
First (Interim) Progress Report

For the **Minister of Energy**

on the

New Zealand Energy Strategy

including the **New Zealand Energy
Efficiency and Conservation Strategy**

October 2007 – June 2008

On behalf of the
Senior Energy Officials Group

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Contents

Part A: Overview	4
1.1 Highlights – October 2007 to June 2008	4
1.2 Recent events	7
1.3 Overall indicators	8
1.4 Stakeholder engagement.....	9
Part B: Implementation	10
Objective 1: Resilient, low carbon transport.....	10
Objective 2: Security of electricity supply.....	15
Objective 3: Low emissions power and heat.....	18
Objective 4: Using energy more efficiently.....	25
Objective 5: Sustainable energy technologies and innovation.....	32
Objective 6: Affordability and wellbeing	35

Tables and Graphs

Graph 1: Total Primary Energy Supply	8
Graph 2: NZ: Greenhouse gas emissions from energy (CO ₂ equivalent) 1990-2007.....	9
Graph 3: New Zealand domestic transport emissions (CO ₂ equivalent) per capita 1990-2007	11
Graph 4: Percentage of electricity generation from renewable sources	19
Table 1: Changes to electricity plant, 1 January 2007 to 30 June 2008	23
Table 2: Future renewable electricity generation.....	24
Table 3: Future fossil-fuel electricity generation	24
Graph 5: Consumer Energy Intensity	26
Graph 6: Factors affecting economy-wide energy use growth, March 2001 to 2006 years	27
Graph 7: Energy Research, Science and Technology Investment.....	34
Graph 8: Percentage of average household expenditure on energy	35
Graph 9: Percentage of household expenditure on energy used in the home, by decile group.....	36
Graph 10: Percentage of household expenditure on fuel for vehicles, by decile group	37
Graph 11: Electricity Consumer Prices (Real 2007 Prices)	38

New Zealand Energy Strategy to 2050: Vision

A reliable and resilient system delivering New Zealand sustainable, low emissions energy services, through:

- ▶ Providing clear direction on the future of New Zealand's energy system
- ▶ Utilising markets and focused regulation to securely deliver energy services at competitive prices
- ▶ Reducing greenhouse gas emissions, including through an emissions trading scheme
- ▶ Maximising the contribution of cost-effective energy efficiency and conservation of energy
- ▶ Maximising the contribution of cost-effective renewable energy resources while safeguarding our environment
- ▶ Promoting early adoption of environmentally sustainable energy technologies
- ▶ Supporting consumers through the transition.

Principles:

- ▶ Investment should occur in energy efficiency measures where this is cheaper than the long-term costs of building extra generation capacity, including environmental costs.
- ▶ For the foreseeable future, it is preferable that all new electricity generation be renewable, except to the extent necessary to maintain security of supply.

Long-term targets:

- ▶ Source 90 per cent of electricity generation from renewable sources by 2025 (based on delivered electricity in an average hydrological year).
- ▶ Halve domestic transport emissions per capita by 2040 relative to 2007 emissions.

New Zealand Energy Efficiency and Conservation Strategy

Expected savings:

- ▶ 30 petajoules of savings in non-transport energy per year by 2025
- ▶ 9.5 petajoules of additional direct use renewable energy per year by 2025
- ▶ 20 petajoules of energy savings in the transport sector by 2015

Part A: Overview

Energy is a vital natural resource underpinning all aspects of our society and economy and fundamentally influencing New Zealand's environmental sustainability.

The New Zealand Energy Strategy (the Strategy) sets a clear, long term strategic direction for the supply and use of energy for New Zealand to 2050 that responds to the challenges of climate change and energy security. The Strategy and its companion action plan, the New Zealand Energy Efficiency and Conservation Strategy (NZE ECS), were released on 11 October 2007.

The Strategy and the NZE ECS set out key actions for government agencies over the next few years to contribute to achieving its long term goals.

This document reports on the actions government agencies have been taking to contribute to this direction. It also contains a small set of indicators that, over time, will provide some evidence of the energy direction that we are heading in. Many of the indicators in this report present trend information up to 2007, which is the baseline year for the Strategy.

This report is intended as a summary and overview of programme activity, rather than a detailed analysis. It is noted that each government agency will continue to report on its own programmes following established reporting requirements.

This is the first (and interim) progress report on the Strategy and NZE ECS covering the first eight months of implementation from October 2007 to 30 June 2008.

1.1 Highlights – October 2007 to June 2008

Key achievements in the period from the launch of the Strategy (11 October 2007) to 30 June 2008¹:

In transport:

- ▶ The domestic sea freight strategy *Sea Change* was launched and the Seafreight Development Unit established to revitalise the domestic sea freight industry.
- ▶ Legislation to introduce a mandatory biofuels sales obligation is progressing through the Parliamentary process.

¹ Note that where programmes have been running for the full 2007/08 year or where data is collected on an annual basis, full year figures have been reported rather than for the partial year from October 2007. Where processes are reported, the progress to 30 June 2008 is noted and additional milestones up to early August 2008 are also noted.

- ▶ A work programme has been scoped to encourage early deployment of electric vehicles in New Zealand and an expert advisory group established (Vehicle Energy and Renewables Group).
- ▶ The New Zealand Transport Strategy was updated and a Government Policy Statement to guide funding allocations for transport was developed.

In ensuring security of supply:

- ▶ The new investment in the transmission grid needed to support new renewable generation in remote locations has been identified.
- ▶ Ways to integrate wind generation into the electricity system have been identified.
- ▶ Improvements to the design of the electricity market were released for comment following a major review – to ensure fair prices for consumers.
- ▶ Guidelines for smart meters have been issued, so that the new technology benefits the consumer and the efficient operation of the electricity system.
- ▶ A better accounting system for electricity flows has improved incentives to minimise electrical losses in the electricity system.
- ▶ Government policy statements governing the electricity and gas sectors have been updated to align to the Strategy goals.

In encouraging more low emissions power and heat:

- ▶ An Emissions Trading Scheme has been designed and is progressing through the Parliamentary process.
- ▶ Proposed amendments to the Electricity Act 1992 to restrict new baseload fossil-fuel generation for 10 years are progressing through Parliament.
- ▶ Guidance for councils on the importance of renewable electricity has been developed, to help resource consent decision-making. A draft National Policy Statement for Renewable Electricity Generation is expected to be released in August 2008.
- ▶ The Minister for the Environment has ‘called in’ two resource consent applications for nationally significant renewable electricity developments and referred them to a one-step process to reduce decision-making timeframes.
- ▶ Legislative reform to enable lines companies to invest in renewable generation is progressing through Parliament.

In promoting energy efficiency:

- ▶ 11,047 homes were insulated through EECA programmes and 3,040 Housing NZ Corporation homes were retrofitted with insulation or heating improvements.
- ▶ 2.2 million energy efficient light bulbs subsidised by the Electricity Commission were sold in the year to June 2008, resulting in estimated annual energy savings during 2007/08 of 173 GWh.
- ▶ The Efficient Lighting Strategy was launched, a voluntary Home Energy Ratings Scheme was launched, minimum energy performance standards for an additional 13 product classes are being developed and new Energy Star labels were launched for computers, monitors and fridges.
- ▶ 3,455 old fridges were retired and recycled in a pilot programme.
- ▶ Building Code changes were introduced requiring higher insulation levels for homes, more energy efficient lighting in commercial buildings and providing a solar water heating standard.
- ▶ The Energy Efficiency and Conservation Authority (EECA) reported energy savings of 1.8 PJ² p.a. from its 'better products' programmes and savings of 1.3 PJ p.a. from its programmes with industry.
- ▶ The Electricity Commission reported energy savings of 0.71 PJ p.a. as a result of its efficiency programmes with industry delivered in the year to 30 June 2008.

In fostering technology and innovation:

- ▶ The Marine Energy Deployment Fund and Low Carbon Energy Technologies Fund were established and the first rounds allocated.
- ▶ Energy research funding was boosted further by \$32.5m over four years in the May 2008 Budget.
- ▶ The EnergyScape project completed an assessment of New Zealand's natural energy resources and developed a model for evaluating new technologies.
- ▶ The National Energy Research Institute improved links between energy researchers by holding conferences and creating a new web-based database.

² For an explanation of electrical units of measure such as PJ (petajoule), GWh (Gigawatt hours), MW (megawatts), refer to the glossary in the Ministry of Economic Development's Energy Data File, published in June 2008. See: http://www.med.govt.nz/templates/StandardSummary_15169.aspx

In affordability and wellbeing:

- ▶ More South Island electricity customers will have lower fixed daily charges once regulation changes, now developed, come into effect (proposed date: 1 April 2009).
- ▶ A new project has been initiated (starting in July 2008, led by the Ministry of Social Development and EECA) to investigate how to define and understand household energy affordability.

There have been minor delays in some actions and one programme (the solar water heating programme) has experienced low uptake. The delays are noted in Appendix 1.

Major initiatives are presented in **Part B** and reports on all actions in the Strategy and NZEECS are listed in **Appendix 1**.

1.2 Recent events

In the eight months since publication of the Strategy, issues of energy supply, affordability and climate change have been prominent:

- ▶ International crude oil prices increased by around 75% to US\$130 per barrel from 12 October 2007 to the end of June 2008, and New Zealand petrol and diesel prices at the pump rose by around 34% and 65% respectively.
- ▶ Rising energy prices have increased household costs.
- ▶ Low rainfall in the first half of 2008 and low hydro lake storage levels generated speculation between April and June of possible electricity supply shortages. Overall storage improved in July 2008; however, South Island storage levels were still low in late July.
- ▶ Internationally, climate change has remained of high interest:
 - The Intergovernmental Panel on Climate Change (IPCC) released the final part of its Fourth Assessment Report on Climate Change in November 2007. It noted:

Mitigation efforts, and investments, over the next two to three decades will have a large impact on opportunities to achieve lower stabilisation levels. Delayed emission reductions significantly constrain the opportunities to achieve lower stabilisation levels and increase the risk of more severe climate change impacts³.
 - Australia ratified the Kyoto Protocol (in December 2007) and released its green paper on the design of an emissions trading scheme.

³ See: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf page 19.

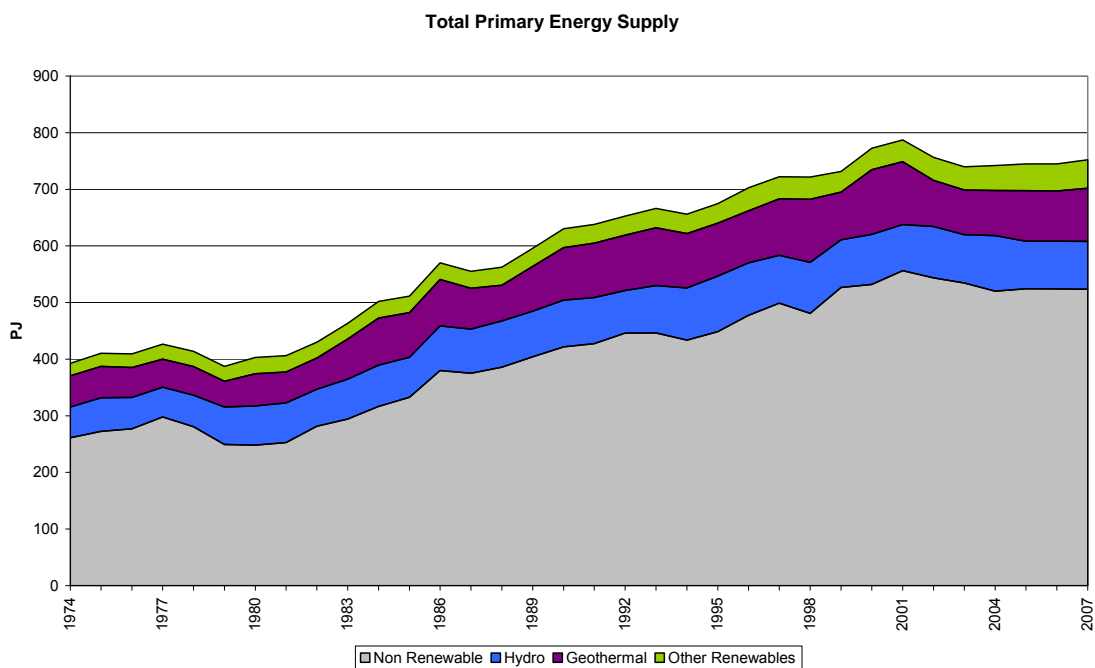
- Kyoto Protocol countries commenced negotiations on arrangements to reduce greenhouse gas emissions for the post-2012 period.

1.3 Overall indicators

Over the long timeframe of the Strategy (to 2050), the delivery of sustainable, low emissions energy services will mean that New Zealand’s sources of primary energy will either come from a greater proportion of renewable energy or, in the future, from sources for which carbon emissions can be captured and sequestered.

Graph 1 shows a long time series of the total amount of energy available for use in New Zealand for each calendar year to 2007. In 2007, 31% of the primary energy supply was from renewable sources. The supply was predominantly from non-renewable sources, particularly oil (38% of the total in 2007) and natural gas (23%).

Graph 1: Total Primary Energy Supply⁴

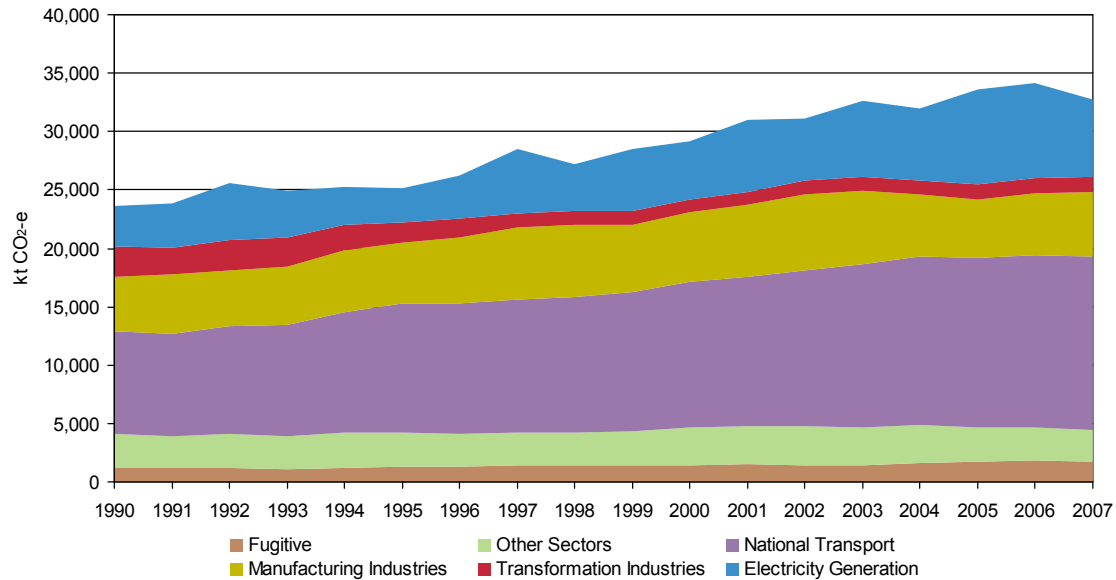


Over time, the impact of the actions in the Strategy should result in a reduction in New Zealand’s greenhouse gas emissions from energy, while maintaining a secure energy supply. The latest figures available are of New Zealand’s emissions for the calendar year of 2007, which is the baseline year for this Strategy. Graph 2 shows there has been an upward trend in greenhouse gas emissions from energy from 1990 to the end

⁴ Ministry of Economic Development: Energy Data File. June 2008. Derived from Figure A.2, p.9.

of 2007. Reducing and ultimately reversing this trend, while maintaining security of supply, is the Strategy's overall goal.

Graph 2: NZ: Greenhouse gas emissions from energy (CO₂ equivalent) 1990-2007⁵



1.4 Stakeholder engagement

A high level of interest in energy policy has continued since October 2007. Public and private sector organisations and individuals have actively engaged in the direction for sustainable energy set by the Strategy. Through special events and annual conferences, many have explored what their sector can contribute to respond to the twin challenges of energy security and reducing carbon emissions from energy, and what implications there may be for their sector and for the country.

The Minister of Energy has presented the Strategy to energy industry and wider business sector conferences and to academic, energy research and post-graduate student groups. Government officials have participated in and hosted meetings, seminars and forums with a range of interested people and organisations encompassing the energy and wider business sectors, the non-profit sector and local government. The Government Spokesperson for Energy Efficiency and Conservation and senior EECA officials took a roadshow on the NZEECS to 14 locations to encourage involvement in implementation of energy efficiency and conservation initiatives.

^{5 5} Ministry of Economic Development. August 2008. New Zealand Energy Greenhouse Gas Emissions 1990-2007. http://www.med.govt.nz/templates/StandardSummary_10370.aspx

Part B: Implementation

Part B reports on progress made in implementing the Strategy (including the NZEECS), in the eight months between mid October 2007 and 30 June 2008. The reporting is against the chapters in *Part 2: Our actions* of the Strategy, which correlate to the six objectives in this report. NZEECS actions are incorporated into the relevant Strategy chapters as identified in each section below.

Appendix 1 provides a brief progress report of each published action in the Strategy and in the NZEECS in tabular form.

The actions reported in Part B have been led variously by the Ministries of Economic Development, Transport, Agriculture and Forestry, Environment, Tourism; the Department of Building and Housing; Land Transport New Zealand; Housing New Zealand Corporation; the Energy Efficiency and Conservation Authority and the Electricity Commission (and others).

Objective 1: Resilient, low carbon transport

The government has set a bold target that rising transport emissions are to be reversed and directed onto a long-term path of steady reductions. The government also made the in-principle decision that New Zealand is to be one of the first countries to widely deploy electric vehicles.

A range of actions targeting specific aspects of the transport system to reduce emissions are underway. These policies are designed to complement emissions pricing. They include managing demand for travel, shifting personal travel and freight to lower emissions modes, improving vehicle and fuel efficiency, developing and adopting new fuels and improving efficiencies. The Strategy also sets actions to maintain short-term fuel security.

Since the Strategy's publication:

- ▶ Petrol and diesel prices have risen dramatically, following international oil price rises, placing greater costs on people and businesses.
- ▶ The government has purchased the rail freight business with the intention to upgrade rail infrastructure to support more freight moving by rail.

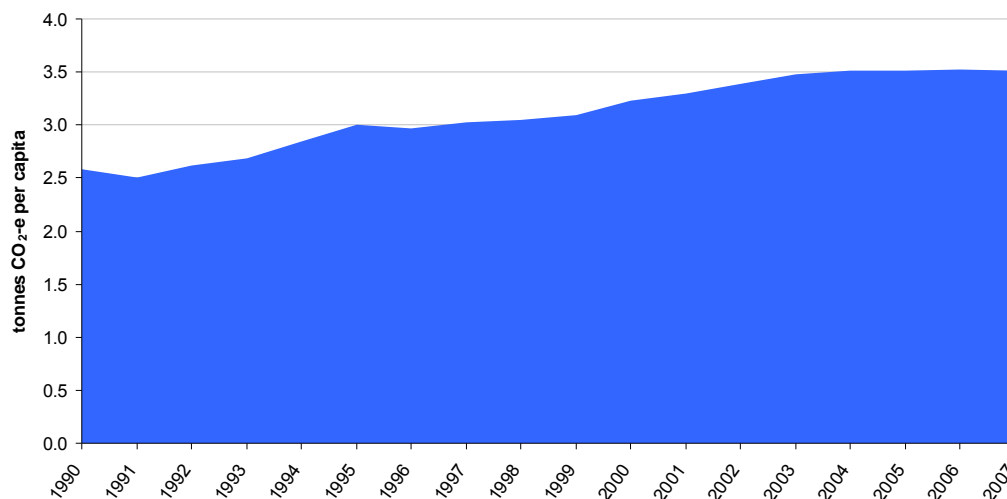
This section covers chapter 7 of the Strategy and chapters 4 and 6.1 of the NZEECS.

2.1.1 Target and indicator

Target: Halve domestic per capita transport emissions by 2040, relative to 2007 levels.

The calendar year of 2007 is the baseline year for this target. In 2007, emissions were 14,877 kt CO₂-e⁶. Graph 3 shows the trend in greenhouse gas emissions.

Graph 3: New Zealand domestic transport emissions (CO₂ equivalent) per capita 1990-2007⁷



2.1.2 Activity

Transport highlights from the first eight months:

Updating the New Zealand Transport Strategy and creating a Government Policy

Statement: By 30 June 2008 an update of the New Zealand Transport Strategy (NZTS 2008) and a government policy statement (GPS) were nearly ready for release. The NZTS 2008 and GPS were released on 5 August 2008.

- ▶ The NZTS 2008 incorporates the Energy Strategy targets and sets the direction for the transport sector up to 2040 (through setting a vision and targets for transport, such as halving transport sector carbon dioxide emissions by 2040). It outlines the challenges facing the transport sector and maps out pathways to achieve the vision and targets.
- ▶ The GPS ensures that funding and planning for land transport contribute to the strategic objectives set out in the NZTS 2008. The GPS is to be reissued every three years by the Minister of Transport to set out the government's high level priorities and funding allocation for land transport for the following 10 years.

Progress towards electric vehicles:

- ▶ The Vehicle Energy and Renewables Group (VERG) has been established to advise the government on the deployment of renewable energy in the transport sector. The group's members are transport and energy sector experts.

⁶ Ministry of Economic Development. August 2008. *New Zealand Energy Greenhouse Gas Emissions 1990-2007*. http://www.med.govt.nz/templates/StandardSummary_10370.aspx

⁷ Ministry of Economic Development. 2008.

- ▶ VERG has begun to assess the business model of a private company Project Better Place (a Silicon Valley company) that proposes to introduce infrastructure for electric vehicles into New Zealand.
- ▶ The Ministry of Transport has scoped an electric vehicle work programme, which intends to identify, delegate and prioritise the steps required for New Zealand to become a world leader in the deployment of electric vehicles. The Ministry of Transport leads the work programme and will coordinate work by other government agencies on electric vehicles and other low carbon fuels and technologies.
- ▶ International vehicle manufacturers have been approached and encouraged to regard New Zealand as an early market, to determine the state of technology development and to gauge estimates of timescales for mass produced export products. Officials visited Mitsubishi, Subaru and Toyota in Japan in March 2008. All these companies are developing plug in/hybrid or full electric vehicles.
- ▶ The Electricity Commission has undertaken an analysis of potential additional demand for electricity from electric vehicles and modelled the impacts on the electricity system⁸.

Sea Change – Transforming Coastal Shipping: New Zealand’s domestic sea freight strategy was launched in May 2008 to increase the share of inter-regional freight carried by sea from 15% to 20% by 2020 and to 30% by 2030. The Seafreight Development Unit was established to revive the local sea freight industry through provision of funding, better information, more trained workers into the domestic sea freight industry and improved supply chain logistics. \$36 million has been earmarked for coastal shipping over the next four years. This is one of several sector and modal strategies to enable each mode to fully contribute to New Zealand’s transport system.

Biofuel Bill: Legislation to introduce a mandatory biofuel sales obligation was introduced to Parliament in October 2007 and by 30 June 2008 had been reported back from Select Committee. The Bill sets out requirements for petrol and diesel suppliers to also supply biofuels as a small but increasing percentage of their total sales from 1 October 2008. The mandatory biofuels obligation is a tool to firmly establish a market for sustainable biofuels in New Zealand.

The Vehicle Fuel Economy Labelling scheme was launched by EECA with associated regulations⁹. This requires fuel consumption information to be provided at point of sale for both new and second-hand cars, enabling purchasers to make more informed choices. From 7 April 2008, every car that is sold (second-hand or new) must display a label both on the vehicle and with electronic sales advertisements such as on TradeMe. Purchasers can also access fuel efficiency information via the

⁸ See: <http://www.electricitycommission.govt.nz/opdev/modelling/EVs/old-index.html?searchterm=electric%20vehicles>

⁹ See: <http://www.eeca.govt.nz/transport/vehicle-fuel-economy/index.htm>

fuelsaver.govt.nz and rightcar.govt.nz websites. Since Land Transport New Zealand launched the rightcar.govt.nz website in November 2007, the site has recorded a steady increase in traffic, clocking up 2.9 million hits in the month of June 2008.

Short-term oil supplies: An Oil Emergency Response Strategy has been updated to ensure that the effects of an oil supply disruption on New Zealand are minimised and New Zealand can meet its obligations as a member of the International Energy Agency (IEA). New Zealand met its international obligation to have access to at least 90 days of oil supplies (including stocks held off-shore for release onto the global market in the event of an IEA emergency) throughout the 2007/08 year. New Zealand held 98 days of oil stocks as of 1 June 2008.

Other progress as of 30 June 2008 includes:

- ▶ The Ministry of Transport is trialling higher heavy vehicle weight limits (allowing trucks to carry heavier loads) to estimate the costs and benefits. The results will feed into a review of heavy vehicle weight limits.
- ▶ The Public Transport Management Bill is under consideration by a select committee. Among other things, the Bill aims to clarify and extend the functions and powers of regional councils with respect to public transport planning, and assist regions to develop integrated, responsive and sustainable transport systems.
- ▶ The Ministry of Transport is undertaking trials to test different fuel efficiency training programmes targeted at drivers in the heavy and light commercial vehicle fleets. The trials will lead to recommendations for a fleet commitment training package appropriate to New Zealand drivers.
- ▶ Land Transport New Zealand has continued to promote travel demand management with local councils, government agencies, businesses and schools by providing resources to support travel planning. These resources include guidelines, templates and the national online workplace travel survey.

The full set of actions is in Appendix 1.

2.1.3 Supplementary targets and indicators

The transport targets below help to provide an indication of change to specific aspects of New Zealand's transport system.

- ▶ To have an average emissions performance of 170g/km of CO₂ (approximately 7 litres/100km) for light vehicles entering the fleet by 2015¹⁰.
 - In 2007: the light petrol vehicles¹¹ entering the New Zealand fleet averaged 206g/km.

¹⁰ Target is in NZEECS, p.12.

- ▶ Cut kilometres travelled by single occupancy vehicles in major urban areas on weekdays by 10% per capita by 2015 relative to 2007¹².
 - The Ministry of Transport Ongoing Household Travel Survey recorded vehicles with single occupants in major urban areas on weekdays travelled on average 3,100km per annum (averaged over the four years 2003-07).
- ▶ Increase overall public transport mode share to 7% of all passenger trips.
 - In the year 2006/07 (July to June): boardings on public transport were 1.8% of all household trips¹³.
- ▶ Achieve regional public transport patronage targets for major urban areas¹⁴.

For the 2007/8 year:

- In Auckland patronage levels reached 54,405,000 passenger trips, or 39 boardings per person, an increase of 0.7% on 2006/07. (Target: to increase public transport patronage to 60 boardings per person per year by 2016.) The number of passenger trips rose by 4.36% in the year; however, there was a similar percentage increase in population.
- In Wellington patronage levels reached 17,554,397 at peak times, an increase of 0.2% on 2006/07. (Target: to increase public transport use for journeys to work by 21% by 2016.). Total passenger trips in the year were 34,693,533, an increase of 1.7% over the previous year.
- In Christchurch patronage levels reached 16,648,889 passenger trips, an increase of 5.91% on 2006/07. (Target: to increase the proportion of trips by public transport to 6% by 2011.)
- In Dunedin, patronage levels on Otago Regional Council-contracted services for the first six months of 2008 compared to the first six months of 2007 (latest figures available) rose by 43% to 906,641 passenger boardings. (Target: 4.5% of all trips in the region to be made by public transport by 2014).
- ▶ To have plans in place to cut workplace travel by core public service departments by 15 percent by 2010¹⁵.
 - Data for a baseline 2007/08 year is due to be reported in March 2009.

¹¹ Note that this data excludes the 13,222 light used diesel first registrations, as only about 4% of these vehicles had fuel consumption values.

¹² Target is in NZEECS, p.12.

¹³ Ministry of Transport. Rolling Household Travel Survey (annual).

¹⁴ The regional targets are set by regional authorities. They are listed on p.53 of the NZEECS.

¹⁵ Target in NZEECS, p.12.

Objective 2: Security of electricity supply

Ensuring the lights stay on (affordably) is fundamental to the Strategy. This section is aimed at maintaining the long-term reliability and robustness of the electricity system in the face of growing demand, as new generation sources enter the grid from new locations and as greater levels of intermittent sources, such as from wind generation, are added. There is also the ongoing task of improving the efficiency of electricity system operations.

The Electricity Commission is responsible for the regulatory oversight of the electricity industry and for the operation of the electricity system and markets, and as such is the key government entity with responsibility for electricity supply security. This section primarily reports on key elements of the Electricity Commission's ongoing work programme for the eight months since the Strategy was launched.

This section reports on chapter 8 of the Strategy and on 5.1 of the NZEECS (promoting an efficient electricity system).

2.1.4 Aim and indicators

Aim: That New Zealand maintains a secure electricity supply at competitive prices, through a well-functioning market operating within a well-defined regulatory environment enabling efficient investment, competition and informed consumer choice, and the provision of appropriate back-stop measures¹⁶.

The Electricity Commission's role is to ensure supply security and system stability. It has developed a set of indicators to monitor various aspects of security of supply, including the extent of the diversity of the generation mix, energy supply margins, national grid reliability, distribution network reliability and retail market competition. These indicators are available to view in the Commission's statement of intent, so are not reprinted here¹⁷.

Short-term supply levels: New Zealand experienced a drought in the early months of 2008, resulting in a 'dry year' electricity supply situation, where the South Island hydro storage was low. This situation was managed by the electricity industry and the government following protocols developed over the past few years. Short-term management of supply and demand, while relevant, is not the focus of the Strategy, which is on the longer term structure and performance of the electricity system to 2050.

The Electricity Commission website hosts ongoing surveillance information on the status of the hydro storage lake levels and thermal fuel supply for electricity. The information is available at: <http://www.electricitycommission.govt.nz/opdev/secsupply>.

¹⁶ Ministry of Economic Development. 2007. New Zealand Energy Strategy, p. 59.

¹⁷ <http://www.electricitycommission.govt.nz/pdfs/publications/SOI-0811.pdf> Statement of Intent 2008-2011. Indicators: pp. 76-87.

2.1.5 Activity

The key new challenge for the Electricity Commission in implementing the Strategy has been to ensure the electricity system can reliably integrate greater proportions of renewable generation to meet the target of 90% of electricity from renewable sources.

Transmission to enable renewables¹⁸: Because new renewable electricity generation projects are often remote from existing major transmission lines, investment in new transmission may be required, and timed appropriately, to enable some projects to proceed. To facilitate the coordination of renewable and transmission investment, the Electricity Commission investigated potential locations of new renewable generation and the transmission investment required to support them. The Transmission to Enable Renewables project published a major report containing a 'resource map' of possible wind, hydroelectric, and geothermal generation locations on 11 July 2008.

Integrating more wind generation into the system¹⁹: Wind power can only be produced when the wind blows, not on demand. In March 2008 the Electricity Commission completed a two-year review of market arrangements to manage higher levels of intermittent wind power entering the electricity system. In the 2008/09 year (and beyond) it will implement the review recommendations.

Major review of electricity market design²⁰: To ensure the market arrangements for the regulated electricity industry deliver fair costs to all consumers and maintain competitiveness, the Electricity Commission reviewed the performance of the electricity market in 2007 and 2008. It consulted with industry and consumers, and looked in depth at how the electricity market can be improved. On 8 July 2008 it released the Market Design Review Options Paper suggesting ways to improve outcomes for consumers, particularly focusing on pricing and competition in the retail market, energy affordability and how electricity generators are paid.

Smart meter guidelines²¹: The Electricity Commission released its policy on 'advanced metering' and guidelines for companies who intend to install smart meters. The policy recognises that smart meter technology has the potential to provide consumers with detailed information about their electricity use (and potentially enable 'peak' and 'off-peak' prices), which could encourage consumers to shift their electricity use away from peak times. The guidelines include provision of open operation of systems so that the meters are still operational if consumers switch retailers, and provision of customer displays.

¹⁸ <http://www.electricitycommission.govt.nz/opdev/transmis/renewables#final-report-on-the>

¹⁹ <http://www.electricitycommission.govt.nz/opdev/comqual/windgen/wgip>

²⁰ <http://www.electricitycommission.govt.nz/consultation/MDROptions>

²¹ <http://www.electricitycommission.govt.nz/opdev/retail/ami/index.html>

A more efficient electricity system²²: The Electricity Commission completed a comprehensive investigation into the electricity reconciliation system (the process of matching wholesale purchases and retail sales and allocating unaccounted for electricity). It has brought in new reconciliation rules and rebuilt its reconciliation manager and registry systems, which account for electricity flows from generators to retailers. The result is a more efficient and effective electricity market, with simpler rules, greater transparency and better incentives for market participants to reduce unaccounted for electricity. This project was initiated in 2002 and was completed in the early months of 2008.

Electric vehicles: The Electricity Commission also has begun to investigate what system changes will support the supply of electricity to electric vehicles in the future.

The government has issued updated government policy statements on electricity governance and gas governance to require the Electricity Commission and Gas Industry Company (the regulatory body for gas) to align to the Strategy. Also:

- ▶ The government has decided that lines companies will be obliged to continue to supply electricity to all remote locations that were connected to the main grid in 1993, after 2013 (this will require a change to the Electricity Act).
- ▶ The Electricity Commission's 2008-2011 Statement of Intent, issued in June 2008, reflects the changes to the government policy statement and clearly identifies projects that contribute to delivery of the Strategy.

²² This project was initiated well before the Strategy, but is reported here as it is relevant to the delivery of a more efficient electricity system and fairer costs for consumers. More information is available at <http://www.electricitycommission.govt.nz/advisorygroups/pjtteam/reconproject>

Objective 3: Low emissions power and heat

In setting a clear direction for the future of New Zealand's energy system, the Strategy states as a principle that: "for the foreseeable future, it is preferable that all new electricity generation be renewable, except to the extent necessary to maintain security of supply"²³.

In eight months the government has been aligning the legislative and regulatory framework to support the Strategy. Legislation and regulations providing greater support for the private sector development of renewable energy have been developed and taken through several major steps in the legislative and regulatory processes.

This section reports on chapter 9 of the Strategy, on 5.2 of the NZEECS (promoting the uptake of renewable energy) and on actions relating to renewable energy in the residential and business sectors in chapters 2 and 3 of the NZEECS.

2.3.1 Targets and indicators

Target: 90 percent of electricity is generated from renewable sources by 2025 (based on an average hydrological year).

Indicator: The latest figures available (in Graph 4) are for the 2007 calendar year, which is the baseline year for the Strategy.

For the 2007 calendar year, hydro generation provided 55% of New Zealand's electricity generation. A further 12% came from other renewable sources, i.e. geothermal, wind and biomass, and waste heat sources. The remaining 33% came from fossil-fuelled plants (oil, coal and gas).

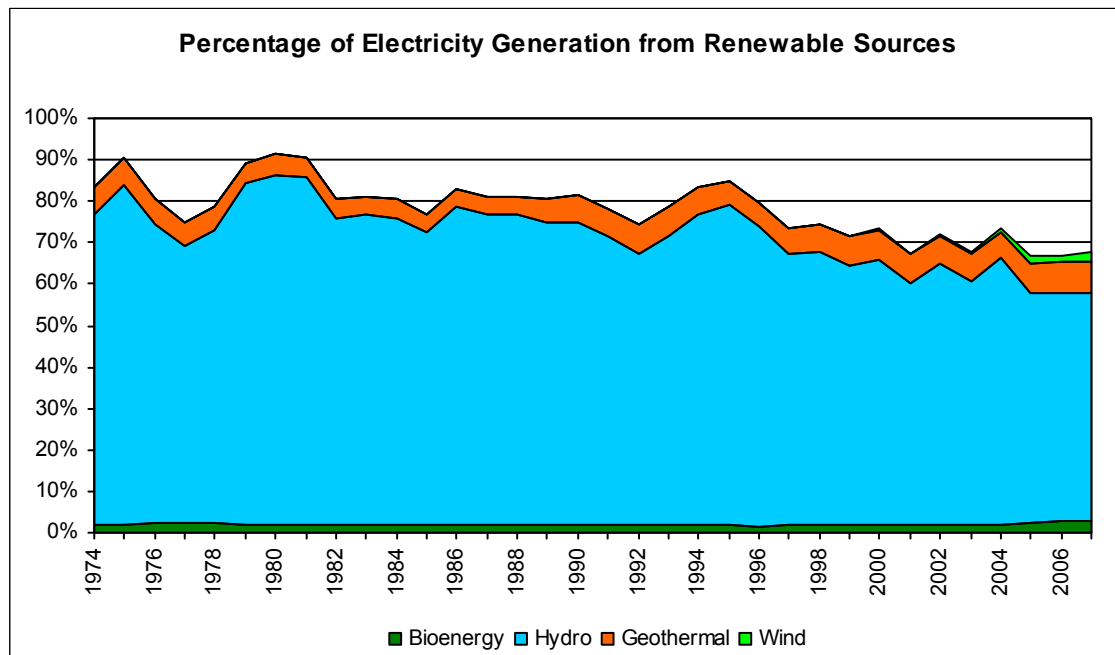
The total quantity of hydro electricity generation has remained at a similar level over the past 10 years; its percentage contribution has declined as increased demand has been met by increases in fossil-fuel generation. The variations in hydro generation in recent years have been due to variable storage capacity between 'dry' and 'wet' years.

Wind generation increased by 50% between 2006 and 2007, to 2.2% of total generation. Total wind capacity increased by 88% in the 2007 year.

In the 18 months to 30 June 2008, total installed generation capacity increased by about 5%, or 422 MW, to create a total generating capacity of approximately 9200 MW.

²³ New Zealand Energy Strategy, p.17.

Graph 4: Percentage of electricity generation from renewable sources²⁴



2.3.2 Activity

In New Zealand, energy development is a commercial activity. The government's role in meeting the 90% target is to set a clear direction through legislation and regulatory frameworks to enable and encourage commercial investment in low emissions energy sources.

Legislative and regulatory work to support low emissions electricity generation in the last eight months includes:

Developing a New Zealand Emissions Trading Scheme (ETS): By June 2008, legislation to introduce an ETS had been considered by select committee and recommended back to Parliament for its second reading. The proposed ETS will apply an economy-wide price signal to activities that contribute to climate change. By putting a price on emissions, this scheme improves the economics of renewable electricity generation compared to generation from fossil fuels.

Preference for renewable electricity generation: Proposed amendments to the Electricity Act 1992 create a preference for renewable electricity developments by restricting new baseload fossil-fuel thermal electricity generation, except to the extent necessary to ensure the security of New Zealand's electricity supply. This legislation is part of the same Bill as the ETS, and as at the end of June, had been referred back to Parliament from select committee for its second reading.

²⁴ Ministry of Economic Development. 2008.

Guidance for councils under the Resource Management Act (RMA): Local authorities have been faced with difficult decisions when trying to weigh up the benefits of renewable electricity against local environmental impacts. A draft national policy statement for renewable electricity generation has been prepared and is expected to be released in August 2008. This will provide clearer guidance to consent authorities when making decisions on renewable electricity generation and when preparing their plans.

A National Policy Statement for Electricity Transmission was completed and is now operational. This provides guidance for local authorities as to the importance to attach to resource applications relating to the transmission grid, including for new and upgraded connections.

Lines companies to invest in renewable generation: Lines companies had been restricted from investing in generation in case they engaged in anti-competitive practices or set up monopolies in local areas. Amendments to the Electricity Industry Reform Act have been drafted to encourage lines companies to invest in renewable generation in their areas. Changes will enable these companies (who are often in a position to see new opportunities) to invest in new renewable generation in a way that ensures effective competition. By 30 June 2008 this proposed amendment had been reported back from select committee to Parliament.

There has also been progress in enabling the electricity system to integrate higher levels of intermittent wind generation and in facilitating transmission investment to support new generation from remote locations. These actions are reported under Objective 2: security of supply.

The government has also encouraged renewable generation by participating in RMA processes:

Using 'call-in' powers under the RMA: The Minister for the Environment has exercised his powers under the RMA to 'call in' nationally significant projects. This sets up a one-step decision-making process, which can result in speedier decisions and less costs for all parties. The resource consent application is heard by either a Board of Inquiry or the Environment Court and appeals are only permitted on points of law. In January 2008, the Minister for the Environment called in the Te Waka wind project application in the Hawkes Bay and referred it to the Environment Court, and referred the Te Mihi geothermal application in the Waikato to a Board of Inquiry.

Submissions: Government agencies have made submissions in support of new renewable generation projects seeking RMA resource consents, to bring to the decision-makers' attention the national significance of renewable generation.

The Crown can make all-of-government submissions under the RMA for nationally significant projects. All-of-government submissions were made for the Project Hayes and Mahinerangi wind farms in Central Otago. The Crown is participating in the appeals process in opposition to the appeals lodged against the two wind farms. The

Minister also decided in July 2008 to lodge an all-of-government submission for Meridian Energy's Central Wind project near Taihape.

Work has also been underway to encourage greater use of direct heat from renewable energy, including:

- ▶ **Clean heat for schools:** 31 coal-fired boilers in schools were funded to convert from coal to wood fuel by EECA in a pilot scheme. Nine installations were completed before the 2008 winter.
- ▶ **Solar water heating:** mixed results:
 - 140 installers were trained in four polytechnics in 2007/08 bringing the total of trained installers to more than 330; seven councils have agreed to waive building consents fees.
 - Solar installation and product standards were published: The solar water heating acceptable solution for Building Code compliance came into force on 1 December 2007.
 - Financial support (grants) for commercial installations: Grants were contracted to support 58 commercial projects, equivalent to 575 residential-sized solar water heating systems.
 - There has been a low uptake of the three residential grants and loans schemes – few homeowners have taken up offers of government subsidies to install solar water heating. To boost uptake, changes were made to the grant schemes in June 2008. Changes include lowering industry administration costs, increasing the amount of the grant and simplifying the cost effectiveness criteria.
 - Provisional industry data indicates 3,400 solar water heaters were installed in the year to 30 June 2008, fewer than the year before.
- ▶ **Clean heat for industry²⁵:**
 - Nine businesses were awarded capital grants through the Wood Energy Grants Scheme (to a total value of \$1.054m) to support the supply and use of 0.6 PJ of wood fuels.
 - Nine feasibility studies were funded at a cost of \$1.054m, which collectively aim to increase the use of wood as a fuel by 0.7 PJ. Two of the studies were complete as at 30 June 2008.

²⁵ See <http://www.eecabusiness.govt.nz/> for more information about EECA's programmes for industry.

Burning wood, a renewable fuel:

Examples of businesses who received wood energy grants from EECA in 2007/08²⁶:

NZ Foam Latex – This Christchurch manufacturer has installed a reconditioned boiler to burn wood chips because its existing source of coal-fired steam was from the neighbouring site and was being disconnected.

Starwood – This Timaru company makes barbecue skewers and is buying a pelletiser to turn its wood residues into a useful commodity, rather than having to pay for dumping the ‘waste’.

Ernslaw / AES – Ernslaw's bioenergy company is importing a pilot bio-oil plant from Canada to test the conversion of forest residues into bio-oil. This mobile plant can be easily assembled at skid sites within the forest.

Rakua Energy – This company is recycling a great amount of demolition waste at its Christchurch site. The funded project will allow it to screen the hog fuel and wood chips to suit various customer requirements.

Findlater Sawmill – This sawmill in Winton, Southland is installing a wood-fired cogeneration plant to allow the business to grow. The expense of upgrading the electricity supply lines was the driving force.

Waste and Energy Solutions – This supplier of hogged fuel will now also be able to offer wood chips and pellets to the local market.

2.3.3 Supplementary indicators

The level of investment in new electricity generation is a useful indicator of the changing proportion of renewable sources for New Zealand's electricity system.

Table 1 shows the additions (and one decommissioning and partial recommissioning) of major plant between 1 January 2007 and 30 June 2008.

²⁶ Business grants for capital/demonstration projects may be up to 40% of the capital cost of the project, with a minimum of \$10,000 and maximum of \$200,000. More details are available at: <http://www.eeca.govt.nz/renewable-energy/bioenergy/fida.html>.

Table 1: Changes to electricity plant, 1 January 2007 to 30 June 2008

Name	Company	Type	Year	Capacity (MW)
White Hill	Meridian Energy	Wind	2007	58
Huntly (U5 e3p)	Genesis Energy	Gas	2007	385
Wairua	Northpower	Hydro	2007	2
Tararua	Trustpower	Wind	2007	93
Southdown	Mighty River Power	Gas	2007	45
Mokai	Tuaropaki Trust	Geothermal	2007	18
New Plymouth Steam Turbines (decommissioned)	Contact Energy	Gas	2007	-300
New Plymouth Steam Turbines (partially recommissioned)	Contact Energy	Gas	2008	100
Manapouri Efficiency Upgrade	Meridian Energy	Hydro	2008	18
Southern Landfill (Wgtn)	Todd Energy	Biogas	2008	1
New Plymouth Flare Gas Co-generation	Todd Energy	Gas	2008	2
Total Gross additional renewable capacity				190 MW
Total Gross additional fossil fuel capacity (excluding New Plymouth)				432 MW
Total Net Decommissioned (New Plymouth)				-200 MW
Total Net additional capacity (Including New Plymouth)				422 MW

Upcoming generation: Table 2 lists the generation capacity of known upcoming and potential larger scale renewable electricity projects, as of the end of July 2008. Of the projects under construction, 330 MW is due to be completed in the next 18 months (by the end of 2009) and the other 132 MW is due to be completed in 2010. These projects include two large wind developments in the Manawatu and Wellington regions, four geothermal projects in the central North Island and in Northland, and two small hydro projects in the Waikato and in Otago.

Another 209 MW of gas fired generation is also under construction or consented and the project is ready to commence (Table 3). These two projects are a peaking plant of 200 MW and use of flare gas (9 MW) in Taranaki.

It is unlikely that all projects in early stages of the development process will eventually be built; however, the figures in the three right hand columns in Table 2 provide an indication of the level of and direction of investment activity in the New Zealand market. (Note that this list was compiled at the end of July 2008 and is likely to date quickly as the status of upcoming projects changes frequently.)

Table 2: Future renewable electricity generation

Energy source	Under construction	Consented	Applied for consent or under appeal	Proposed
Wind	189 MW	313 MW	2411 MW	787 MW
Hydro	13 MW	21 MW	415 MW	895 MW
Geothermal	260 MW	60 MW	225 MW	265 MW
Biogas	0 MW	0 MW	0 MW	2 MW
Biomass	0 MW	0 MW	0 MW	0 MW
Marine	0 MW	1 MW	200 MW	0 MW
Total	462 MW	395 MW	3251 MW	1949 MW

Table 3: Future fossil-fuel electricity generation

Energy source	Under construction/ project started	Consented	Applied for consent or under appeal	Proposed
Gas	209 MW	400 MW	480 MW	-
Diesel	-	30 MW	-	-

New renewable generation required to reach the target of 90% of electricity generation by 2025:

The analysis supporting the Strategy assumes that demand is to grow at a rate of 1.3% per year, which is equal to a 26% increase between 2007 and 2025. Based on this assumed demand growth, approximately 175 MW of new generation will be required to be built on average each year to reach the 90% target. The actual amount of new capacity required each year will depend on the type of generation.

Direct use of renewable energy target in NZEECS: An additional 9.5 PJ of energy from woody biomass and/or direct heat from geothermal sources is used by 2025.

The Ministry of Economic Development collects data on the use of woody biomass for direct heat from some industry sources. This data is available in the Energy Data File, published annually²⁷. It is noted that the data is incomplete. This target is difficult to measure as much direct heat generation (such from wood waste) is small scale and takes place within companies and is not reported.

²⁷ The data that is available can be accessed in the Ministry of Economic Development Energy Data File (published June 2008) in the Energy Balances section (pp. 14-19) and Table F.3 (p.93).

Objective 4: Using energy more efficiently

The Strategy states as a principle: “investment should occur in energy efficiency measures where this is cheaper than the long-term costs of building extra generation capacity, including environmental costs”²⁸.

This principle applies more widely than simply to electricity; investment should occur in energy efficiency measures for use of all forms of energy where this is cheaper than investment in energy or the costs of new energy infrastructure.

Energy efficiency programmes have been underway for some time. The launch of the Strategy and the second-generation NZEECS gave a stronger mandate for improving energy efficiency across all sectors and a new boost to energy efficiency work programmes.

New Zealand has considerable potential to use energy more efficiently²⁹. The NZEECS targets actions for homes, products, industry and commercial sectors, the transport system, central and local government. Most of the benefits quantified in this section are expressed as ‘per annum’ savings which will continue into the future.

This section reports on chapter 10 of the Strategy, the actions relating to energy efficiency for homes and businesses in chapters 2 and 3 of the NZEECS, and actions relating to central and local government in sections 6.2 and 6.3 of the NZEECS.

2.4.1 Target and indicator

Target: Energy is used efficiently across the New Zealand economy.

Indicators: One indicator of energy efficiency is the trend in the energy intensity of an economy³⁰, calculated as the ratio of total energy consumed against gross domestic product (GDP) (see Graph 5).

Since 1990, New Zealand’s GDP has grown faster than the total quantity of energy consumed. By this indicator, our economy has become less energy intensive (or, it could be inferred, more energy efficient) by about 15%. However, also since 1990, total energy consumed has increased and the quantity consumed per person has increased by 10%. In 2007, 120 GJ (or the equivalent of approximately 3,400 litres of petrol) was consumed per person. Total energy consumed increased by 1% between the calendar year of 2006 and 2007³¹.

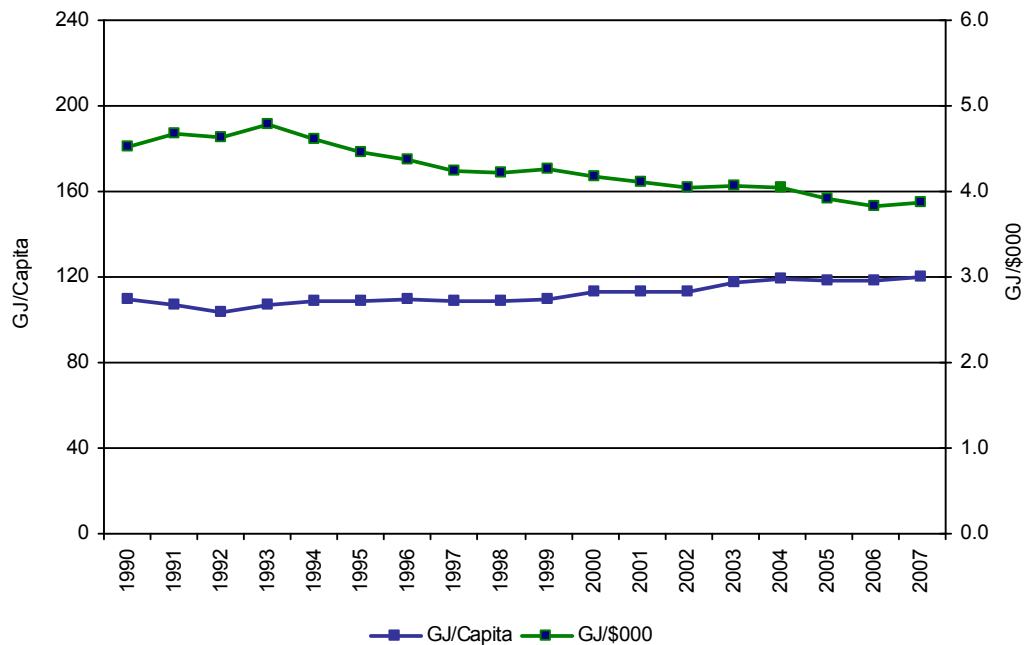
²⁸ New Zealand Energy Strategy, p.17.

²⁹ See the Electricity Commission’s electricity efficiency potential study: <http://www.electricitycommission.govt.nz/opdev/elec-efficiency/potentialstudy>

³⁰ Energy intensity is energy consumption per unit of output, whereas energy efficiency refers to the ratio between energy output (services such as light, heat and mobility) and input (fuels). At the national level, the main determinants of energy intensity include the structure of an economy, stage of economic development, energy efficiency, energy prices, climate, geography (which affects distances travelled), culture and life styles. Accordingly, reductions in energy intensity do not necessarily imply improvements in energy efficiency.

³¹ Ministry of Economic Development. 2008. Energy Data File. p.9.

Graph 5: Consumer Energy Intensity³²



EECA estimates energy efficiency in the economy using the Divisia decomposition methodology. This analysis takes the total increase in consumed energy and separates out the influences of factors such as activity growth, structural changes (such as industries starting up or closing down), weather, and the type of energy used (fuel quality). The quantity remaining is taken to be the change in energy efficiency. This method relies on complex data from a range of sources, and the data availability and quality are variable so the results are less reliable.

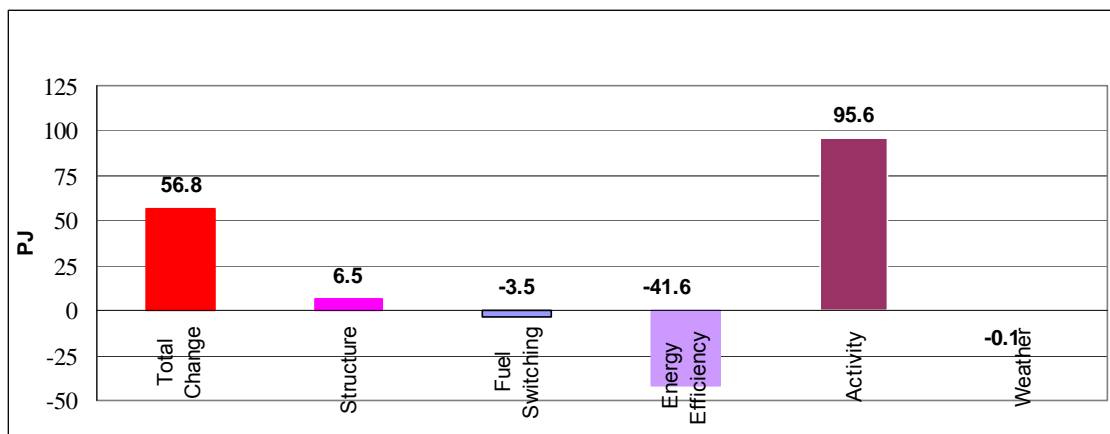
In the period March 2001 to March 2006, EECA estimates energy efficiency improvements to have reduced energy demand by 42 PJ across the economy – an improvement of 1.8% per annum on average³³. (Data for the 2007 year is not yet available.) The sectoral analysis that underpins these economy wide changes is provided in the underlying report.

Graph 6 shows the estimated trends for the factors driving total energy use in New Zealand from 2001 to 2006. Over that period the economy grew substantially, requiring a gross increase in energy of 96 PJ. However, other factors reduced the demand for energy. Improvements in energy efficiency offset demand growth by 57 PJ in this period. Other effects, such as structural change, fuel switching and weather also had a small impact on energy use.

³² Ministry of Economic Development. 2008. Energy Data File. Figure A.4a, p.10.

³³ New Zealand's Energy Efficiency, Conservation and Renewable Energy Trends to March 2006. EECA 2008. (website reference pending)

Graph 6: Factors affecting economy-wide energy use growth, March 2001 to 2006 years³⁴



2.4.2 Activity

Highlights of NZEECS actions for the year to June 2008³⁵:

For homes:

- ▶ **11,000 homes** were insulated³⁶ through the ENERGYWISE™ home grants scheme, which co-funds insulation for low-income residents in older homes. EECA funded \$7.3m towards the retrofits. Every dollar granted by EECA was matched by an average of \$1.90 by partner funding agencies.
- ▶ **2,962 Housing New Zealand Corporation homes** were retrofitted with insulation to specified standards and another **88** received heating upgrades in the year to 30 June 2008.
- ▶ **EECA launched a new offer of subsidies on interest payments or grants for homeowners to insulate and heat their homes:** (the new ENERGYWISE™ interest subsidies and grants scheme). This programme has had a slower start than expected, but is underway now with 15 partners marketing the subsidies to homeowners. The scheme is delivered through partner organisations who market the loans and grants directly to homeowners. Contracts with the first partners were signed in February 2008 and by 30 June 2008, **47** homes were insulated and/or had more efficient heating installed, and a further 1100 applications had been

³⁴ Source: EECA

³⁵ Note: A mixture of measurement and reporting processes counting energy savings over many industrial and commercial sites have been aggregated into the EECA business programme and Electricity Commission electricity efficiency programmes. As a result, the data is of variable quality and may in some instances cross over. The reported savings are the best estimates available. An improved reporting frame is under development.

³⁶ The insulation standards in the ENERGYWISE™ Grants Programme are generally at or just above NZ Building Code levels and have been upgraded this year in response to NZ Building Code improvements.

approved. This scheme provides an interest-free loan or small grant to encourage moderate-income home owners to invest in better insulation and clean heating in older homes.

- ▶ **Clean heat for homes:** 571 homes were retrofitted with clean heat appliances (mostly heat pumps) through grants of \$0.895m, contributing to the NZEECS target of 4,000 upgrades for low income families in areas of poor air quality by 2012. (The target to 30 June 2008 was up to 800 homes funded by up to \$1.1m.)
- ▶ **A voluntary Home Energy Ratings Scheme** was introduced. Rating schemes are recognised internationally as a way to provide homeowners with credible, comparable and objective information on the energy efficiency of their homes. The information can also assist people to improve the energy efficiency of their home.
- ▶ **Higher insulation levels** were required by the Building Code for houses and small buildings from 31 October 2007.

For products:

- ▶ **Better consumer information:** Energy Star efficiency labels were introduced on computers, imaging equipment, fridges and freezers.
- ▶ **Minimum standards being developed:** Minimum Energy Performance Standards (MEPS) for 13 additional product categories are under development. Once developed, these will require all products in these categories to meet minimum efficiency standards to be allowed to be sold in New Zealand.
- ▶ **3,455 old fridges were retired** in a pilot programme aimed at removing inefficient appliances from operation, saving \$550,000 in energy costs a year.
- ▶ **Efficient lighting:** During 2007/08 the Electricity Commission subsidised the sale of 2.2 million bulbs³⁷. Its CFL (compact fluorescent lighting) programme was incorporated into the new *Efficient Lighting Strategy*, broadened and renamed the efficient lighting programme. This programme is now delivering 370 GWh (1.33 PJ) of annual electricity savings (including pilots and programmes from previous years). Of the annual savings, 173 GWh stem from bulbs sold during 2007/08. The calculation is based on the savings estimated to be achieved by replacing inefficient lights.
- ▶ **The Efficient Lighting Strategy**, involving EECA, the Electricity Commission and the lighting industry, was launched in June 2008³⁸. It aims to reduce lighting energy consumption by 20 per cent by 2015. By setting minimum efficiency standards for

³⁷ The Electricity Commission estimates there are 44 million light bulbs in New Zealand households. It estimates that of this figure, 14 million are CFLs and of that 14 million, the Commission's programme has subsidised 4.6 million bulbs since the programme started.

³⁸ <http://www.eeca.govt.nz/news/media-releases/lights-out-on-incandescent-bulbs.html>

lighting products, less efficient products such as energy-hungry incandescent light bulbs will slowly phase out from late 2009.

Energy savings of 1.8 PJ worth \$71m were achieved from EECA's product efficiency programmes from July 2007 to June 2008. This is calculated from sales data of electrical products showing trends towards more energy efficient models.

For industry:

- ▶ **Energy audits and improvements:** EECA committed \$1.2m through its Emprove programme to audit businesses that spend, in total, \$175m per year on energy. EECA's client companies reported 362 GWh or 1.3 PJ in energy savings from efficiency improvements made during the 2007/08 year.
- ▶ **Capital grants for efficiency technology** saved an estimated 0.06 PJ annually. Cost: \$1.04m across 27 projects in **energy intensive businesses**.
- ▶ **Compressed air systems:** Auditing standards and an accredited auditor scheme for compressed air systems, used in many larger industrial processes, was established and 37 larger industrial sites were audited or scheduled for audit by August 2008. The programme has delivered or committed electricity savings of 9.6 GWh p.a. (0.03 PJ).
- ▶ **Electric motors:** A pilot programme from April 2008 encouraged companies to replace inefficient electric motors with newer, MEPS compliant (higher efficiency) 3-phase electric motors through a bounty scheme and education. The delivered or committed electricity savings from the three-month pilot to 30 June is 1.2 GWh p.a. (0.004 PJ). The programme will be rolled out nationally in September 2008.
- ▶ **The Building Code required** more energy efficient lighting in commercial buildings from 31 October 2007.
- ▶ **Building Energy End-use Study:** A six year study was started which will identify how and where energy is used in non-residential buildings.
- ▶ **A new commercial buildings programme** developed by the Electricity Commission was launched in April 2008 and generated 13.6 GWh (0.05 PJ) of committed annual electricity savings by 30 June 2008. Partners were contracted to undertake efficiency projects within pre-agreed economic criteria³⁹.

During 2007/08 the Electricity Commission invested \$4.6 million in developing and implementing a range of new programmes (excluding establishment costs). These programmes are the efficient lighting, commercial buildings, compressed air and

³⁹ The aim is to generate more than 200 projects over the next two years, targeting equipment such as HVAC systems, refrigeration, commercial lighting, and building management systems in commercial office buildings, hospitals, tertiary institutions, food stores and commercial enterprises.

electric motors programmes. It achieved an estimated 198 GWh (0.71PJ) of annual energy savings. The new programmes are on track to achieve the NZEECS target of 3 PJ of annual energy savings by 2012.

The Electricity Commission requires its programmes to be more cost effective than the long run marginal cost of building new generation. The Commission's programme costs range from 0.7–4.7 cents per kWh, which is significantly below the long run marginal cost of new generation of 7–8 cents per kWh.

Working with business sectors to improve energy efficiency⁴⁰

Through its Energy Intensive Businesses and Emprove programmes, EECA signed an agreement with Plastics New Zealand resulting in financial assistance to plastics businesses to improve their energy efficiency.

The 12 companies currently participating in the programme have, through conducting energy audits, identified average electricity savings of 13% (5,890 MWh). The companies have so far completed about 25% of their implementation programmes delivering savings of 928 MWh.

For example, through one audit a manufacturer found that compressed air represents 38% of its annual energy bill – a cost of \$120,000 p.a. The company saved \$40,000 of these annual costs by fixing air leaks, reducing the pressure set point, and by using electric blowers rather than compressed air in some areas.

A web-based benchmarking tool has provided an opportunity for plastics companies to monitor their energy use data over time and compare their performance against other plastic manufacturers with similar processes.

EECA developed projects with four more industry sectors in 2007/08.

For government and local government:

- ▶ **Crown loans scheme** – \$2.0m was allocated to support four projects improving the energy efficiency of operations run by the Taupo District Council, Dunedin Hospital, Nelson City Council and Palmerston North Hospital.
- ▶ **Govt3:** Energy efficiency improvements delivered through the Govt3 programme will be surveyed annually. The first (baseline) report is due in March 2009.

⁴⁰ Case studies of business achievements under EECA's business programmes are available via: <http://www.eecabusiness.govt.nz/>

Emissions reductions achieved through the Carbon Neutral Public Service programme can be accessed online⁴¹.

- ▶ **Urban design case studies:** The Ministry for the Environment published nine case studies relevant to local government that promote reduction in energy consumption through the delivery of high quality urban design.

Transport energy efficiency improvements are reported under Objective 1 and electricity system efficiency improvements are under Objective 2.

Progress on the full list of actions is in Appendix 1.

⁴¹ Each of the 34 agencies involved in the Carbon Neutral Public Service programme have published their emissions inventories on their websites. The inventories can be accessed via:
<http://www.mfe.govt.nz/issues/sustainability/public-service-carbon-neutrality.html>

Objective 5: Sustainable energy technologies and innovation

Widespread uptake of affordable new technologies is required to achieve the Strategy's goals. The Strategy calls for a significant effort to focus support for innovation in energy systems, playing to New Zealand's natural strengths and addressing our unique situation.

This section reports on chapter 11 of the Strategy.

2.5.1 Activity

Government funding support for energy research has been significantly increased in the past year, an assessment of New Zealand's natural resources and technology pathways has been completed, and coordination and linkages between researchers, industry and government is improving to support energy innovation. The highlights are:

The Marine Energy Deployment Fund was established to allocate \$8 million over four years towards the deployment of marine electricity generation devices in New Zealand. Generating electricity from tidal or wave power is in an experimental stage worldwide and New Zealand has a promising resource of wave energy. In May 2008 EECA, the fund administrator, awarded Crest Energy \$1.85m to assist the trial of devices in Kaipara Harbour (subject to Crest obtaining resource consents).

The Low Carbon Energy Technologies Fund was established, initially with \$12 million over three years to support new low carbon energy technologies. In the May 2008 Budget the government committed to continuing this fund at the same level beyond three years. In July 2008, the Foundation for Research, Science and Technology (FRST) awarded Auckland-based company Lanzatech \$12 million over three years to develop a second-generation 'low-carbon petrol' fuel from industrial flue gas waste that could be blended with petrol to reduce petrol use. FRST also awarded a NIWA/Solray partnership \$2.5m over three years to research a process developing biofuel from algae. This fund has been fully allocated for the next three years.

Energy research funding was boosted by \$32.5m over four years in the May 2008 Budget. This is added to the existing targeted energy research funding of \$18m per annum. The new funding will support research into low emissions and renewable energy, deep geothermal energy and to support renewable energy projects that are at the piloting (deployment) stage.

The EnergyScape project completed an assessment of the range of New Zealand's natural energy resources and a framework, or model, for evaluating alternative energy scenarios for developing the resources. New Zealand's bioenergy resource potential and the potential role of hydrogen were explored in depth. EnergyScape was a multi-researcher project funded by FRST in 2007. The work is published at www.energyscape.co.nz.

The National Energy Research Institute (NERI) is improving the coordination between energy researchers and raising the profile of energy research in New Zealand.

It organised two conferences to link energy researchers with policymakers, reviewed tertiary energy education programmes, developed an energy resource for schools, established a web-based energy researcher database with more than 100 researchers listed (available at: www.neri.org.nz), and has brokered links between companies and energy researchers for several projects with commercial potential. NERI formally started on 1 July 2007 with government funding. Its members include all New Zealand's universities and most crown research institutes undertaking energy research.

Example of funding award:

Research into the potential for low temperature geothermal energy

In June 2008, FRST awarded GNS Science \$2.6 million over three years to find ways to increase the use of low temperature geothermal energy in New Zealand. Researchers from the University of Auckland and Coal Research Ltd will also be involved.

The project is to create a nationwide inventory of energy sources of less than 150°C. The researchers will study the heat energy transfer characteristics of the ground at a number of places in New Zealand, analyse socioeconomic factors and energy and tax policies that might influence the uptake of this energy type, and address technical and scientific areas that will need development to enable the growth of this type of energy.

Low temperature geothermal resources are widespread and there is significant potential to increase their use, providing long-term energy and heat supply with low carbon emissions.

The sources include springs and borehole fluid discharges, shallow aquifers, water and steam discharges from thermal power plants, water associated with oil and gas wells, and flooded underground mines.

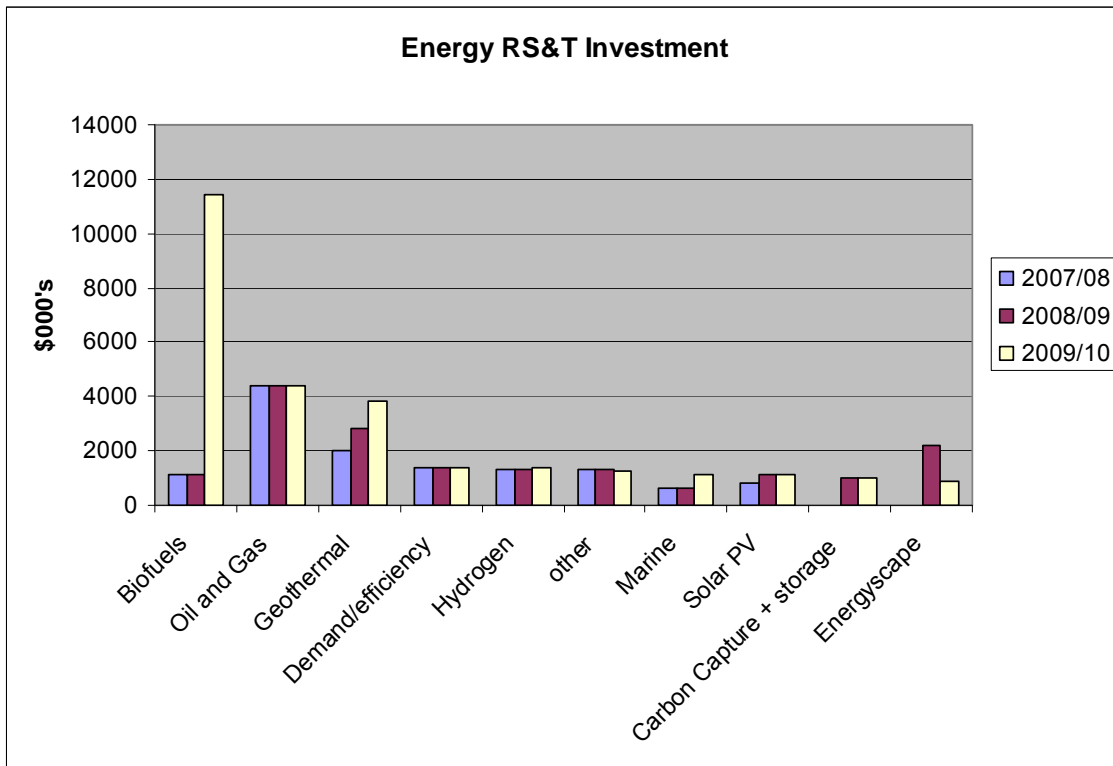
2.5.2 Indicators

The level of funding for energy research committed to by the government is one indicator of the level of government's commitment to energy research and development.

FRST funding for energy research is shown in Graph 7. 'Other' includes funding for distributed generation, wind, network, climate change impacts and Maori resources. The 2009/10 geothermal figure includes new funding for high temperature geothermal research, which has yet to be invested but will be by 1 January 2009. The biofuels funding includes the Low Carbon Energy Technologies Fund (LCET) and the Energy TRST (Transformational Research and Technology) which is focussed on ligno-cellulosic conversion of biomass.

In addition to the FRST funds shown in Graph 7 are the funds committed to the Marine Energy Deployment fund, administered by EECA, and Technology NZ investments with industry.

Graph 7: Energy Research, Science and Technology Investment⁴²



FRST reports that government investment in renewable energy research and development grew by \$3.375m in the 2007 budget for the 2007/08 year (over the 2006/07 year) and by a further \$8.437m in the 2008 budget. Funding increased particularly for geothermal and biofuels with more modest growth for marine and solar PV.

FRST also reports there was increased industry investment in research programmes in 2006 and 2007, most notably in geothermal and in carbon capture and storage (CCS), which also includes government involvement.

⁴² Source: Foundation for Research, Science and Technology. July 2008.

Objective 6: Affordability and wellbeing

The Strategy states that every householder in New Zealand should be able to heat and light their home. The actions in this section aim to ensure household energy is affordable and that homes are of a thermal quality that can support wellbeing.

The Strategy recognises that the introduction of emissions pricing will raise costs for consumers, so it seeks to help consumers make the transition to a low emissions energy system.

Questions of affordability have become more prominent as the economy has slowed in 2008 and oil prices have risen sharply. As a result, a new project to investigate how to define and tackle household energy affordability is signalled for the next year.

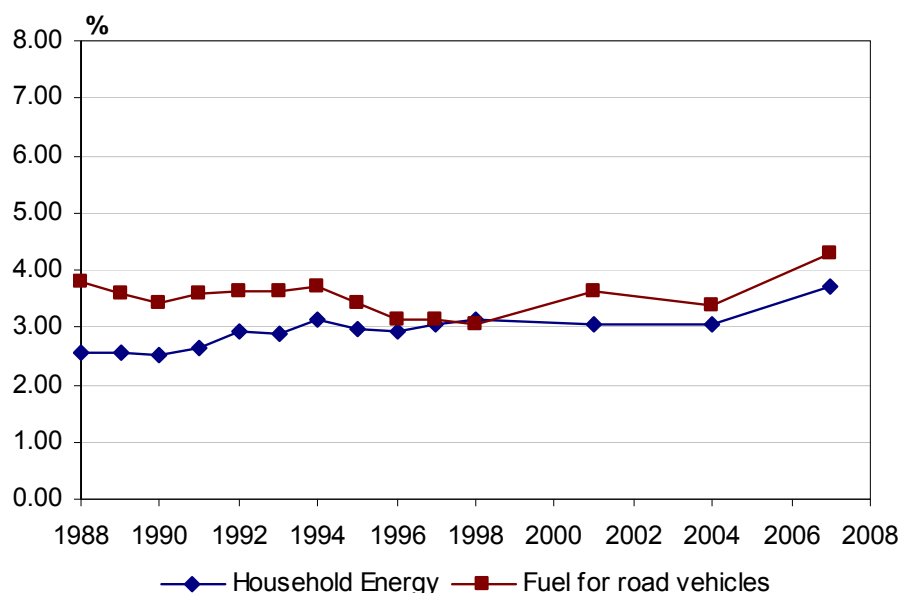
This section reports on the actions in chapter 12 of the Strategy.

2.6.1 Aim and indicators

Aim: Every household in New Zealand is able to heat and light their home.

Graph 8 shows the average percentage of total household income spent by households on both the energy used in the home (i.e. electricity and other fuels) and on vehicle fuels. The average expenditure increased between 2004 and 2007.

Graph 8: Percentage of average household expenditure on energy⁴³



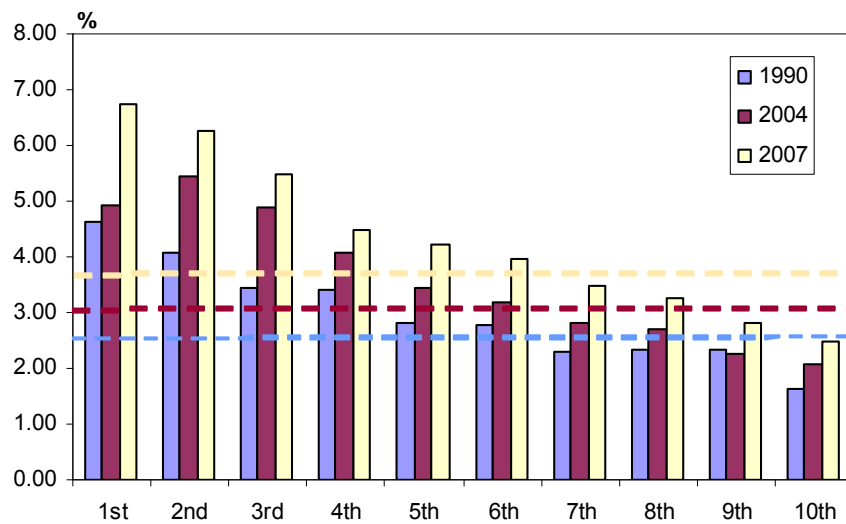
⁴³ Source: Statistics New Zealand's Household Economic Survey. Collected annually in the years to the end of June 1998 and three-yearly from end June 1998 to end June 2007.

Graphs 9 and 10 show the change in the cost of energy (as a percentage of total household costs) across different income groups (the first decile is the poorest and the tenth is the richest). The dotted lines indicate the average percentage spent across all incomes for each year.

Graph 9 shows that electricity costs are a larger percentage of total household costs in low income households than high income households, and that over time, the percentage of total household income spent by households on electricity and other domestic fuels has been increasing, particularly for lower income households.

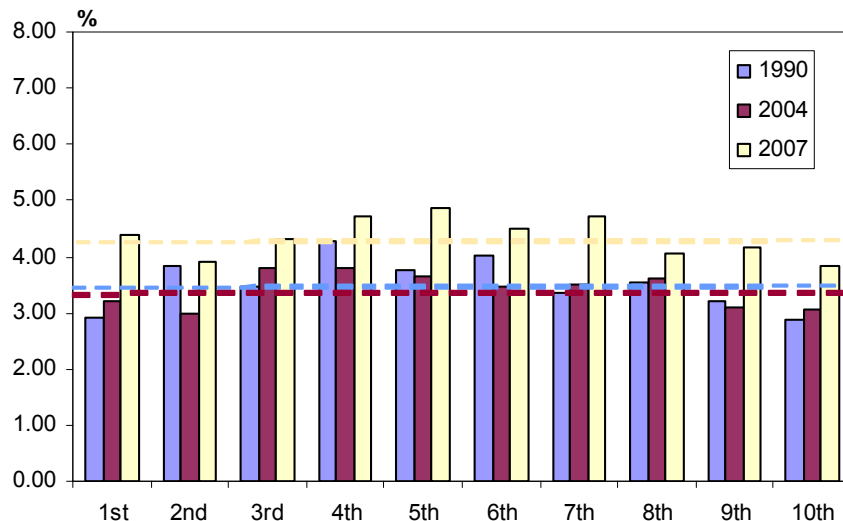
Graph 10 shows the percentage spent on vehicle fuels is relatively similar across income groups and the percentage increased for all groups between 2004 and 2007.

Graph 9: Percentage of household expenditure on energy used in the home, by decile group⁴⁴



⁴⁴ Source: Statistics New Zealand's Household Economic Survey.

Graph 10: Percentage of household expenditure on fuel for vehicles, by decile group⁴⁵



2.6.2 Activity

Major actions in the eight months to June 2008 were:

Lower fixed electricity charges for some households: The government has decided that more households in the lower South Island should benefit from low fixed charges on their electricity bills, which are set by the Electricity (Low Fixed Charge Tariff Option for Domestic Consumers) Regulations 2004. The average consumption level in the regulations is proposed to be increased from 8,000 kWh to 9,000 kWh per year for homes in the lower South Island⁴⁶, in recognition that in colder climates people may require more electricity for basic home heating needs. Draft amendment regulations have been consulted on and are expected to be finalised for approval by Cabinet in August 2008 to take effect from 1 April 2009.

Better insulation saves heating costs: Homes are easier and cheaper to heat when they are better insulated. Through energy efficiency programmes, 13,962 lower income households received fully funded insulation for their homes in the year to 30 June 2008 and another 47 homeowners received subsidies for insulation or more efficient heating systems (reported in Objective 4).

Household energy affordability being investigated: In recognition that an increasing number of households are experiencing higher energy prices and that ways to address household energy affordability need to be investigated, government agencies agreed to commence a research project in July 2008 to examine the extent of energy affordability in New Zealand and possible policy responses. This work is being led by the Ministry of Social Development and EECA.

⁴⁵ Source: Statistics New Zealand's Household Economic Survey.

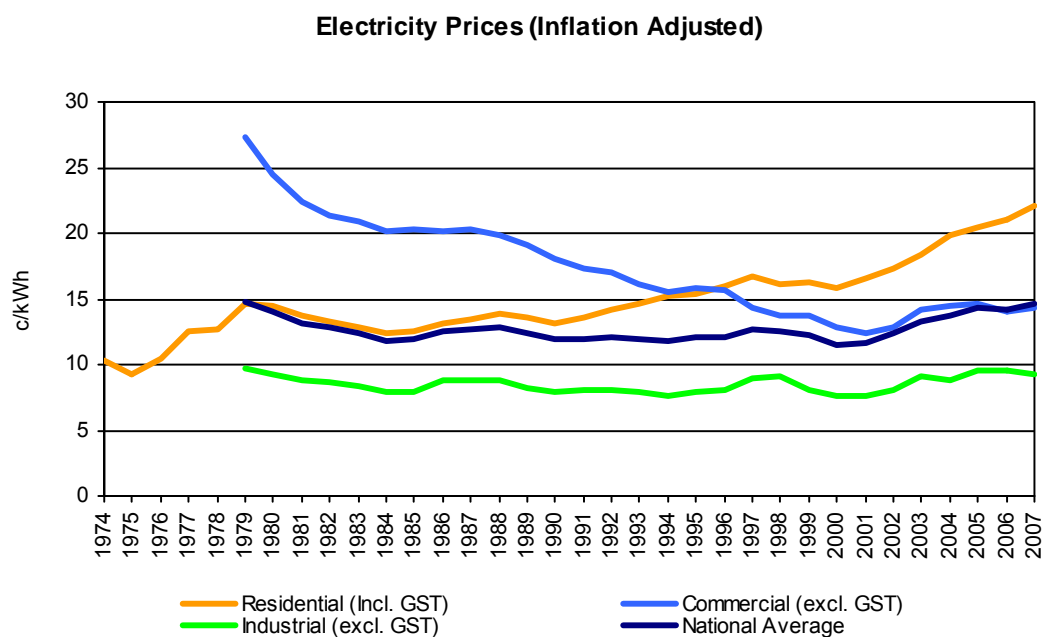
⁴⁶ The 'lower South Island' includes Christchurch and areas below, but excludes the West Coast.

2.6.3 Supplementary indicator

Graph 11 shows the cost per unit of electricity to various types of consumers from 1974 to 2007 (adjusted for inflation). It shows that prices for industrial consumers have remained fairly constant over the past 30 years, while prices for households have risen and prices for the commercial sector have dropped in real terms.

The Electricity Commission, as regulator of the electricity market⁴⁷, is responsible for ensuring all consumers have access to competitive prices and reasonable terms and conditions of electricity supply.

Graph 11: Electricity Consumer Prices (Real 2007 Prices)⁴⁸



In 2008 the Electricity Commission assessed the levels and the trends in residential prices, and is consulting (through its Market Design Review) on options to ensure prices are competitive for all classes of consumer (see objective 2 for more details).

⁴⁷ See Electricity Commission's Statement of Intent 2008-2011. Objective 3: Fair and efficient markets. p.18. <http://www.electricitycommission.govt.nz/publications/index.html#soi>

⁴⁸ Ministry of Economic Development. 2008. Energy Data File. p.129.