

Electricity, energy, and the environment:

**Environmental performance assessment
1 July 2004–30 June 2005**

May 2006



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Preface

As I write this preface in May 2006 I reflect on the growing awareness of climate change. New Zealand has had its first major climate change conference, Tim Flannery released his book *The Weather Makers*, new research is appearing constantly, and Time magazine's cover featured climate change with the heading, Be worried, very worried. The implications are enormous. We are entering arguably the most turbulent period in human history. As we design policies, technologies, and electricity systems for the future, our past experiences will increasingly count for less. The necessity and urgency of weighting our decisions in terms of this future rather than our past is highlighted by a statement Prime Minister Tony Blair made to a British industry group in late 2004. He said:

The emission of greenhouse gases...is causing global warming at a rate that began as significant, has become alarming and is simply unsustainable in the long term. And by long term I do not mean centuries ahead. I mean within the lifetime of my children certainly; and possibly within my own. And by unsustainable, I do not mean a phenomenon causing problems of adjustment. I mean a challenge so far-reaching in its impact and irreversible in its destructive power, that it alters radically human existence... There is no doubt that the time to act is now.

My second assessment of the Electricity Commission's environmental performance has been made in the shadow of this enormous global challenge. It is imperative that the evolution of New Zealand's electricity services focus on:

- raising the efficiency of all aspects of electricity supply, distribution, and use
- improving the resilience of the entire system from supply to use, so that in physical, ownership, capital, and human resource terms, it can withstand whatever the future holds
- decarbonising electricity generation as quickly as the depreciation of assets allows.

Action on these three fronts will ensure that we extract increasing value from our electrons, promote innovation in supply and demand, and ensure security of supply. We need to be innovative. We must challenge the validity of our current mix of regulatory framework and market model, and the political views of what is needed. The current debate is primarily about how to supply and distribute more electricity. We are led to that focus by our current supply and distribution model. Together with major electricity users, the generators who also retail most of the electricity tend to dominate current thinking about New Zealand's needs.

This is the tough 'canvas' on which the Electricity Commission has been working during this assessment period. While I have made six key recommendations to the Commission, I have also made seven to Government Ministers and agencies. These seven recommendations recognise that the Commission operates within the wider energy sector and has powers over only parts of the electricity industry. Many others must contribute if New Zealand is to reap the rewards of a highly efficient, more environmentally sustainable electricity sector.

Given the circumstances in which the Commission is working, I want to clearly acknowledge that they are asking many of the right questions and investing effort and monies in the right areas. But, in the context of New Zealand's wider energy setting, the challenges in meeting their statutory responsibilities are daunting. If the Commission is to continue making substantive progress, our political representatives and the many influential voices in the private sector will need to reassess their contributions and views on the electricity sector's strategic direction.

My team and I are constantly thinking about how New Zealand can reshape its energy thinking, resourcing, and use. We are increasingly focusing on how to empower all New Zealanders to take more control over their energy needs, particularly in terms of electricity services. The potential to harness Kiwi innovation is enormous. If given more direct involvement in supply and in applying technology, people and their communities can create many business opportunities and energy savings in their homes. Our view is that the supply of electricity services has too many monopoly elements and that all aspects of supply and use need to be democratised. With the right policy settings, people would embrace the challenge. We are currently researching this position and in an upcoming report we will examine the potential for greatly expanding small-scale distributed generation and energy capture.

I look forward to the responses to our recommendations and, as always, welcome feedback on our analysis. Through innovation, and by integrating our renewable supplies more deeply into the fabric of society and our thousands of small and medium size enterprises, including farms, New Zealanders can continue to get more value from their electricity services.



Dr J Morgan Williams
Parliamentary Commissioner for the Environment

Guide to the report

Purpose of this report

Under an amendment in 2004 to the Electricity Act 1992, the Parliamentary Commissioner for the Environment (PCE) must assess the extent to which the Electricity Commission (Commission) is meeting the environmental objectives and outcomes identified in the GPS on electricity governance.¹ This environmental performance assessment has been prepared to meet that requirement.

The PCE has expanded the scope of this environmental assessment to include the wider electricity sector, because not all environmental outcomes in the electricity sector can be attributed to the Commission.

This is the second assessment and the first full-year assessment report prepared by the PCE. Contact the PCE's office or see our website www.pce.govt.nz for copies of:

- the first assessment report – *Electricity, energy, and the environment: Environmental performance assessment 1 March–30 June 2004*
- the assessment framework documents – *Electricity, energy and the environment: Making the connections* and *Assessment framework*.

Structure of this report

Chapter 1 sets the scene of recent developments in the electricity sector.

Chapter 2 sets out the areas for action, including the recommendations.

Chapter 3 describes the PCE's roles and responsibilities and the scope of the environmental performance assessment.

Chapter 4 sets the context by identifying key developments in the sector since the last assessment period. This chapter provides a macro view with more detailed comment and review included in Chapters 5 and 6.

Chapters 5 and 6 assess the environmental performance of the Electricity Commission and the wider electricity sector respectively.

1 Setting the scene

1.1 Security of supply

During the period of this assessment, the security of New Zealand's electricity supply once again dominated media coverage. The country's demand for electricity has continued to increase, placing further pressures on the environment and on communities to accommodate new sources of supply and transmission.

Even though New Zealand's energy efficiency and energy intensity did improve, the prevailing attitude is that the country must continue to rely on developing new capacity in the electricity system to fuel economic development.

1.2 New sources of energy

Historically, a key contributor to New Zealand's comparative advantage has been its access to relatively cheap sources of energy. With the decline of the Maui gas field, it is becoming apparent this can no longer be taken for granted.

New sources of energy will be more expensive than those of the past. However, significant energy potential remains. When the chair of the United Kingdom's Sustainable Development Commission, Sir Jonathon Porritt, visited in January 2006 he expressed envy at New Zealand's rich endowment of renewable energy resources. The challenge is to seek more innovative ways to harness this endowment.

1.3 Micro-scale solutions

The Parliamentary Commissioner for the Environment is increasingly convinced that the potential for innovative energy solutions is greatest at the small or micro scale.² There have been exciting developments in this area in many countries. New Zealand is predominately a 'technology taker' and could well tap into these new technologies to complement our well-established hydro resources and the recent growth in wind farms.

At the small-scale level, New Zealand is well suited to take a lead in the development of many of these technologies, as the Christchurch firm WhisperGen has done with its WhisperTech micro-scale combined heat and power system.

1.4 Proposals for large-scale solutions

Yet the focus of investment in the electricity sector is still with 'Think Big' large-scale supply-side solutions. These rely on imported technologies. Recent proposals include:

- a large gas-fired plant at Huntly
- the re-commissioning of Marsden B to run on coal

- a liquefied natural gas (LNG) terminal in Taranaki
- the southern hemisphere's biggest wind farm in Wellington
- a new transmission line through Waikato carrying twice the voltage of the existing line on much higher pylons.

The bigger the proposal is, the bigger the controversy tends to be. Everyone wants a secure electricity supply but, not surprisingly, those directly affected do not want to carry the burden for the entire country. At present, Waikato and Wellington residents are experiencing first hand the tensions between national objectives and local impacts.

1.5 National Policy Statements for electricity generation and transmission

In attempting to address the tension between national and local effects, the Government is looking at developing National Policy Statements (NPSs) for electricity generation and transmission under the Resource Management Act 1991. The objective is to provide some guidance and certainty.

While it is pleasing to see central government taking leadership, such an initiative should not simply rubber stamp large developments. Many still remember the National Development Act.

1.6 Availability of natural gas

Last year was also characterised by concerns about the future availability of natural gas for electricity generation. Indigenous supplies of natural gas, which account for about one-fifth of the country's electricity supply, will become increasingly tight unless major new discoveries are made soon.

Energy companies that operate gas-fired power stations are becoming more concerned about future supplies, and some are now investigating the importing of LNG from overseas. This option may offer some short- to medium-term security for gas supplies. However, it will also expose the electricity sector to the international natural gas market; something New Zealand's electricity sector has largely been shielded from to date.

The future supply of natural gas has not received the same attention as oil and the 'Peak Oil' debate, but it is becoming increasingly apparent that the international natural gas market will face the same economic and geopolitical uncertainties. Long term, there are no guarantees that New Zealand will have affordable access to overseas natural gas supplies. This will inevitably affect the country's energy security and self-sufficiency.

1.7 Increased reliance on coal

There are also unanswered questions about the future of coal. New Zealand has abundant indigenous supplies of coal, but not all of it is suitable for electricity generation. The key issue is how to resolve an increased reliance on coal with the Government's climate change objectives. Proposals for new coal-fired power stations appear to undermine the Government's attempts to stabilise New Zealand's carbon emissions.

By supporting the Marsden B proposal the Government appears to place short-term economic benefit over the country's international commitments and considerations of environmental sustainability. Global warming is an issue that must be taken seriously and meaningful actions must be taken immediately.

1.8 Developing energy policy

It is essential to have robust long-term policy thinking about the institutional arrangements in the electricity sector. Whether energy crises are real or perceived, New Zealand cannot afford to develop energy policy in a crisis-driven manner.

The Government's follow-up to its *Sustainable energy* discussion document will need to set out clearly the long-term energy issues facing the country and propose feasible solutions that take account of future generations.

1.9 Pilot electricity efficiency programmes

Finally, it is pleasing to see the Commission's pilot electricity efficiency programmes successfully underway. Many will be looking to see these programmes rolled out on a much larger scale.

However, during the assessment period the role of energy efficiency remained very much a secondary concern. As energy prices rise, a greater focus on using energy more prudently could be expected. But providers and users remain stubbornly wedded to the new addition of supply as the only means of meeting demand.

The huge potential for improved energy efficiency remains largely untapped, even though many problems in the electricity sector would become much less pressing if more effort was put into improving the demand side of the equation.

2 Areas for action

2.1 Introduction

This chapter sets out the recommendations of the 2004–05 assessment and summarises what the PCE considers needs to be done to enhance progress towards a more environmentally sustainable electricity sector. The rest of the report provides the data and analysis that led to the development of these recommendations.

The electricity sector is complex. For example, many agencies and parties in both government and industry have overlapping interests and accountabilities. Determining each agency or party's role in or contribution to the environmental sustainability of the sector is difficult. Table 2.1 shows responsibilities in the electricity sector.

Table 2.1 Electricity sector responsibilities

Ministers	Energy	Environment	Commerce	Shareholders of SOEs	} Strategic policy
Government departments	MED	MFE			
Local government	Regional councils and territorial authorities				} Policy advice and regulation
Crown owned entities	EC	EECA	Commerce Commission		
	EC	EECA			} Delivery
Retailers and generators	Meridian, Contact Energy, Genesis Energy, Mighty River Power, TrustPower, Other generators				
Transmission	Transpower				
Distribution	United Networks, Vector, Orion, WEL Ltd, Others				

This report makes seven recommendations for the Electricity Commission and an additional seven for action in the wider electricity sector. These recommendations are outlined in Sections 2.2 and 2.3.

2.2 Recommendations for the Electricity Commission

1. Complete the Commission's environmental sustainability framework

There has been a lack of progress in the development of the Commission's environmental sustainability framework (discussed in Section 5.2). Without the framework it is difficult to assess the Commission's commitment to good environmental and sustainability outcomes.

The PCE recommends that the Commission:

- **complete its environmental sustainability framework within the next assessment period**
- **demonstrate how the environmental sustainability framework will be incorporated into the Commission's operations and decision making. (Setting up an environmental sustainability advisory group would be one way to demonstrate this.)**

2. Accelerate the implementation of time-of-use billing to encourage efficient electricity use

The costs of smart meters that allow time-of-use (TOU) billing have been reducing for several years during a period of significant electricity price increases. These changes indicate that the value of TOU metering is increasing; however, uptake of this technology in New Zealand remains limited (see Section 5.4.4). It is important that this technology is widely introduced as it will allow customers to:

- better understand their electricity use and manage it more efficiently
- respond to TOU pricing signals.

The PCE recommends that the Commission develop a programme with a set time frame to increase the installation and use of smart meters in all market sectors.

3. Increase the breadth and depth of knowledge and views used in the Electricity Commission's decision making by diversifying the representation on its advisory groups

The Government Policy Statement (GPS) on electricity governance states that the Commission should make extensive use of advisory groups wherever possible. The GPS also states that advisory groups should have the necessary expertise and be widely representative of affected parties, including customers. (See Section 5.6.2 of this assessment.)

The PCE's first assessment expressed concern that representatives of small consumers and providers of demand-side management solutions were not adequately represented on the advisory groups. The PCE is concerned that little progress appears to have been made in this area. In particular, the PCE notes the poor representation of parties with an understanding of demand-side solutions compared to those advocating supply-side solutions.

The PCE recommends that the Commission actively seek to engage more participants in advisory groups that are:

- **practitioners involved in demand-side activities**
- **representatives of consumer groups.**

4. Improve the quality and clarity of the information provided to stakeholder and advisory groups as part of the consultation process

Although consumer groups are represented to some degree on advisory groups, the information provided to them is often extensive and complex. (See Section 5.6.3.)

The PCE supports the Commission's approach of open and free exchange of information, and also recognises the complex nature of the sector. However, we are concerned that the volume and complexity of information provided often limits the ability of some groups to constructively engage in the Commission's consultation processes.

The PCE recommends that the Commission prepare its consultation documents so that they are clear, concise, and accessible to a broad range of stakeholders. To improve understanding of the issues, the Commission could provide the consumer representatives on the advisory groups with independent technical support.

5. Promote distributed generation

Although the Commission has developed guidelines and model contracts to facilitate the uptake of distributed generation, it is uncertain whether these measures will be sufficient. (See Sections 5.4.5 and 6.8.) Therefore, the Commission may well need to consider additional measures.

The PCE recommends that the Commission undertake regular evaluations of the efficacy of these model contracts to facilitate the uptake of distributed generation.

6. Reduce system losses (transmission and distribution)

The regulatory framework enforced by the Commerce Commission provides no incentive for lines companies to minimise energy losses within their distribution networks. (See Section 5.4.2.) The regulatory framework should be reviewed to provide incentives for lines companies to reduce these system losses.

The PCE recommends that the Commerce Commission and the Electricity Commission work together to consider incentives for lines companies to reduce energy losses in their networks and implement changes to resolve this regulatory failure.

2.3 Recommendations for the wider electricity sector

7. Develop an overarching government policy framework for the energy sector

An overarching policy framework would clearly outline the Government's strategic long-term vision for energy provision and use in New Zealand. (See Section 6.1.) It would assist government agencies to integrate their policies and programmes with respect to energy security, economic development, and environmental sustainability (e.g. energy efficiency, greenhouse gas emissions etc). Such an approach would take account of all energy resources, fuels, and, in particular, highlight the importance of the linkages between electricity, other energy resources such as gas and coal, and demand-side measures.

The broad objectives of a policy framework have already been identified; but many of these involve trade-offs between the Government's economic, social, and environmental objectives. As a result, government agencies and other stakeholders are often not clear which objective or objectives should have the highest priority, what criteria should be used, and in what circumstances. (See Sections 6.1.1 and 6.1.2.)

The policy framework will need to specifically address the issue of how to reduce carbon dioxide (CO₂) emissions from the electricity sector. At present this goal is being compromised to ensure security of electricity supply.

The PCE recommends that the Minister of Energy lead the development of an overarching energy framework policy process that builds on the Government's sustainable energy work programme. The policy framework must:

- **set out defined goals and objectives and clarify how these will be assessed and implemented**
- **ensure that all players in the sector, including government agencies, e.g. state owned enterprises and private businesses, are integrated into the framework, and are involved and accountable**
- **address how conflicts between the Government's different energy-related policy objectives will be resolved.**

8. Clarify responsibilities for achieving environmental sustainability outcomes for the electricity sector

The PCE's assessment has highlighted overlaps of government agency responsibility for achieving environmentally related outcomes for the electricity sector. These overlaps have led to confusion of roles, duplication of effort, and a lack of accountability.³ (See Section 6.1.3.)

The PCE recommends that the Minister of Energy and the Minister for the Environment review the roles and objectives of the Ministry of Economic Development (MED), the Electricity Commission, the Energy Efficiency and Conservation Agency (EECA), and the Ministry for the Environment (MFE) with respect to:

- **environmental input into the development of electricity sector policy**
- **energy efficiency in the electricity sector**
- **demand-side participation in the electricity market**
- **distributed generation**
- **investment decisions in transmission capacity (and, by implication, transmission alternatives).**

9. Strengthen environmental sustainability focus and objectives in the development of electricity and energy policy

MFE should be resourced to extend its activities in the energy sector beyond issues related to the development and implementation of Climate Change policy and administration of the Resource Management Act. MFE can ensure that, during the development of government energy policy, matters related to environmental sustainability are fully taken into account. (See Section 6.3.3.)

The PCE recommends that the Minister for the Environment ensure that the MFE has sufficient resources to fully participate in and promote environmental sustainability outcomes in the Government's energy-related policies and programmes.

10. Improve the availability, accuracy, and accessibility of energy data

MED's Energy Data File provides a valuable resource. However, it is not clear which organisation is responsible for different data sets or for identifying information gaps and implementing measures to fill these gaps. (See Section 6.2.1.)

The PCE recommends that the Minister of Statistics, the Minister of Energy, and the Minister for the Environment clearly establish which agency is responsible for each data set. The Ministers should designate one agency that has responsibility for coordinating the collection, analysis, and dissemination of energy data, so that overlaps and gaps are eliminated.

11. Improve monitoring of the performance of the National Energy Efficiency and Conservation Strategy

Greater clarity is needed on measuring progress towards targets identified in the National Energy Efficiency and Conservation Strategy (NEECS) and attributing progress to specific work programmes or action plans. (See Section 6.3.) Both the timing and accuracy of NEECS progress reports could also be improved.

The PCE recommends that the Minister of Energy direct EECA to improve its monitoring of the NEECS so that:

- **progress of specific work programmes or action plans can be measured and attributed to specific agencies**
- **information is timely and accurate.**

12. Provide environmental performance indicators for the electricity sector

A set of environmental performance indicators to assess the environmental performance of the electricity sector should be developed. (See Section 6.2.) An agency such as MFE should be assigned responsibility to collect and verify the required data, calculate the indices, and report on performance on an annual basis.

The PCE recommends that the Minister for the Environment direct MFE to re-establish the Environment Performance Indicators Programme for energy.

Note: the PCE's specific interest will be those indicators that assess the environmental performance of the electricity sector.

13. Improve the transparency in reporting of resource consent compliance and monitoring

At present there is a lack of transparency in the monitoring and reporting of resource consent compliance by electricity generators. (See Section 6.7.)

Based on the information provided by the large electricity generators in their environmental and sustainability reports, most companies breach their resource consent conditions several times a year. These breaches are often reported as minor, or as having no detrimental environmental effects. It is impossible to verify the actual effects of these breaches from the available reporting methods.

The PCE recommends that MFE work with electricity generators to develop a robust, transparent, and verifiable system of reporting on resource consent compliance and the environmental effects of electricity generation.

3 Assessment framework

3.1 Energy responsibilities in central government

3.1.1 Officials Committee on Sustainable Energy

The Officials Committee on Sustainable Energy (OCSE) advises the Minister of Energy on matters of energy supply and demand.

MED, which takes a lead role in advising on energy, chairs the OCSE. Other agencies on the committee are MFE, the Energy Efficiency and Conservation Authority (EECA), the Ministry of Transport (MoT), the Ministry of Research, Science and Technology, the Department of Prime Minister and Cabinet, and The Treasury.

A separate Sustainable Energy Steering Group has also been formed to progress strategic policy development following on from the Government's Sustainable Development Programme of Action. The Sustainable Energy Steering Group is also led by the MED and includes the same group of agencies that are represented on OCSE.

3.1.2 Ministry of Economic Development

MED leads the production and coordination of policy advice related to economic, regional, and industry development. Sustainable energy is an issue addressed within these functions.

MED is also the Government's main advisor on the operation and regulation of specific markets and industries, including energy.

3.1.3 Commerce Commission

The Commerce Commission enforces legislation that promotes competition and fair market practices. The Commerce Commission also enforces legislation specific to various industries including the electricity industry.

The Commerce Commission has both an enforcement and adjudication role under the Electricity Industry Reform Act 1998, and has responsibilities under Part 4A of the Commerce Act 1986, specifically in relation to large electricity lines businesses.

The Commerce Commission no longer oversees Transpower's pricing methodology – this function has been transferred to the Electricity Commission.⁴ The Commerce Commission's functions in relation to all large lines businesses, not just Transpower, may be transferred to the Electricity Commission after 30 September 2007.⁵

Other aspects of the electricity industry are also covered under the Commission's general powers and responsibilities under the Fair Trading Act 1986 and the Commerce Act 1986.

3.1.4 Electricity Commission

The Electricity Commission regulates the operation of the electricity industry and markets (wholesale and retail) in accordance with the Electricity Act 1992 and government energy policy.

The Commission's principal objective is to ensure that electricity is produced and delivered to all classes of consumers in an efficient, fair, reliable, and environmentally sustainable manner. The Commission is also required to promote and facilitate the efficient use of electricity.

3.1.5 Ministry for the Environment

MFE is the lead ministry advising the Minister Responsible for Climate Change Issues. MFE focuses on building partnerships with business, community, Maori, and local government groups, as well as working closely with other government departments and Crown agencies. It works with EECA especially where activities will have an impact on the Government's climate change objectives.

MFE is responsible for the administration and provision of policy advice on the Resource Management Act 1991 (RMA).

MFE also monitors EECA's performance as required under the Public Finance Act 1989.

3.1.6 Energy Efficiency and Conservation Authority

EECA was established as a Crown entity under the Energy Efficiency and Conservation Act 2000. Its purpose is to promote energy efficiency, energy conservation, and the sustainable use of renewable energy sources. EECA's functions are to assist and advise the Minister of Energy in all the above responsibilities, and any other functions conferred on it by other statutes.

3.2 Parliamentary Commissioner for the Environment's role

The role of the PCE in assessing the Electricity Commission and the wider electricity sector is defined by two Acts.⁶

- The Environment Act 1986 empowers the PCE, among other things, to investigate any matter where the environment has been, or could be, adversely affected (e.g. the wider electricity sector).
- The Electricity Act 1992 (as amended by the Electricity Amendment Act 2001 and Electricity Amendment Act 2004) requires the PCE to report annually to Parliament on the Commission's performance against the environmental objectives of the GPS.

3.3 Assessment criteria

Table 3.1 outlines the PCE's environmental priorities for the electricity sector as set out in the assessment framework.⁷ These priorities underpin the PCE's assessments.

Table 3.1 PCE's priorities for the environmental performance assessment

Priority	Environmental considerations and responses
1	Manage growth in electricity demand by: <ul style="list-style-type: none"> • promoting energy efficiency in all segments of the electricity sector • facilitating and promoting active demand-side participation in the wholesale market.
2	Promote the development and role of renewable technologies, particularly new and emerging technologies.
3	Promote the electricity system's security and efficiency by: <ul style="list-style-type: none"> • ensuring the use of distributed generation is facilitated • facilitating and promoting active demand-side participation in the wholesale market • ensuring energy resources are used efficiently • ensuring renewable resources are managed within their natural rates of replenishment • facilitating and promoting the complementary use of energy sources to overcome supply limitations, particularly for renewable sources of energy.
4	Ensure consistency with government policies on climate change and energy efficiency.
5	Minimise greenhouse gas emissions by: <ul style="list-style-type: none"> • using energy and other resources efficiently • minimising hydro spill • managing transmission losses and constraints efficiently.
6	Avoid, remedy, or mitigate new or existing effects on the environment, including effects on: <ul style="list-style-type: none"> • biodiversity • air • water • land.

Source: PCE, 2004.

With respect to the Commission, this assessment focuses on the delivery of the Government's objectives for renewable energy, distributed generation, energy efficiency, climate change, and the potential contribution of the demand side in the electricity market as set out in the GPS.⁸ See Table 3.2.

The Commission has a range of methods available to it to give effect to the GPS. They can be grouped into five broad categories:

- *facilitating and promoting* (e.g. organising discussions with other parties and assisting energy efficiency and demand-side initiatives)
- *monitoring* (e.g. developing measures of progress)

- *developing and implementing rules* (e.g. identifying whether a rule needs to be developed after market failure to achieve a specific outcome)
- *modelling* (e.g. identifying information that could come from new models for forecasting future electricity supply and demand, whether created by the Commission or another party)
- *developing policy* (e.g. providing input into policy solutions after observing market failure and identifying the need for regulatory action).

This report comments on how the Commission has applied each method to the environmental objectives listed in Table 3.2.

Table 3.2 Environmental objectives of the GPS on electricity governance, 2004

Key environmental objectives of the GPS on electricity governance
Ensure electricity is produced and delivered in an environmentally sustainable manner.
Promote and facilitate the efficient use of electricity.
Promote and facilitate stronger demand-side participation in electricity markets.
Maintain or enhance incentives for investment in electricity efficiency and demand-side management.
Remove barriers to new generation technologies, renewables, and distributed generation.
Use hydro, thermal, and other fuel resources efficiently in the generation of electricity, and minimise unnecessary hydro spill.
Contribute to achieving the Government's climate change objectives.

Source: Minister of Energy, 2004a.

3.4 Dimensions of environmental performance

Section 2 of the Environment Act 1986 provides a very broad definition of 'environment'. (See *Making the connections*, PCE, June 2003, Sections 1.4 and 3.3 for more detail.) The definition includes:

- ecosystems and their constituent parts including people and communities
- all natural and physical resources
- those physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes
- the social, economic, aesthetic, and cultural conditions that affect the matters listed above or that are affected by those matters.

The concept of 'strong' sustainability recognises that economic systems always exist within the context of a society (and that many important social aspects do not involve economic activity). Similarly, human societies, and the economic activities conducted within them, are totally constrained by the natural systems of our planet. Economies

may expand or contract, and societies' expectations and values may change over time, but, to function in a sustainable way, human societies must not exceed the capacity of the biosphere to support those societies and absorb the effects of their activities.

The electricity sector contributes to New Zealand's economic objectives, and social well-being. The sector also influences the physical environment. The PCE is interested in all three of these dimensions of environmental performance – environmental, social, and economic.

3.4.1 Environmental dimension

Different electricity technologies differ in their impact on environmental sustainability. For example, fossil-fuelled generation results in emissions to the air, while hydropower can have impacts on river systems, wetlands, and biodiversity. Wind power has visual and amenity impacts, and the construction of roads for installation has other environmental impacts.

The extent (local, regional, and global) of those effects varies greatly and this variability must be factored into environmental sustainability assessments.

Conversely, the provision of electricity can result in improved air quality in high population areas that rely on solid fuel heating. In such cases the environmental impacts may be moved to other areas, depending on how the electricity is generated.

The transmission and distribution of electricity also has environmental impacts, as do some of the materials and end-use technologies such as PCBs (polychlorinatedbiphenyl) in lighting ballast and heavy metals in rechargeable batteries.

The PCE is concerned about managing and minimising current and future environmental impacts arising from the overall electricity system. To help reduce those impacts, electricity must be produced and consumed efficiently to minimise the need for new supplies.

3.4.2 Social dimension

Electricity delivers essential services to society. A reliable supply of electricity is an essential element of our quality of life, social cohesion, public welfare, and economic performance.

Social sustainability requires that the services electricity can provide must continue to be available to meet family, community, and business needs. The PCE considers that the provision of these services can be achieved with less impact on the environment and greater economic benefit through the increased use of renewables and improved system and end-use efficiency.

3.4.3 Economic dimension

The PCE recognises that acceptable economic outcomes for the electricity sector and society as a whole are important. We want to ensure that customers receive valid pricing signals so that they can respond appropriately.

The PCE is interested in economic and market issues. Efficiently operating markets should deliver energy services at the least cost, but these costs need to account for negative externalities (environmental and others). The New Zealand electricity market should be efficient in environmental sustainability terms. Energy service options should include appropriate values for environmental externalities to ensure that the market is truly operating efficiently.

3.5 Assessment objectives, methodology, and scope

3.5.1 Objectives

The objectives of this assessment are to:

- meet the PCE's statutory obligations to assess the Electricity Commission's environmental performance
- provide information to decision makers in the electricity industry and government to help them improve the electricity sector's environmental performance
- raise awareness of the electricity sector's environmental effects among people working in the electricity industry and in the wider community
- provide information about whether the electricity sector is helping New Zealand to achieve its sustainable development objectives.

The PCE recognises the need to work with all participants in the electricity sector to develop a secure and environmentally sustainable sector.

This assessment provides an independent view on what the Government and the energy sector need to do to create a holistic approach to sustainable energy management.

3.5.2 Methodology

This assessment is based on interviews, discussions, and information from the Electricity Commission, government agencies, and organisations with responsibilities or interests in electricity generation, distribution, and use.

The PCE consulted:

- the Electricity Commission
- MED
- MFE
- EECA

The PCE sent letters to these organisations asking specific questions. The issues covered in the letters and the responses are incorporated in this report.

The PCE also sourced environmental reports and annual reports from the five main electricity generators/retailers.⁹

3.5.3 Scope

First assessment

The Commission was established in September 2003 and took over the regulation of the electricity sector in March 2004. The first assessment covered the period 1 March 2004 to 30 June 2004.

The approach in the first assessment was high level and focused on structural issues of form, process, organisations, and relationships. It provided an initial view about the prioritisation and development of key issues relating to energy policy.

Second assessment

In this second assessment, the focus is on those aspects of the Commission's processes, outputs, and outcomes that are relevant to the PCE's environmental priorities.

This assessment also examines the Commission's environmental responsibilities and comments on overlaps with other government agencies. The assessment sets out what future assessments will focus on and highlights the types of information the PCE will need to effectively assess the electricity sector's environmental performance in the future.

3.6 Assessment time frame

This second assessment (the first full-year assessment) covers the period from 1 July 2004 to 30 June 2005. As the report was written from August to December 2005, it refers to some events that happened after the assessment period that will be relevant to future assessments.

The most recently available data has been used to demonstrate environment-related trends in the electricity sector. Data has been used for the year ending 31 March 2005 wherever possible. Data for electricity prices and electricity consumption by sectors is available only up to 31 March 2004. Availability and timeliness of data is commented on in Section 6.2.

Future assessments will be conducted annually and linked to the Commission's reporting time frame.

3.7 Recommendations and actions from the first assessment report

The following actions have resulted from the seven recommendations included in the first assessment report.

3.7.1 Deliver the Commission's environmental sustainability framework

Although the Commission has drafted an environmental sustainability framework, the framework is still being internally reviewed. This delay creates a gap in the Commission's overall policy framework and, as a result, uncertainty about how it intends to achieve the environmental objectives contained in the Electricity Act 1992 and the GPS.

3.7.2 Address market barriers for demand-side initiatives and distributed generation

The Commission has recently established model agreements for distributed generation. The PCE will monitor the uptake and use of these agreements by electricity retailers and whether the agreements are effective in addressing market barriers to demand-side initiatives.

3.7.3 Consider demand-side initiatives and distributed generation as alternatives to transmission projects

The Commission has engaged consultants to investigate and evaluate alternatives to upgrading the transmission line to Auckland.

3.7.4 Examine transmission issues and the role of alternatives more closely

At the end of this assessment, the Commission was still evaluating Transpower's proposal for a line upgrade into Auckland. This evaluation included considering alternatives.

3.7.5 Clarify roles and responsibilities

The relationship between the Commission and EECA appears to be clearer now that a memorandum of understanding (MoU) has been signed. It took 18 months for the MoU to be finalised, which indicates the difficulties in clarifying roles.

Although the roles of the Commission and EECA are now clearer, areas of ambiguity remain. The PCE will continue to monitor the effectiveness of the MoU.

3.7.6 Clarify the wider policy direction for energy

The Government's Sustainable Development Programme of Action indicates commitment to developing a wider policy direction for energy. It is pleasing to note that this initiative considers all forms of energy i.e. electricity, gas and transport fuels. However, progress to date has been slow. While the Government is presently reviewing its overall energy policy framework, it is uncertain what further work will be done in this area and whether it will address the concerns raised by the PCE in the first assessment.

3.7.7 Improve data collection

The PCE notes a significant improvement in collaboration between agencies to develop improved energy statistics. Improvements in data collection and reporting are needed so that policy makers can make informed decisions. An example is MED's Energy End Use study involving EECA, the Commission, MoT, and Statistics New Zealand. The PCE will continue to monitor this work programme.

4 Developments in New Zealand's electricity sector

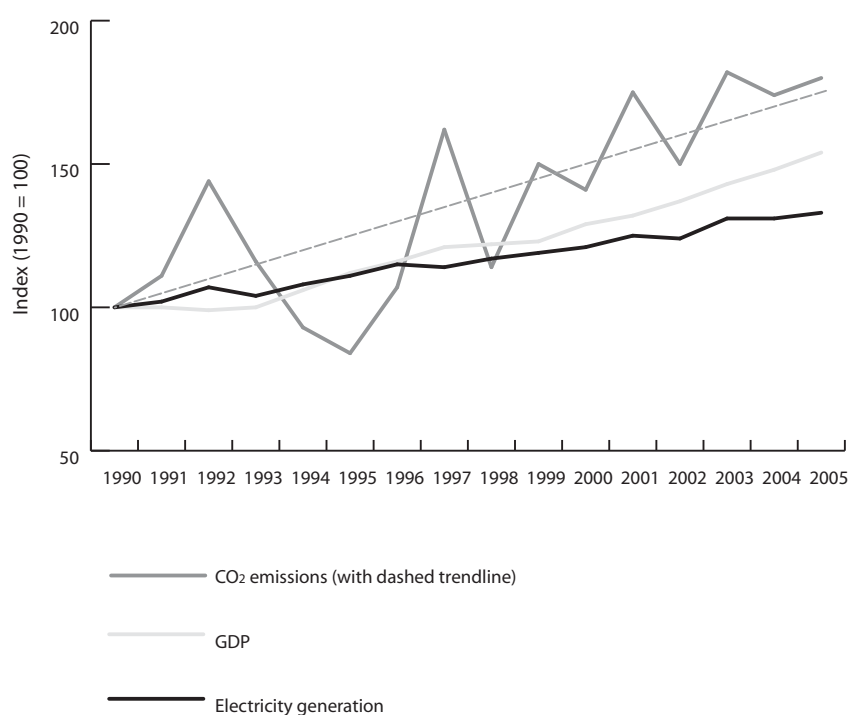
4.1 Electricity sector trends

The next section presents key trends in the electricity sector. The energy data is from MED's *Energy data file*¹⁰ and economic data is from Statistics New Zealand.¹¹ Data is based on the year ending 31 March 2005. More detailed information on electricity and energy trends is available in MED's *Energy data file* and *New Zealand energy outlook*.¹²

4.2 Uncoupling electricity generation, economic growth, and carbon dioxide emissions

Between 1990 and 2005 electricity generation in New Zealand increased by 33 percent, while Gross Domestic Product (GDP) increased by 54 percent. This indicates that the link between electricity generation and economic growth had not yet been broken (i.e. these trends had not been 'decoupled'). However, the trend since 2003 appears more promising. Between 2003 and 2005, electricity generation only increased by two percent, while economic growth increased by eight percent.

Figure 4.1 Uncoupling electricity generation, economic growth, and carbon dioxide emissions 1990–2005



Between 1990 and 2005, carbon dioxide (CO₂) emissions from electricity generation increased by 80 percent. This is significantly higher than the increases in electricity generation and economic growth over this time. This trend indicates that CO₂ emissions have not decoupled from electricity generation and economic growth.

This increase in CO₂ emissions has been caused by:

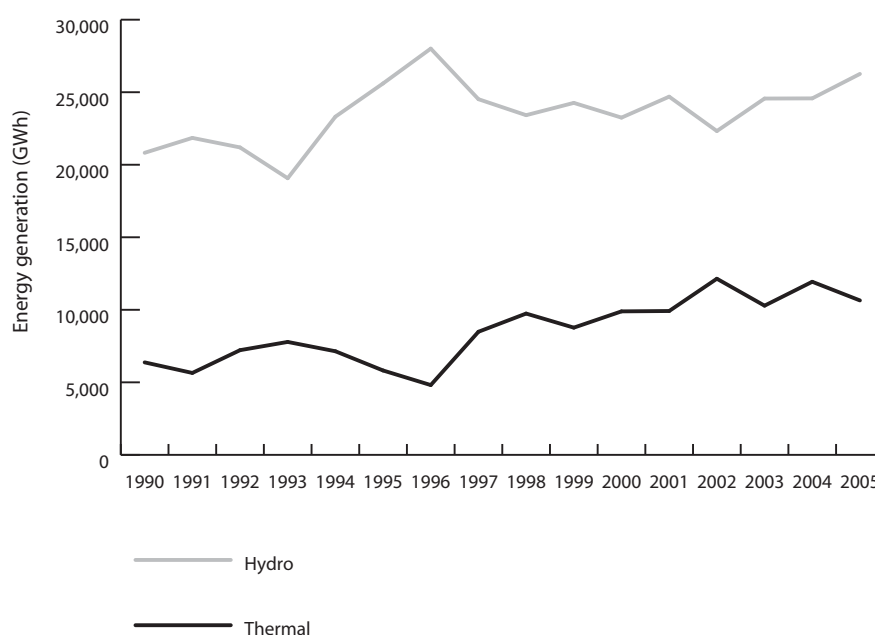
- a decrease in the proportion of electricity generated by renewable energy sources, i.e., over time, increases in electricity demand are being met mainly by non-renewable thermal generation (see Section 4.1.3)
- an increase in the use of coal for thermal electricity generation rather than gas at the Huntly power station.

4.2.1 Hydro and thermal electricity generation trends

New Zealand's electricity generation is dominated by hydro generation (approximately 60 percent), with short-term storage (six-eight weeks). Hydro generation fluctuates from year to year as a result of rainfall and snowmelt, and thermal generation is used to supplement it.

This characteristic leads to annual fluctuations in thermal generation, resulting in fluctuations in CO₂ emissions from electricity generation. Figure 4.2 illustrates the relationship between thermal and hydro generation in New Zealand.

Figure 4.2 Hydro and thermal generation 1990–2005



4.2.2 Changes in the electricity generation mix

The generation mix in New Zealand has changed significantly over time. As the availability and costs of resources and technology have changed, different generation types have been used to meet increasing demand. These changes are shown in Figures 4.3 and 4.4. In these figures, non-renewable thermal includes coal, oil, and gas, whereas renewable thermal includes geothermal, biogas, steam (waste heat), and wood.

Figure 4.3 Electricity generation mix (GWh) 1975–2005

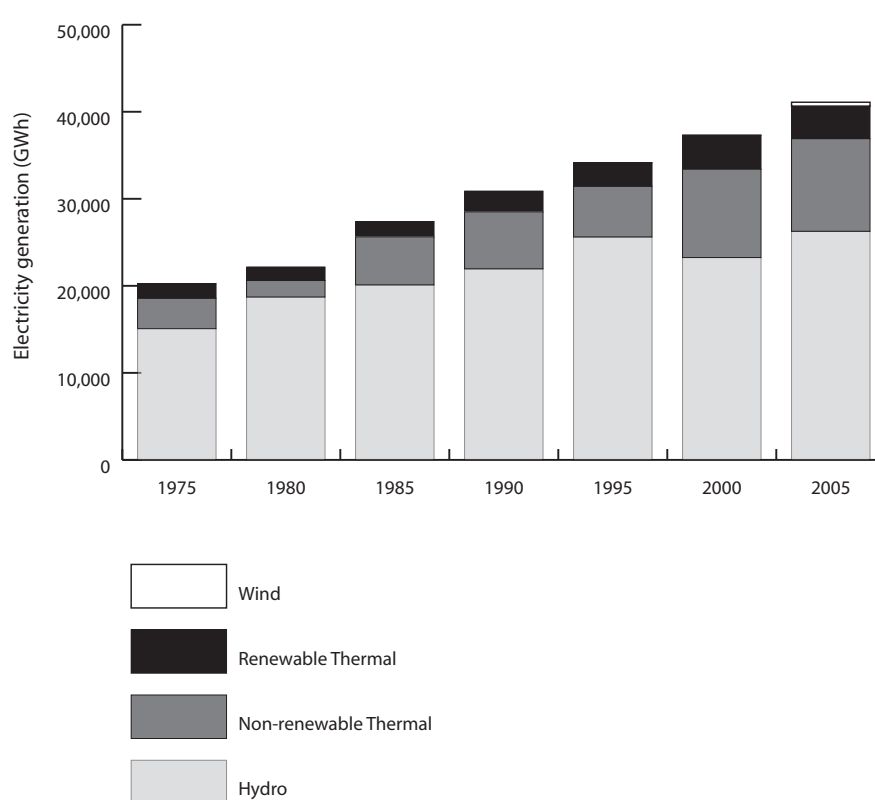
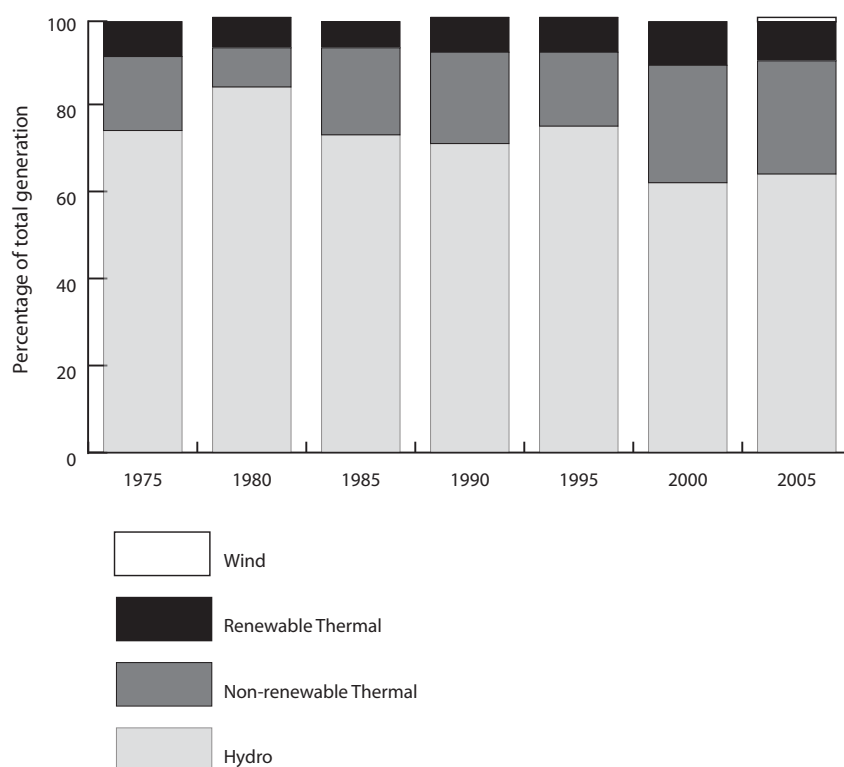


Figure 4.3 and 4.4 show the steady reduction in the proportion of electricity generation from renewable sources (approximately 10 percent over the last 30 years). Although many forms of renewable electricity generation have increased (i.e. hydro, wind, and renewable thermal), the increase has not kept pace with the increase in total electricity generation. The majority of the increased demand over this period has been met by non-renewable thermal generation. This leads to the adverse environmental effect of increased CO₂ emissions both in absolute and relative terms.

In addition, the growing reliance on fossil fuels means greater exposure to world fossil fuel price rises.

Figure 4.4 Electricity generation mix (%) 1975–2005

4.2.3 Renewable electricity generation

Figure 4.5 shows the proportion of electricity generation from renewable sources from 1990 to 2005, with non-hydro generation shown separately. This graph shows the scale of hydro generation compared to other renewables, the annual fluctuation in hydro generation, and the long-term trend of a reducing proportion of total generation from renewable sources.

4.2.4 Efficiency of thermal electricity generation

Figure 4.6 shows the trends in efficiency of thermal generation. To calculate the efficiency of thermal generation, we have summed the electricity generation and the fuel input for all forms of thermal generation, and divided the output by the input.

Note that up to 2001, all geothermal electricity generation was assumed to be 10 percent efficient. Since 2002, efficiency figures for geothermal have been calculated from input and output data provided by the generators. The small increase in efficiency over time is significant. The slight decrease in efficiency in 2005 is caused by an increase in generation from coal and a decrease in generation from gas. (Electricity generation from gas is more energy efficient than from coal.)

Figure 4.5 Electricity generated by renewable sources 1990–2005

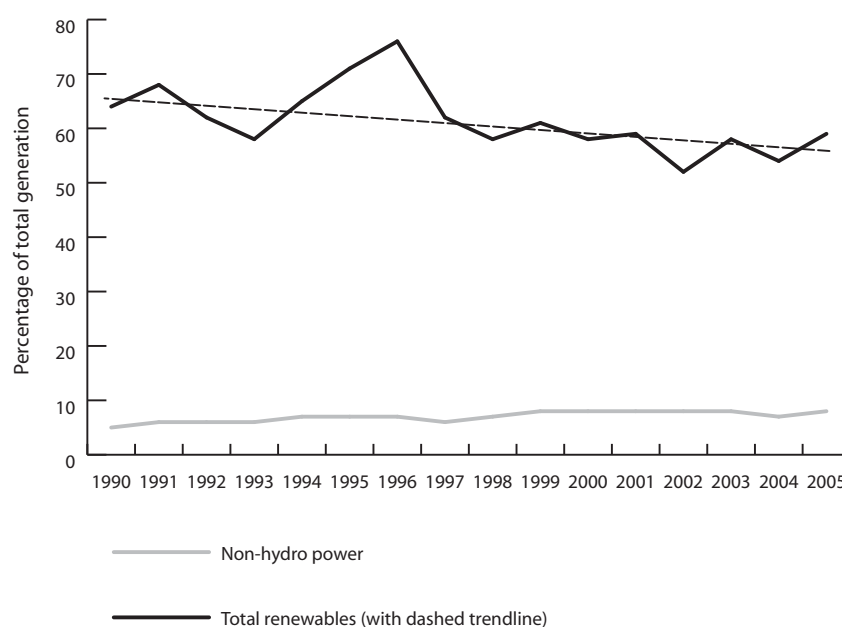
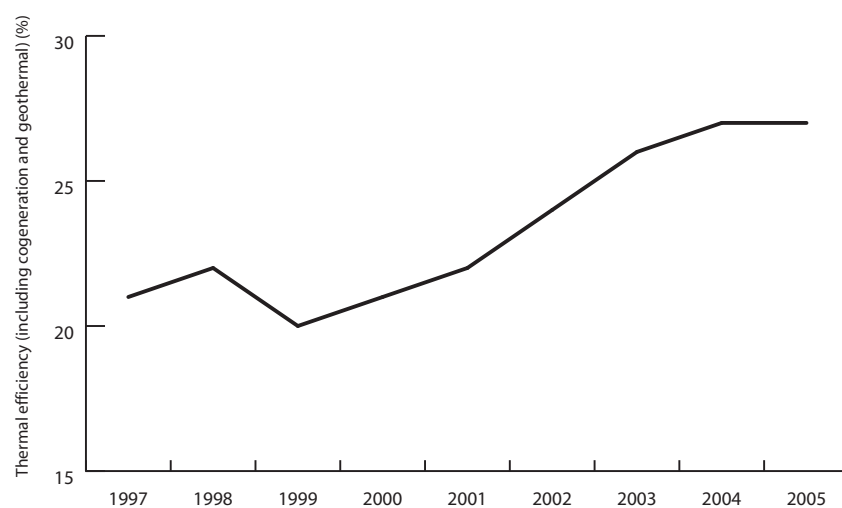


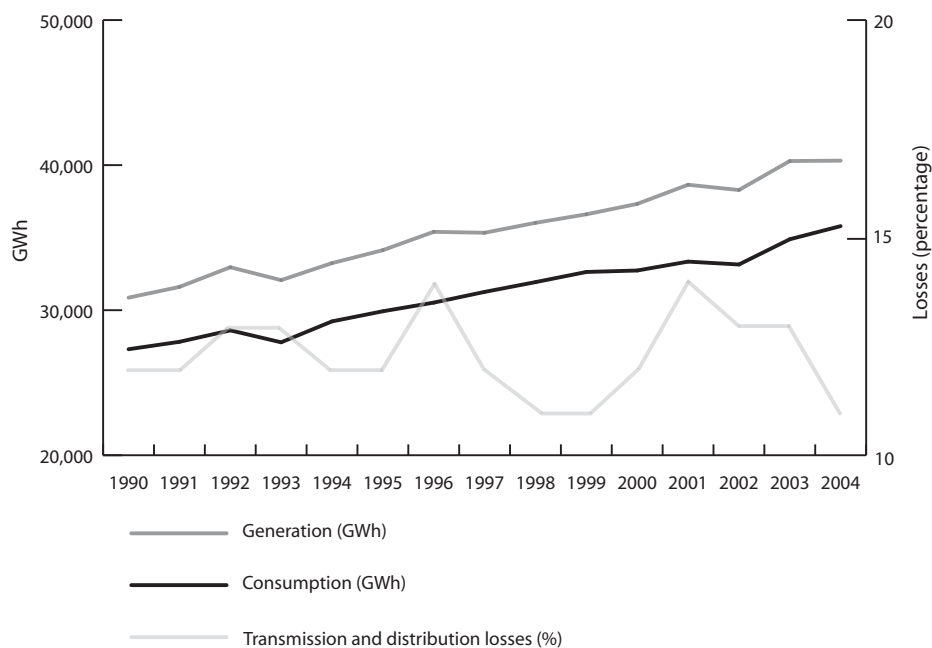
Figure 4.6 Efficiency of thermal electricity generation 1997–2005



4.2.5 Efficiency of electricity transmission and distribution

Figure 4.7 shows trends in electricity generation and consumption from 1990–2004. These trends are used as an indicator of transmission and distribution losses. This graph shows that transmission and distribution losses fluctuate within a narrow band between 11 and 14 percent.

Figure 4.7 Efficiency of electricity transmission and distribution 1990–2004



4.2.6 Industrial and commercial sector electricity use and economic growth

Figure 4.8 indicates that industrial and commercial sector electricity use and economic growth have both increased at a similar rate since 1990. However, data since 2002 suggests that these indicators are beginning to uncouple. It is difficult to determine how much this is attributable to improvements in energy efficiency or to changes in the structure of those sectors over this period.

4.2.7 Residential sector electricity use and population growth

Figures 4.9 and 4.10 show that electricity consumption in the residential sector is closely correlated to both population and the number of households. The change in electricity use per person and per household has changed by less than two percent over 13 years. In 2004 the residential sector's electricity consumption was 3,000 kWh per person per year and 8,200 kWh per household per year.

Figure 4.8 Industrial and commercial sector electricity use and economic growth 1990–2004

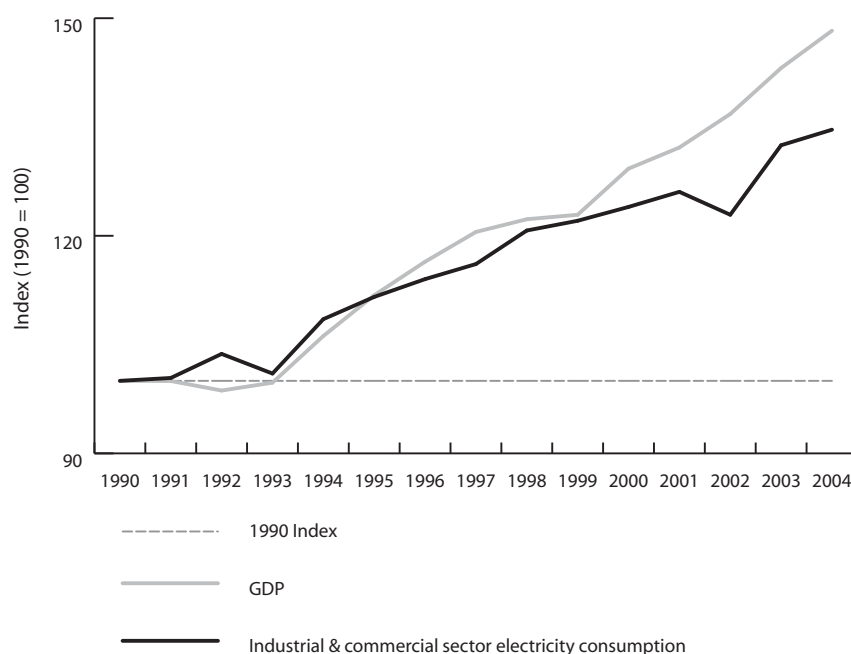


Figure 4.9 Residential sector electricity use, population, and number of households 1992–2004

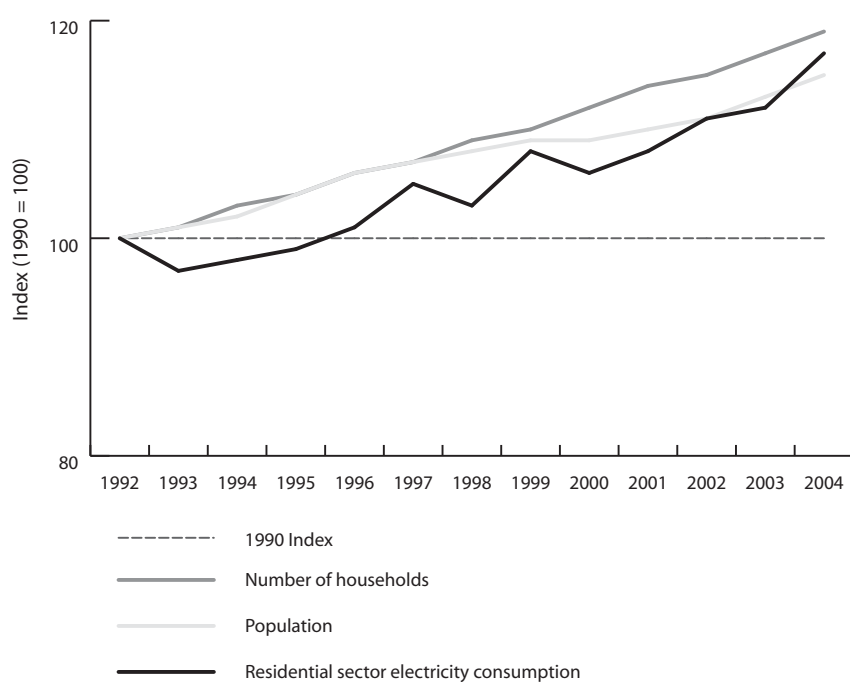
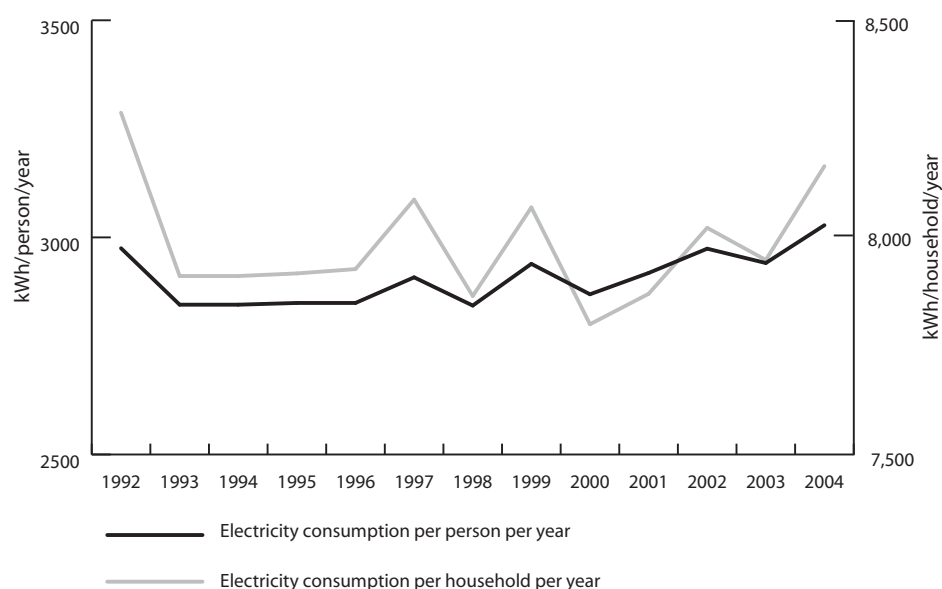


Figure 4.10 Residential sector electricity use per person and per household 1992–2004



4.2.8 Electricity prices

Figure 4.11 shows the real changes in electricity prices from 1990 to 2004. Note that commercial, industrial, and residential prices have been adjusted into real terms using different price deflators. Residential electricity prices include GST. Commercial and industrial electricity prices exclude GST.

Figure 4.12 shows nominal electricity prices from 1990 to 2004. Note that all prices exclude GST. Notice the rebalancing of electricity prices in the commercial and residential sectors, and the upward trend for all sectors over the last few years.

4.2.9 Key trends

Figures 4.1 to 4.12 clearly show some key trends:

- carbon dioxide emissions from electricity generation have been increasing at a faster rate than both the increase in electricity generation and growth of the economy.
- while economic growth and electricity generation are not yet decoupled, there are signs that some decoupling could now be occurring.
- the proportion of electricity generated from renewable energy sources is reducing.
- between 2003 and 2005 real electricity prices have increased for all sectors. These price increases are usually attributed to declining Maui gas (historically a low-priced source of energy) and increasing costs associated with accessing new sources of generation. This increase in real electricity prices may be a reason for the decoupling of energy consumption from economic growth in recent years.

Figure 4.11 Real electricity prices 1990–2004

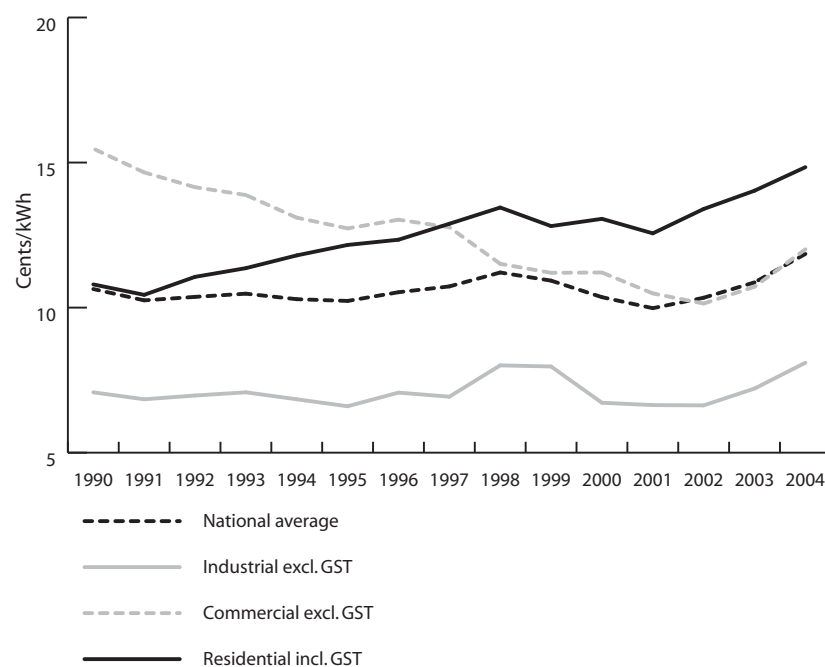
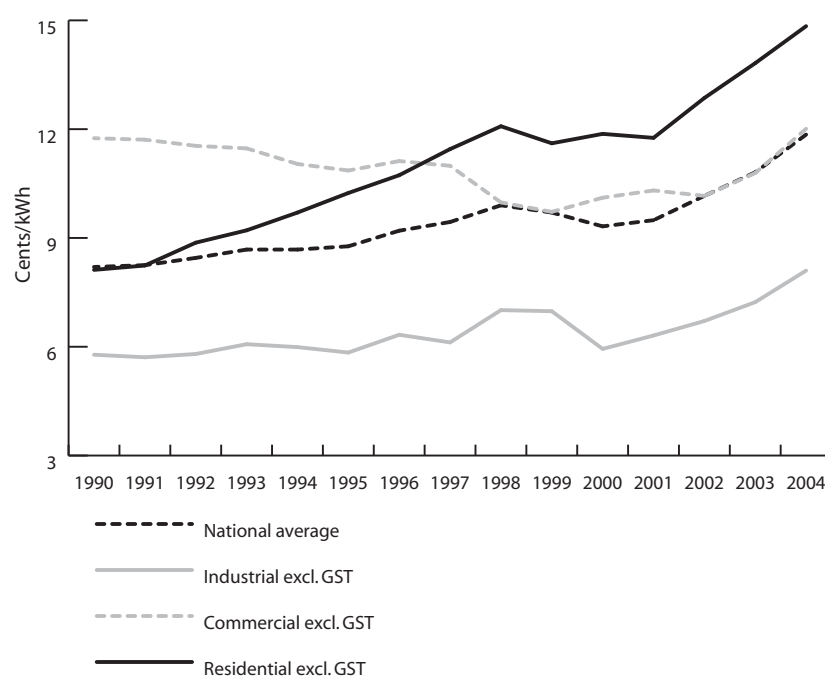


Figure 4.12 Nominal electricity prices 1990–2004



4.3 Electricity and energy policy issues

4.3.1 New Government Policy Statement on electricity governance

In October 2004 the Government published the final version of the GPS. This slightly amended the September 2003 draft. The key differences are:

- a requirement for the Commission to work with a broader range of stakeholders
- a requirement for the Commission to include customers on advisory groups
- a requirement for the Commission to contract an independent third party to review the effectiveness of the reserve energy policy
- a requirement that practical alternatives to transmission investment be considered.

These changes demonstrate how the GPS has evolved, but they do not impact significantly on the scope of the PCE's *Environmental performance assessment*.

4.3.2 Sustainable Development Programme of Action – sustainable energy

The policy framework articulated in the Sustainable Development Programme of Action aims to achieve three outcomes:

- energy use in New Zealand becomes progressively more efficient and less wasteful
- our renewable sources of energy are developed and maximised
- New Zealand consumers have a secure supply of electricity.¹³

In October 2004, the Minister of Energy released the discussion document *Sustainable energy: Creating a sustainable energy system for New Zealand*. This document discussed various options for establishing a comprehensive and integrated energy policy framework. The overarching goal of the framework is “to ensure the delivery of energy services to all classes of consumer in an efficient, fair, reliable and sustainable manner”.¹⁴

In the 2004 discussion document, sustainable energy is defined by three sets of characteristics, rather than specific outcomes. The characteristics are:

- reliability and resilience
- environmental responsibility
- fair and efficient pricing.¹⁵

No specific links exist between these objectives and that of maximising renewable sources of energy.

The document identified two key long-term challenges for the New Zealand energy system:

- global climate change
- the peak in global oil production.

A series of workshops on sustainable energy facilitated by MED was held in February and March 2005. The workshops' objectives were to present the ideas outlined in the sustainable energy documents, and to discuss with key stakeholders the energy challenges and opportunities facing New Zealand. The Government intends to use the results of these discussions to develop policies to take New Zealand further towards a sustainable energy system.

The PCE will follow the progress of this work to assess how it will impact on the environmental sustainability performance of the electricity sector.

4.3.3 Electricity and Gas Industries Bill 2004

The Electricity and Gas Industries Bill 2004 put in place a framework for the governance of the electricity and gas sectors to help achieve the Government's energy policy goals.

The Bill's explanatory note states the policy goal that "electricity is generated, conveyed, and supplied to all classes of consumers in an efficient, fair, reliable, and environmentally sustainable manner".

The Bill partially eases restrictions on lines companies owning electricity generation, and allows Transpower to contract for generation to manage grid reliability.

The Bill also clarifies the roles of the Commerce Commission and the Electricity Commission relating to the control of prices, revenues, and quality standards for electricity distribution businesses (lines companies).

The Bill was split and passed as the Electricity Amendment Act 2004 and the Gas Amendment Act 2004.

Electricity Amendment Act 2004

The Electricity Amendment Act 2004 gives new functions to the Electricity Commission and updates the Electricity Act 1992 to take account of this. It identifies the specific outcomes that the Government wants the Commission to achieve, including: security of supply; customer protection; competition; demand management; electricity efficiency and conservation; and the development of distributed generation. It also details the Commission's role in the planning and assessment of transmissions upgrades.

Gas Amendment Act 2004

The Gas Amendment Act 2004 provides for the establishment of an approved industry body to deliver the policy objectives in the Government's Policy Statement for the Gas Industry. The industry body is in the form of a gas industry company. (For more details, refer to www.gic.org.nz.) If this model is not successful, the Minister of Energy has the power to extend the Electricity Commission's responsibilities to include the gas sector.

4.3.4 Climate change policy review

In June 2005 the Government requested a review of climate change policy and objectives, and that officials report back to Cabinet by 31 October 2005.

The decision to conduct a review was based on two key factors:

- faster than expected growth in emissions, particularly in transport
- changes to New Zealand's forest sink position.

The release of revised forecasts for greenhouse gas emissions prompted the review. These forecasts indicate that New Zealand will not meet its emissions reduction target for the first commitment period (2008–2012) of the Kyoto Protocol, unless further measures are put in place.

The review was intended to investigate how New Zealand should respond to this forecast deficit against our Kyoto target. It was to consider how to address New Zealand's climate change goal (i.e. "to be set towards a permanent downward path for total gross emissions by 2012") in the context of forecast emissions. The review was to:

- consider whether to change the current climate change goal
- identify an appropriate mix of policies for New Zealand up to 2012 and beyond
- look at the implications for New Zealand if current, alternative, or additional climate change policies are adopted.

The results of the review were made public on 23 December 2005. The main outcome is that the Government will not be proceeding with the proposed carbon tax at this time and will consider other measures to ensure that New Zealand meets its Kyoto commitments.

The implications for the review on the environmental sustainability of the electricity sector will be considered in the next assessment.

4.3.5 Resource Management Act 1991

The RMA is the core piece of legislation intended to promote the sustainable management of natural and physical resources in New Zealand. By bringing together

laws governing land, air, and water resources and concentrating on the environmental effects of human activities, the RMA introduced a new approach to environmental management.

The Resource Management Amendment Act 2005 was passed in August 2005 following a government review of the RMA. The amendments aim to improve the RMA's operation by addressing problems with delays, costs, inconsistencies, uncertainty, and national leadership in RMA processes and decision making.

The amendments focus on five key areas for improvement:

1. National leadership
2. Decision making
3. Local policy and plan making
4. Certainty on consultation and iwi resource planning
5. Certainty over natural resource allocation.

The key areas relating to energy and environmental outcomes are likely to be: improved national leadership; improved local policy and plan making; and improved natural resource allocation.

Improved national leadership

Key changes likely to impact on energy issues include:

- development of a new, abridged, alternative process for the development of national policy statements
- changes to clarify the relationship between National Environmental Standards (NESs), regional and district plan provisions, designations, and bylaws
- councils will need to ensure that their policy statements and/or plans give effect to a national policy statement
- where appropriate, national environmental standards will become absolute (i.e. councils cannot be more lenient or impose stricter controls through resource consents or plan provisions)
- to provide central government will a range of more flexible tools to meet the needs of decision makers, applicants, and communities when considering resource consent applications, requests for plan changes, requests for the preparation of a regional plan, or notices of requirement to present issues of national significance.¹⁶

We also note that, aligned with the legislative changes in the Resource Management Amendment Act, the Government has signalled its intention to prepare national policy statements and/or national environmental standards on electricity transmission and electricity generation.

Improved local policy and plan making

The Resource Management Amendment Act gives regional councils new functions and strengthens the effect of regional policy statements.

The new functions that have the potential to impact on energy matters are the allocation of selected natural resources and “the strategic integration of infrastructure with land use through objectives, policies, and methods”.¹⁷ Infrastructure is defined as including, among other things, “pipelines that distribute or transmit natural or manufactured gas, petroleum, or geothermal energy”; and “facilities for the generation of electricity, lines used or intended to be used to convey electricity, and support structures for lines used or intended to be used to convey electricity”.¹⁸

Changes have also been introduced to make regional policy statements more effective. Both regional and district plans must now “give effect to” regional policy statements. This is stronger than the previous requirement that plans be “not inconsistent with” the regional policy statements.

Regional policy statements should now provide clearer and stronger directions on how local authorities are to manage their environmental issues.¹⁹

Improved natural resource allocation

These changes clarify the regional councils’ role in relation to resource allocation by explicitly providing for the ability, where appropriate, for the establishment of rules in a regional plan to allocate any of the following natural resources:

- the taking or use of water (other than open coastal water)
- the taking or use of heat or energy from water (other than open coastal water)
- the taking or use of heat or energy from material surrounding geothermal water
- the capacity of air or water to assimilate the discharge of a contaminant.

In addition, if appropriate, a regional council may, in conjunction with the Minister of Conservation:

- establish rules in a regional coastal plan to allocate the taking or use of heat or energy from open coastal water
- establish a rule in a regional coastal plan to allocate space in a coastal marine area.

4.3.6 National Air Quality Standards

National Air Quality Standards (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) have been developed and implemented. Some elements of the standards came into force on 8 October 2004, and others on 1 September 2005.²⁰

Seven standards ban various activities resulting in the discharge of specified toxic substances into the air above specified thresholds. Five ambient air quality standards must be monitored, reported on, and controlled. (The controls relate to carbon monoxide, fine particulates (PM₁₀), nitrogen dioxide, sulphur dioxide, and ozone.)

The standards will impact on the issuing of resource consents. No consent can be issued for any of the banned activities. The impact on issuing resource consents in relation to the five air quality standards that must be attained will depend on the standard in question. In some cases, where it has been projected that specified air quality standards cannot be met by 1 September 2013, consent applications will be declined.

This subordinate legislation may impact on resource consent applications for new thermal electricity and heat plant projects in towns and cities in New Zealand.

4.4 Demand-side developments

4.4.1 NEECS review

The NEECS was prepared as a requirement of the Energy Efficiency and Conservation Act 2000 and released in September 2001.²¹ EECA leads and coordinates the implementation of this whole-of-government strategy.

The NEECS has two high-level targets:

- energy efficiency – at least a 20 percent improvement in energy efficiency by 2012²²
- renewable energy – an increase in New Zealand's supply of renewable energy by a further 30 PJ by 2012.²³

EECA led the development of the NEECS and is now responsible for its review. Progress towards the energy efficiency target in particular has not been significantly different from business as usual (a one percent improvement in the first three years, against a target of a 20 percent improvement over 10 years). The review will re-evaluate the goals for energy efficiency, energy conservation, and renewables over the next three to five years and may or may not result in a replacement NEECS.

The review has begun by benchmarking current performance and approaches against international best practices. This process was due to be completed in October 2005.

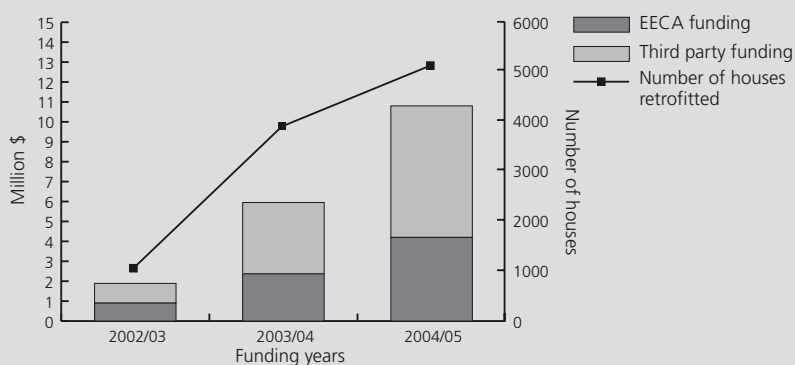
If the Minister of Energy and the Cabinet approve the NEECS review, a draft NEECS II strategy is due to be released for public consultation in 2006.²⁴

Improving insulation for low-income households

Seventy percent of New Zealand houses were built before insulation became mandatory in 1977.

EECA's EnergyWise Home Grants Scheme targets uninsulated homes occupied by low-income earners, with the aim of installing energy efficient measures in all such homes by 2016. To achieve this target, EECA have significantly increased the scale of the EnergyWise Home Grants Scheme in the past few years.

EnergyWise home insulation retrofits and funding 2002 to 2005



In 2004/05 the scheme supported insulation improvements in 5,059 houses – over 1,000 more than in 2003/04.

4.4.2 Memorandum of understanding between EECA and the Electricity Commission

EECA and the Commission signed an MoU in August 2005 as required by the GPS. The MoU:

- details working principles and arrangements between the parties to avoid duplication of effort and waste of resources
- defines the roles and responsibilities of both the Commission and EECA in energy efficiency, demand response, and renewables (and acknowledges the overlap in roles and responsibilities)
- includes a protocol that sets out how the organisations should work together
- sets out categories of activities – independent, cooperative, and neutral – based on expected overlap.

The MoU is discussed further in Section 5.3.3.

4.5 Supply-side (generation) developments

4.5.1 Fossil fuel generation

Huntly e3p plant

Genesis Energy is building a new 365 MW combined cycle gas turbine plant called Huntly e3p (Huntly Energy Efficiency Enhancement Project). In August 2004, the Government announced that it would enter into a risk-sharing agreement for the plant with Genesis. The decision was based on the requirement for a secure supply of electricity in the medium term that will support economic growth and enhance New Zealand as an investment destination. Without the commitment from the Government, Genesis might not have proceeded with this project.

Construction started in February 2005 and commissioning is scheduled for 2007. At 365 MW, e3p will be the largest single electricity generation project since the 380 MW Otahuhu B combined cycle gas turbine plant (commissioned in 2000). Huntly e3p is similar in size to the 367 MW Taranaki combined cycle gas turbine plant commissioned in 1998.

In terms of scale, the output from e3p is predicted to provide three years of electricity demand growth.

Gas and liquefied natural gas

Contact Energy and Genesis have completed a joint study investigating the feasibility of importing LNG for electricity generation. The study concluded that importing LNG is technically and financially feasible. From the information made publicly available this study did not assess the project in terms of its environmental sustainability. Favourable delivery sites in the Taranaki region and at Marsden Point have been identified. Technical investigations at each of these sites have been initiated.

Contact Energy is also investigating the feasibility of importing compressed natural gas (CNG) as a further option, although the technology for shipping large quantities of CNG has not yet been commercialised.

Coal

Solid Energy is investigating a 150–250 MW coal-fired power station in the Buller region. They are also investigating the viability of a coal-fired power station in Southland, near Comalco's Tiwai Point aluminium smelter.

Mighty River Power has plans to re-power its Marsden B power station as a 320 MW coal-fired plant. Mighty River Power has recently obtained resource consents from regional and district councils for the plant, but has appealed some conditions of the consents. Other parties have also appealed the decision on environmental grounds.

Whirinaki power station

In June 2004 the reserve power generator at Whirinaki was commissioned. This is a 150 MW diesel-fired open cycle gas turbine. Whirinaki's operation throughout this assessment period is discussed in Section 5.4.6.

4.5.2 Renewable energy developments

Wind generation

MED and EECA collaborated on a high level wind study²⁵ to investigate integration of wind-generated electricity into New Zealand's electricity system. The study estimates that New Zealand's electricity system could cope with about 35 percent wind generation at peak demand, based on the installed capacity and an annual market share of 20 percent. These estimates are based on technical and operational issues only. The Electricity Commission is conducting a more detailed investigation into the technical and market issues relevant to wind generation.

In July 2004 the first power was generated from Meridian Energy's Te Apiti wind farm in Manawatu. The 90 MW project was completed in December 2004 and is New Zealand's largest wind farm.

Table 4.1 Wind projects with confirmed resource consents

Project name	Developer	Size (MW)	Location
Tararua III	TrustPower	120	Manawatu
White Hill	Meridian Energy	58	Southland
Te Rere Hau Wind Farm	NZ Windfarms	49	Manawatu
Awhitu	Genesis Energy	18	Auckland
Total		257	

Table 4.2 Wind projects currently in the resource consent process

Project name	Developer	Size (MW)	Location
Hawke's Bay Wind Farm (Titiokura)	Hawke's Bay Wind Farm Limited	225	Hawke's Bay
West Wind	Meridian Energy	210	Makara, Wellington
Stage 1 – Titiokura Saddle	Unison Wind Farm	48	Hawke's Bay
Stage 2 – Te Waka	Unison Wind Farm	111	Hawke's Bay
Awakino	Ventus	27	Awakino, Waikato
Total		621	

Table 4.3 Wind power proposals currently being investigated

Project name	Developer	Size (MW)	Location
Rocklands	Meridian Energy	675	Otago
Turitea	Mighty River Power	120	Manawatu
Seddon	TrustPower	90	Marlborough
Wainui Hills	Wainui Hills Wind Farms	30	Wainuiomata, Wellington
Middlemarch	WindPower Otago	25	Middlemarch, Otago
Poverty Bay	Eastland Network	12	Poverty Bay
Ahipara	Meridian Energy	†	Northland
Pouto	Meridian Energy	†	Kaipara Harbour, Northland
Redhill	Northpower	†	Northland
Horehore	Genesis Energy	†	Poverty Bay
Total		952	

† No information available at time of writing.

In addition, the Wellington Regional Council is investigating the possibility of two wind farms in the Wellington region: an 80 MW wind farm in Belmont and a 40 MW wind farm in Puketiro. However, no developer has been identified for these projects.

Swift rooftop wind energy system

Erect your own wind turbine.

It may sound like the stuff of fantasy, but as microgeneration technology takes giant strides forwards, it's becoming increasingly feasible. The Swift turbine attaches on to your house like a satellite dish, is just 2.1 metres in diameter and can provide up to 80% of a household's electricity.²⁶

An Edinburgh company has developed an award-winning rooftop-mountable wind turbine. The Swift turbine provides a cost-effective renewable energy source for households, communities, and industrial use. The Swift can be either grid connected or linked to a hot water cylinder.

Swift rooftop-mountable wind turbines have an output of 1.5 kW and are estimated to provide 2,000–3,000 kWh of electricity per year. This is equivalent to about one-third of the total electricity requirement for the average New Zealand household.

Swift wind turbines are currently being installed across the United Kingdom.

For more information on Swift wind turbines visit
<http://www.renewabledevices.com/swift/index.htm>

Hydro generation

Meridian Energy's decision to abandon Project Aqua in the lower Waitaki River has spurred debate on the future of large hydropower projects.

Meridian has completed a pre-feasibility study for an underground hydropower station (210–260 MW) at Stone Wall using water from the lower Waitaki.

Several existing hydro generators have planned, initiated, or completed projects to increase the output of existing hydro generation plant. An example is Meridian Energy's Manapouri Efficiency Improvements – Part 2 project, which is scheduled for completion in 2008 and will add 16 MW of capacity. Other improvements to existing hydro plants have been investigated and implemented by TrustPower and Contact Energy.

In July 2005 TrustPower applied for resource consent for a new hydropower project of approximately 50 MW in Marlborough's Wairau Valley. The hearing on the application is due to be held in the first quarter of 2006.

Geothermal generation

In June 2005 Contact Energy commissioned a new energy-efficient binary plant at the Wairakei geothermal station. This plant makes better use of heat extraction, adding an additional 16 MW of generation capacity from the same amount of geothermal fluid.

Drilling commenced in April 2005 on new geothermal wells at Te Mihi, Taupo. These wells are expected to add a further 25 MW of capacity to the Poihipi and Wairakei power stations by 2007.

Contact Energy plans to commence drilling at Ohaaki in November 2005, which will add 14 MW of capacity by 2006.

Ngawha II in Northland is expected to provide an additional 15 MW of capacity by 2008 if resource consent approvals are obtained.

Bioenergy

The Government is making \$1.8 million available over five years through the *Forest industry development accord* to help the forest industry increase its uptake of bioenergy. This area of funding includes, but is not limited to, the generation of electricity. EECA is administering this programme and has recently established an advisory group. The advisory group has identified the following themes:

- information
- engineering
- feasibility
- demonstration.

Solar generation

Solar water heating systems continued to be installed at an increasing rate, with a 55 percent increase (based on collector surface area) for the year ending January 2005 compared to the previous year.²⁷

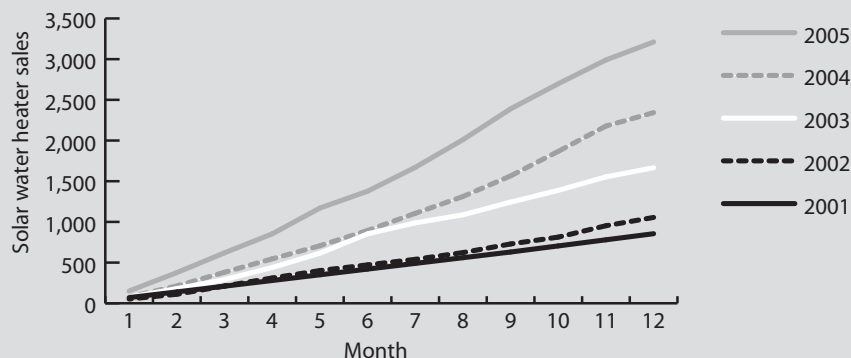
The Government continues to support a finance scheme based on interest-free loans to encourage the uptake of solar water heating, although the scheme does not necessarily cover all the finance costs.

It is estimated that the installation of solar water heaters avoids the need for 60 GWh per year of electricity generation (based on figures available to December 2004).

Sales of solar water heaters are increasing steadily

Installation of solar water heaters has a direct effect on the demand for electricity for household or commercial applications. Sales of solar water heaters have been consistently increasing in New Zealand over the past 5 years.

Monthly cumulative total solar water heater sales



Rising electricity prices have highlighted the benefits of solar water heating. This, combined with an increased numbers of suppliers/installers selling systems, contributed to the installation of 3,200 solar water heaters in 2005. This represented a growth rate of 45 percent compared to the figures for 2004. This growth is likely to continue as the benefits of solar water heating become more apparent and more tradespeople become skilled in installing the systems.

Source: Solar Water Heating Industry Association.

4.6 Transmission and distribution issues

In December 2004 Transpower released a document titled *Future of the National Grid – Transmission Plan Summary*.²⁸ The document included proposals to further develop the national grid with total costs estimated at \$1.5 billion by 2010, and outlined three major projects:

- Upper North Island – a new 400 kV transmission line between Whakamaru and Otahuhu in the North Island, and plans to reinforce supply from Otahuhu to the North Isthmus Region (North Auckland)
- Christchurch and Upper South Island – a new 400 kV transmission line between Waitaki Valley and Islington
- HVDC Link – an upgrade of the high voltage direct current (HVDC) link between the North Island and the South Island from 1,040 MW to 1,400 MW.

In April 2005 Transpower submitted details of a comprehensive programme of regional upgrades to the national grid to the Electricity Commission. (See Section 5.4.1 for more details.) The list consists of 30 projects, several of which have now been completed while others are still in the planning stages. The five most costly regional upgrades are:

- Bunnythorpe-Tokaanu
- Islington-Kikiwa
- New substation, Waipara
- Blenheim-Stoke
- Islington-Livingstone

A full list of these regional upgrade projects is available from the Transpower website: www.transpower.co.nz.

A significant change to the Electricity Act 1992 now allows lines companies to invest in electricity generation for supply within their distribution network. This issue is discussed in detail in Section 6.8.

4.7 Electricity prices and market developments

4.7.1 Low fixed-charge tariff option

In September 2004 new regulations came into force compelling all electricity retailers to make available a low fixed-charge tariff option. The fixed-charge portion must not exceed 30 cents per day excluding GST. This tariff is expected to benefit residential customers who use less than the average 8,000 kWh of power per year.

The Electricity Commission is responsible for collecting information on the uptake rate of the low fixed-charge tariff. The initial uptake has been significant at about 30 percent.

4.7.2 Retail competition, the Fair Trading Act, and the Commerce Act

The Commerce Commission recently initiated an investigation under Part 2 of the Commerce Act 1986 into the wholesale and retail electricity markets.

The Commerce Commission has concerns about the compliance of electricity retailers with the Fair Trading Act 1986 and the Commerce Act 1986.²⁹

The Commerce Commission has prosecuted Mighty River Power in the past. It has recently settled with Meridian Energy, TrustPower and Contact Energy, and is currently prosecuting Empower and Bay of Plenty Electricity. It also has several alleged anti-competitive behaviour investigations underway.

These issues are discussed in detail in Section 6.5.

Smart meters

Smart meters are capable of measuring and recording electricity usage in real time. They have many uses beyond simple monthly billing, such as demand-response programmes and two-way communications to allow remote meter reading.

Smart meters allow electricity retailers to charge different rates for peak and off-peak power. The meters provide accurate information to consumers to enable them to better manage their electricity use. Consumers can save money by using power at off-peak times, for example by setting the dishwasher or washing machine to operate at night. This reduces consumption at peak periods resulting in more efficient use of energy.

Most of New Zealand's meters are over 40 years old. Meridian Energy recently commenced a pilot project to install 6,300 smart meters throughout central Hawke's Bay by the end of 2006.

Australia has installed more than 200,000 smart meters since 2004 and 25,000 consumers are now charged on a time-of-use basis.

United States utilities are required to provide a time-based meter capable of enabling time-of-use billing to all customers who request one.

Ontario has established targets for the installation of 800,000 smart electricity meters by 2007 and installation of smart meters for all consumers by 2011.

4.7.3 Load control and smart metering

In August 2005, the Electricity Commission released consultation documents on the use of load management of water heaters as a measure to improve security of supply.

Within this assessment period the Electricity Commission established a load management advisory group that is investigating the potential value and use of load management within the New Zealand electricity system.

Meridian Energy's business unit, Arc Innovations, has announced a project to install over 6,000 TOU meters in the Central Hawke's Bay lines company area. The new technology has two-way communication capacity, allowing an electricity meter to be read, monitored, and managed remotely.

These issues are discussed in more detail in Sections 5.4.3, 5.4.4, and 6.6.

5 Assessment of the Electricity Commission's environmental performance

5.1 Overview of the Electricity Commission

5.1.1 Introduction

The Electricity Commission is a Crown entity established in September 2003. The Commission oversees New Zealand's electricity industry and markets. It regulates the operation of the industry and its wholesale and retail markets in accordance with the Electricity Act 1992 and government energy policy.

The Commission has a full-time chair, four part-time commissioners, and 40 staff.

Its main objectives are:

- to ensure that electricity is produced and delivered to all classes of customers in an efficient, fair, reliable and environmentally sustainable manner
- to promote and facilitate the efficient use of electricity.

The Commission has a broad mandate including industry regulation, approving grid investment decisions, and facilitating improvements in efficient electricity use. The Commission is required to deliver outcomes specified in the GPS.³⁰

5.1.2 Key work streams

The Electricity Commission identified the following work streams in their fourth quarterly report to the Minister of Energy:

- transmission
- security of supply
- modelling
- retail and distribution
- electricity efficiency
- wholesale
- common quality
- market governance
- corporate services.³¹

5.2 Environmental sustainability framework

In our first assessment we reported that “at the end of this assessment period, the Commission was developing an environmental sustainability framework to guide its activities”. We understand that work on the framework has progressed, but it has not yet been finalised.

This slow progress concerns the PCE because, in the interim, the Commission’s other work streams have advanced without any clear guidance on how environmental sustainability is being incorporated into its decision making.

The PCE expects the environmental sustainability framework to be completed and integrated into the Commission’s day-to-day activities before the next assessment. (See Recommendation 1.)

5.3 Demand-side programmes

5.3.1 Electricity efficiency pilot programmes

An important objective for the Commission is to promote and facilitate the efficient use of electricity. The Commission can recover the costs of electricity efficiency initiatives from industry participants by way of a levy, and has significant funding available to invest in electricity efficiency.

Within the assessment period the Commission funded five electricity efficiency pilot programmes and was negotiating a further three pilots to fund. These pilot programmes were developed with EECA to eliminate any overlap. EECA also provided technical input to help the selection panel decide which organisation would implement the projects.

The Commission has initiated pilot programmes in the following areas:

- light bulbs (compact fluorescent)
- commercial lighting
- old fridges
- water heating
- industrial motors.

The pilot programmes were established to test the electricity efficiency potential of several ideas. In particular, the Commission wanted to test:

- the delivery mechanism
- customer response rates

- outcomes achieved
- how to scale up the pilot programmes.

The pilot programmes are expected to be completed in mid-2006 and evaluated by the end of 2006.

The PCE welcomes the improvements in electricity efficiency that will result from these pilot programmes. This activity is encouraging and we await the evaluation of their effectiveness.

5.3.2 Electricity efficiency potentials study

The Commission is required³² to work with EECA on a comprehensive review to quantify the cost-effective potential of electricity efficiency, and to estimate the investment required to realise this potential.

Both the Commission and EECA have reported that they are working together on this study as part of the NEECS review.

The Commission circulated a request for proposals for an electricity efficiency potentials study on 21 October 2005, and proposals were due on 22 November 2005. The project is expected to take 6–12 months to complete.

5.3.3 Memorandum of Understanding with EECA

The MoU with EECA was signed in August 2005, nearly two years after the Commission was established. This agreement took longer to finalise than expected. The MoU is available on both the Commission's and EECA's websites.

Work streams have been divided into three categories: independent; cooperative; and neutral. These categories are broadly defined as follows:

- independent – both parties' activities must be pursued independently for statutory responsibilities to be fulfilled
- cooperative – the parties should work together to advance the objective
- neutral – both parties should be aware of each others' activities, but cooperation is not required to advance the work streams.

For exact definitions, see the MoU document at www.electricitycommission.govt.nz/pdfs/opdev/elec-efficiency/MoU-Aug-05.pdf.

The MoU identifies nine independent activities and one neutral activity for the Electricity Commission. It identifies no independent activities for EECA and 20 neutral activities. A total of 19 activities have been defined as cooperative. The lead agency for each activity has been identified, except for two activities where both organisations have joint responsibility.

Examples of the Commission's independent activities include transmission and the development of market rules.

Table 5.1 shows the cooperative activities and the lead agency for each.

Table 5.1 Cooperative activities identified in the MoU between EECA and the Electricity Commission

Cooperative activities	Lead agency
NEECS Review	EECA
Transmission alternatives evaluation	Electricity Commission
Enabling demand-side management	Electricity Commission
Existing demand-side management	EECA
Technical advisory group	Electricity Commission
Demand response	EECA
Research	Both
Electricity efficiency pilot projects	Electricity Commission
Electricity efficiency plan	Electricity Commission
Electricity efficiency potential study	Both
Energy audits	EECA
Energy-intensive businesses	EECA
Emergency electricity conservation campaign	Electricity Commission
Scenario development	Electricity Commission

The Chair of the Electricity Commission has acknowledged that it is unusual for two organisations to have such a similar mandate. The key difference is that EECA has a broader energy efficiency mandate (i.e. it must address all fuel types), and it receives funding from the Crown. The Commission has a mandate only to improve electricity efficiency, and is funded by an industry levy.

The PCE acknowledges that the MoU signing is an important step in clarifying each agency's roles and responsibilities. However, the number of cooperative activities, and the considerable time taken to finalise the MoU, indicate a lack of certainty over roles and responsibilities in the area of electricity efficiency.

Further effort is required to reduce duplication and assign clear accountability to avoid overlap in the goals and activities of the two organisations. In the interim, both agencies appear to be working collaboratively and keeping each other informed of their activities and plans. (See Recommendation 8.)

5.3.4 Progress and budget issues

Recent presentations by the Chair of the Electricity Commission³³ have included information about the budget available for electricity efficiency: \$2.5 million

in 2004/05. However, in the 2005 annual report this budgeted amount had changed to \$1.87 million, but actual expenditure was only \$215,000.³⁴

The PCE appreciates there may be valid reasons for the under spending, but recommends that the Commission report actual expenditure on electricity efficiency initiatives with the budget figures.

The under-spending in the first year is understandable, because the goals the Commission set itself were extremely challenging. Although progress has been delayed, solid outcomes are expected from the Commission's electricity efficiency initiatives in future years. The PCE understands that investment in electricity efficiency must be based on solid analysis and that prudent expenditure of public funds is essential. However, it is disappointing that the available resources and funds could not be fully utilised in this area.

The PCE recommends that the Commission consider funding additional pilot projects, and/or expanding the most successful current pilot projects. In the longer term more planning is needed to ensure that future programmes fully and constructively utilise the available resources.

5.3.5 Conclusions

Solid progress has been made with the Commission's electricity pilot projects and potentials study. Further steps are required to clarify the roles and responsibilities of EECA and the Commission.

The electricity efficiency budget is not yet being fully utilised.

The PCE will continue to report on the Commission's demand-side initiatives as part of the environmental performance assessment.

5.4 Supply-side programmes

5.4.1 Transmission

Transmission upgrades and Grid Investment Test

In the first assessment, the PCE expressed concern that the Grid Investment Test seemed to disadvantage alternatives to transmission. The PCE recognises that a robust national grid is necessary for a sustainable electricity system. However, transmission upgrades are costly. Large increases in transmission capacity can lock out lower-cost alternative investments in distributed generation and energy efficiency and perpetuate the reliance on large-scale remotely located generation.

It is important, therefore, that the assessment process considers all alternatives in a fair, balanced, and integrated manner.

Consultation

A decision on Transpower's first major proposal for the future upgrading of the grid – the 400 kV link from South Waikato into Auckland – is not expected until early in 2006. However, the Commission has produced a detailed consultation paper called *Options for enabling transmission alternatives*³⁵ and has held several public meetings in the Waikato region.

The consultation paper categorises the alternatives into three types – transmission, generation, and demand-side. Transmission alternatives include upgrading the capacity of the existing line and placing the proposed new line underground for part of the route. Generation alternatives include various possible gas- and coal-fired generation plants in the region, including shifting Whirinaki closer to Auckland, and a range of smaller distributed generation possibilities. Demand-side alternatives include network load management, gas substitution, and a range of energy efficiency improvements.

Ranking the alternatives

The Commission has ranked these alternatives according to the speed at which they believe they can be introduced. Many of the demand-side and distributed generation alternatives are ranked relatively low. This strongly suggests that significant market barriers remain in these two important areas. The PCE urges the Commission, in conjunction with EECA, to look at how it can facilitate these alternatives, including, if necessary, rule changes to remove market barriers.

Looking for long-term solutions

As noted above, the Commission has spent only a fraction of its budget on its electricity efficiency work stream to date. The Commission could consider targeting some of the unspent funding from this programme to those regions where transmission constraints exist. This approach would be consistent with the efficiency and environmental goals set out in the GPS, and would demonstrate an integrated approach to addressing the problem.

The Commission has been handed a complex task in implementing the Grid Investment Test. Looming constraints in generation and transmission capacity have created a sense of urgency. The situation reflects past failures in addressing growing electricity demand, and a possible weakness in the market to ensure security of supply. However, it is important that both the Commission and the Government look beyond the traditional large-scale, supply-side interventions for long-term solutions that ensure the electricity system is environmentally, economically, and socially sustainable.

5.4.2 Distribution

Within the electricity industry, the pricing controls for lines companies provide a perverse incentive with regard to network system losses. Although line charges have price controls, a lines company's revenue is directly proportional to the amount of electricity passing through its network. However, network operators have no incentives or performance requirements to optimise network system losses.

The Electricity Commission and the Commerce Commission should ensure that the correct incentives are in place for lines companies to optimise network system losses. (See Recommendation 6.)

5.4.3 Load management

Load management includes any mechanism where customers receive signals from suppliers that allow them to respond to supply or introduce constraints. This includes the use of ripple control and the use of so-called 'smart meters' that provide real-time information on electricity use. These allow the user, or a third party on behalf of the user, to manage the load. The PCE supports the development of load management as it permits the existing infrastructure to be used more effectively and can potentially delay the need for new investment.

Ripple control

New Zealand has a long history of using ripple control to manage electricity supply to water heaters. The Electricity Industry Reform Act 1998 brought about the split between lines and energy companies. In some cases, this resulted in the retailer owning the ripple receivers and the lines company owning the transmission equipment. These changes mean that existing ripple control equipment is not always well maintained, although in some areas the equipment has been maintained or replaced.

The Commission reviewed the possibility of using water heating cuts as an emergency measure. This review and analysis was based on available data on the use and potential of ripple control.

The potential of ripple control and other load management techniques to enhance the reliability and operation of the existing electricity infrastructure is largely unknown.

Load management advisory group

The Commission has more recently set up a load management advisory group. The Commission's web page describes the group's purpose and objectives:

The purpose of the load management work programme is to determine the optimal load management infrastructure for New Zealand in order to achieve the following benefits from the removal of barriers to investment in existing and new technology:

- *Greater demand side involvement in the electricity market;*
- *Deferral of investment in distribution, transmission and generation;*
- *Cost reductions from improved market efficiency; and*
- *Innovation in retail products leading to consumer choice and increased competition.*

Proposed work programme

The Commission's proposed work programme for load management and metering technology is available on its web page. The PCE welcomes this programme and will report on progress in future assessments.

As a result of the load management work programme, the PCE suggests that the Commission's analysis of the suitability of water heating cuts as an emergency measure is reviewed, incorporating the improved data and analysis. This further work should also assess the value of other forms of load management, which will give the electricity market access to a greater range of load management responses.

5.4.4 Metering technology

The PCE is concerned about the slow uptake of smart meter technology and the apparent lack of incentives for existing market participants to implement this technology. The significant real price increases in electricity, and price decreases in the technology, indicate that TOU or smart meter technology is becoming more cost effective for customers with smaller loads. However, its uptake in New Zealand remains limited. It is important that this technology is widely introduced, as it will allow customers to better manage their electricity use and respond to TOU pricing signals.

The PCE understands that the Electricity Commission has begun a work programme on load management and metering technology. We hope that this will address and remedy the present barriers to the uptake of smart meters.

One of the Government's intentions in amending the Electricity Act 1992 in 2004 was to give the Electricity Commission regulation-making powers covering "improved information for market participants".³⁶ The wider use of smart metering would be one mechanism to help achieve this outcome. (See Recommendation 2.)

5.4.5 Distributed generation

The GPS includes a section on distributed generation (paragraphs 109–113) that describes:

- the importance of distributed generation
- the Government's expectation that the Commission will ensure there are no unnecessary barriers to its development.

The GPS notes:

...it can be difficult for owners of distributed generation units to negotiate terms and conditions with local retailers to purchase small surpluses of electricity generation. High transaction costs are involved.

Increasing the uptake of distributed generation creates a widely dispersed range of fuel types and technologies and can potentially defer the need for transmission and distribution upgrades.

The Commission has developed guidelines and model contracts to facilitate the uptake of distributed generation. However, some in the sector doubt whether these measures will be sufficient to address what they perceive as the critical barriers to investment in distributed generation. (See Recommendation 5.)

5.4.6 Reserve generation

Whirinaki power station provides reserve energy to help ensure New Zealand's electricity needs can be met, even in very dry years, without electricity savings campaigns.

The dispatch guidelines for Whirinaki's operation were published in August 2004 on the MED website (www.med.govt.nz). The Electricity Commission is reviewing these dispatch guidelines. It has produced a discussion document and called for submissions as part of this review.

Currently Whirinaki is required to operate in response to any of the following triggers:

- spot price in the electricity market
- dry hydro sequences
- grid emergency.

During this assessment period, Whirinaki exported electricity on 37 occasions, resulting in a total output of 1.58 GWh (approximately 0.004 percent of total annual electricity generation).

This compares to a total generation of 15.9 GWh in the first assessment period. Most of this was part of the commissioning process (15.6 GWh).

The Electricity Commission has decided not to seek additional reserve generation for winter 2006, but will continue to monitor the situation closely.

More details on the operation of Whirinaki are included in Appendix A.

5.5 Electricity market issues

5.5.1 Low fixed-charge tariff option

In September 2004, the Electricity (Low Fixed-Charge Tariff Option for Domestic Consumers) Regulations 2004 were finalised. They came into effect on 1 October 2004 and require electricity retailers to offer a low fixed-charge tariff option for domestic customers. This tariff option must have a fixed charge no greater than 30 cents a day (excluding GST and after deducting any prompt payment discount). It must also be cheaper than other tariff options for the equivalent electricity supply package for customers using less than 8,000 kWh of electricity per year. As noted in Section 4.7.1, uptake of this option has been significant (at about 30 percent).

The regulations include a requirement for electricity retailers to provide details of annual electricity use to all their residential customers. The PCE is encouraged by the introduction of the low fixed-charge tariff option and the high degree of uptake. We hope that both regulators and electricity retailers will continue to minimise or possibly eliminate all fixed charges for residential customers. Reducing fixed charges provides financial incentives for residential customers to use electricity more efficiently.

The PCE is interested in any effect on residential electricity demand as a result of this tariff, and will monitor it in future assessments.

5.5.2 Model domestic supply agreements

Although the model domestic supply agreements have been finalised, these will not come into effect until after the Electricity Commission has completed model distribution agreements and benchmark transmission agreements. This process is due to be completed in February 2006.

The rationale for the delay is that all these agreements need to be aligned. However, consumer representatives do not believe this alignment is necessary. In many other industries, supply agreements are not aligned in this way, recognising that domestic customers require more protection than commercial entities.

It has been seven years since the electricity industry was deregulated, and model domestic supply agreements are still not in place. Hence the GPS requires the Commission to implement model agreements and to recommend regulation if these are not comprehensively implemented.

The PCE supports the application of model agreements because:

- providing better information to consumers allows them to make better informed decisions about their use of electricity, including considering investing in energy efficiency
- well-informed consumers place pressure on energy retailers and distribution companies to compete on price and services provided (including demand management options and modern meters).

It is the PCE's view that the Electricity Commission should consider providing additional protection for residential customers through regulation. The PCE will monitor progress in this area and report back in the next assessment report.

All electricity retailers should also be required to conform to standard requirements for electricity invoices, so that customers can more easily compare invoices from different suppliers.

5.6 Stakeholder relationships and consultation

5.6.1 Relationship with other government agencies

Significant overlap exists between the Commission's roles and responsibilities and those of other government agencies. This is discussed in detail in Section 6.1.3.

The PCE commends both the Commission and EECA on the improvement in their relationship and the increased level of interaction that will help to minimise duplication. It is particularly pleasing to see the improved staff interaction on electricity efficiency initiatives.

5.6.2 Makeup of advisory groups

The GPS states that the Commission should make extensive use of advisory groups wherever possible: "These advisory groups should have the necessary expertise and be appropriately representative of affected parties including customers".

In the first assessment the PCE expressed concern that representatives of small consumers and providers of demand-side management solutions were not adequately represented on the advisory groups.

Little progress appears to have been made in this area. The PCE is particularly concerned about the poor representation of parties involved in providing demand-side solutions compared to those providing supply-side solutions. For example, we note

that the retail market advisory group consists of five industry representatives, one representative focused on demand-side initiatives, and three customer representatives.

Better consultation could be achieved by diversifying the representation on the Electricity Commission's advisory groups. (See Recommendation 3.)

5.6.3 Consultation processes and procedures

Although consumer representatives are included on advisory groups, the information provided to them is often complex and extensive. For example, as at 30 January 2006 the Commission was consulting on 12 topics, each supported by at least one technical document that advisory group members needed to read. The topics included:

- changes to the reconciliation rules
- transmission alternatives policy
- 2007 reserve generation needs analysis
- scenarios for the wind development investigation process.

More effective consultation could be achieved if supporting information was summarised for advisory group members. Providing technical support on matters that need extra clarification would also help consumer representatives.

The PCE is concerned that the volume and complexity of documentation limits the ability of some groups to constructively engage in the Commission's consultation processes. (See Recommendation 4.)

6 Assessment of wider electricity sector's environmental performance

This chapter discusses the issues affecting the electricity sector's environmental performance that lie outside the Electricity Commission's scope.

6.1 Government policy for electricity

6.1.1 Energy policy direction

In the first assessment, the PCE expressed concern about the apparent lack of an overarching framework for energy policy for New Zealand. The PCE noted that, since the Government's October 2000 *Energy policy framework*,³⁷ no cohesive energy policy has built on where the Government felt it needed to get to for a sustainable energy future for New Zealand.

During discussions with the PCE, several industry stakeholders, including generators and Transpower, mentioned a concern about the lack of a clearly defined long-term energy policy direction. As the Government has several competing interests and objectives to consider, some level of uncertainty is inevitable. However, many stakeholders are unclear how government will weigh up various competing requirements. Key stakeholders have indicated that this uncertainty does not assist their investment decisions.

During the electricity industry reforms of the 1990s, it was assumed that market forces would resolve issues of price and security of supply. However, several recent interventions and policy changes appear to indicate a departure from that view. These include:

- direct government investment in reserve generation (Whirinaki)
- establishment of a reserve generation market
- government support through a risk-sharing agreement for a significant new thermal electricity generation plant (e3p)
- relaxation of restrictions on lines companies investing in electricity generation.

These developments indicate some government uncertainty that the current electricity market structure can deliver the outcomes that the Government requires.

Experience both in New Zealand and overseas now suggests that the objectives of a sustainable energy policy cannot be left to market forces alone. While market mechanisms are undoubtedly necessary, they must be underpinned by a robust and sustainable regulatory structure that creates certainty for all stakeholders.

The *Sustainable energy* discussion document and subsequent workshops appear to have recognised this issue. At the document launch, the Government was asked: “Does the document signal a new approach to energy policy” and “What new policies can be expected?” It responded:

*In the past five years, the Government has introduced a number of specific energy and energy-related policies and strategies that contribute to sustainable energy objectives. These policies and strategies provide an excellent start, but they are not sufficient by themselves to support a transition to a sustainable energy system.*³⁸

The new general policy direction needs to be more clearly communicated and understood so that stakeholders can bring about the most sustainable energy solutions. Therefore the PCE suggests that the output from the sustainable energy workshops be used to develop a set of long-term policies that are clearly explained. The current period of uncertainty about policy direction makes it difficult for the industry to implement sustainable energy solutions. (See Recommendation 7.)

6.1.2 Integration of energy policy (electricity and gas)

Energy issues continue to be addressed separately, rather than comprehensively. Policy frameworks still do not address:

- the benefits of encouraging fuel switching to optimise the use of existing energy resources and infrastructure
- measures that address security of supply and, at the same time, aim to minimise environmental impacts either through the promotion of renewable energy over non-renewable sources, or programmes that result in more efficient energy use.³⁹

An example is the recent requirement for electricity retailers to offer a low fixed-charge tariff option [Electricity (Low Fixed-Charge Tariff Option for Domestic Consumers) Regulations 2004]. The regulations include a requirement that retailers “must inform domestic customers at least annually whether it may be beneficial for them to switch to a low fixed-charge tariff option”.⁴⁰ Some retailers have responded to this requirement by reporting to customers on their annual electricity use.

If gas retailers were also required to report to consumers on annual gas use at a similar time, customers would be able to compare total household energy use with average usage. This information would help customers consider the impact of their energy choices.

6.1.3 Clarity of roles and responsibilities

In the first assessment, the PCE expressed concern about the potential overlap of energy responsibilities in central government, which could create confusion, duplication of effort, and a lack of accountability.⁴¹

Significant overlaps occur between:

- EECA and the Electricity Commission – the promotion of energy efficiency and demand response in the electricity market
- EECA, MED, and the Electricity Commission – encouraging, facilitating, and removing barriers to the uptake of distributed generation
- EECA, the Electricity Commission, and MFE – achieving the Government's goals for increased energy efficiency and reduced greenhouse gas emissions from the electricity sector
- MED, EECA, MFE, and the Electricity Commission – developing and maintaining environmental performance indicators for the electricity sector.

The Commission has been given a broad mandate so it can deal with the significant problems of electricity industry governance and improve the security of electricity supply. However, the PCE considers that this wide mandate creates two significant challenges:

- the difficulty of adequately resourcing the organisation, so that it has the diverse skills needed to deliver on a large and varied work programme
- ensuring no significant overlaps occur with existing organisations.

Over the period of this assessment, various government agencies have attempted to minimise any potential duplication of effort. An example is the Memorandum of Understanding between EECA and the Commission. While the memorandum will hopefully reduce duplication, the confusion that remains about accountability for outcomes concerns the PCE. For example, if CO₂ emissions decreased because of a change in electricity demand, which organisation – MFE, EECA, or the Commission – would be responsible? (See Recommendation 8.)

6.1.4 Climate change policy review

The climate change policy review has been completed and submitted to Cabinet, and was made public on 23 December 2005. This policy review and its implications for the electricity sector will be reviewed in the next assessment.

The PCE notes that, while EECA was consulted, it was not formally part of the team of officials involved in the policy review. In the PCE's view, there is significant overlap between MFE's climate change objectives and EECA's objectives. Within the energy

sector, greenhouse gas emissions can be reduced only by improvements in energy efficiency, energy conservation, or increased uptake of renewable energy.

The PCE is concerned that EECA was not formally involved in the climate change policy review.

6.2 Electricity-related environmental performance indicators

6.2.1 Availability of data

The PCE is still having difficulty accessing relevant data to assess the environmental sustainability of the electricity sector.

Several issues relate to the availability of data to produce key environmental performance indicators for the electricity sector. The issues are:

- accessibility – it is not clear which organisations or agencies are responsible for each set of data
- consistency – data sets from different government agencies are not consistent, e.g. MED and Statistics New Zealand, MED and Climate Change Office
- timeliness – data is often not available for the timely reporting of trends
- end-use data – very little data is available on how electricity is used
- social performance indicators – no data is available to measure the social outcomes of electricity use
- environmental impacts – the only consistent data available on the environmental performance of electricity generators is on greenhouse gas emissions from electricity generation. No other environmental impacts are measured or reported in a consistent way.

The PCE is pleased that the relevant government agencies are now working together to resolve some of these issues. We will continue to monitor progress in this area with a view to using the data in future environmental performance assessments. (See Recommendation 10.)

6.2.2 Responsibilities for environmental performance indicators

In 2000 MFE published a report called: *Environmental performance indicators: Proposals for indicators of the environmental effects of energy*. However, these proposals have not been further developed and do not appear to be a current priority. This is disappointing.

The PCE recommends that the value of having a single organisation, such as MFE, responsible for maintaining and reporting on environmental performance indicators, including those for the electricity sector be explored. (See Recommendation 12.)

6.2.3 Environmental performance standards for electricity generators

The PCE welcomes the consideration of the development of National Policy Statements under the RMA for electricity generation and transmission. However, we hope that any NPS is consistent with the Government's desired environmental sustainability outcomes for the sector. We note that there are no proposals for an NPS that addresses the demand side of the electricity sector (e.g. improving energy efficiency).

The PCE expects that these national policies will not be a means to fast-track new energy projects. Because of this risk, the development of all national policies and their subsequent implementation will need to be closely monitored.

The PCE also welcomes the 2005 changes to the Resource Management Act that aim to improve national leadership, particularly in the area of enabling central government to take a greater leadership role through national policy statements and national environmental standards.

Well-crafted National Policy Statements for electricity generation and transmission can provide clarity in assessing new and existing projects. National Policy Statements can consider both national and local interests, while at the same time taking full account of environmental sustainability.

6.3 Demand-side assessment

6.3.1 EECA and the NEECS review

The PCE continues to support EECA in its efforts to promote energy efficiency and renewable sources of the energy. The PCE also endorses the need for a National Energy Efficiency and Conservation Strategy (NEECS). The PCE supports any efforts that raise New Zealanders' awareness of the benefits of energy efficiency and the development of renewable energy.

Meeting the targets

In our first assessment, we were disappointed that energy efficiency in New Zealand improved by only one percent overall in the two years to March 2003. EECA have acknowledged that this is less than what is needed to achieve the energy efficiency target identified in the NEECS. The chairperson of EECA stated: "Organisations and individuals will need to make a stronger commitment to meet the challenge of New Zealand's sustainable energy strategy".⁴²

Recent progress towards the NEECS renewable energy target was more promising with an increase of six PJ of renewable energy up to March 2003. However, it is not clear what proportion of this is related to electricity (more recent data was not available when this report was prepared). The total target is for an additional 30

PJ of energy in 2012 from renewable energy. As stated in EECA's *Year 3 Report* on the strategy: "Indications are that New Zealand is on track to achieve the NEECS renewable energy target in 2012".⁴³

The Government's Projects to Reduce Emissions programme has made a significant contribution towards reaching the target. However, it is disturbing to note that even though the country is on track to achieve it, the long-term trend indicates an overall decrease in renewable energy as a proportion of total electricity generation (see Figure 4.6).

NEECS review

The Energy Efficiency and Conservation Act 2000 provides for the Minister of Energy to replace the Strategy after 5 years if necessary. To determine whether this might happen, EECA has initiated a review of the NEECS commencing with a situational analysis or stocktake.⁴⁴ This first stage is nearly complete, but has not yet been published.

The PCE welcomes the NEECS review and hopes that it will result in a revised strategy that will provide greater certainty in achieving stated targets and outcomes. As part of the next assessment, the PCE looks forward to commenting on those aspects of the review that impact on the electricity sector.

If the NEECS is to be replaced the PCE strongly supports the inclusion of measures that clearly set out which organisations are accountable for the achievement of each action plan and/or initiative. (See Recommendation 11.)

This will help EECA and others to better understand areas where the outcomes either exceed or fall short of expectations and where more effort is required. Separating electricity data from data for other fuel types will assist the Electricity Commission and the PCE in completing this assessment.

Such reporting will be the first step in ensuring that those organisations accountable for the specific outcomes can make changes to their work programmes so that the strategy goals are achieved.

The PCE also suggests monitoring of progress towards the NEECS on a regional basis to:

- identify regional progress
- evaluate significant regional initiatives
- provide information for use by Transpower and the Electricity Commission when considering infrastructure investments, alternatives to transmission upgrades, and electricity efficiency initiatives.

Focusing on smaller businesses

It is pleasing to note that EECA has recently increased its focus on small- and medium-sized businesses, both through development of the Energy Challenger initiative and the new climate change initiative focusing on energy-intensive businesses. Details of these can be found on their website. EECA could have considerable effect targeting these smaller organisations, as they have fewer resources to focus on energy management programmes themselves.

We note EECA's success in collaborating with the Solar Industries Association (SIA) to promote solar water heating. From 2001 to 2005, the area of solar water heating collectors increased by 535 percent across the country.⁴⁵ This progress is made possible by EECA's active support of the SIA, which in turn supports development of the industry. A similar approach could be applied to other small-scale renewable opportunities.

6.3.2 Climate Change Office

The second tender round for the Projects to Reduce Emissions programme offered 6 million Kyoto Protocol emission units and closed in October 2004. The tender round attracted 51 bids and emission units were awarded for 24 projects, including:

- wind farms
- hydro generation
- geothermal generation
- bioenergy
- landfill gas.

It is expected that many of the successful projects will be related to the electricity sector. (Full details of all the projects awarded emission units are not yet available.)

The second tender round attracted a wide range of project types covering small business, individuals, industry groups, and local government. If all the projects offered emission units proceed, the forecast emission reduction during the first Kyoto Protocol commitment period will be seven million tonnes of CO₂ equivalent.

The PCE is encouraged by the wider range of project types that can apply for emission units, including those that support demand-side initiatives that will reduce electricity demand.

Progress on negotiated greenhouse agreements has been much slower than expected. As a response to this the Government has reviewed the Negotiated Greenhouse Agreement (NGA) policy and several changes have been made to streamline the NGA

process. A series of briefings to key stakeholders was held in April and May 2005 to explain the benefits of NGAs and the new streamlined process.

The PCE welcomes this streamlining and the input of key stakeholders in the review.

6.3.3 Ministry for the Environment

National Environmental Standards (NES) introduced in 2004 require councils and communities to deal with poor air quality in their areas. In some urban areas the major source of air pollution is home heating. The Warm Homes project was initiated by MFE to investigate how families can be encouraged to make their homes more energy efficient and to install cleaner heating solutions.

The first phase of the Warm Homes project involved:

- collecting data
- assessing heating options
- looking at best practice overseas
- investigating incentive schemes that encourage householders to choose cleaner heating options.

These options include a wide range of fuel choices, such as gas heating, low-emission wood burners, and heat pumps (although in practice most Christchurch households have selected heat pumps to heat their houses). If similar schemes are implemented nationally, this could have a significant impact on electricity system infrastructure requirements. MFE is working with EECA and regional councils on this project.⁴⁶

For more information on the Warm Homes project see www.mfe.govt.nz/issues/energy/warm-homes/.

Other MFE activities in the energy sector have been restricted to the 2005 amendments to the RMA, RMA administration, and climate change policy initiatives.

MFE has limited involvement in the electricity sector, but the PCE believes it should have a broader role in the development of energy policy. Key areas where MFE could play an important role are:

- taking a lead in advocating environmentally sustainable energy options in the development and implementation of the Government's energy policies
- establishing a nationally consistent method for electricity generators to report on compliance with resource consent conditions and the environmental impacts of electricity generation
- working with electricity generators to reduce the number of breaches of resource consent conditions

- adding a national environmental perspective to RMA processes that deal with electricity generation and transmission (particularly where these may impact on New Zealand's climate change objectives).

In many cases these national-level environmental issues are not effectively dealt with by regional councils or territorial authorities. (See Recommendation 9.)

6.3.4 Local government and regional energy/electricity issues

EnergyWise Councils Partnerships

Regional councils throughout New Zealand are showing an increasing interest in regional energy issues related to electricity by taking a more active role in strategic energy issues. Six of the 14 regional and unitary councils (43 percent) are represented on EECA's EnergyWise Councils Partnerships. However, only 19 of the 74 territorial authorities are represented (25 percent).

The PCE has obtained information on the activities of some regional councils and unitary authorities relating to energy. This information is included in Appendix B.

Communities for Climate Protection programme

In July 2004, the Government launched the Communities for Climate Protection (CCP-NZ) programme, in partnership with the International Council for Local Environmental Initiatives (ICLEI) and councils. CCP-NZ is a global programme drawing on international best practice and experience. A key component is the provision of technical guidance to help councils plan for and adapt to the effects of climate change.

Fifteen councils, representing over 45 percent of the New Zealand population, are now participating in CCP-NZ. The PCE welcomes the involvement of local government in formulating and implementing these solutions.

National Air Quality Standards

Several regional councils are beginning to respond to the National Air Quality Standards, which came into force in September 2005. The most significant action is Environment Canterbury's Clean Heat project and MFE's Warm Homes project (described in Section 6.3.3).

Because these initiatives typically involve improving insulation levels as well as replacement of heating appliances, they result in improved social outcomes. The new standards are a key driver in improving the energy performance of New Zealand homes and the energy efficiency of installed heating appliances.

6.4 Supply-side assessment

6.4.1 Fossil fuel generation

Re-commissioning of Marsden B

During the assessment period significant developments in fossil fuel generation have occurred. These developments will have a major impact on the electricity sector's environmental performance. The key event was the granting of resource consents for the re-powering of the Marsden B power station.

Two environmental impacts from Marsden B that concern us are the amount of CO₂ emissions, and the adverse effects associated with the proposed use of seawater for cooling. The applicant, Mighty River Power, considers the consent conditions for seawater cooling unworkable, and is now appealing.

The PCE is concerned that this generation proposal was given qualified support from the Government through MED, despite it being inconsistent with many of the objectives contained in its environmental, electricity, NEECS, and climate change policies.

The PCE will continue to monitor the Government's role in proposed energy solutions for policy trends that are inconsistent with its stated environmental and sustainability objectives.

Huntly e3p plant

As noted in the first assessment, the Government made a risk-sharing agreement with Genesis Energy to facilitate the building of a gas-powered thermal plant (e3p). In effect, the Government provided a subsidy for thermal generation. This support concerned a number of commentators, as it appears to ensure security of supply at the expense of other policy objectives.⁴⁷ These other objectives are not only environmental outcomes, but also those, which aim to achieve an efficiently operating electricity market.

It appears the Government does not consider that price signals from the market are adequate to encourage new electricity generation at a rate that provides the security of supply New Zealand wants.

The PCE is concerned that, from the evidence available, the impact of the Government's involvement in the market on the achievement of its broader energy policies was not considered.

Ensuring security of supply appears to have overridden other considerations in this case. The PCE expects that after the Electricity Commission has finalised its policy and procedures to procure electricity generation to ensure security of supply, the

Government should not need to intervene in a similar manner in the future. However, should the Government intervene in decisions over future generation capacity, we hope these interventions will be more consistent with its overall energy policy framework.

6.4.2 Renewable generation

Wind energy projects

During this assessment, four wind energy projects received resource consents. Five other proposals are seeking consents, and several other proposals are being investigated. The rate of development of wind generation in New Zealand is significant, but it is coming off a small base. The PCE is encouraged by this growth in renewable electricity generation. However, this rapid growth does present some challenges to the industry, local government, and communities.

The PCE supports the development of wind energy in New Zealand, but it needs to be undertaken within a context that recognises the potential impacts on communities and the environment.

The PCE is assessing whether statutory and non-statutory processes could be improved to address the concerns arising from the future development of large-scale wind energy.

Hydro generation

Recent development of hydroelectric resources has largely been restricted to efficiency enhancements of existing generation plant. However, during the assessment period, TrustPower proposed a 50 MW hydro development in the Wairau Valley and is seeking resource consents for this proposal.

Geothermal projects

Several geothermal generation projects are under development. The PCE strongly supports projects that enhance the electricity output from geothermal fields without increasing the amount of geothermal fluid used.

Solar water heating

During this assessment period, the rate of uptake of solar water heaters was 55 percent (compared with 68 percent for the previous year). This indicates that the solar industry is continuing to grow at a significant rate.

Recent government announcements to encourage the uptake of solar water heating are promising, but there are real concerns that the installation industry is underdeveloped to achieve these new targets. It will take time to train suitable practitioners so as to ensure quality of the products.

Over the next 30 years solar electricity can be expected to become a valuable component of the renewable generation mix.

6.4.3 Transmission

During the assessment period, Transpower proposed several significant electricity transmission upgrades. These proposals are documented in *Future of the national grid: Transmission plan summary*, and include three major projects and several regional upgrades.

The Commission plans to hold a third series of public meetings to update stakeholders on its continuing appraisal of public submissions on Transpower's proposed transmission grid upgrade between Whakamaru and Otahuhu.

The Commission needs to ensure a reliable electricity supply to the Auckland region. It is considering alternatives to a transmission upgrade before making a decision on whether to approve Transpower's proposal.

It is pleasing to note that, for the proposed transmission upgrade into Christchurch, Transpower is considering alternatives to the upgrade before initiating public consultation. This is a positive change and indicates that Transpower is responding to its stakeholders' concerns.

The PCE is pleased to see that the industry appears to be seriously considering alternatives to transmission system upgrades. These upgrades result in adverse environmental effects and incur considerable expense. However, the PCE recognises that, irrespective of the future development of the electricity system, a reliable and secure national grid is essential.

For the PCE the key issues when considering transmission upgrades are:

- adverse environmental impacts are minimised
- the upgrades do not preclude future investment in renewables and demand-side measures.

The PCE will continue to encourage robust investigations into transmission alternatives that fully take account of demand-side interventions and distributed energy options.

6.5 Electricity prices and the competitive market

The PCE remains concerned about the lack of effective competition in the provision of electricity services by the electricity retail market. Competition for services is important because without it electricity retailers have little incentive to:

- compete on price, which can adversely impact on those least able to pay and on social sustainability

- provide innovative services (such as time-of-use tariffs, smart metering technology, and energy management services) that can be used to:
 - optimise the use of existing infrastructure by time-specific energy conservation (peak shifting)
 - encourage users to invest in energy efficiency measures that will reduce their energy consumption over the longer term.

Correct pricing signals are needed to ensure that all market participants have the opportunity to respond to the market and use electricity efficiently.

Several distribution areas have as few as two electricity retailers to choose from. Residential electricity prices have also increased significantly in recent years. The Commerce Commission has stated that “the electricity sector has been very slow to understand their obligations under the Fair Trading Act”.⁴⁸

Concerns about the level of competition in the residential market in particular and retailers’ actions appear to indicate a problem. Misleading information from various electricity retailers has had a significant impact on customers’ perceptions of competition.⁴⁹

The Commerce Commission has recently initiated an investigation (under Part 2 of the Commerce Act 1986) into the wholesale and retail electricity markets. This investigation followed ongoing complaints and concerns about electricity prices, profits of electricity retailers, switching issues, and the perceived low level of competitive activity.

The Electricity Commission has recently published new retail market statistics on its website, including customer switches per distribution network.

These concerns will need to be adequately addressed for the market to operate efficiently and to ensure the best environmental outcomes are achieved.

6.6 Metering technology

The PCE’s first assessment highlighted concern about the lack of data on the type and efficacy of existing electricity meters. The PCE also expressed concern at the apparent lack of effort to support the uptake of smart meters. These enable retailers to send (in addition to other functions) more accurate pricing signals to customers.

A business unit of Meridian Energy is planning to implement a large-scale pilot project to install smart meters in the Central Hawke’s Bay network area. Although the PCE supports industry efforts to increase the uptake of smart metering technologies, the ownership of metering technology could possibly become a barrier to competition. The Commerce Commission is prosecuting Bay of Plenty Electricity for allegedly refusing to grant access to its meters to other retailers within the region.

Ownership of meters

From a market perspective the PCE considers it would be more logical for lines companies, independent meter companies, or the consumer to own electricity meters rather than retailers. This would eliminate the possibility of meter ownership being used for anti-competitive purposes. This issue is obviously not as significant for large customers, because their metering costs represent a smaller proportion of their total electricity costs.

The PCE recommends that the Commerce Commission consider the impact of meter ownership, both now and in the future, on the operation of the competitive electricity market.

6.7 Sustainability reporting of electricity generation organisations

The PCE recognises that the Electricity Commission is only one player in the electricity sector. Achieving the Government's environmental objectives requires support from the wider sector.

In this assessment the PCE has reported for the first time on some of the electricity generators' environmental performance. While this assessment focuses on the major generators, we intend that in future assessments this reporting will become more comprehensive.

The PCE's initial method of investigating the environmental performance of electricity generators was to review their environmental/sustainability reporting. As further information becomes available, subsequent assessments will provide a more in-depth review of environmental/sustainability reporting.

The reports used in this assessment depend on report availability within the timeframe that this assessment report was prepared. We have used the most recently available sustainability or annual reports. The reports used and the issues assessed are shown in Table 6.1.

6.7.1 Contact Energy**Sustainability report**

Contact Energy's latest Environmental Report covers the 12 months to 30 September 2004. They have more recently published an annual report to 30 June 2005, as their financial year end date has changed. Contact is currently reviewing its environmental reporting and expects to publish a sustainability report during the next financial year ending 30 June 2006. For the purposes of this analysis we have used the June 2005 annual report, which includes a section on the environment.

Table 6.1 Electricity generators' sustainability reporting

	Meridian Energy	Genesis Energy	Mighty River Power	Contact Energy	TrustPower
Reporting and systems					
Does the organisation publish a sustainability report or include information on environmental and social outcomes in its annual report?	Yes	Yes	Yes	Yes	Yes
Is the sustainability report integrated with the annual financial report?	Yes	Yes	Yes	Yes	Yes
Annual Reports used (year ending)	June 2005	June 2005	June 2005 and Sustainability Report 2004	June 2005 ⁵⁰	March 2005
Date that the first environmental report was published	2000	2001	2001	2002	Unknown
Is sustainable reporting completed to recognised international standards?	Yes	No	No	No	No
Does the report include a verification statement from an independent organisation (addressing environmental reporting procedures and processes)?	Yes	No	No	No	No
Does the report quantify the number of times resource consent conditions have been breached?	No	No	No	No	Yes
Does the report quantify internal resource use such as electricity, paper etc?	Yes	No	Yes	No	No
Does the report quantify the CO ₂ footprint for internal operations?	Yes	No	Yes	No	No
Does the report quantify the CO ₂ emissions from electricity generation?	Yes	Yes	Yes	Yes	N/A ⁵¹
Does the organisation have an Environmental Management System in place?	Yes	Yes ⁵²	Yes	Yes ⁵³	Yes
Compliance with resource consent conditions					
Number of non compliance events reported	Not reported	Not reported	Not reported	Not reported	17
Number of contaminant releases reported	Not reported	Not reported	Not reported	Not reported	1
Minimisation and mitigation of effects					
Does the report include information on investment in supply-side energy efficiency projects?	Yes	Yes	Yes	Yes	Yes
Does the report include information on investment in demand-side energy efficiency projects?	Yes	Yes	Yes	Yes	No
Does the report include information on investment in environmental protection or mitigation?	Yes	Yes	Yes	Yes	No

Compliance with resource consent conditions

Contact Energy does not include clear details of the number of non-compliance events in their reporting. They state:

Contact's environmental aim is to conduct its business in a manner that seeks to minimise effects upon the environment and deliver benefits to New Zealanders.

Contaminant release

No information on contaminant release was included in the annual report for the year ending June 2005.

6.7.2 Mighty River Power**Sustainability report**

Mighty River Power published separate sustainability reports in 2001, 2003, and 2004. No sustainability report was available on their website for 2005. However, the annual report includes a section titled *People, environment, community*.

Compliance with resource consent conditions

Mighty River Power does not include clear details of the number of non-compliance events in their reporting. The company provides information on consent compliance to regulatory authorities in electronic form, which cuts down on the volume of paper produced by the company. This material may be reviewed in subsequent assessments.

Mighty River Power reports on their level of compliance with resource consent conditions on a percentage basis, which makes it difficult to determine the number of times resources consent conditions have been breached and the level of importance of the non-compliance events.

Contaminant release

No information on contaminant release was included in the annual report for the year ending June 2005.

Investment in demand-side efficiency projects

In 2005 Mighty River Power completed a full lighting and appliance audit. They also report annually on internal electricity usage.

Environmental protection expenditure to mitigate environmental impacts

Mighty River Power supports the Waikato Ecological Trust and the Maugatautari Ecological Trust.

6.7.3 TrustPower

Sustainability report

TrustPower does not publish a sustainability report, but includes sections on environmental and social performance in its annual report. These sections are titled *Sustainability report*, but no information is provided on internal resource use.

Compliance with resource consent conditions

TrustPower is the only electricity generator that includes clear details of non-compliance events in its annual report. In the year ending March 2005 there were 17 non-compliance events, a reduction on the previous year's figure of 21. Although TrustPower states that it "strives to have no non-compliance events", the company has never achieved this goal.

TrustPower states in its annual report that all these non-compliance events were insignificant and resulted in no adverse environmental consequences. However, no evidence is provided to support this statement and the sustainability section of their environmental report is not verified by a third party.

Contaminant release

One "very minor" contaminant release was reported during the 2005 financial year. No additional information was provided on the contaminant release.

Investment in demand-side efficiency projects

Investment in demand-side efficiency projects was not mentioned in TrustPower's annual reports. However, their Environmental Management System includes a goal to improve resource use efficiency and to implement a programme of continual improvement in its electricity consumption.

6.7.4 Genesis Energy

Sustainability report

Genesis Energy does not publish a sustainability report, but includes a section on environmental responsibility in its annual report.

Compliance with resource consent conditions

Genesis Energy states that "we are committed to sharing information with the community and our stakeholders, to assist in the environmental management and protection of the natural resources we all use and rely on". However, they do not include specific information in their annual report on the number of non-compliance events that have occurred in the previous year. Under *Environmental performance* they use phrases such as "excellent compliance", "few and very minor excursions", and "generally very good".

Genesis reports on non-compliance in percentage terms for some of its hydro stations, such as Waikaremoana and Tongariro. However, no details are provided about the breaches.

Genesis has this to say about Huntly:

Waikato District Council has been auditing the site on a monthly basis since early in 2005. Generally our environmental performance is very good, however there are areas of our environmental compliance that need some additional focus.

These descriptions, together with a lack of specific information, mean we cannot determine the level of compliance with resource consents or determine the environmental effects of its operations. However, Genesis has indicated that they are keen to work towards setting frameworks to ensure consistency in reporting among generators.

Contaminant release

No information on contaminant release was included in the annual report for the year ending June 2005.

Investment in demand-side efficiency projects

Genesis Energy has been involved in a number of demand-side initiatives with some of its major customers. These initiatives include:

- an energy audit with the Port of Auckland to improve the efficiency of the Port's lighting and refrigeration
- a dairy efficiency calculator designed to provide more information to dairy farmers on how they can use energy more efficiently.

Genesis Energy's Environmental Management System includes a goal to improve efficiency of resource use and implement a programme of continual improvement in its own electricity consumption.

Environmental protection expenditure to mitigate environmental impacts

Projects to which Genesis Energy contributes include:

- Central North Island Blue Duck Trust – aims to mitigate the environmental effects of the Tongariro Power Development on blue duck and their habitat
- Waikaremoana Ecological Restoration Programme – aims to protect kiwi and threatened native plants and to control exotic pest weeds in Lake Waikaremoana

- Whanganui River Enhancement Trust
- environmental mitigation work to enhance whitebait spawning areas in the lower Waikato River.

6.7.5 Meridian Energy

Sustainability report

Meridian Energy published separate sustainability reports in 2000 and 2001. In 2002 Meridian combined their financial and sustainability reports, “recognising that environmental sustainability is fundamental to our business and underpins every decision that we make”.

Meridian’s level of sustainability reporting is comprehensive when compared to other electricity generators. We note particularly:

- the calculation of a CO₂ footprint for the company using Landcare’s EBEX21 model
- the audit of the report consistent with the AA1000 Assurance Standard (March 2003).

Compliance with resource consent conditions

Meridian Energy does not include clear details of the number of non-compliance events in their reporting. For example, their 2005 annual report notes that in respect of the Waitaki and Manapouri hydro systems there were “no significant non-compliance events”.

Meridian claims that compliance with resource consent conditions is not necessarily a good indication of the environmental effects of their operation. The PCE has noted this issue in other work. Often consent conditions are aimed at managing an activity that may or may not be effective in protecting environmental quality. The RMA requires that councils review the effectiveness of their consent criteria by assessing actual environmental quality. The quality of this process varies from council to council.

However, Meridian has recently completed a seven-year review of the monitoring programme attached to resource consents for the Manapouri Power Station. As part of this review Meridian is involved in several monitoring partnerships with agencies such as NIWA (eel research); Department of Conservation (bird research); the Cawthron Institute (an adaptive management programme in the Doubtful Sound); and in a project aimed at improving understanding of the Waiau Arm ecosystem.

Contaminant release

No information on contaminant release was included in the annual report for the year ending June 2005.

Investment in demand-side efficiency projects

In 2004 Meridian Energy supported an Energy Saver Van campaign to install energy-saving products and to provide practical advice to lower-income customers in Christchurch on how to save on their power bills. In two weeks the vans visited about 590 homes.

Other projects included:

- offering discounted heat pumps to staff and customers
- developing an online home energy saving calculator
- installing energy efficiency equipment in Plunket Family Centres
- providing energy efficiency solutions and other services to industrial companies through the Energy for Industry business unit (previously known as Meridian Solutions)
- developing a web-based demand exchange system that allows customers to track prices and, when they are high, reduce consumption and sell electricity back to the retailer.

Environmental protection expenditure to mitigate environmental impacts

Meridian Energy funds and/or participates in several environmental projects, including:

- a project aimed at protecting the braided river habitat in the Upper Waitaki Basin (with the Department of Conservation)
- controlling the spread of the aquatic weed *Lagarosiphon major* in Lake Benmore (with Land Information New Zealand)
- collaborations with various environmental and cultural trusts in the South Island affected by hydro generation projects
- a project to restore shingle beds and managing the movement of fish to aid spawning of trout in Scott's Creek in the Waitaki catchment (with Fish & Game New Zealand)
- support for a black-billed gull study on the lower Waiau River.

6.7.6 General comments on sustainability reporting

With the exception of TrustPower, none of the electricity generators detail the number of times they breach their agreed resource consent conditions. Some generators argue that compliance may not be a reasonable measure of their environmental performance. In general, it seems that it is not uncommon for electricity generators to breach their agreed resource consent conditions several times a year.

The PCE is seeking to quantify the number of non-compliance events in order to compare numbers for different generation plant and generators. The purpose is to identify any trends, which may be relevant.

Resource consent conditions for some plants are significantly more onerous than others, and sometimes this difference is based on the timing of the last resource consent rather than the local environment effects.

The PCE commends TrustPower on clearly reporting the number of times it has breached its resource consent conditions. We encourage other generators to follow this lead. We would also like to see all generators provide more details on the nature of the breaches and the expected environmental effects, if any.

National consistency in categorising the breaches would be useful for this assessment report and for other purposes. We intend to look at this area in more detail in the next assessment period. This will include the extent to which these companies are reporting what they are doing to promote a robust demand-side sector in the electricity market, at both the wholesale and retail levels. (See Recommendation 13.)

6.8 Distributed generation

MED is still progressing the work stream that will allow greater investment in distributed generation by lines companies. Two main barriers to greater investment exist:

- the requirement for lines companies to set up an “arm’s length” ownership structure if they want to retail the electricity they generate – this creates extra transaction costs
- the present market dominance of certain retailers in some regions, which can make it difficult for distributed generators to sell their electricity locally.

While the progress in developing guidelines and model agreements for distributed generation is pleasing, it is not yet certain they will be effective.

This issue is important and should be a priority for MED. Without effective agreements, significant distributed generation opportunities will be further delayed and risk being displaced by large-scale remote generation projects.

Responsibility for encouraging and facilitating distributed generation is unclear with involvement from the Commission, EECA, and MED. It is important this responsibility is streamlined by the next assessment.

Glossary and abbreviations

abatement technologies: Technologies that can be incorporated into industries or other parts of the economy to reduce emissions of greenhouse gases from these activities.

advisory groups: Groups of informed individuals set up by the Electricity Commission to provide non-binding advice to the Commissioners.

base load generation: Generation plant that is used first and therefore runs most of the time.

carbon charge: A low-level government tax that attempts to incorporate the environmental cost of greenhouse gas emissions into the economy and assist New Zealand to meet its international climate change obligations.

carbon credit: Generic term for the credit awarded to a qualifying project. The credit recognises the carbon abatement benefits that will arise from implementing the project. One credit is equal to one tonne of CO₂ equivalent.

CCO: Climate Change Office. A business unit within MFE responsible for leading the development, coordination, and implementation of whole-of-government climate change policy.

CCP-NZ: Communities for Climate Protection.

CNG: Compressed Natural Gas.

combined cycle: An electricity generating technology in which electricity is produced from otherwise lost waste heat exiting from one or more gas combustion turbines. The exiting heat is generally diverted to a steam turbine. The process increases the generation plant's efficiency. Sometimes referred to as co-generation.

Commission: Electricity Commission. A Crown entity set up under the Electricity Act 1992 to oversee New Zealand's electricity industry and markets. It regulates the operation of the electricity industry and markets to ensure electricity is produced and delivered to consumers in an efficient, fair, reliable, and environmentally sustainable manner. It promotes and facilitates the efficient use of electricity.

CPI-X: The consumer price index (CPI) less a factor (–X) that accounts for incremental efficiency improvements. A form of price control that caps price increases and places pressure on companies to improve efficiencies.

Crown Loans Scheme: Loans available to government departments, district health boards, territorial authorities, regional councils, universities, polytechnics, schools, and Crown entities.

demand side: The people and organisations that buy electricity and/or offer to alter their demand for electricity based on the price in the wholesale market.

demand-side management: Methods to change electricity consumers' demand for electricity (e.g. energy efficiency measures, load management, and fuel substitution).

demand-side participation: The process whereby electricity retailers or users can sell into the market reductions in their demand for electricity at times of high price.

distributed generation: Any electricity generation facility, usually small-scale, that produces electricity for use at the point of location, or supplies electricity to other consumers through a local lines distribution network.

e3p: The Energy Efficiency Enhancement Project at the Huntly power station.

EECA: Energy Efficiency and Conservation Authority. The government organisation whose role is to promote the benefits of increased energy efficiency, conservation, and renewable energy. It also works with others to implement the National Energy Efficiency and Conservation Strategy (NEECS).

electricity efficiency: Any change in electricity use that results in an increase in net benefits per unit of electricity. A narrower concept than 'energy efficiency'.

electricity industry: The part of the electricity sector that undertakes to generate electricity, transport it through the national grid and local distribution networks, and sell it to users.

electricity sector: The people and organisations that use the energy services provided from electricity, the providers of electrical equipment and infrastructure (such as buildings) that use electricity, demand management service providers, the electricity industry, and the wholesale electricity market (including any secondary financial markets).

emission unit: Alternative term for carbon credit.

Energy Audit Grant Scheme: An EECA-managed scheme to encourage organisations to undertake energy audits on their facilities and implement the audit's recommendations.

energy efficiency: Any change in energy use that results in an increase in net benefits per use of energy.

energy services: Services such as heating and cooling, motive power, and lighting that individuals and organisations can obtain with energy.

generator: A company that generates electricity connected to the national grid of a local network.

GIT: Grid investment test. A test to develop grid reliability standards, to ensure the benefits to the electricity sector of proposed grid investments exceed the costs, and to enable different investment options to be considered.

Government policy statement on gas governance: Released on 8 July 2004, this draft statement details the Government's policy for gas industry objectives, governance, and rules relating to the wholesale gas market, and the processing, transmission, distribution, and retailing of gas.

GPS: Government policy statement on electricity governance that specifies the Government's expectations, objectives, and outcomes in relation to electricity.

GW: Gigawatt. A measure of installed capacity that is equal to 1 million kilowatts. New Zealand's installed capacity in 2005 is around 8.7 GW (8,700 MW).

GWh: Gigawatt hour. A measure of energy equal to 1 million kilowatts operating for 1 hour. New Zealand's annual electricity production is about 40,000 GWh.

HVDC: High voltage direct current. Transmission between the North Island and South Island of New Zealand is through an HVDC line.

hydro spill: Water that could have been used to generate electricity, but was released for other reasons.

ICLEI: International Council for Local Environmental Initiatives.

in-stream values: Those values associated with a river's natural environment. Includes traditional Maori, recreational, and aesthetic values.

KPI: Key performance indicator. A specification for measuring organisational performance.

kv: Kilovolt. A measure of potential energy, equal to 1 thousand volts. This unit is used to measure the capacity of transmission lines.

KWh: Kilowatt-hour. A unit of energy and the basis of measuring retail sales of electricity.

Large Electricity Users Audit Scheme: An EECA-led audit to help large users identify potential electricity savings projects and co-generation projects on site that consume more than 10 GW of electricity each year.

LNG: Liquefied Natural Gas.

load aggregation: The process by which individual energy users form an alliance to secure more competitive prices than they might otherwise receive working independently. Aggregation can be accomplished through a simple pooling arrangement or through the formation of clusters.

load management: Steps taken to reduce power demand (during peak hours, peak days, or peak seasons) or shift some of it to off-peak times.

load shedding: The removal (usually by mutual agreement) of demand from an electricity system when an abnormal load has occurred. The shedding maintains the system's integrity and minimises overall demand-side outages.

load shifting: A demand response that involves users changing their behaviour to shift part or all of their demand from a system's peak period (or a period of constrained supply) to some other period. This provides a key source of flexibility in an electricity system.

MED: Ministry of Economic Development. The government agency responsible for promoting and regulating business and commercial activities.

memorandum of understanding: A written agreement (not usually legally binding) between two parties, recording the basic terms under which they agree to work together on a project.

MFE: Ministry for the Environment. Responsible for the administration of the Government's response to Climate Change and the Resource Management Act 1991.

MoT: Ministry of Transport.

MW: Megawatt. Unit of electrical power equal to 1 million (10^6) watts.

national grid: The high voltage electricity transmission network that transmits electricity throughout New Zealand. It is owned by Transpower, a state-owned enterprise.

NEECS: National Energy Efficiency and Conservation Strategy. A strategy to promote the uptake of energy efficiency, energy conservation, and renewable energy in New Zealand. It contains national targets and sets out initiatives that focus on the government, energy supply, industry, buildings and appliances, and the transport sector.

NES: National Environmental Standard, issued under section 43 of the Resource Management Act.

Network companies: Also known as lines or distribution companies, they operate the local, low-voltage electricity networks.

NGA: Negotiated Greenhouse Agreement. An agreement between the Crown and firms or industries that, as a result of the carbon tax, face significant risk to their competitiveness relative to producers in countries with weaker climate change policies.

NPS: National Policy Statement. A statement from the Minister for the Environment issued under section 52 of the Resource Management Act that provides guidance to local authorities on how an issue should be addressed under the RMA.

OCSE: Officials' Committee on Sustainable Energy.

ODV: Optimised Deprival Valuation. A valuation method based on the replacement value of assets.

PCB: Polychlorinatedbiphenyl. PCBs are highly toxic and become concentrated in food chains.

PCE: Parliamentary Commissioner for the Environment. An independent officer of Parliament appointed for a five-year term under the Environment Act 1986 to review and advise on environmental issues and on the system of agencies and processes established by the Government to manage the environment.

peak load: High electricity demands experienced for short periods. During a normal day, demand peaks at about 8 am and 6 pm.

PJ: Petajoule. A unit of energy equal to 10^{15} joules or 277.778 GWh.

reserve generation: Back-up generation, usually thermal, which is used in the event of an extreme drought or unforeseen breakdown or maintenance.

RMA: Resource Management Act 1991.

SIA: Solar Industries Association.

spinning reserve: Immediate reserve capacity from generation plants that are synchronised to the national grid, but are not generating electricity. They are already 'warmed up', so can be connected to the grid at short notice.

supply side: The people and organisations that offer (i.e. supply) quantities of electricity to the wholesale electricity market.

wholesale market: The market where purchasers buy electricity from the generators. It includes the half-hourly spot market, longer-term contracts market, and the security and reserves market.

Endnotes

- 1 Minister of Energy, 2004a.
- 2 For an in-depth discussion see *Future Currents* (PCE, 2005). The PCE is also conducting a focused investigation this year into distributed energy resources.
- 3 Contact Energy Annual Report 2004 (CEO Review), Transpower 2005, EECA Update September 2005.
- 4 Section 57DB of the Commerce Act 1986 as amended by the Electricity and Gas Industries Bill 2003.
- 5 Section 57DC of the Commerce Act 1986 as amended by the Electricity and Gas Industries Bill 2003.
- 6 Both Acts are discussed in *Electricity, Energy and the Environment: Making the Connections* (PCE, 2003).
- 7 These priorities and the reasons for their rankings are discussed in *Electricity, Energy and the Environment: Assessment Framework* (PCE, 2004).
- 8 Minister of Energy, 2004a.
- 9 These are Contact Energy, TrustPower, Genesis Energy, Meridian Energy, and Mighty River Power.
- 10 MED, 2005.
- 11 Statistics New Zealand, 2005.
- 12 MED, 2003.
- 13 Department of Prime Minister and Cabinet, 2003: 18.
- 14 The goal was subsequently modified in the electricity GPS with “sustainable” changed to “environmentally sustainable” (Minister of Energy, 2004a).
- 15 Ministry of Economic Development (MED). 2004b. *Sustainable energy: Creating a sustainable energy system for New Zealand*. Wellington: MED. p21.
- 16 For more detail see *Resource Management Amendment Act 2005. Improving national leadership – information sheet* (MFE, 2005b).
- 17 Section 11 of the Resource Management Amendment Act 2005.
- 18 Section 4 of the Resource Management Amendment Act 2005.
- 19 For more detail see *Resource Management Amendment Act 2005. Improving local policy and plan making – information sheet* (MFE, 2005a).
- 20 For more detail see *Amendments to National Environmental Standards for Air Quality* (MFE, 2005d). <http://www.mfe.govt.nz/laws/standards/amendments.html>
- 21 EECA and MFE, 2001.
- 22 See EECA's website for the definition and measurement of ‘energy efficiency’ (<http://www.eeca.govt.nz>).
- 23 EECA and MFE, 2002.
- 24 *Energy Efficiency and Conservation Authority Statement of Intent 2005–2008*.
- 25 A summary of the report is available at the MED website <http://www.med.govt.nz/ers/electric/wind-energy/summary/index.html>
- 26 http://www.renewabledevices.com/swift/news_article04.htm
- 27 <http://www.eeca.govt.nz/news/MediaItemDetails.aspx?s=m&id=192>
- 28 Transpower, 2004.
- 29 <http://www.comcom.govt.nz/MediaCentre/Speeches/7thannualnationalpowernewzealand20.aspx>
- 30 *ibid.*
- 31 Electricity Commission, 2005a.
- 32 Paragraph 26 of the GPS.
- 33 Energy Management Association 15 November 2005 (Electricity Commission, 2005b).
- 34 Electricity Commission, 2005d.

- 35 Electricity Commission, 2005c.
- 36 Third Reading of the Electricity and Gas Industries Bill 2003 by the Minister of Energy. 13 October 2004. <http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=21204>
- 37 Minister of Energy, 2000.
- 38 From media package for the launch of Sustainable Energy Discussion Document. Questions and Answers <http://www.med.govt.nz/ers/environment/sustainable-energy/qa/>
- 39 The same could be said about coal and the opportunities for using coal. It is important the complementary roles of electricity, gas, and coal are addressed.
- 40 http://www.med.govt.nz/ers/electric/governance-gps/final/final-03.html#P86_9549
- 41 Contact Energy *Annual report 2004* (CEO Review); Transpower media release Oct 2005; EECA Update September 2005; Meridian Energy *Annual report 2005*.
- 42 EECA, 2005c.
- 43 *ibid.*
- 44 A situational assessment typically reviews the processes for collecting and analysing information, so an organisation can be evaluated in the context of its operational environment. It may also evaluate particular programmes and canvass stakeholders' perceptions of the organisation and its programmes.
- 45 Pers. comm. Chair Solar Industries Association, 2005.
- 46 MFE, 2005e.
- 47 For example, Contact Energy commented on this issue in their 2004 annual report: "Contact can see no good public policy reason for the extension of a government guarantee – no matter how limited – to one player in the sector".
- 48 Speech by Paula Rebstock of the Commerce Commission presented to the 7th Annual National Power New Zealand Conference, March 2005 (<http://www.comcom.govt.nz/MediaCentre/Speeches/7thannualnationalpowernewzealand20.aspx>).
- 49 *ibid.*
- 50 We supplemented this information by using the most recent Annual Environmental Report for the year ending September 2004.
- 51 TrustPower has no thermal generation plant.
- 52 Broadly aligned with the ISO 14001 standard.
- 53 Accreditation for all Contact-owned generation plants to the internationally recognised environmental performance management system certification ISO 14001 was completed in March 2005.
- 54 Northland Regional Council, *Northland Community Plan 2004-2014, Long-Term Council Community Plan*.
- 55 More details are available in EECA's *EnergyWise Councils Partnership year 7 report 03/04*.
- 56 More details are available in Environment Waikato's *Delivering a Sustainable Future, Long-Term Council Community Plan 2004-2014*.
- 57 <http://www.ecan.govt.nz/Plans+and+Reports/Energy/Regional+Energy+Strategy+2004.htm>

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Appendix A: Operation of Whirinaki

Information for PCE provided by MED

October 2005

The reserve generation plant at Whirinaki was officially opened on 1 June 2004. In April 2004 the plant exported 15,646 MWh of electricity as part of commissioning the power station.

Since April 2004, the power station has dispatched electricity into the grid for four different reasons:

1. In response to high market prices – guidelines for dispatch are set by the Electricity Commission (previously by the Crown).
2. On request from Transpower, in response to a short-term electricity shortage – the Whirinaki plant is able to dispatch to the grid in a shorter time than many other generation plants (low ramp rate), and can maintain security of supply until larger, cheaper plants are online.
3. On request from Transpower, in response to longer-term electricity shortages – this has occurred when problems were experienced with the HVDC link between the South Island and the North Island.
4. During monthly plant integrity verification (PIVT) or annual testing.

On occasions the plant was started but did not reach the point where it was synchronised with the grid to start exporting, as the security concerns were resolved before synchronisation was complete.

Details of dispatch since commissioning are given in Table A1 and reasons for dispatch are listed below.

June 2004

Dispatched on 20 occasions, 12 of which resulted in a unit being synchronised to the grid. Apart from testing, these were triggered by average prices exceeding \$200 over eight consecutive trading periods.

July 2004

Dispatched on 19 occasions, 18 of these resulted in units being synchronised to the grid. Starts still appear to be related to the station's ramp rate rather than price. In some cases the plant was on load for very short periods of time.

August 2004

Dispatched on eight occasions, seven of these resulted in units being synchronised to the grid. Of these, two dispatches were price related and the balance due to either ramp rate constraints of in-service plant, or shortfalls in reserve.

September 2004

Dispatched only once but did not synchronise to the grid. This single dispatch (for 29 MW) occurred at 12.34 pm on 8 September and appears to have been ramp rate related.

October–December 2004

PIVT test runs only.

January 2005

Transpower dispatched the station on one occasion for generation of 25MW, on 16 January 2005, due to the loss of the HVDC link. As a result of the running for the month of January, units 1 and 2 did not need to undergo PIVT tests, (a PIVT test was carried out on unit 3 only).

February 2005

Dispatched a total of 17 times at either Transpower's request or for testing purposes. From 4–11 February dispatch requests varied from 0.7 MW to 78 MW. Dispatches were a result of continuing restraints of the HVDC link and the maintenance outage at the Taranaki Combined Cycle plant, but were primarily due to high river water temperatures at Huntly Power Station restricting the station's output.

March 2005

PIVT and annual testing.

April–June 2005

PIVT test runs only.

Table A1 Generation at Whirinaki April 2004 to June 2005

Date	Generation (MWh)	Date	Generation (MWh)
April 04	15,646.00	Sun, 16-Jan-05	3.45
Thu, 03-Jun-04	143.93	Mon, 17-Jan-05	1.82
Fri, 04-Jun-04	48.74	Tue, 1-Feb-05	49.36
Tue, 29-Jun-04	64.9	Fri, 4-Feb-05	63.45
Wed, 30-Jun-04	40.68	Tue, 8-Feb-05	14.98
Thu, 1-Jul-04	101.28	Wed, 9-Feb-05	164.12
Fri, 2-Jul-04	10.86	Thu, 10-Feb-05	78.97
Sat, 3-Jul-04	4.87	Fri, 11-Feb-05	26.15
Thu, 8-Jul-04	223.38	Fri, 25-Feb-05	164.93
Fri, 9-Jul-04	8.89	Sat, 26-Feb-05	12.22
Sat, 10-Jul-04	11.29	Thu, 10-Mar-05	29.38
Mon, 12-Jul-04	104.44	Fri, 11-Mar-05	101.71
Tue, 17-Aug-04	32.42	Tue, 22-Mar-05	97.71
Wed, 18-Aug-04	0.37	Wed, 23-Mar-05	25.71
Thu, 19-Aug-05	0.31	Thu, 24-Mar-05	114.68
Tue, 24-Aug-04	16.24	Wed, 20-April-05	4.1
Wed, 25-Aug-05	9.34	Wed, 4-May-05	2.11
Thu, 26-Aug-06	47.47	Wed, 18-May-05	2.09
Fri, 1-Oct-04	11.3	Wed, 25-May-05	9.83
Wed, 3-Nov-04	3.2	Wed, 8-June-05	9.89
Mon, 20-Dec-04	3.15	Wed, 28-June-05	12.28

Appendix B: Regional Council energy initiatives

Northland Regional Council

Northland Regional Council has identified in their long-term community plan that “a secure and cost effective electricity supply is required”.⁵⁴ They also mention that:

Northland Regional Council intends to facilitate the development of a non-statutory Regional Energy Plan for Northland, working with stakeholders such as District Councils, power trusts and key industries. The objectives of such a plan would be to develop a long-term, sustainable energy strategy for Northland.

The time frame for this work is 2004–2007.

The council advises that work on the strategy has not yet commenced. Their main concerns are that, because the region is a net electricity importer, there is potential for electricity supply and transmission problems through Auckland.

The council is now processing a resource consent application for Marsden B. It wants to avoid any perceived conflict of interest, so will not proceed with a regional energy strategy until this application is processed. The outcome of the application could also have a significant impact on the direction and focus of a regional energy strategy.

The idea of the regional council facilitating a non-statutory regional energy strategy has been discussed with Enterprise Northland.

Auckland Regional Council

The Auckland Regional Council became a founder member of EECA's EnergyWise Councils Partnership programme in 1997.

In October 2002, Auckland Regional Council made a commitment to provide leadership in relation to how a council can ‘walk the talk’ by fully integrating social, environmental, economic, and cultural sustainability into all aspects of its internal operations.

Environment Waikato

Environment Waikato joined EECA's EnergyWise Councils Partnership programme in 2002 and completed a regional energy survey in 2003. Environment Waikato plans to complete an energy strategy for the Waikato region.⁵⁵ A draft scope of works for the strategy has been completed, but the project has been delayed due to other unplanned work on geothermal energy in the region. Completion of the strategy remains an important goal for Environment Waikato.

Its long-term council community plan identifies goals to continue reporting on Environment Waikato's energy use.⁵⁶

Wellington Regional Council

Wellington Regional Council joined EECA's EnergyWise Councils Partnership programme in 2003. Their Regional Policy Statement has been promoting energy efficiency and conservation as well as renewable energy since becoming operative in 1995.

The long-term council community plan includes a chapter on energy. Key targets are:

- fewer than 400 million litres of petrol and diesel used for transport purposes per year (currently 442 million litres)
- at least a 500 percent increase in electricity generated from renewable energy resources in the region (currently 14 GWh)
- Wellington Regional Council's carbon footprint reduced by 10 percent per year.

Environment Canterbury

Environment Canterbury has been a member of EECA's EnergyWise Councils Partnership programme since this was first formed. As part of this involvement, they report annually on internal energy use as a method of tracking progress towards energy reduction targets.

Environment Canterbury has been active in energy issues and associated air quality issues for some time. They have developed and implemented a Clean Heat project to reduce air pollution in Christchurch. This project involves encouraging, facilitating, and supporting energy efficiency improvement in homes within the clean air zone (including insulation improvements and replacing heaters with more efficient cleaner heating technologies).

Environment Canterbury also encourages sustainable transport within the region and published a Regional Energy Strategy in April 2004.⁵⁷

Regional Councils' energy efficiency initiatives

Membership of EECA's EnergyWise Councils Partnership programme is used as an indication of commitment or interest in energy issues. For the purposes of this report, a Regional Energy Survey is defined as a study of energy use within the region, whereas a Regional Energy Strategy is a more comprehensive study in which potential energy supply and demand management opportunities are identified. Table B1 summarises the energy activities of regional councils.

Table B1 Energy activities of regional councils

Regional/Unitary councils	EnergyWise councils partner	Regional energy survey completed	Regional energy strategy completed
Northland	No	No	Planned (by 2007)
Auckland	Yes (1997)	In progress	No
Waikato	Yes (2002)	Yes (2003)	Planned (draft scope of works has been completed)
Bay of Plenty	Yes (2005)	No	No
Gisborne	Yes	Yes (2005) Tairāwhiti (includes Wairoa)	Yes (2005) Tairāwhiti (includes Wairoa)
Hawke's Bay	No	No	No
Manawatu-Wanganui	No	No	No
Taranaki	No	No	No
Wellington	Yes (2003)	No	No
Tasman	No	No	No
West Coast	No	No	No
Canterbury	Yes (1997)	Yes (1982-2002)	Yes (2004)
Otago	No	No	No
Southland	No	Yes (2003)	Yes (2003)