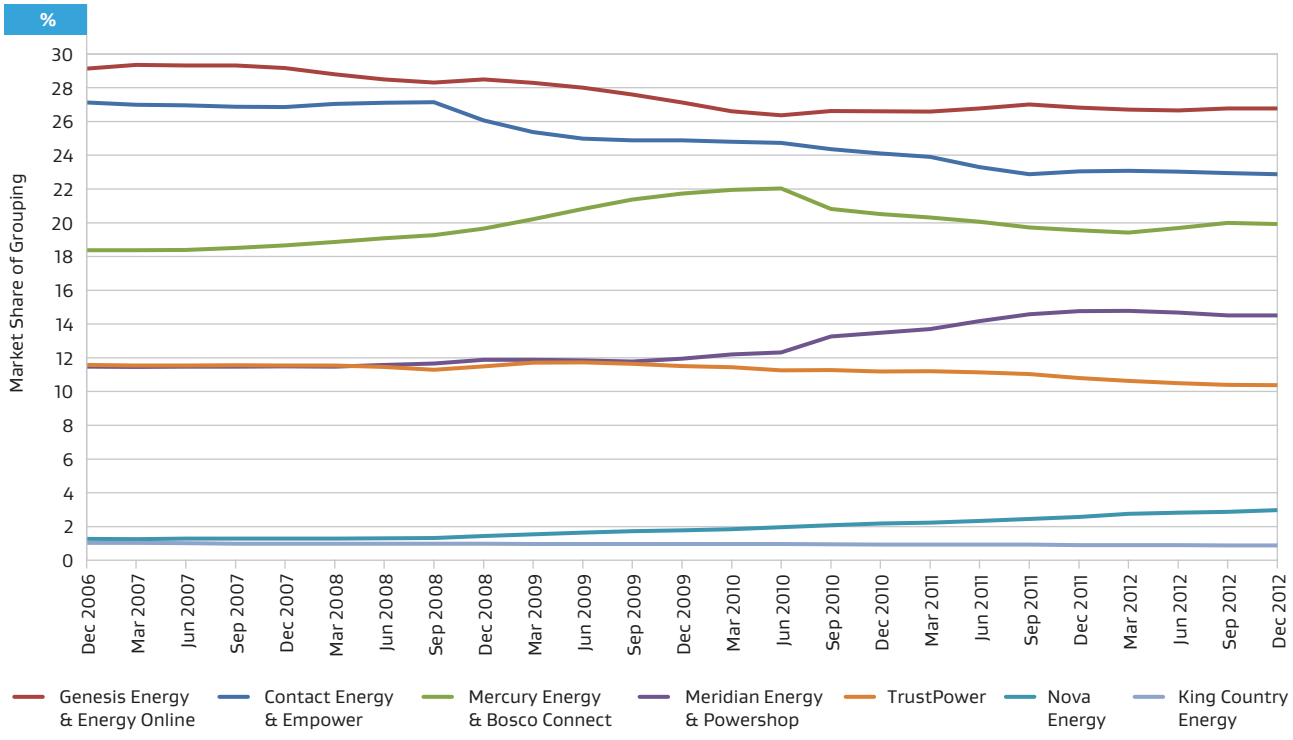


Figure F.4c: Approximate Retail Market Share Groupings Based on Registry Count of Active ICPs



Notes to Fig F.4c

1. It should be noted that the step-change in ICP numbers from July 2010 apparent in the data is the result of a change in retailer for approximately 21,000 ICPs rather than individual customers proactively switching retailers.

Electricity

Transmission & 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, Tasman Pulp and Paper, and New Zealand Steel.

Electricity transmission between the North and South Islands is via a high voltage direct current (HVDC) link from Benmore power station in the South Island to Haywards substation in the North Island. The link allows surplus power generated in the South Island to be transmitted to the North Island, where demand is greatest, but also allows transmission from north to south if required.

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

Electricity Prices

Electricity price data for the commercial and industrial sectors are calculated by dividing total income by the sectors' electricity consumption. Consumption and income figures are collected on a March year end basis; hence December year end prices need to be estimated.

The domestic price data presented in this section is based on the Quarterly Survey of Domestic Electricity Prices (QSDEP). The Quarterly Survey of Domestic Electricity Prices monitors changes in line charges and retail charges for a domestic consumer using 8,000 kWh a year.

Figure F.5a: Commercial and Industrial Electricity Prices

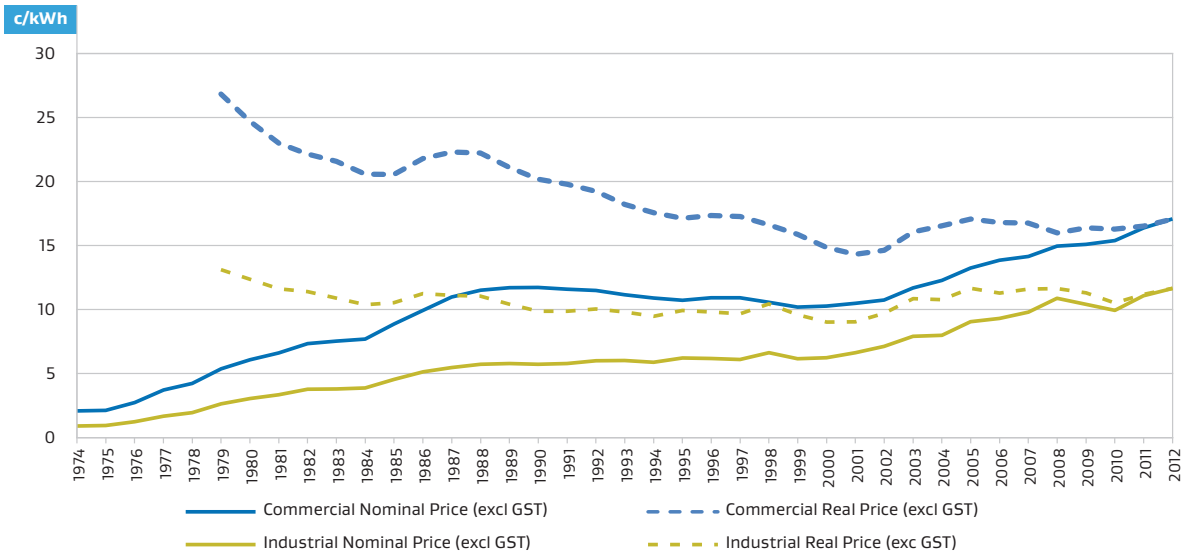
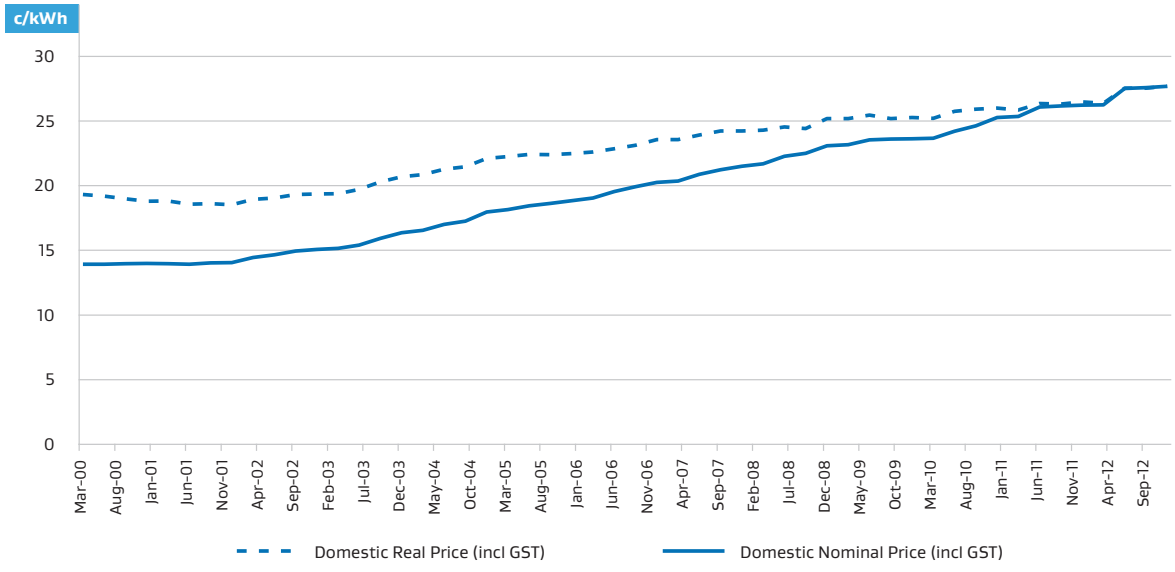


Figure F.5b: Quarterly Survey of Domestic Electricity Prices



Currently, the annual residential price data is being reviewed and will be released at a later date. In the absence of these data users should use the Quarterly Survey of Electricity Prices data found online: http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/energy-in-new-zealand-2013

G. INTERNATIONAL ENERGY COMPARISONS

INTRODUCTION

This section compares New Zealand's energy situation with that of its major Organisation for Economic Cooperation and Development (OECD) trading partners, for which information is available.

Care is needed in interpreting the data as product specifications, statistical methodology and information available can differ considerably among countries. Where 2012 data are not available the latest available information has been used. Where information is unavailable for the last three years, no data are shown.

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%).

International Energy Comparisons

Consumption

Comparative energy consumption on a per capita basis in New Zealand's OECD trading partners in 2012 is shown in Table J.2 and Figures J.2a–J.2c. This shows that New Zealand is around the middle of the group when comparing electricity, oil and natural gas consumption.

Figure G.1a shows the international electricity prices for the December 2012 quarter, for both industrial and residential consumption. New Zealand's residential electricity consumption price is within the middle of the OECD range. In contrast, industrial energy consumption prices are amongst the lowest across the OECD range. New Zealand's geographical size, population, taxes and levies as well as industry size may contribute to its electricity prices across both residential and industrial. New Zealand's electricity prices are comparable with the United States in terms of the differences between residential and industrial prices. Residential prices are significantly higher than industrial ones.

International gas price figures across the OECD range show a significant difference between the prices of residential and industrial natural gas consumption in New Zealand, comparable only to the Netherlands. New Zealand has the largest difference in prices between natural gas industrial and residential consumption and

Figure G.1a: International Electricity Prices for the December Quarter 2012 (NZ cents/kWh)

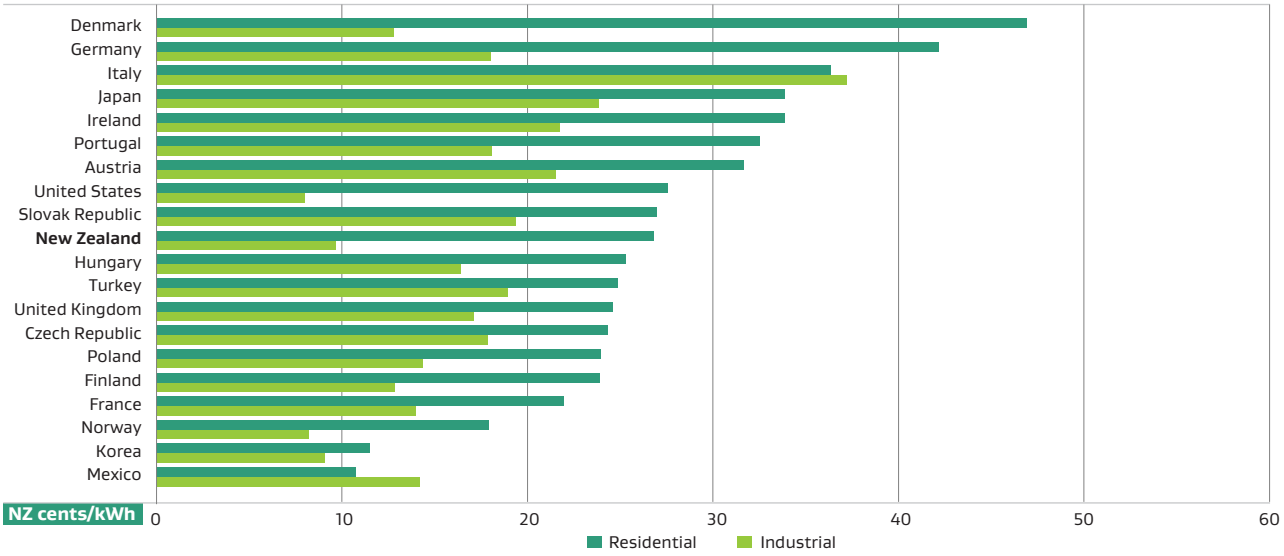
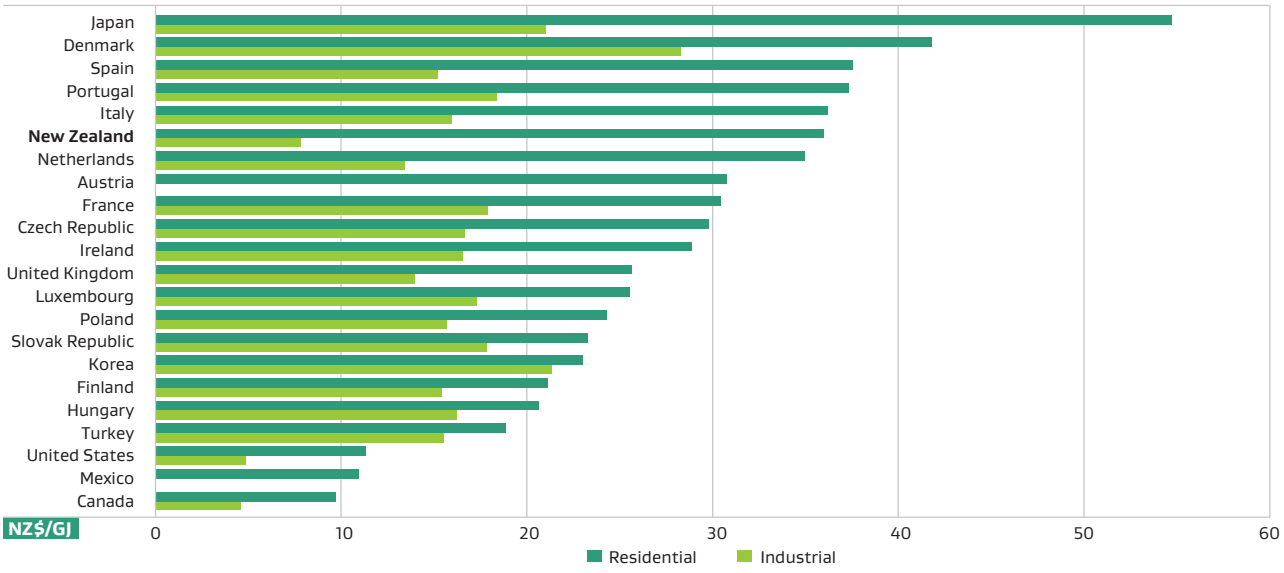


Figure G.1b: International natural gas Prices for the December Quarter 2012 (NZ$/GJ)



International Energy Comparisons

amongst the lowest price rates for industrial usage. Similarly New Zealand's natural gas price in 2012 for residential consumption is amongst the highest across the OECD countries. Residential natural gas prices are currently higher than the average OECD price. Industrial natural gas prices and industrial and residential electricity prices are all less than the average of OECD countries.

Residential (or 'retail') energy prices are subject to value-added taxes such as New Zealand's Goods and Services tax of 15%.

New Zealand's Premium Petrol Prices in 2012 are amongst the lowest across the OECD countries; similarly in 2012 the difference in prices between regular petrol and premium petrol in New Zealand was the second lowest (Germany being the first). Regular petrol is not a feature in some of the OECD countries but again New Zealand's regular petrol prices were amongst the lowest.

Diesel price comparisons may be misleading because Road User Charges are not included in these data. Other countries may have taxes and levies paid at the pump.

Figure G.1c: International Petrol Prices for the December Quarter 2012 (NZ cents/litre)

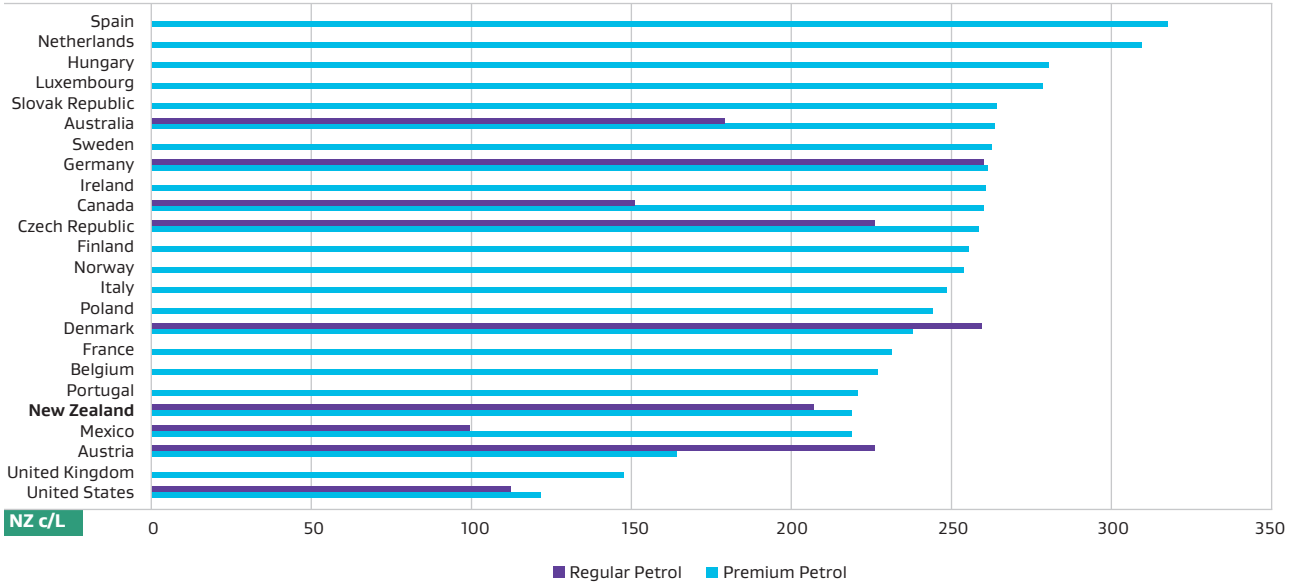
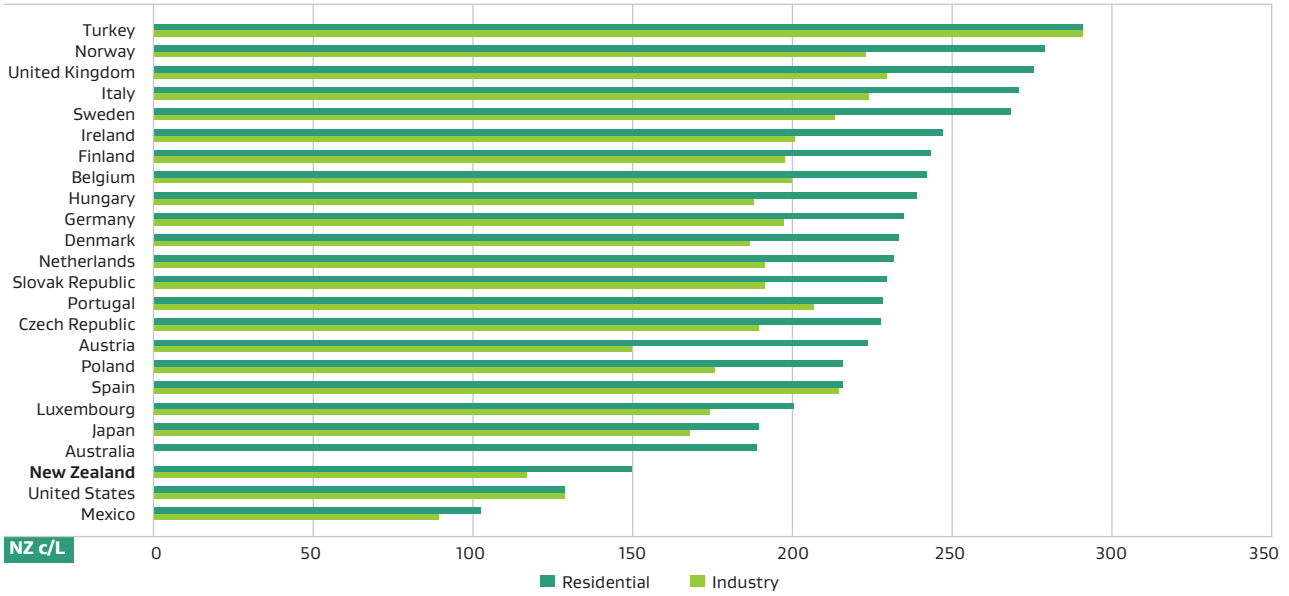
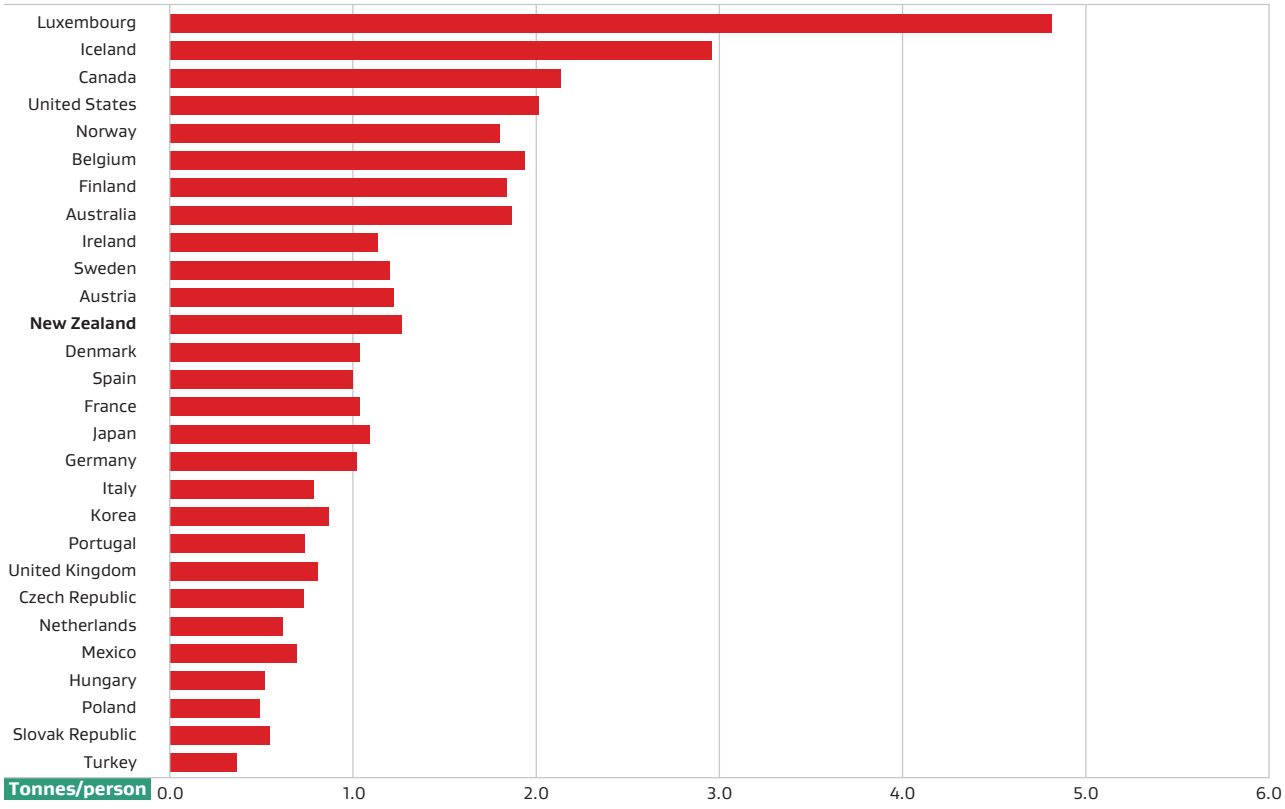


Figure G.1d: International Diesel Prices for the December Quarter 2011 (NZ cents/litre)



International Energy Comparisons

Figure G.2a Oil Products Consumption Calendar Year 2012



New Zealand's Oil products consumption in 2012 was around the middle of the OECD range. New Zealand's smaller population and dominance of importing oil products may have driven this pattern. Despite growing oil and gas production, New Zealand is a very minor player in global energy production. In 2012 domestic consumption of oil products fell 2%. New Zealand is therefore a net importer of oil and oil products.

Gas consumption in New Zealand is again in the middle of the OECD range, with 45% of its natural gas consumption used for electricity generation.

International Energy Comparisons

Figure G.2b Gas Consumption Calendar Year 2012

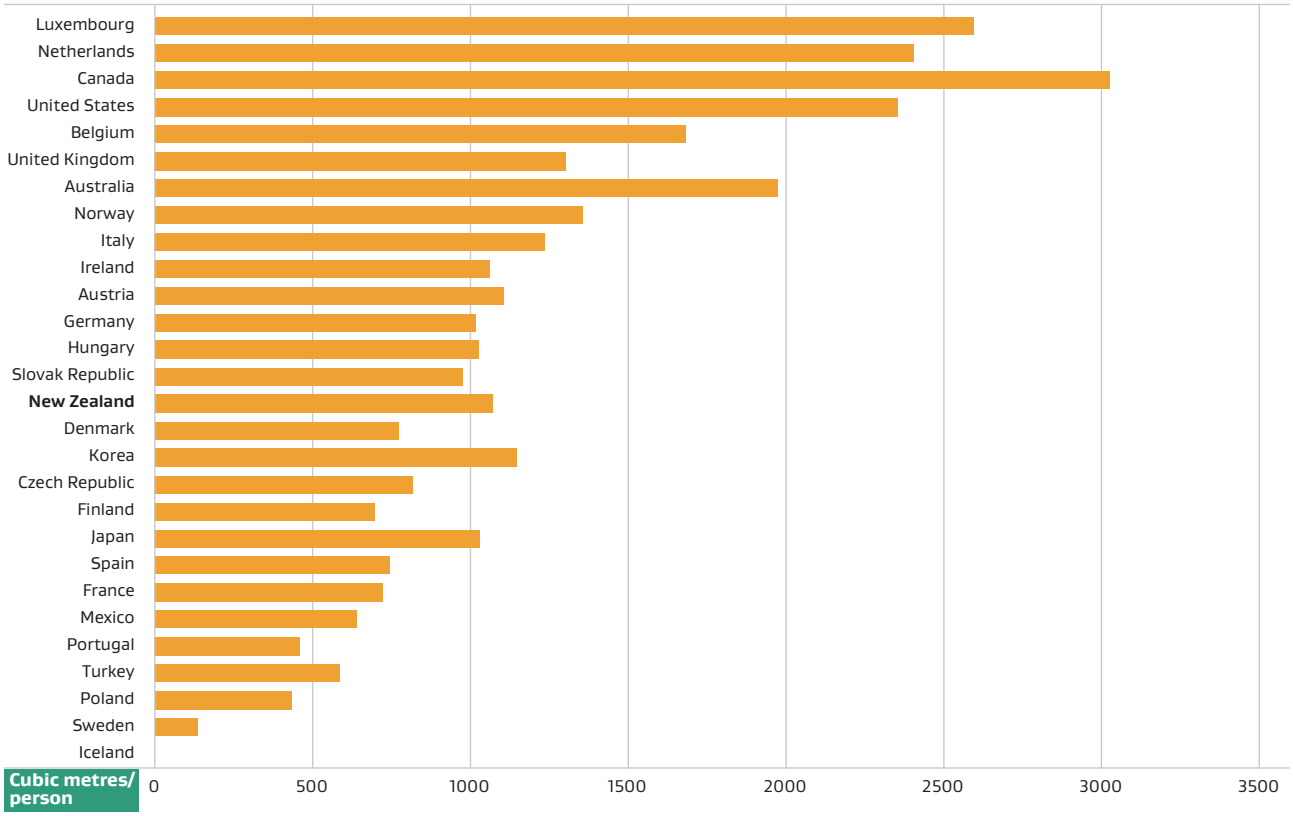
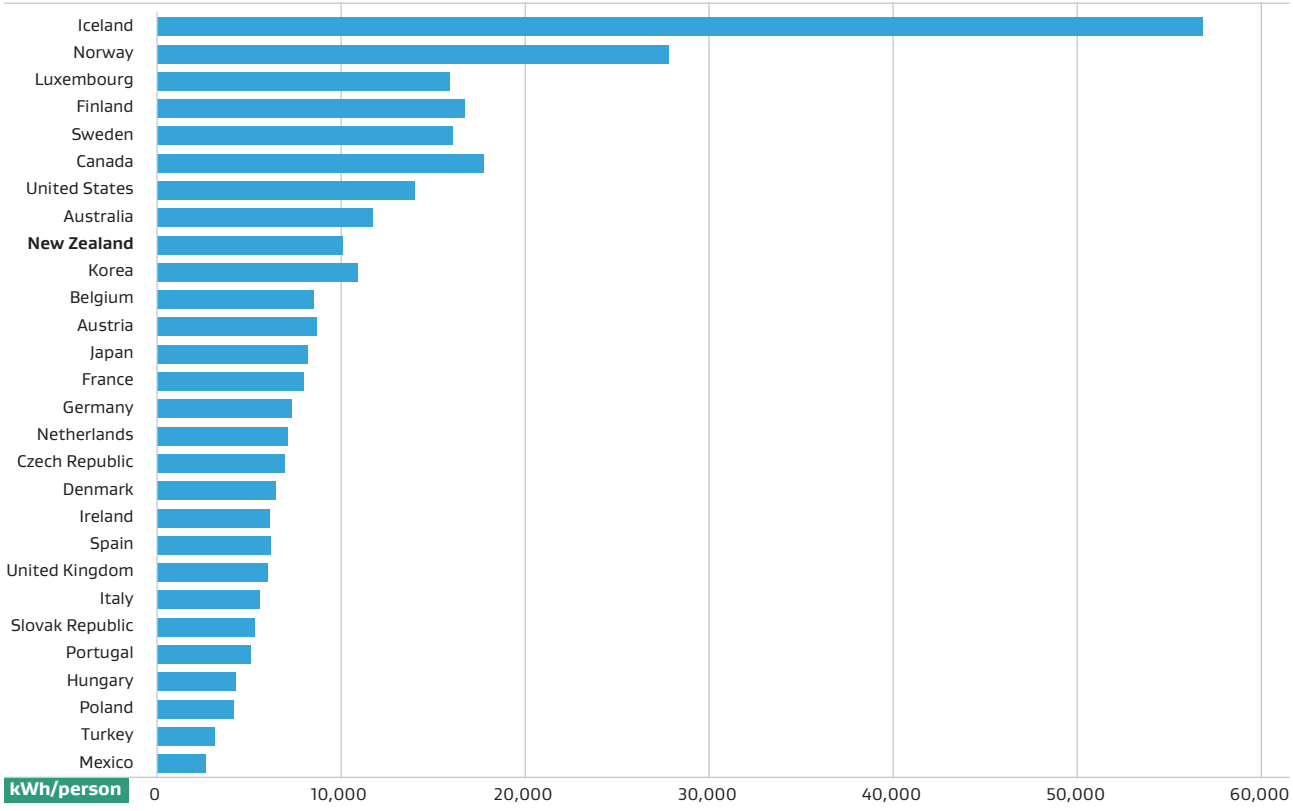


Figure G.2c Electricity Consumption Calendar Year 2012

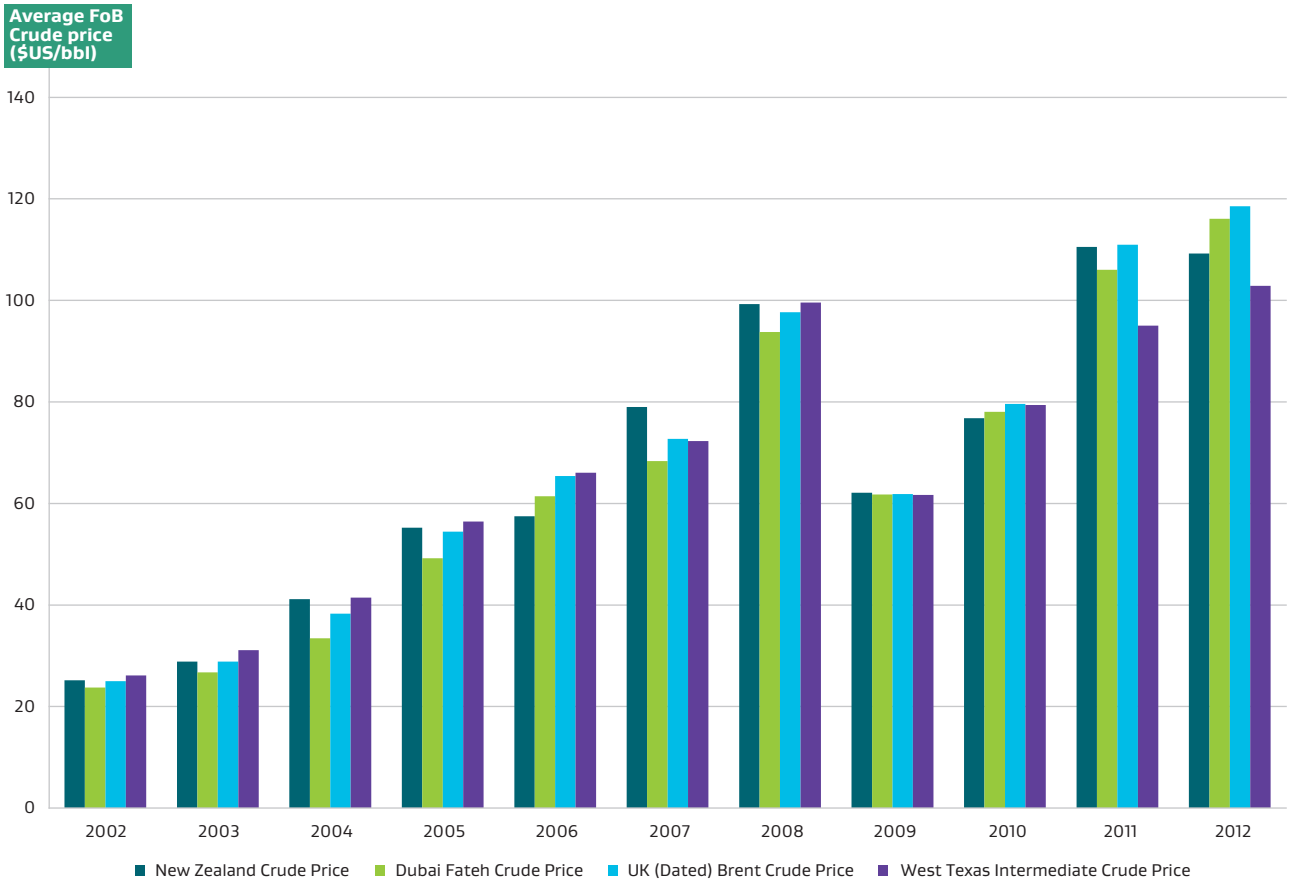


International Energy Comparisons

Figure G.2d compares the international free on board (FoB) spot price of New Zealand indigenous crude oil to three other international crude benchmarks; Dubai Fateh, UK Brent and West Texas Intermediate (WTI). The Dubai Fateh crude is chosen for this chart because it is similar in quality to many of the crudes imported for refining in New Zealand, the UK Brent and WTI benchmarks are chosen because they are similar in quality[1] to the exported New Zealand crude, and are also widely used in the media as 'the crude oil price.' The figure shows the steady growth in these crudes in the years leading up to the peak price during the 2008 global financial crisis and the following price plummet in 2009. The prices thereafter resume positive growth. Three of these crudes reached new all-time high prices in 2012 surpassing the 2008 and 2011 prices. WTI was the exception which grew slower than the others between 2009 and 2011, and has only recently surpasses the 2008 all time high.

The crude oil price series are presented in US$/barrel because these crudes are traded in US dollars (one barrel is approximately 159 litres). A time-series of exchange rates to convert these data to New Zealand dollar equivalent are available from the Reserve Bank of New Zealand (http://rbnz.govt.nz/statistics/exandint/b1/).

Figure G.3: Annual Average Crude Oil Spot Price (nominal)



1. Quality, in this context, means 'light' (low density) and 'sweet' (low sulphur content). Dubai Fateh crude is 'heavier' (higher density) and more 'sour' (higher sulphur content) than New Zealand crude oil.

FURTHER READING

http://www.med.govt.nz/sectors-industries/energy/energy-modelling

Modelling and Sector 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 1990–2011.

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. The New Zealand Energy Snapshot replaced *New Zealand Energy in Brief.*

New Zealand Energy Quarterly provides quarterly energy statistics and trend data on the supply of major fuel types, electricity generation and its 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.