12. Energy

12.1 Introduction

Energy[17] is an essential input to natural and economic systems but its use has both good and bad effects.

Energy enables humans to achieve a high degree of mobility through its use in transport systems. It provides heating for comfort and warmth, and motive power for the operation of equipment in the workplace and at home.

Imaginative exploitation of a variety of energy sources has provided the basis for economic development and for dramatic improvements in the quality of life for many people.

Unfortunately, the fossil fuel sources of energy that have underpinned many of the social and economic benefits referred to above will not last for ever. Fossil fuel energy sources are not only finite, but their use is also producing a number of undesirable environmental effects. Moreover, several decades of cheap and apparently plentiful energy supply has induced wasteful energy practices in industry, transport and in the home. In short, current patterns of energy production and use are unsustainable.

If the social and economic benefits are to be maintained and the bad environmental effects avoided or substantially reduced, then

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[17] Energy is identified as a natural and physical resource in the definitions contained in s. 2 of the Act. Energy is subject to all of the provisions of s. 5 of the Act. Minerals, including non-renewable fuel minerals such as coal and petroleum, are specifically excluded from s. 5(2)(a). The Regional Policy Statement acknowledges that minerals cannot be considered in terms of "sustaining their potential to meet the foreseeable needs of future generations", consistent with s. 5(2)(a).

In developing policy for energy management in the Regional Policy Statement there is a requirement to consider all of Part II of the Act. S. 7(b) identifies the "efficient use and development of natural and physical resources" and s. 7(g) "any finite characteristics of natural and physical resources" as matters for particular regard. Minerals are not excluded from these provisions in the Act.

The Regional Policy Statement therefore strikes a balance between meeting the provisions of s. 5(2)(a) and the broader requirements of Part II to provide integrated management of natural and physical resources. Given the importance of energy in underpinning economic and social well-being in the Region, the Regional Policy Statement considers how energy (from renewable and non-renewable sources) can continue to sustain desirable social and economic goals.

a different policy direction is needed. Broadly, the policy direction should aim towards reducing energy demand, increasing efficiency in energy use, managing non-renewable sources to extend the period of their usefulness, and developing renewable sources.

Because of its central importance to economic and social well-being, and because of the environmental effects of its use, energy is a significant resource management matter for the Regional Policy Statement. Energy management is closely linked with policies for transportation, air quality and the shape, layout and locations of settlements in the Wellington Region.

See also chapters 8 (Air) and 14 (Built Environment and Transportation).

12.2 Issues

Issue 1

Data on energy sources and sectoral use is not generally available at the regional level. Even at the national level, many of the important categories of information (e.g., about trends in the use of energy by different activities) are patchy and focus on economic rather than environmental considerations. It is therefore very difficult to establish a clear and comprehensive picture of energy use and the effects of that use.

Energy Policy 10.

Issue 2

There are many **players** in the energy field. These include the energy industry and consumer organisations, central government, environmentalists, energy related professional associations and a variety of national and international organisations concerned with the development and delivery of several different forms of energy. Moreover, a number of environmental issues related to energy management have a global dimension, thus involving even more players.

Energy Policy 10.

Because of the wide range of bodies with overlapping and sometimes conflicting organisational responsibilities for energy related matters, it is very difficult to establish or co-ordinate local policy or project initiatives aimed at energy management. There is also a false perception that any such local initiatives are unlikely to make significant inroads into global problems and therefore, may not be worth the effort. However, even small efforts have some beneficial effect and New Zealand is required to take certain actions in order to meet international obligations and protocols.

Energy Objectives 1-3.

Issue 3

There is a high degree of **dependence** by the Wellington regional economy and by communities in the Region on non-renewable sources of energy. This dependency on non-renewable energy sources, particularly fossil fuels, raises concerns about the long-term viability of regional economic and social well-being. For example, the transport sector is a crucial link in the Region's social and economic well-being, but relies on a heavy and increasing use of non-renewable fuels. Half of these fuels come from overseas and this proportion is likely to increase in the next few years.

Energy Objective 2.

Issue 4

The production, transmission and use of energy are not as efficient as they could be. Examples of **inefficient use of energy** can be found in all sectors of activity — industry, commerce, transport, primary production, urban form and in the individual home. Opportunities and incentives for greater efficiency have recently received more attention, reflecting a growing body of evidence that energy efficiency offers the potential to postpone or avoid the various costs (including environmental costs) associated with the provision of new energy capacity.

Energy Objective 1.

Issue 5

A growing number of **adverse environmental effects** are being identified as a result of energy production, transportation, transmission, conversion and, particularly, end use. These effects include both localised and global scale damage to environmental systems.

Energy Objective 3.

12.3 Objectives

Objective 1

Energy demand is moderated and energy that is needed is produced, distributed and used efficiently so as to reduce impacts on the environment and to make effective use of limited energy resources.

Energy Polices 1-3.

Objective 1 recognises that energy efficiency, by itself, is not sufficient to be able to sustain the beneficial services provided by energy resources or to successfully manage significant environmental effects that arise from energy production and use. The objective is thus based on an understanding that an additional and substantial increment of environmental benefit can also be achieved through a moderation in the demand for energy.

Objective 1 applies to the production, distribution and use of energy by all activities. It also applies to all sources of energy.

Energy efficiency increases benefits per unit of energy consumed. Efficiency can reduce both financial costs and the adverse environmental effects arising from the production, transportation, conversion and the end use of energy.

Moderating energy demand and making more efficient use of non-renewable sources will also provide a longer period for the orderly transition to renewable energy sources. S. 7(b) of the Act requires that those exercising functions and powers under the Act have particular regard to the efficient use and development of natural and physical resources.

Improved energy efficiency can be achieved in a number of ways, including:

- Matching the type, location and quality of the energy provided by a particular source to the end use or specific service needed;
- Using energy saving technologies for production, transmission and end use; and
- Changing individual or collective patterns of behaviour.

Although improved efficiency is an objective in its own right, it is also an integral and complementary part of the other energy objectives set out below.

Objective 2 *An increasing proportion of energy is provided by sources that are renewable.*

Energy Policies 4-6.

Non-renewable fossil fuel energy sources currently comprise the major source of energy for transport and are a significant source of energy for direct and indirect inputs to agricultural, industrial and commercial activities. Because of their chemistry, the uses of fossil fuel based sources of energy also have actual or potential adverse effects on local and global environmental systems.

See also Built Environment Issues 6 and 10.

See also Air Objectives 3-4.

S. 7(g) of the Act requires particular regard to be given to the finite characteristics of resources.

The continuing use of non-renewable fuels is not a sustainable practice. Depletion of finite energy resources (e.g., petroleum, gas and coal) raises economic, social and environmental costs, and will limit the choices that future users will have about energy sources. Depletion of an energy source to the point of exhaustion will preclude use by future generations.

Objective 2 seeks to sustain social and economic well-being by helping to prepare for the time when fossil fuels are in short supply. The objective recognises the adverse effects that arise as a result of the use of fossil fuels. To avoid, remedy or mitigate these adverse effects, and to sustain well-being, the objective points to the development and use of environmentally benign and renewable energy sources.

Objective 3

Adverse local and global environmental effects of energy production, transportation, transmission, conversion and end use are avoided, remedied or mitigated.

Energy Policies 7-9.

Objective 3 seeks to avoid, remedy or mitigate local and global effects of energy production, transportation, transmission, conversion and use, particularly the effects of the use of fossil fuels.

See also Air Issue 2.

Whilst energy production does not currently occur on a large scale in the Region, the effects of this activity elsewhere are indirectly felt (e.g., "acid" rain, climate change). To a limited extent, the Regional Policy Statement can anticipate some of these external effects and attempt to mitigate the impact of such effects.

The Regional Policy Statement is more able to deal with the direct impacts on environmental systems that arise from the transmission and transportation, storage, conversion, processing and end use of energy in the Region.

The effects can find expression in a number of ways:

- **By changing air composition and quality** (e.g., CO_2 and primary pollutants such as lead, CO and other gaseous and particulate emissions enter the air as a result of the combustion of fossil fuels; secondary pollutants such as photochemical oxidants also enter the atmosphere);

- **By reducing water and soil quality** (e.g., from oil spills and from stormwater run-off containing deposits from roads

and airborne particulates from exhausts);

- **By damaging ecosystems** (e.g., specific habitats affected by construction of energy related infrastructure and pollution of soil, water and ambient air that reduces ecosystem quality);

- **By affecting visual values** (e.g., pylons in landscape); and

- **By placing potential pressures on human health** (e.g., electromagnetic fields from power lines).

12.4 Policies

Policies for Moderating Energy Demand and for Energy Efficiency

Policy 1

To promote a more efficient match between the characteristics of different energy sources and the required end uses:

- *In production processes and activities (including production and transmission of energy);*

- *In the management of energy needs for commercial buildings and businesses; and*

- *In domestic energy service requirements.*

Energy Method 3.

See also Waste Policy 3.

Policy 2

To promote a moderation in energy demand and efficient energy use:

- *In production processes and activities (including production and transmission of energy);*

- *In the operation of equipment and appliances; and*

- *Through the development of energy efficient products and services.*

Energy Method 3.

Policy 3

To promote the consideration and the application of energy efficiency and a moderation in energy demand:

- *In building design and site layout;*

Energy Methods 1-3. See also Built Environment Policies 2-3.

- *In the use of construction materials;*

- *In the design and operation of transport vehicles and transportation systems; and*

- *In plans, policies and proposals that influence urban form and the distribution of land uses and activities.*

Policies 1-3 seek a moderation in energy demand and improvements in the efficient production, transmission and use of all sources of energy, in all sectors of the economy, and throughout the Region. They recognise that comprehensive improvements in efficiency are needed in the development of products and services, in building design and the use of appropriate materials, and in the integrated development of the Region's settlement pattern and transport systems. Many public and private sector organisations will be able to help implement these policies.

Energy efficiency can make an important contribution to relieving environmental pressures, as well as producing cost savings. At the level of individual organisations and households, investment in cost effective energy efficiency is likely to produce financial benefits with a short pay back period.

Policies for Making an Orderly Transition to Renewable and Environmentally Friendly Energy Sources

Policy 4

To promote efficient and effective use and management of all energy resources in the short-term, and the adoption and use of appropriate renewable energy resources for industry, commerce and domestic energy services in the longer-term.

Energy Method 5.

Policy 5

To promote a movement away from the use of non-renewable fossil fuels as the primary source of motive power for transport in the Region.

Energy Methods 4-5. See also Air Policy 7 and Built Environment Method 3.

Policies 4 and 5 are concerned with how goods and services might continue to be provided in the longer-term, given the finite characteristics and the environmental effects of using the energy sources on which the provision is currently based.

The policies therefore seek to sustain the long-term provision of necessary services, whilst using less harmful and renewable

energy sources. **Policy 4**, in using the word "appropriate" acknowledges that the development, transmission and use of renewable energy resources do not necessarily imply desirable environmental outcomes and that care needs to be taken to ensure that all the environmental effects of the development, transmission and use of such resources are considered.

Policy 6

To promote efficient energy production from the Region's renewable energy assets, where the effects of the development are environmentally acceptable.

Energy Method 5.

Policy 6 specifically addresses the Wellington Region's natural advantages and potential for energy production. The locally based energy provision could draw on renewable and environmentally benign sources of energy. Wind power, in particular, has been seen to offer considerable potential in the Region. Energy production from waste materials in landfills is another possibility.

The policy wording provides support for taking opportunities, but emphasises that other criteria for environmental management have also to be considered.

Policies for Dealing with Adverse Effects of Energy Production, Transportation, Transmission, Conversion and End Use

Policy 7

To avoid, remedy or mitigate effects on the atmosphere, including emissions of greenhouse gases, that result from energy production, transportation, transmission, conversion and end use, consistent with national standards and international protocols.

Energy Method 6. See also Air Methods 11-12.

Policy 8

To avoid, remedy or mitigate pollution of soil, water and ecosystems that arise from energy production, transportation, conversion and end use consistent with any standards or rules that may be set for managing such effects.

Energy Method 6. See also Fresh Water Policies 4-7, Soil Policy 6 and Ecosystems Policy 4.

Policy 9

To avoid, remedy or mitigate any adverse effects on human health that arise from the production, transmission, transportation, conversion and end use of energy.

Energy Methods 6-7.

Policies 7-9 concern the avoidance of environmental pollution

and impairment of human health, both of which may potentially arise from the production, transmission, transportation, conversion and end use of energy.

Policies to achieve **Objective 3** are, in fact, spread throughout the Regional Policy Statement. In particular, policies that deal with air and water quality, the health of ecosystems, landscape, the urban environment, energy from waste and with the coastal environment can all be seen as relevant policies for achieving Energy **Objective 3**. Collectively, they set standards of environmental quality within which activities associated with energy production, transportation, transmission, conversion and end use have to operate.

The policies listed here supplement this broader collection of standards by alluding to global climate protocols and internationally accepted needs for good human health.

Whilst the policies are intended to apply to issues for the Wellington Region, there is an additional expectation that global benefits, albeit small, are likely to ensue (e.g., reducing pollution levels in the local environment through a reduction in traffic volume can also help limit greenhouse gas emissions).

Policy for Meeting Information and Organisational Framework Needs for Energy Management

Policy 10

To improve knowledge of energy use and the effects of energy use, and to co-ordinate implementation of national, regional and local policies and actions aimed at achieving the sustainable management of energy.

Energy Method 8.

Policy 10 is concerned with establishing an information base and an organisational framework for energy management.

The policy recognises the need to have a data base on the use of different energy sources by different activities as an important step in understanding how energy can be managed in a sustainable way.

Policy 10 also seeks to establish some co-ordination between the diverse range of authorities, organisations and companies that have a responsibility for, or interest in, energy management. The policy acknowledges the need for consistent application of energy policies at all levels and across different organisational responsibilities.

12.5 Methods

Methods for implementing the energy management policies are discussed under the four headings which correspond to the policy groupings adopted above.

Methods for Improving Energy Efficiency

The Wellington Regional Council will:

Energy Policies 1-3.

Method 1

- *Serve as a role model for energy efficiency by conducting Energy Audits as part of a commitment to implement a long-term energy efficiency action programme dealing with its in-house energy-using assets.*

Method 2

- *Consider, where relevant, energy efficiency in regional plans, in transport policy development and in assessments of environmental effects required by the Council as part of the resource consent granting process.*

Energy Policy 3.

Method 3

To achieve integrated management, other means which could be used to implement Energy Policies 1-3 include:

Energy Policies 1-3.

(1) Advocacy by concerned organisations and individuals for the preparation of a New Zealand Energy Policy Statement;

(2) Introduction, by appropriate organisations, of a consistent and comprehensive range of measures to promote energy efficiency and a moderation in energy demand;

(3) Provision of information and promotional campaigns by appropriate organisations to increase public awareness about the means for achieving, and benefits of, moderating energy demand and improved efficiency in the use of transport fuels;

(4) Continuation of the provision of information and advice by the Energy Efficiency and Conservation Authority (EECA) to all sectors of economic and domestic activity on the benefits of energy efficiency and the availability of energy efficient equipment and products;

(5) Encouragement from and targeted campaigns by the EECA and the energy supply industry to industry, trade

associations and the construction industry and related professions to identify and adopt energy efficient practices;

(6) Provision of financial and other incentives by the energy supply industry to encourage improved energy efficiency in all sectors of the economy;

(7) Introduction of energy audits by public and private sector organisations, and implementation of cost-effective findings from such audits;

(8) Establishment of demonstration projects on energy efficiency by the EECA, the energy supply industry or other relevant organisations; and

(9) Implementation through the provisions of district plans.

To be effective and efficient, programmes and initiatives aimed at implementing energy efficiency need to be strategically co-ordinated and apply across all sectors of energy use. **Method 3** identifies a range of possibilities.

A New Zealand Energy Policy Statement could provide direction for energy management in general and for energy efficiency in particular.

Central government, in conjunction with the Energy Efficiency and Conservation Authority, could also introduce various other means of encouraging and enforcing improved energy efficiency. Financial incentives could include differential taxation (e.g., to encourage the use of more fuel-efficient vehicles), taxes on pollutants (e.g., a carbon tax) or the provision of capital for appropriate initiatives (e.g., the installation of energy efficient technology). Some incentives could be provided through the energy supply industry, which is well placed to provide direct contact with consumers.

If it was felt that some more formal level of control or guidance was appropriate, this could be exercised by central or local government through the:

- Use of legally binding **regulations**;
- Development of formal or informal **agreements** reached by Government with, for example, industrial or trade associations, product manufacturers or business groupings;

and

- Setting of **standards** which could:

  * Specify design criteria for how a building, a product or an appliance performs (e.g., a performance standard for retaining heat);

  * Establish energy efficient behaviour (e.g., companies or organisations to conduct Energy Audits and to implement the findings); or

  * Identify appropriate information about energy efficiency (e.g., kitchen "whiteware" to have energy efficiency rating information).

A number of studies have shown that one of the reasons why greater efficiency is not practised is because of a lack of information. The EECA and the Centre for Advanced Engineering Energy Efficiency Project are addressing this issue. A wide range of possibilities exists to increase knowledge, including targeted campaigns and demonstration projects (**Method 3**).

In conjunction with national scale initiatives, local authorities such as the Regional Council could serve as role models for cost effective energy efficiency (**Method 1**). The role model could find expression in conducting Energy Audits as a key component of in-house Energy Management Plans and the greater use of energy efficient equipment in the delivery of operations and services. Other organisations might also wish to find out how they can benefit financially by becoming more energy efficient (**Method 3**).

By highlighting energy efficiency as an explicit matter to consider in its consent granting and in policy development (e.g., in transport policy and urban form), the Regional Council will be acknowledging and signalling the important status given to energy efficiency in decision making (**Method 2**).

Similarly, district plans could be an appropriate means of implementing energy efficiency through the management of urban form and the distribution of and relationship between land uses (**Method 3**).

Methods for Making an Orderly Transition to Renewable and Environmentally Friendly Energy Sources

Method 4

The Wellington Regional Council, through its Regional Land Transport Strategy, will:

Energy Policy 5.

(1) Promote existing modes of sustainable transport and their associated infrastructure;

(2) Promote, in the short-term, more efficient use of fossil fuels in transport; and

(3) Promote, where appropriate, in the medium to longer- term, the progressive development and use of cost effective transport modes that are propelled by motive power derived from renewable energy sources.

Method 5

To achieve integrated management, other means which could be used to implement Energy Policies 4-6 include:

Energy Policies 4-6.

(1) Promotion of cost effective use of renewable energy sources in the industrial, commercial, domestic and transport sectors, by the EECA and other relevant authorities working in conjunction with research institutions and energy sector representatives.

(2) Promotion and co-ordination of funding for a research and development programme for the establishment of cost effective and environmentally acceptable energy ventures in the Region; and

(3) Distribution to interested parties of information about the Wellington Region's potential for renewable energy provision.

As with several of the energy policies, policy direction and associated programmes for implementation are most sensibly initiated by central government. The Government has, in June 1993, produced an outline framework for renewable energy, and it is expected that more specific steps will follow. The methods discussed here therefore focus on actions that the Regional Council might take to complement wider policy, together with reinforcement of the initiatives that are already being taken by Government and the EECA.

Method 4 deals with Regional Council responsibilities and the

See also

steps that the Council can take to progressively enable a shift from non-renewable to renewable energy forms. Support could be given to renewable energy sources for transport (e.g., electricity), and modes of transport (e.g., walking, cycling) and their associated infrastructure that do not deplete finite fossil fuels.

Built Environment Method 3.

Whilst research and development continues on cost-effective and renewable alternatives for the medium to longer-term, the focus of Council effort in the meantime would be placed on improved efficiency in the use of existing (mainly fossil) fuels. The Council could complement this effort by continuing to promote public transport options as a means of reducing the use of fossil fuels in private transport.

Method 5 concerns the establishment of the broader policy and financial framework to facilitate a transition to greater use of renewable forms of energy, including co-generation of heat and power, and the development of the Region's potential for renewable energy.

The suggestion that a National Energy Policy Statement be prepared is mentioned in relation to energy efficiency in **Method 3**. It is repeated here to emphasise that the Statement also needs to consider the long term supply of energy sources and transition to use of renewable sources in order to sustain social and economic well-being.

The reference to the role of the EECA in **Method 5** acknowledges the work already being done by the organisation. The wording through the method emphasises the EECA concern that a move to renewable energy sources needs to be based on cost effectiveness and technical viability, as well as environmental acceptability.

Methods for Dealing with Adverse Effects Arising from Energy Production, Transmission, Transportation, Conversion and End Use

The Wellington Regional Council will:

Method 6

- *Establish discharge and other environmental standards, where appropriate, in order to achieve reductions in pollutants associated with energy production, transmission, transportation, conversion and end use.*

Energy Policies 7-9.

Method 7

District plans would be an appropriate means of implementing

Energy Policies 7-9.

Energy Policies 7-9.

Methods 6-7 are concerned with the statutory means for avoiding or reducing the adverse effects of energy production, transmission, transportation, conversion and use on local and global communities and environmental systems.

The methods are a supplement to national scale initiatives, to policies and methods elsewhere in the Regional Policy Statement, and to numerous responsibilities that other authorities have for managing the effects of energy provision on people and environmental systems.

In relation to global effects, the most effective and efficient methods are likely to be national and international agreements and initiatives. Although small in scale, local actions would complement initiatives with global objectives. However, there will also be local benefits in pursuing particular actions that incidentally help resolve a global concern. For example, improving energy efficiency in transport reduces local pollution, saves resources and assists (global) CO_2 reduction programmes.

See also Air Methods 11-12.

Methods for avoiding or otherwise managing adverse local effects are likely to be primarily achieved through controls or standards against which proposals for resource consents will be considered. Environmental quality standards (e.g., for air, water, ecosystems, etc.) will be shaped by policies provided elsewhere in the Regional Policy Statement and specific controls may be set in regional plans (**Method 6**) and in district plans (**Method 7**).

Method for Meeting Information and Organisational Framework Needs for Energy Management

Method 8

To achieve integrated management, means which could be used to implement Energy Policy 10 include:

Energy Policy 10.

(1) Establishment of a regional energy forum, for:

(a) Bringing together energy interests in the Region;

(b) Facilitating links between the EECA and local government; and

(c) Advocating on energy matters on behalf of the Region.

(2) *Assessment of the energy characteristics of the Region, and monitoring of:*

(a) *Energy **sources** used by activities and communities in the Region (e.g., type and location of sources, quantities used and trends in proportions of non-renewable and renewable sources);*

(b) *Energy **use** (e.g., by sector);*

(c) *Energy **efficiency** (e.g., by sector, by product improvement rate); and*

(d) ***Effects** of energy production, transportation, transmission, conversion and end use (including effects on air, water, soil, ecosystems and human health).*

An energy forum could co-ordinate efforts for advocating and achieving sustainable energy management. It could bring together a range of interests, including the energy supply industry, energy companies, education and research organisations, venture capital and investment groups, and environmental and consumer groups.

A forum could be useful in achieving a number of other energy management policies. The forum could monitor the characteristics and effects of energy use in the Region and provide a mouthpiece for advocating on energy policy to central government. It could also be a means of linking EECA initiatives, co-ordinating energy management information and integrating policies for energy, air quality, transport, etc., across local authorities within the Region.

As an informal grouping of interests, the forum would not be primarily concerned with the funding of local energy initiatives. Whilst the method does not specify any particular body to direct research, initiate investment and develop promotional activities, the forum could have a role in these areas.

12.6 Anticipated Environmental Results

(1) There is a reduced demand for all forms of energy and

public needs for energy services are met.

(2) There is increased efficiency in energy use in all sectors of the economy.

(3) An increasing proportion of renewable energy sources is used.

(4) There is a decreased use of fossil fuels and an increased use of the less environmentally damaging energy sources, including those available within the Wellington Region.

(5) There is a reduction in the adverse effects attributable to the production, transportation, transmission, conversion and end use of energy.