greater WELLINGTON
REGIONAL COUNCIL

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Committee Regional Sustainability Committee
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Renewable energy in the Wellington Region

1. Purpose

To provide the Committee with an overview of national policy initiatives relating to energy issues, and an overview of the renewable energy resource in the Wellington region.

2. Background

Issues such as climate change, energy efficiency and conservation, security of supply and renewable energy opportunities are increasingly high profile issues at the national, regional and household level.

Several key policy documents have recently been released by the Government which address actions and initiatives to mitigate negative trends around energy use. They also provide a framework and targets for managing energy use into the future, in a sustainable manner, which places an emphasis on developing renewable energy resource. At the local level, regional councils can provide appropriate leads to support these national initiatives.

The key documents referred to above included:

- *Wind Power, People, and Place*, Parliamentary Commissioner for the Environment, 2006 www.pce.govt.nz
- *Renewable Energy Assessment – Greater Wellington Region*, EECA[1] August 2006 www.eeca.govt.nz (to be addressed by Rose Feary, EECA)
- *NZ Energy Efficiency and Conservation Strategy*, New Zealand Government, October 2007 www.eeca.govt.nz

[1] EECA (Energy Efficiency and Conservation Authority) is a Crown entity implementing the National Energy Efficiency and Conservation Strategy

- *NZ Energy Strategy to 2050*, MED[2], October 2007 www.med.govt.nz (to be addressed by Richard Hawke, MED)
- *Environment New Zealand 2007* (the second state of the environment report), January 2008

While there are many other relevant documents, these are currently the most significant to Greater Wellington in the renewable energy field.

3. Comment

3.1 The State of the Energy Resource

Other than minor generating sources, the Wellington region is totally dependant on 'external' sources for its electricity. One exception is New Zealand's first commercial wind farm, Hau Nui, which provides power locally to the Martinborough and Greytown area.

Wellington region's electricity consumption is 3,000GWH/year which represents 8% of the national total. Our demand is therefore mostly met by remote generation facilities served by the national grid, thus incurring transmission losses and making Wellington dependant on energy sources from outside the region.

As the 2006 EECA report[3] identifies, Wellington has multiple potential energy resources, but as stated, it relies on existing data and "Some of these sources are contradictory or very non-specific." In order to reach the full potential for some energy sources, the degree of environmental acceptance and/or advancement in technologies is also required.

Independent of issues such as climate change and environmental ramifications and emissions trading, the price of liquid fuels has increased faster than anticipated. For example, in 2003, the Ministry of Economic Development[4] predicted that crude oil would be US$30 per barrel by 2025; this has been well exceeded now potentially enhancing the economic feasibility of renewable energy sources.

This rapid price increase has been driven by factors such as security of supply concerns and a realisation of the finite nature of oil reserves despite exploration & recovery technological advances. Exacerbating this, within New Zealand, hydro-generation is vulnerable to dry years and water shortages.

New Zealand's electricity consumption continues to grow at 1.3% per annum, but is lower than recent historic levels of growth of about 2% due to efficiencies and lower growth demand. It is estimated that 3900MW of new electricity capacity will be required to meet this demand by 2050.

Currently 70% of New Zealand's electricity is generated from renewable sources, mainly through hydro and geothermal sources. The government has set a target for 90% of electricity generated from renewable sources by 2025 (based an average hydrological year). The NZ Energy Strategy states if the

[2] MED (Ministry of Economic Development)
[3] EECA, 2006: Greater Wellington Regional Renewable Energy Assessment
[4] MED, 2003: on Energy Outlook to 2025

country can reach this level in the electricity sector, then the country would return to 1990 emissions level.

At present, economies of scale tend to favour large grid-connected renewable generation rather local distributed generation. In their favour, renewable generation plants can be built incrementally, such as the staged development of wind farms, as opposed to fossil fuel generation plants.

As the *Environment New Zealand 2007* report states (refer **Attachment 1**), the shift over the last 10 years towards the use of renewable energy sources such as wind has been a significant change in the country's traditional means of generating energy.

Of relevance to regional councils, government is developing a National Policy Statement for renewable energy during 2008; as a result, regional policy statements will have to give effect to the national objectives and policies.

3.2 The Potential for Renewable Energy in the Wellington region

The 2006 EECA report, *Renewable Energy Assessment – Greater Wellington Region*, identifies and assesses the renewable energy potential in Greater Wellington.

In summary it identifies:

- 500-700 MW of wind capacity – subject to acceptance of affects
- 1000MW of wave energy – provided technologies become available
- 30 million litres of ethanol per year from the region's grain crops
- 20 million litres of ethanol or 90GWh/year of electrical energy from woody biomass
- 38MW of mini and small scale hydro projects
- Significant potential for solar thermal hot water systems

In addition to cultural and environmental constraints, the region's ability to approach this potential will be governed by advancement in technologies, especially for marine (tidal and wave) sourced energy, and affordability.

3.3 Wellington's Wind Resource

Of those renewable energy resources identified in the EECA report, wind energy is without doubt the most abundant and economically viable resource in our region. The Wellington region has an excellent wind resource and the use of locally generated wind energy could improve our energy independence and security of supply, reduce supply losses and make a substantial contribution toward reducing the regional and national carbon footprint.

For a wind generation in New Zealand to be economically viable, it must have average wind speeds about 9m/sec (approximately 32km/hr)[5]. Approximately 35% of the region meets or exceeds this criterion; not surprisingly, there is a strong correlation between altitude and high average speeds.

On average, wind and hydro, at almost 100%, are the most efficient forms of energy generation. By comparison, the thermal efficiency of thermal fuels (coal and natural gas) is between 30 to 50%, while geothermal is 15% when converting it into electricity[6].

There are no significant technological barriers to exploiting the region's wind resources, and potential generators currently consider the greatest barriers to their proposals to be community resistance and the resource consenting process.

In relation to broader issue of the potential for wind development in the region, a number of other policy and environmental issues of note are highlighted below:

Regional Policy

Both the current and draft Regional Policy Statements support renewable energy generation, but do not provide specific guidance to wind power generation.

Wind energy generation is consistent with the LTCCP policy on partnerships with the private sector. The current LTCCP has a short term target to investigate renewable energy production on Greater Wellington lands (Parks and Forests).

The Wellington Regional Strategy acknowledges that contributing to the development of renewable energy can contribute to limiting the effects of climate changes although renewable energy generation is not currently one of the measures of progress.

Environmental Management

As with any 'development', both positive and negative environmental consequences will result - in the case of wind generation developments this applies to the investigation, installation, operation and decommissioning phases. In addition, wind developments have been shown to generate significant public interest, especially in relation to the more subjective issues such as landscape and amenity. The optimum would be wind farm developers to be directed to locations where wind conditions are most favourable and likely environmental impacts minimal. Such locations though may be well removed from suitable transmission lines.

[5] This is slightly higher than most overseas locations because of New Zealand's relatively low cost electricity supply and lack of subsidies for renewable energy.

[6] Environment New Zealand 2007 (state of the environment report), January 2008

Regulation

City and district councils have the primary role in regulating wind farm development via land use controls, while Greater Wellington plays a regulatory role through the resource consent process and permitted activity rules that address environmental impacts associated with site development activities such as vegetation clearance, earthworks, discharges to air, stream works and stormwater run-off.

Greater Wellington can also have a secondary influence on wind farm siting by providing information describing the region's wind resource and possible constraints to wind farm development.

3.4 Greater Wellington Initiatives

Wind Resource Mapping

In mid 2007, Greater Wellington commissioned NIWA to model the region's wind resource across the land area of the region, using existing GWRC and other publicly available wind data. This produced a map of estimated mean annual wind speed (**see Attachment 2**), that can be used to identify opportunities for wind resource development, and identify potential conflicts where other land values coincide with a viable wind resource.

The wind map was finalised by NIWA in January 2008. Even though this information is at a far finer level of detail (333m square grids) than previously available for the Wellington region, consideration of specific wind farm developments will still require detailed investigations to determine the precise nature of any site on matters such as legal, physical, ecological and cultural constraints. Refer to **Attachment 3** of this report for the wind resource mapping outputs. The development of this wind map, and potential options for how to further progress this piece of work will be discussed in more detail at the Committee meeting.

It is suggested that the wind energy resource map could be made available on the Greater Wellington web site, in the first instance. It would be important to ensure however, that it is made clear in any communication that the mapping indicates average wind speeds over the region, but does not pinpoint where wind generation development should or should not specifically occur.

Consideration is currently also being given to how most appropriately combine the information in the wind map with other information to reflect the accuracy, consistency and objectivity of the information.

The development of this wind map does illustrate that there are clear opportunities for Greater Wellington to take a lead in the development of messages around the efficient use of energy, particularly renewable energy. This has links with the household sustainability message, particularly around energy conservation. Links with EECA can also be further explored which could lead to innovative partnerships between central and local government for 'roll out' in the community.

Some other specific actions in the renewable energy field which are currently being developed or explored include the following:

- Exploring with EECA to develop sustainable energy 'viability calculators' for wind turbines and solar photo-voltaic (PV) systems. This will enable landowners and investors to assess the financial viability of installing a turbine or PV system[7].

- Exploring incorporating wind-related information into a sustainable energy web page on the GWRC web site, with reference to the wind resource map and sustainable energy viability calculators (via a hotlink to the EECA website), and 'micro-wind' turbines for domestic use.

- Investigating whether we could form a consortium comprising territorial authorities, EECA and Massey University's Energy Centre, to provide an anemometer loan facility. This would enable individuals to loan an anemometer to determine the low altitude wind resource at their property. This would be at minimum cost to the user, on the understanding that the data produced would also be available to consortium members. The consortium would fund anemometer purchase, while Massey University and EECA would co-ordinate installation, data collection and mapping of findings as a region-wide GIS layer.

4. Communication

A communication strategy around how best to relay the findings of the wind resource map will be developed once agreement is reached on the most appropriate form of presentation for the material.

[7] Based upon mean annual wind speed/sunshine, electricity tariffs and the spot market price for electricity.

Recommendations

That the Committee:

1. ***Receives*** *the report;*

2. ***Notes*** *the contents; and*

3. ***Endorses*** *working relationships being developed with the Ministry of Economic Development and the Energy Efficiency and Conservation Authority to explore further the potential of increasing renewable energy use in the Wellington region.*

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Attachment 1: Methodology to Estimate Mean Annual Wind Speed over Wellington Region
Attachment 2: Changes since the 1997 State of the Environment report
Attachment 3: Greater Wellington Region wind resource mapping