Prepared for

Tairawhiti Development Taskforce

Tairawhiti Regional Energy Assessment

By

East Harbour Management Services

29th January, 2004

Preface

The Tairawhiti Regional Energy Assessment has been commissioned by the Tairawhiti Development Taskforce to proactively identify the range and scope of potential energy initiatives in the Wairoa and Gisborne Districts. This study is based on the known and potential resources of the Region, the assessed market demand, and response to both traditional and new emerging energy technologies for use and generation. The report also focuses on key constraint issues, including the supply of electricity to and within the region and the use of energy across the Region. It is important to note that this report provides a snapshot of current market trends and sector responses, which are subject to constant change.

Recent dry year season energy shortages coupled with a potential national energy deficit and ever increasing demand on the network in the Gisborne and Wairoa Districts has lead to this initiative to plan proactively to ensure that local initiatives can be advanced in a manner which provides maximum economic benefit while maintaining environmental standards. This document is a baseline from which a Regional Energy Strategy could be developed. The creation of a service delivery mechanism or agency, for example a Tairawhiti Energy Trust could partner such a Strategy. Subsequent initiatives may also include the development of a Regional Energy Action Plan.

The Tairawhiti Regional Energy Assessment identifies a number of potential opportunities for regional action. This report is the outcome of a collaborate exercise. The authors acknowledge the positive contribution made by Eastland Network, Gisborne and Wairoa District Councils, Te Runanga O Turanganui a Kiwa, Te Runanga O Ngati Porou, Ngati Kahungunu Ki Te Wairoa and other individuals interviewed.

Table of Contents

Tairawhiti Energy Assessment

Executive Summary

The Current Energy Scene

The Tairawhiti region currently has some of the highest costs for energy and in some rural areas the least reliable supply. It is also facing an electricity supply constraint as transmission and distribution lines into parts of the region reach capacity.

The Drivers for Change

National drivers for improvement in energy supply to the region include:

- Increasing costs of energy as gas supply becomes limited.
- Increasing constraints in availability of gas except for high value uses.
- Increasing costs of electricity as new higher cost generating power stations have to be built.
- The introduction of a carbon charge in 2007.
- The removal of the requirement on network companies to supply electricity after 2013.
- Government Policy as outlined in the GPS and Government objectives "*that electricity is delivered in an efficient, fair, reliable and environmentally sustainable manner to all consumers*".

Regional drivers include:

- Having sustainable, reliable, affordable energy supply.
- A desire to attract new industry to the region.
- To increase the extent of primary product processing in the region.
- The desire for warm and healthy communities.
- Transport costs

Energy Riches

The region is rich in untapped energy that can be used for increasing economic growth and community well-being. Regional energy resources in the area are typically of a size that they can be developed and used locally. Much of the resource can be developed at a community level with larger opportunities being regionally based. There are only a few energy investment opportunities that are of a size such that there would be potential to export from the region into the national grid.

The Way Forward

Meeting the energy needs of the Tairawhiti Region can be best achieved through the pursuit of a portfolio of supply and demand solutions. Ideally, parties in the area (including industrial/commercial and residential users and electricity/energy operators) would participate according to their own specific needs and ability to contribute. Unlike other regions in New Zealand where there are economies of scale for large energy company solutions, in the Tairawhiti Region, the low level of energy demand, large number of small potential opportunities, and spread out communities of interest, indicate that the Tairawhiti community (business and residential) must implement many of its own solutions, and is well placed to so.

Tairawhiti is fortunate in that throughout the region there is potential for a balance between energy supply and demand. In theory, the energy sources within the region itself are adequate alone to meet local demand. However, in reality, the economics of many opportunities are such that this balance will not be able to be achieved in the short term, and medium and longer term plans or transition paths will need to be developed. Such plans should be a prime focus of a regional Energy Strategy.

The way forward for the region on energy issues will require strong leadership, identification of opportunities for community involvement and skill development, co-ordination and facilitation of the various interested parties and the fostering of a climate of innovation and fit for purpose solutions. An inclusive approach is essential. If these attributes are not assured then opportunities will not be achieved to the maximum. Achievement of these attributes will have to come from a number of avenues, and will require the input of resources and expertise both internal and external to the region.

Energy Demand

Electricity demand in the Wairoa area is expected to increase at about 1-2% over the next few years as a new wood processing plant is built and the meat processors increase throughput. Beyond that any further growth, in particular in the residential areas is likely to be small except in localities such as the Mahia Peninsula (8% growth) which also has large seasonal fluctuation.

Electricity demand in the Gisborne/East Coast area is expected to increase at a rate of around 2.5% over the next few years principally from additional wood and food processing. The area between Gisborne and East Cape is expected to experience growth in the next few years only if a wood processor locates in the area in which case energy demand could more than double.

Reticulated gas demand is expected to only increase if additional food processing requiring heat is to be undertaken within Gisborne City.

Bottled gas is expected to increase throughout the region as energy users diversify energy supply options.

Transport Energy

Transport energy is expected to remain at current levels unless additional wood processors locate in Gisborne rather than closer to the forests. Locating near the forests will keep truck movements to a minimum.

With expected international increases in transport energy, it will be important that the Regional Transport Strategy is integrated with the recommended Regional Energy Strategy. In particular will be the consideration of greater use of the rail network for transport of bulk goods such as wood and food products.

Electricity Supply

The Tairawhiti region is split into two distinct supply areas, Wairoa and Gisborne. Wairoa has adequate electricity supply capacity into the area but has local distribution constraints that will need to be addressed to allow for future industrial growth in the area.

The electricity supply into Gisborne is becoming constrained at peak periods. Two potential solutions exist - either another transmission line will have to be built into the region, or other supply or demand reduction initiatives will have to be instigated within a reasonably short timeframe. The construction costs of a new transmission line could be of the order of $15-20million.

Closer analysis of the transmission options is necessary and raises the question of the necessity for Transpower to own the transmission lines into Wairoa and Gisborne. Transpower are the current owners of the line asset but arguably, there are distinct benefits for Eastland Networks, the local distribution company, to take over all the supply to the region at Tuai. The transmission lines could then be included within Eastland's own distribution network. This would allow an integrated supply/demand/transmission solution.

Throughout the region there are specific localities where electricity supply capacity and quality is poor. In some areas the occasional use of diesel generators to maintain adequate supply is already necessary.

The region has a large number of long stringy electricity distribution lines with few connections. This results in Eastland Network having to maintain such lines at considerable cost but for a low rate of utilisation.

The upfront capital funding of network upgrades can be a barrier to new industry growth. Unless Eastland Network can be confident that it will be able to gain adequate revenue from such investment, it is unlikely that the upgrade will be carried out. The alternative is that the industry causing the need for an upgrade may have to meet the costs. Mechanisms for deferred payment, avoided cost, or risk sharing are potential incentives to regional economic growth and should be explored further to establish the most effective long-term solution for the area. The local Councils may also be able to use financial contributions to upgrade costs.

Tairawhiti 'Incorporated'

The region is already undertaking a number of energy related initiatives but these tend to be ad hoc and un-co-ordinated. There is limited sharing of information, experience, funding and management. The region does not have the population to be able to pursue initiatives independently and there are significant gains to be made from operating collectively. In order for the people of the region to experience maximum benefit from the proposed Energy Strategy it is essential that an inclusive and 'team' approach is adopted. The full participation of all parties is essential.

Prevention Is Better Than Cure

The Region is in receipt of payments from Work and Income New Zealand (WINZ) to help some individuals pay their power bills and/or avoid having their power supply cut-off. Monthly assistance to the Region has reached $55,000. This is in effect a short term solution. This money could be allocated more effectively enabling the delivery of a longer-term solution. It could be channelled into programmes that

assisted these individuals or families with retrofitting insulation materials to their home, provided they are also able to obtain efficient appliances and budgeting advice. On-going assistance through innovative payment methods could also help and in the long term prevent these situations from arising.

Sustainability

The Region has a wealth of potential energy resources. While there is potential for a number of these resources to be developed over time they will never and should not be viewed as an alternative to national grid electricity supply. Their incremental development will complement national supplies and will push-out into the future the need for the upgrade of the transmission lines in the region. The region has an opportunity to develop 'fit-for-purpose' resources, for example, bioenergy and gas for heat while local electricity resources, for example wind and hydro are developed to complement and secure national electricity supplies to the region.

Full sustainable energy supply to the region is likely to be expensive because of the need to provide backup and other system benefits connection to the national electricity grid will always provide.

Solar

The region has ample solar radiation for solar water heating or electricity production from photovoltaic cells. Both these technologies are expected to have high growth rates and the installation industry will have to increase capabilities to meet demand in the area.

Installation of solar water heating systems can reduce household electricity costs by 30-50%. The production of electricity from photovoltaic systems is only economic in off-grid applications but in the long term, has the potential to allow off-grid existence and self-sufficiency for individuals and community groups.

The capital cost of both systems will remain a major barrier and initiatives such as lease-to-buy will need to be investigated to assist uptake. Other initiatives will be required to develop the skills necessary to meet the demand for installations.

Hydro

There are opportunities in the region for medium, small and micro-hydro developments. There are medium-sized hydro power stations that could be built on the Mohaka and adjacent Motu rivers. Such developments would need to be driven by the local landowners and Maori with specific interest in each river who wished to use the resource for economic growth. The developments would need to be integrated with the Water Conservation Orders so that there was a balance between the environmental values protected by the Orders and the economic utilization of the resources.

There are also a number of possible sites for small hydro developments throughout the region. Earlier studies indicated that there could be in the order of 80MW of electricity generation potential however this assessment has assumed that only up to 30MW could possibly built before 2015. The nature of the rainfall and river topography in the region is such that a hydro facility design would need to take account of high flashy water flows and the ability for removal of silt build-up. Modern engineering designs can successfully address both of these aspects and there should be no engineering reason why projects could not occur. Critical aspects will be overall economics and environmental protection requirements.

The area is extremely suitable for micro hydro both to individual rural electricity users but also to community clusters. Over the next decade the demand for micro hydro is expected to increase and consequently design and installation capabilities will need to be established within the region.

A significant barrier to any sized hydro facility is the cost of constructing electricity transmission lines to get the electricity to where it is needed.

Wind

The wind energy potential in the region is reasonable but not significant. Its value however is in the avoidance of otherwise high electricity costs on an average basis. Without storage, wind is not able to reliably meet electricity demand peaks. Good wind sites are also often not near existing electricity transmission lines and the cost of connecting lines will significantly reduce the wind farm economics.

It is expected that over the next period that wind farms will be built in some high wind areas. The wind farms will not be large but will be able to make a contribution to meeting overall electricity demand. This assessment assumes around 36MW of wind farm capacity producing 110GWh could be built before 2015.

Small windmills for direct pumping of rural water are expected to make a come-back as alternatives to rural grid supplied electricity use are sought.

Geothermal

The two geothermal areas at Te Puia and Morera are currently used to a very limited extent. The potential for greater use for electricity generation, heat extraction, ecotourism, and greenhouse heating are all possible while maintaining the environmental characteristics.

The existing geothermal features indicate a higher temperature source must be at depths that are not insignificant below each area. Research should be undertaken into using deep drilling and hot rock energy extraction technologies to obtain heat for electricity generation. While not likely to be economic in the short to medium term it is expected that such technologies will become economic in the next decade.

Coal

Coal could be imported into the region for electricity generation but the economic size of a coal fired electricity generation facility is way out of proportion to the needs of the region. Coal could be used for heat production but post 2007 it is expected that forest residue will be more economic.

Marine

There appear to be few viable tidal and sea current electricity generation opportunities in the region however wave generation could be viable in the future. It is recommended that this technology be monitored.

Bioenergy

The opportunity for bioenergy facilities throughout the region are significant. Current economics for bioenergy plant are such that heat production from on-site processing residues is economic but sites are often constrained by residue quantities.

Post 2007 and currently within some localities in the region it will be economic to produce electricity from forest residues initially in cogeneration applications and then for electricity generation solely. It would be expected that all new wood processing sites would install cogeneration plant when they installed new heat plant.

Domestic heating from burning firewood is the most economic form of space heating in existing buildings throughout the region. Community programmes to improve the efficiency of installed wood burners should be a high priority. The addition of a wet-back burner can provide water heating in addition to space heating.

Gas Fields

The region has a known gas field at Wairoa and gas seepages in other areas. Gas would be a high value energy source and exploration companies should continue to be given every encouragement to undertake exploration and development.

Warm Home Programme

The highest priority energy investment opportunity in the region should be that associated with having warm and healthy homes. However, the capital cost barrier is very significant for many who would gain most from this kind of investment. The Government has recognized this and has established a number of national housing improvement programmes that aim to both increase domestic energy efficiency (solar water heating and insulation retrofit programmes) and improve community well being.

The delivery of these programmes in the Tairawhiti Region appears to be somewhat limited due to the need to find co-funding and to have facilitation to assist establish programme delivery capabilities. In addition to the difficulties in sourcing matching funding for government programmes, the lack of continuity in terms of funding duration for existing programmes means that there is an inability to keep trained implementers available and involved. Programmes with a delivery horizon of up to three years could go some way to addressing the issue of continuity.

Energy Efficiency

Government also has a number of energy efficiency programmes that would produce economic benefits to domestic and commercial energy users. Energy efficiency is about using less energy to achieve the same or similar energy outcomes – with a cost saving to energy users.

The establishment of effective delivery programmes requires assistance and facilitation from trained and experienced practitioners. Specific efforts should be focused on securing assistance from nationally funded programmes and on the delivery of local solutions by local people solving local problems. Unless

a deliberate effort is made to train such people from within the region the implementation and delivery of national programmes will be compromised and will require additional external assistance.

Impediments

To assist the region meet its energy needs in the most cost effective manner will require addressing the significant impediments that exist. The most significant barriers to most economic opportunities are:

- the lack of awareness and understanding (among residential and commercial energy users),
- the lack of information, case studies, and reference sites,
- limited or no access to sound technical advice,
- high capital costs (from large scale supply and demand projects to small scale demand projects),
- inability to access co-funding partners,
- high cost of feasibility studies,
- apparent low accessibility of Government funded programmes,
- the need for facilitation and coordination of local efforts.

Many other opportunities will not be economic in the short and medium term.

Commercial Energy Users

Commercial energy users whether big or small are all in a good position to contribute to reducing their own energy costs, and to assist meet energy demand through local initiatives. Again, national programmes directed at aiding understanding and identify energy efficiency opportunities could achieve savings if they were targeted effectively at the regional level.

The Capacity to Deliver

Many of the energy opportunities will require the establishment of service delivery organizations who can manage and deliver Government programmes, be able to provide the community with guidance on opportunities and options, facilitate implementation, and look after local interests. It is inefficient for each local community (residential and commercial) to try and do this themselves and the model provided by the primary health provider, Ngati Porou Hauora, or the energy service company, Energy Options at Whakatane may be appropriate organizations to engage or models on which to build.

There is a danger that if every local community tried to be a knowledgeable energy facilitator that scarce resources would be spread too thinly and the quality of advice and implementation would suffer. There is a need to coordinate efforts and programme delivery throughout the region so that economies of scale can be achieved and a strong delivery team can be developed.

Local solutions require local leadership and the involvement of the all the key groups in the local community. The development of local skills, and the use of local knowledge is of paramount importance. Regional facilitation should be supportive of local initiatives rather than be dominant.

Councils have a key role to play in providing leadership on energy matters, from setting good example to developing appropriate policies.

Regional and District Planning

The Councils have a key role to play through the Regional and District planning processes. The plans can assist or hinder the implementation of energy opportunities. Councils are encouraged to review their plans to identify how they can be improved from an energy perspective. The plans currently tend to be silent on energy and as a consequence, good energy solutions are not encouraged.

Energy Market Regulation

Analysis of the energy market rules and regulation raises a number of issues which the region should take up with Central Government and the Electricity Commission in particular. These include:

- the ability of Network Companies to retail electricity,
- Inclusion of distributed generation facilities in the ODV Handbook,
- Local community combined ownership of generation and distribution lines,
- Relaxation of Network Company generation constraints,
- How alternatives to new transmission line investment will be considered and handled by the Electricity Commission,
- Ownership and utilization of electricity meters and ripple control,
- Net metering.

Investors

Many of the energy investment options available (both supply or demand side) are such that the investment is often able to be made by the beneficiary of the investment itself, i.e., the home owner or business energy user.

The capital cost of many opportunities is often a major barrier and seed funding or other financial support will usually be necessary. Sources over an above the traditional funding providers may need to be considered.

Future investment in generation developments will require an initial process of awareness raising.

Eastland Network are well advanced with investigations into wind and bioenergy investment opportunities and are likely to expand their business portfolio in these areas. Their investment incentives are likely to continue to be stronger than most other potential investors and they have the local management expertise to achieve these investments alone or in conjunction with other parties. To maximise the opportunities may require a change in the regulations allowing network company investment.

Regional Electricity Generation Opportunities

A summary of the electricity use and generation opportunities in the region are shown in Table 1.

Opportunity	Cost (Cents/kWh)	Regional uptake to 2015 (GWh)
Domestic energy efficiency	9	13
Commercial energy efficiency	9	6
Domestic solar water heating	8-10	2
Commercial solar water heating	6-7	1
Photovoltaic – on grid	105	0.02
Photovoltaic – off grid	150	0.02
Small hydro	12-15	150
Micro hydro	?	?
Wind – direct water pumping	?	?
Wind	9-14	110
Industrial biodigester	7	2
Bioenergy (wood processing residue)	9-11	20
Bioenergy (forest residue)	14-16	10
Geothermal	?	?

Table 1 Regional Electricity Generation Opportunities and Costs

It is estimated that approximately 300GWh per annum of electricity could be generated from the region if the opportunities were pursued and barriers addressed. This is around current average annual electricity demand.

In terms of electricity generation capability, there are adequate new generation opportunities where at least 50% of peak demand could be installed this decade. A further 50% is technically achievable by around 2015.

Research Initiatives

The region has been and continues to be the focus of a number of wide ranging energy research projects over the last 10-15 years. Projects range from small-scale solar water heating programmes to health and insulation studies. Typically, the projects have been research focussed (limited demonstration or delivery focus) and many have retained intellectual property rights to the findings of the work. As a result, there have been limited wider benefits to the region. Other projects that have been more operational in nature have failed to deliver on monitoring and reporting aspects which again limits the potential for the region to learn and benefit. Future initiatives need to clearly demonstrate the actual benefits delivered to the region.

Regional Energy Champion

In order that the region can coordinate and establish a capacity to deliver good energy outcomes there is a need for the establishment of an Energy Champion to work with the various existing and potential parties involved in energy projects. This would allow the build up of a competence in working with all the players in the energy market and sourcing funds from central government.

The Energy Champion structure could be modelled on several Energy Trust entities that have been established in other regions. The Energy Champion would focus on activities that are currently not being adequately addressed by existing entities such as Eastland Network and the Ngati Porou Hauora. It may

be a virtual organisation or it could have a delivery presence such as is provided by Energy Options in Whakatane. It is however important that the region build up its own skill base for delivery of energy outcomes.

Regional Energy Strategy

It is recommended that a Regional Energy Strategy based on the following principles be established:

- Improving community wellbeing through warm home programmes.
- Reducing costs of energy through implementing energy efficiency, solar water heating and efficient fireplaces.
- Development of programmes that actively encourage industry and commercial enterprises to have energy management plans, time of use meters, and investment in energy efficiency initiatives.
- Establishment of an energy services delivery organisation to meet the needs of local residential and business energy/electricity users.
- Improving electricity network supply capacity and reliability and avoiding the need in the short term of investing in a second transmission line into the region by encouraging investment in distributed small and micro hydro, bioenergy, wind, biodigester, and geothermal facilities.
- Longer term aiming for greater investment in solar electric, wave energy, and gas exploration.
- A programme of engagement with Central Government Agencies responsible for the delivery of national programmes on security of energy supply, energy efficiency (industrial and commercial), residential retrofitting programmes etc in order to secure supportive funding for programmes, to maximize the opportunities for the region and ensure economic growth and community well-being.
- Integrating the Regional Transport Plan with the Regional Energy Strategy.
- A clear steer by the Taskforce to organisations/bodies (both government funded and others) that there is a need for work in the area to have a greater focus on demonstration projects and delivery projects and less focus on research projects.
- A clear message from the Taskforce that the intellectual property from past, current and future research projects is unlikely to advance the needs of the region and the Taskforce cannot accept this arrangement in the long term. Future initiatives must clearly demonstrate benefits transferred directly to the region.

The Regional Energy Strategy should be a fundamental component of the Long Term Council Community Plans for the Wairoa and Gisborne Districts and so ensure community buy-in and that it is established as a key component of the region's future planning focus.

Tairawhiti Regional Energy Assessment

1 Introduction

The Tairawhiti Development Taskforce has commissioned this work which is an assessment of the energy supply opportunities and constraints in the Tairawhiti Region (i.e. Gisborne and Wairoa Districts).

The assessment provides information on current and predicted future energy demands, and provides an overview of energy development opportunities in the area.

The focus of the assessment project brief is aimed at identifying:

- Existing information and data.
- Tairawhiti's current energy resource use and infrastructure.
- Constraints or barriers (if any) for regional economic development caused by a lack of 'distributed power,' infrastructure limitations, grid management, energy security and any other factors.
- The range of options and the possible viability of renewable energy types.
- Any regional advantage with respect to renewable energy and fossil resources (in particular gas).
- Current and future energy demand and overall projected energy needs.
- Energy efficiency opportunities (for industry and residential users).
- Enabling technologies and energy management systems.
- Community energy issues and home heating.
- Regional energy tariffs and pricing.

The impact on the region of the Resource Management Act, the Local Government Act, and the Long Term Community Council Plans, and possible mitigation strategies

The assessment is based around a review of publicly available information and recently updated data prepared by East Harbour Management Services (East Harbour) for, and published by, the Ministry of Economic Development and the Energy Efficiency and Conservation Authority (EECA). In addition East Harbour has drawn on data from its broad experience of the energy sector and on relationships with key players in the region. Where necessary, data from earlier reports has been moderated by the experience of the authors.

The assessment has also drawn on the substantial amount of work undertaken by Eastland Network Ltd, on an initial scoping study of Wairoa District carried out by East Harbour, and a similar study carried out on behalf of Venture Southland.

The information collated has been expanded where appropriate by interview with relevant local, regional and national parties or experts on specific topics.

The assessment identifies the estimated energy scale, and cost resulting from the deployment of a range of technologies, along with the potential community and economic development benefits, and opportunities associated with:

- Renewable energy
- Fossil fuels
- Energy efficiency
- Infrastructure development
- Community (residential) energy use
- Commercial energy use
- Industry opportunities
- Reducing transport costs
- Public energy efficiency promotion.

The assessment covers the whole of the Tairawhiti Region. It covers all energy forms but priority is given to those energy drivers that are within the regional ability to influence, or to respond to.

The report provides a list of opportunities to ensure adequate availability of reliable energy at affordable prices for the region in the near term and into the future. It then ranks them in terms of likely importance and recommends actions that may address barriers and facilitate opportunities for future energy supply and demand in the region.

2 Background

2.1 The Region Details

Tairawhiti is New Zealand's most eastern region. Its position makes it among the most isolated regions in New Zealand. Covering a land area of 8351 square kilometres, it accounts for 3% of New Zealand's land area. The region splits into two segments which are represented by the Gisborne and Wairoa District Council boundaries.

The Region produces maize, grapes, kiwifruit, citrus and subtropical fruits. The region is mainly hill country, well-suited to farming sheep, cattle, and deer. Agriculture has diversified in more recent times, with forestry now a major industry in the region. Viticulture, horticulture and related industries such as food processing are important to the region.

The largest industry sectors represented in Tairawhiti are community, social and personal services (24.8%); agriculture, hunting, forestry and fishing (20.8%); wholesale, retail trade and restaurants and hotels (18.3%) and manufacturing (11.1%). The largest occupational groupings are agriculture and fishery workers (18.7%) and service and sales workers (12.9%), of which agriculture and fishery workers have far higher proportions than are found nationally.

2.2 Population and Regional Statistics

Tairawhiti is a sparsely populated region with a total population of 55,680. Of this total population, around 45,780 live in the Gisborne district (6,300 on the East Coast) and 9,900 in the Wairoa district. About 32,000 of the district's total population live in Gisborne City. About 5,200 of Wairoa's population live in the Wairoa township[1],[2],[3],[4]. Statistics New Zealand notes that from 1996-2001 the population of Gisborne District declined from 45,780 to 43,971 (a reduction of 3.95%) and the population of Wairoa District has declined 9.9% since 1996, from 9,900 to 8,916. By comparison, New Zealand's population as a whole grew 7.2% from 1996 to 2001.

The Tairawhiti Region has some significant socio-economic issues worthy of note relative to the national situation. In the Region generally, unemployment numbers fluctuate seasonally and there are high levels of unemployment of those between 17 and 24 years old. Both the Gisborne and Wairoa Regions have notably higher than national averages for unemployment (10.4% in Gisborne District, 12% in Wairoa District, and 7.5% NZ average) and lower than national median income ($15,300 for Gisborne District and $14,600 for Wairoa District against $18,500 for NZ). Both regions have home ownership levels lower than the national average (62.9% in Gisborne District, 66.3% in Wairoa District, 67.8% NZ average respectively). Household expenditure in both areas is also significantly less than the national average ($35,874 for Gisborne District and $34,370 for households in Wairoa District against $43,682 for the whole of New Zealand).

Of particular note from an energy perspective is the fact that many in the Gisborne Region are in receipt of payments ("advances") from Work and Income New Zealand (WINZ) for reconnection or to avoid having their electricity cut off[5].

Local lines company Eastland Network reports a general decrease in the ICP numbers[6] in the region, although the load per ICP is growing. Generally though, residential growth is not an issue of concern for the lines company.

2.3 Tairawhiti Development Taskforce

The Tairawhiti Development Taskforce was set up in May 2000 when the Mayors of Wairoa and Gisborne District Councils invited the Deputy Prime Minister Hon Jim Anderton, Associate Minister of Maori Affairs, Hon Parekura Horomia and East Coast MP Janet Mackey to join a Taskforce to look at ways the Tairawhiti region could be further developed. The Taskforce partners are:

- Gisborne District Council
- Wairoa District Council

[1] Report on Tairawhiti Development Taskforce, November 2000.
[2] Note Census 2001 census – Gisborne District population noted as 43,971 and Wairoa District as 8,913 and 4,428 for Wairoa Township.
[3] Wairoa LTCCP notes the estimated population of Wairoa District as of 30 June is 8,880.
[4] The Tairawhiti Region had a population of approximately 52,874 in 2001 (43,977 in Gisborne District and 8,903 in Wairoa District) Tairawhiti Development Taskforce, Strategic Plan, March 2002.
[5] Work and Income figures show in October, $55,009 was paid out to people struggling to pay their power accounts in the Gisborne district.
[6] ICP number (Installation Control Point number) is a unique number given to the connection point between a site and the network company's line.

- Te Runanga O Ngati Porou
- Te Runanga O Turanganui A Kiwa, and
- Ngati Kahungunu Ki Te Wairoa.

In the 2002 Taskforce Strategic Plan document, the Taskforce identified eight action areas. At the time of the formation of the Taskforce and the development of the Strategy (and until recently), the region's energy needs were not an issue that the Taskforce had identified specifically as an action area. With this study, the Taskforce is identifying that a secure, reliable and sustainable energy supply is essential to the future economic growth of the region.

2.4 Regional Economic Growth

A number of recent economic surveys and forecasts (national and local) present mixed messages on growth and the potential for future growth in the region.

The August 2004 quarterly survey by the National Bank ranked Gisborne in the number one spot at 2.5% growth in the second quarter of the year.[7] In contrast, the November 2004 quarterly survey indicated that eleven of the fourteen regions monitored a rise in economic growth. Yet in September Gisborne recorded the largest decline in economic activity, dropping 1.0%.[8] (Economic activity over the country as a whole rose 0.8%). The report of year on year growth put Gisborne at the bottom of the table with 2.5% growth over the November 2003 – 04 period (cf 5% and 4.3% growth in Bay of Plenty and Hawke's Bay).

The NZIER Report for the Ministry of Economic Development on New Zealand's Regional Economic Performance was published in September 2004.[9] For the Gisborne-Hawke's Bay region, a number of key economic indicators are worthy of note including:

- Its regional GDP in the same year was $6.3 billion.
- Gisborne-Hawke's Bay's economic growth between March 2000 and 2004 averaged 3.0% (cf national growth of 3.5%).
- Gisborne-Hawke's Bay's per capita real GDP grew at an average of 3.5% between March 1998 and 2003 (cf national growth rate of 2.3%).
- Gisborne-Hawke's Bay's economy is highly reliant on agriculture and its associated downstream processing industries, relative to the New Zealand economy. While agriculture is a slow-growing sector nationally, the food, beverage and tobacco (FBT) manufacturing sector has performed strongly.
- The Regions reliance on slow growth sectors such as agriculture and natural resources explains in part why its overall economic growth rate has lagged behind the national economy. Slow or negative population growth has also slowed overall regional growth.
- Gisborne-Hawke's Bay's unemployment rate averaged 5.1% over the year to June 2004. This is the third highest regional unemployment rate in New Zealand. This, combined with a low labour force participation rate and a relatively high proportion of its population being unqualified, suggests that Gisborne-Hawke's Bay has a sizeable pool of labour resources available, but that they may not be suitably skilled for the region's industrial structure.

The September 2004 survey by APR consultants[10], commissioned by Gisborne District Council on a six-monthly basis, shows both Gisborne businesses and the public expect a positive change in business conditions in the next 12 months, while nationally a negative change is expected. The report indicates that there is expected to be positive change in business conditions, real GDP economic activity, personal income, profits for businesses, unemployment, employment, investment and exports.

From these conflicting projections, it is difficult to forecast a future energy use trend.

2.5 National Energy Policy Objectives and Key Energy Agencies

2.5.1 National Energy Policy

National energy policy is driven by several key pieces of Government Policy including the National Energy Efficiency and Conservation Strategy (the NEECS), Sustainable Development Programme of Action, Sustainable Energy Framework, Electricity Governance (and the formation of the Electricity Commission), and Gas Governance.

[7] http://www.nationalbank.co.nz/economics/regional/200408/charts.htm#regional2
[8] http://www.nationalbank.co.nz/economics/regional/200411/default.htm
[9] http://www.med.govt.nz/irdev/reg_dev/rep-report/final/
[10] http://www.gisborneherald.co.nz/archives/November2k4/news/news_26-11-2k4.htm

Of particular note is the Government's policy for electricity is outlined in the Government Policy Statement on Electricity Governance. The policy recognises that the electricity sector has a critical role to play in underpinning the Government's growth and sustainability objectives. Sustainable economic growth will best be supported by an electricity system that:

- Is reliable and resilient
- Is environmentally responsible
- Delivers energy prices that are efficient, fair, and as competitive as possible consistent with these requirements.

The Electricity Commission has a key role in contributing to these objectives. The Government has amended the Electricity Act 1992 to set the following principal objectives for the Electricity Commission:

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

2.5.2 Key Energy Policy Organisations

The list below illustrates the key central government agencies focussing on energy.

Ministry of Economic Development

- Energy Policy (lead organisation)
- Sustainable Energy Framework
- Small and medium business

Electricity Commission

- Electricity sector governance
- Security of supply
- Rules and regulations
- Demand response
- Electricity efficiency
- Transmission investment and upgrading

EECA

- Energy efficiency
- Promotion of renewable energy
- Community energy projects
- Business focussed energy efficiency projects

Ministry for the Environment and the Climate Change Office

- Resource Management Act 1991
- Climate Change Policy

2.6 Local Community Organisations

In addition to the activities of the two local councils, community groups in the area can be distinguished typically as Maori and non-Maori. The local iwi authorities which, alongside the councils are the partners in the Tairawhiti Taskforce, have a strong community presence and an involvement in energy matters. The Ngati Porou Hauora is also very active in energy activities.

Some small communities such as Hicks Bay are also active in community energy programmes.

3 Current Drivers of Energy Demand in the Region

Energy demand demographics in the area have shifted from a predominantly rural load base to urban dominance concentrated in Gisborne City. Commercial electricity demand is exhibiting relatively high growth and has become the predominant user group supplied by the network.

Summer load peaks are developing in parts of the network from high growth associated with tourism and holiday housing. Of particular note, in summer, visitors to the Mahia Peninsula can increase the population from under 1000 to about 3,000 -5,000 for a two week period. For the past several seasons a diesel generator has been installed at Opoutama for two to four weeks to support voltage and meet the increased capacity demands. A new larger unit is now a permanent fixture.

3.1 Residential Energy Use

The Wairoa community consists of around 1,500 business points of electricity supply and 4,000 residential electricity customers. The residential customers use on average 8,000kWh of electricity per year. Approximately 30% of the energy is used for heating water.

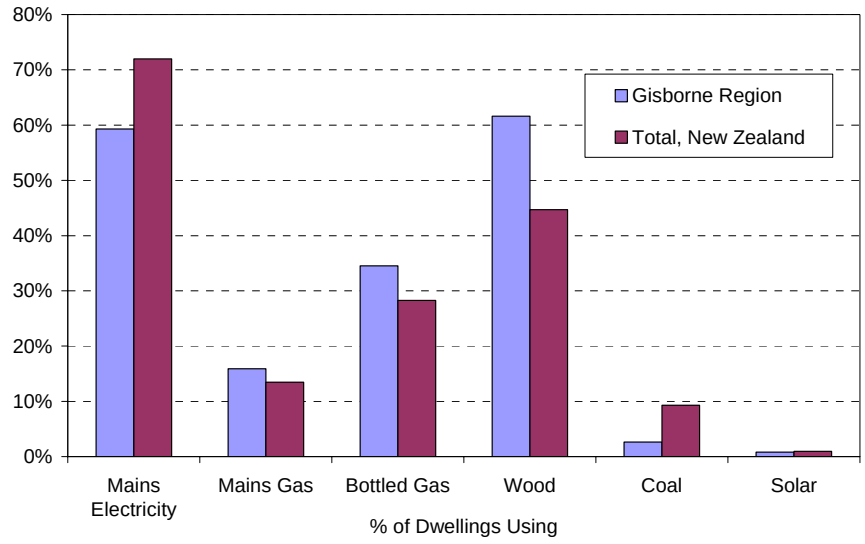

Figure 1 Home heating fuels in Gisborne compared to National usage.[11]

As Figure 1 illustrates, compared to the national situation, the Gisborne District uses more wood and more gas (mains and bottled) for home heating. For New Zealand as a whole, electricity is the dominant source of heating though this is considerably less in the Gisborne district. Solar heating nationally and in Gisborne District is less than 1%.

3.2 Commercial and Industrial Energy Users

3.2.1 Forestry/Wood Processing

Wairoa Companies	Gisborne Companies
Clapham sawmill	Juken Nissho
East Coast Lumber	Earnslaw One
	Larsen Sawmilling

Table 2 Key Forestry/Wood Processing companies in Tairawhiti

Wairoa Companies

The Clapham and East Coast Lumber sawmills have combined with Brightwood Timber to construct a wood processing facility taking sawn timber from each of the respective sawmills in Wairoa. This will increase electricity demand from Wairoa and necessitate an upgrade of the existing distribution assets at the Wairoa substation.

[11] Source: Statistics New Zealand, Census Data 2001, Regional Council and Urban and Rural Area by Fuel Type Used to Heat Dwellings.

The disposal of sawmill by-product in the form of bark, sawdust, planer shavings and chip fines provides an opportunity for generation of their own electricity. The waste does have an opportunity value in that some of it could be chipped and sold.

Further development decisions are dependent on gaining additional electrical capacity.

Gisborne Companies

Juken Nissho has an established wood fired boiler producing hot water for wood processing. While they have some surplus wood residue there is inadequate to move to cogeneration.

Earnslaw One have recently taken over the Prime sawmill site which has an old 6MW boiler which will require replacing once Earnslaw One expands operations on the site.

Hikurangi Forest has discussed building a new sawmill but no plans are currently announced.

3.2.2 Agriculture

Key agricultural activities in the Region focus on meat processing, dairying, viticulture, and fruit and vegetable growing. Increases in the primary processing in the Region would result in greater economic growth and increased electricity/energy demands.

Wairoa Companies	Gisborne Companies
AFFCO Wairoa (meat processing)	Leader Brand (food processing)
	Cedenco Foods (food processing)
	Sunrise Coast Limited

Table 3 Key Agriculture Energy Users in Tairawhiti

Wairoa Companies

The AFFCO meat works and freezers is a prime example of how development and economic growth could be achieved with some innovative approaches to energy use and efficiency. The AFFCO electricity demand is around 40% of the Wairoa area total load that results in AFFCO picking up a high percentage of the areas transmission costs. There is therefore a very strong incentive for AFFCO to consider load management so that they can reduce their connection costs.

Gisborne Companies

LeaderBrand Produce Ltd—LeaderBrand Produce Ltd is one of New Zealand's largest diversified professional horticultural production and marketing businesses. Originally focused on crops such as sweet corn, LeaderBrand has expanded their range of vegetable crops to include tomatoes, peas, capsicum, squash, celery and pop corn. The applications of these ingredients range from frozen consumer packs of vegetables to vegetable pastes and concentrates. In recent years, LeaderBrand has developed vineyards for the production of Gisborne's Chardonnay.

The potential for further growth in the company and indeed the sector is significant and such growth will have to be mirrored by a focus on energy/electricity supply and use issues.

Cedenco Foods—Cedenco Foods is a food ingredient processing and marketing company with factory operations in Gisborne and Australia. Cedenco have already indicated to the Tairawhiti Taskforce that with another 3,000 hectares of land it could double its exports. While discussions with the Taskforce have focussed on land development on Maori owned land, to secure the maximum economic benefit from expansion, Cedenco must also be able to have confidence in the area to meet its future electricity/energy needs and that energy costs are attractive.

Sunrise Coast New Zealand Limited—Sunrise Coast New Zealand Limited is an international fruit and produce marketing Company. Its headquarters are in Gisborne, where the company was established in 1980 by large fruit and vegetable farmers. The company markets fresh produce from all over New Zealand representing many growers and packers and providing a comprehensive service from the seed to final consumer. The company collects and distributes produce through sophisticated and experienced post harvest facilities owned by the Company or by long standing business partners.

3.2.3 Manufacturing

Wairoa Companies	Gisborne Companies
	Pultron Composites
	Columbine Hosery

Table 4 Key Manufacturing companies in Tairawhiti

Gisborne Companies

PULTRON® Composites Ltd—PULTRON® Composites Ltd was originally established to take advantage of the growing demand by material scientists and engineers for sophisticated composite materials for specialised applications, and has sustained interest in the pultrusion process because of its unique capabilities.

Columbine Industries Ltd—Columbine Industries Ltd is a family owned manufacturer and distributor of high quality hosiery and socks for women and children since 1951. We are located in Gisborne, on the East Coast of New Zealand's North Island.

3.2.4 Tourism

Gisborne is a minor visitor destination, attracting 0.6% of international and 1.7% of domestic visitor nights in 2002. Tourism infrastructure is limited, predominantly in the form of motel and camping capacity, and some recreation services and facilities. However, low visitor volumes, combined with the small resident population, mean the scope for recreation and leisure product and transport infrastructure remains limited.

Gisborne attracted 385,100 visitors in 2002. Visitor numbers are forecast to increase by an average of 2.1% per year, to reach 446,800 in 2009 (a total increase of 61,700 visitors, or 16.0%). At 16.0%, projected total growth in visitors over the period is below the national average of 20.9%.

Tourism is a growing economic activity in the Wairoa district. It also will likely have significant economic impacts, as a growing visitor population changes the district, and economic opportunities are realised by local residents. Wairoa District Council has prepared a strategy to meet the challenge of growing tourism in the Wairoa District.

3.2.5 Transport

The region is very dependent on transport and its relative isolation from the main transport corridors for road, rail, air and sea results in expensive transport costs. Energy is just one component of the transport costs but investment in improved infrastructure transport services will lead to significant reductions in energy consumption.

Wood logs are generally transported throughout the region by road. Export logs are shipped out through the port and there is significant wood transported out of the region by road to the south.

Transport represents 25% of the Gisborne District household energy end use and land transport end use represents 43% of the Gisborne District energy consumption.

In a 2001 study[12] whenTranz Rail had three scheduled return rail-freight trips per week between Napier and Gisborne, annual cartage was of the order of 43,000 tonnes/annum with approximately 27,000 tonnes/annum being fertiliser, the remainder being a mixture of general freight. Logs were not being transported by rail within the Gisborne District. If the rail service was to be discontinued, the above freight tonnage would equal a range of 5-8 laden log trucks per day, 312 days per year depending on whether 28.5 tonne truck and trailer units or 16 tonne trucks are utilised.

In a subsequent industry workshop held in Gisborne in 2001, the following was provided:.

- The capacity of the existing Napier to Gisborne branch rail line, given a minimum of additional expenditure on upgrading works and deferred maintenance works, is in excess of the likely wood flow originating from within its catchment;
- The minimum economic rail freight loading on the Napier to Gisborne branch line is about 100,000 tonnes per year. (Equivalent to about 13 fully laden log trucks per day on SH 2, which is considered to be a small proportion of the growth in heavy traffic levels predicted for SH 2 over the next 20 years);
- The current rail freight loading for the branch line was of the order of 40,000 tonnes for the 2000 year (five laden log trucks per day), and falling; and

[12] Environmental Management Services (EMS) report for Transit New Zealand, Napier, "Road/Rail Study, Napier - Gisborne State Highway and Rail Line",

- The branch line may be able to provide an economic service to handle the growth in the rural produce industry, the wood processing industry, and the future development of the export container trade - currently being exported via the Port of Napier.

- Given the necessary commercial will by transport operators, and the appropriate level of marketing effort, a number of potential customers from within the Region, estimated that of the order of 200,000 tonnes of freight per year (excluding logs and wood products) would be available for cartage by rail within five years, dependent on the freight rates and the level of service provided by the rail operator. Any contracts to transport logs or wood products would increase the tonnage of freight on the line accordingly;

- Several members of the forest industry were ambivalent in their support for rail transport as, given the current status of rail in the Region, it does not run through the majority of forests nor provide an economic service for log transport;

- Workshop attendees were emphatic that rail should not be subsidised at the expense of roading improvements within the Tairawhiti Region;

- Wairoa District Council considered that the retention of an effective and economic rail service was essential to a number of strategic and developmental initiatives currently being undertaken within the District;

- A number of key business and industry stakeholders within the Tairawhiti Region considered the Napier to Gisborne rail line to be both a strategic asset and a key transportation link of considerable regional importance to both the Wairoa District and the Gisborne District, and would argue for and support its retention.

The high level of bulk commodity goods produced in the region indicates that the region is appropriately positioned for a good use of rail as a means of transport for some goods. However rail is not necessarily appropriate for a significant amount of log transport as logs need to be transported from forest harvest areas to a rail head and the subsequent double handling can increase transport costs significantly.

3.3 Future Energy Use—Projections for 2010 and 2020

Future energy growth is particularly sensitive to the pattern of development of the regions forestry resources, gas resources and industry.

Energy demand on a business as usual basis is expected to continue to increase at around 1-2% per year in Wairoa and 2.5% in the Gisborne/East Coast area. For electricity in Tairawhiti this would be around 8GWh per year. This business as usual growth will be driven by normal industry growth and changes in the way energy is used. While there will be energy efficiency changes that may decrease energy use, the increase in energy efficiency will also drive an increase in energy consumption.

As industry moves from a commodity base to more added value there is a resulting change in demand for energy quantity, reliability, form of fuel source, and secure quality. Industry needs to demonstrate the importance of these energy supply characteristics through the way they respond in times of electricity shortage.

Within a business as usual scenario, the increase in wood product processing is expected to lead to an increase in the need for heat for wood drying. It can be expected that kiln drying could increase by about 20% above that currently used.

In addition to these business as usual scenarios, it is likely that a large wood processor (or a number of processors) will establish in the region. The entry of such a large energy user could bring about a large step change in energy demand that is more difficult to deal with. (It could be of the order of around 5-15MW electricity and 25+MW thermal). On the other hand, a large wood processor would also produce large quantities of wood processing residues which would be used as fuel for heat and electricity production. It can be expected that any new large wood processor would install a cogeneration unit and generate a proportion of their own electricity requirement thus minimising the impact on the regional energy supply.

The more significant issue relating to the entry of a new large wood processor is the location of the plant. Locating up the East Coast would significantly increase electricity demand in that area but investment in wind or hydro generation would assist supply. A location up the East Coast has the advantage that only processed timber has to be moved by road to the port or rail head. This would overcome the problem of

increased road transport from taking logs through Gisborne City. There is a trade off of local production energy compared to changes in transport energy.

Regardless of location of any new large wood processor it is expected that forest residue will soon become economic for use as a fuel for electricity generation thus also encouraging a new large wood processing energy user to be self sufficient in energy supply.

The increased horticultural product processing expected in the region is difficult to assess because of the extent of changes occurring in these markets, which are driven by national product demand and prices.

Transport energy demand projections have not been assessed as it is too difficult to undertake in a limited assessment such as this.

4 Current Energy Supply to the Region

4.1 Tairawhiti Electricity Supply

The Tairawhiti region has two distinct electricity supply networks, Wairoa and Gisborne/East Coast. Both networks are owned and operated by Eastland Network Ltd.

Eastland Network is 100% owned by the Eastland Energy Community Trust. The Gisborne District Council is the capital beneficiary of the Trust. The income beneficiaries constitute consumers connected to the Gisborne/East Coast parts of Eastland Network's distribution network and all rate payers on the Gisborne District Local Authority Electoral Roll. The Wairoa community is not a beneficiary of the Eastland Energy Community Trust as the proceeds from the sale of the Wairoa Electric Power Board transferred to Wairoa District Council who hold the funds in trust for the Wairoa Community.

As a result of the Electricity Industry Reform (EIR) Act, Eastland Network sold its interests in electricity supply in the Gisborne /East Coast area to Contact Energy in November 1998. Wairoa Power Board sold its customers to TrustPower. Contact Energy and TrustPower remain the respective incumbent electricity suppliers in each of these areas.

Eastland Network owns and operates the electricity distribution lines, which the electricity retailers use to deliver electricity. (Eastland Network is managed by Eastland Infrastructure) The distribution network connects to the national transmission system at the Wairoa, Tuai and Gisborne substations. The Transpower transmission lines operate at 110kV, while the distribution system operates from 50kV and 33kV, down to 400v and 240v.

4.2 Transmission

Electricity supply to the region comes from the national grid via Napier and Waikaremoana.

The Waikaremoana hydro power stations are connected to the national transmission system through Redclyffe substation near Napier and Fernhill substation south of Hastings. The Waikaremoana system is on a spur from the national grid and Wairoa and Gisborne are on further spurs.

The current system has a single-circuit 110 kV line from Tuai to Fernhill and a double-circuit 110 kV line from Tuai to Redclyffe.

Electricity is supplied from Tuai to the Wairoa substation by a Transpower 110 kV double circuit line to Gisborne substation by a Transpower 110kV double circuit line.

The Gisborne – Tokomaru bay 110kV Transpower line has been taken out of service and Eastland Network feeds electricity into that area via its 50kV system.

The coincident system peak demand on both the Wairoa and Gisborne lines and the Tuai supply point is currently 57MW.

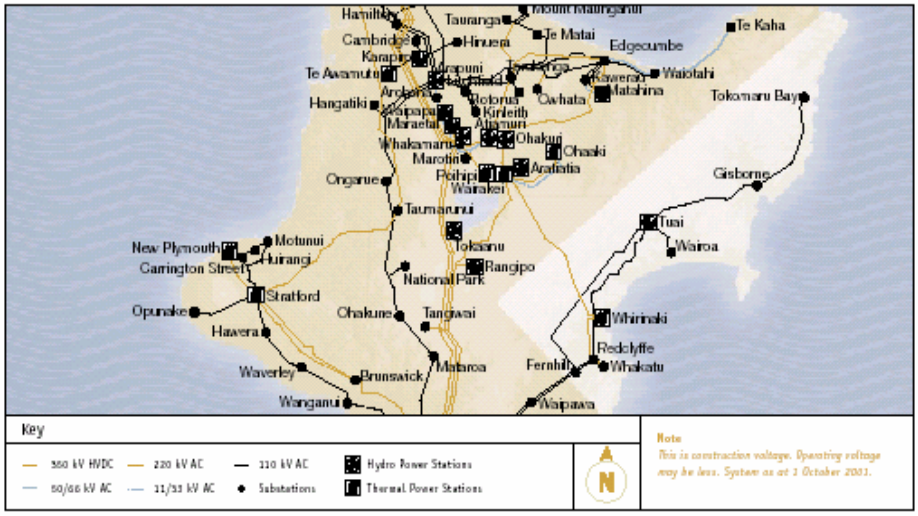

Figure 2 Schematic of the Transmission Grid for the Tairawhiti Region[13]

Moderate generation (tens of MW range) in the Waikaremoana and/or Tairawhiti region would be of particular benefit to the Transpower system, as it improves both the load and voltage limits on the whole regional network. In about seven to ten years' time, any generation up to about 100 MW on the 110 kV system would be useful as it offsets the possible need to increase the Redclyffe 220/110 kV transformer capacity.

The annual load duration curve for the Gisborne-Tuai line is shown below in figure 3. The curve indicates that about 18% of current load occurs only 10% of the time. This peak loading is expensive to provide with a transmission upgrade as for a large percentage of the time it is not being utilised. This is where peaking plant such as diesels of hydro with storage are of great value.

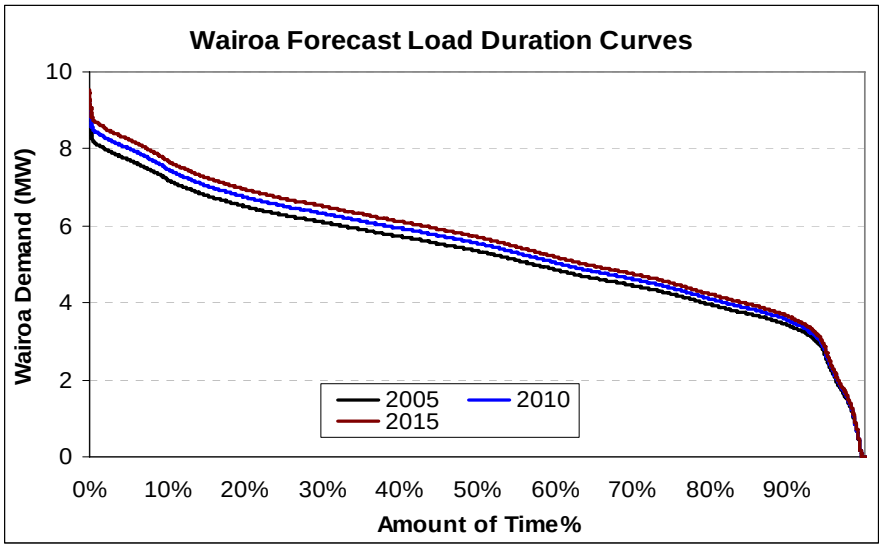

Figure 3 Wairoa Forecast Load Duration Curve[14]

[13] Source: Transpower.
[14] Provided on request by Transpower.

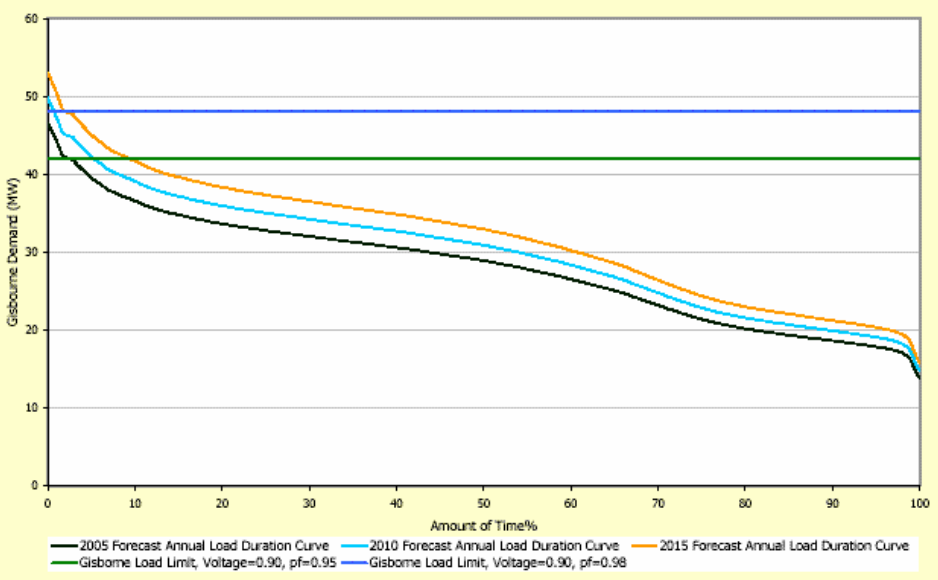

Figure 4 Gisborne Load Limits and Forecast Load Duration Curves[15]

Typical daily load curves for Wairoa in summer and winter are given in Figures 5 and 6.[16]

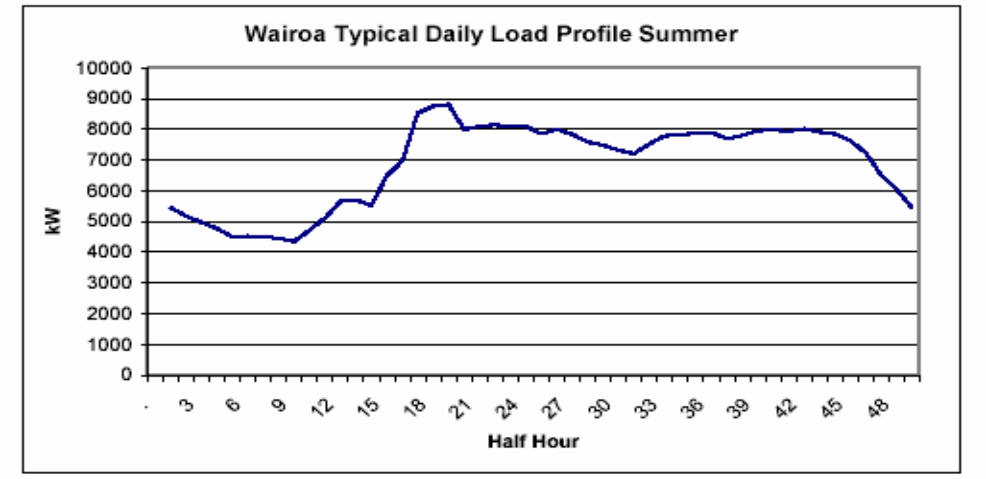

Figure 5 Wairoa Daily Load Profile Summer

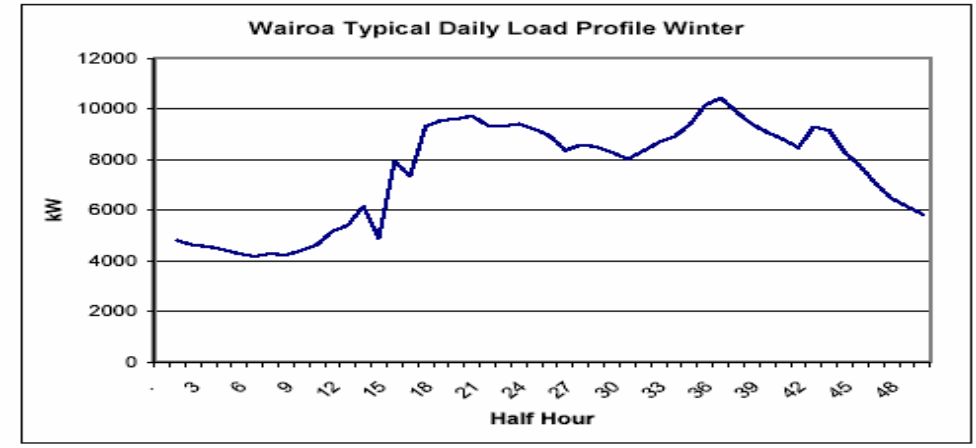

Figure 6 Wairoa Daily Load Profile Winter

[15] Source – Transpower System Security Forecast Report, Section 3 North Island, Hawkes Bay, December 2004.
[16] Source – Electricity Information Disclosure Statistics 2003, MED, April 2004, ISSN 1173 – 8758.

Daily Gisborne load profiles presented in Figures 7 and 8[17] exhibit a large 6.00 pm load peak of over 8MW and a smaller mid-morning peak of 3MW. The base load never falls below 12MW with the trough occurring at approximately 3.00 a.m. each morning. The daily load profile is therefore very peaky and presents demand side management opportunities.

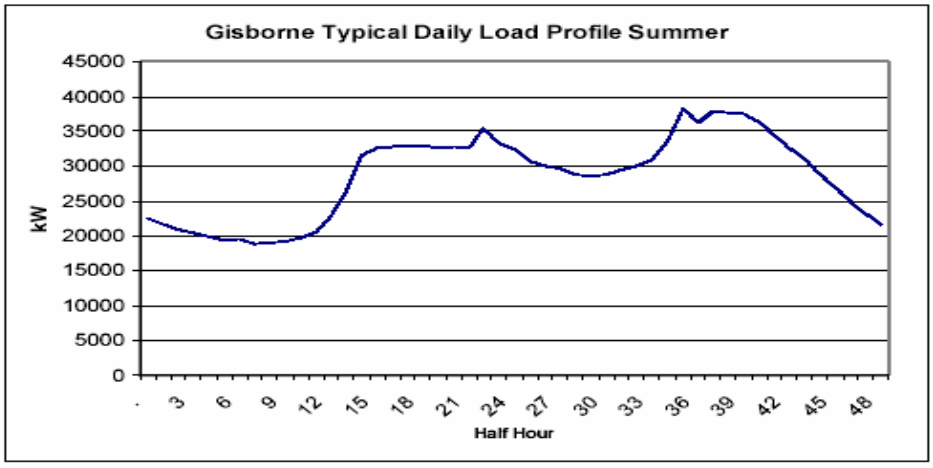

Figure 7 Gisborne Daily Load Profile Summer

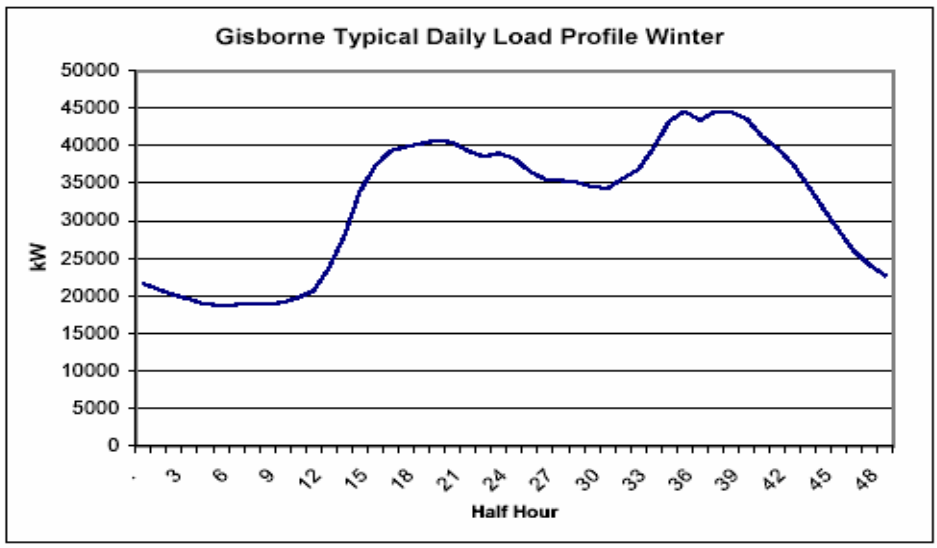

Figure 8 Gisborne Daily Load Profile Winter

4.2.1 Grid Security Issues

Supply security from the Transpower transmission system satisfies Eastland Network's normal current requirements but the Tuai – Gisborne line is reaching contingent capacity and meeting security standards is the main driver for consideration of an upgrade or duplication of that line. In the past four years Eastland has invested $48 million in the network, which had greatly improved reliability. Despite this, the line with two Transpower circuits into Gisborne was reaching its maximum capacity. The current maximum demand of greater Gisborne was nearing 50 MW. One new wood processing plant would add 5 megawatts, or 10 percent. A new line would cost between $15 and $20 million.

The Tuai – Wairoa line has adequate capacity.

The transmission network is a critical component of infrastructure, which without adequate investment will continue to be a barrier to regional economic growth. The Taskforce has already identified electricity supply as an infrastructure issue in the 2002 Strategic Plan.

Transpower has recently published its System Security Forecast (SSF)[18]. The SSF identifies where new investment may be required to maintain security and quality of supply over the 10-year forecast period.

[17] Source – Electricity Information Disclosure Statistics 2003, MED, April 2004, ISSN 1173 – 8758.
[18] http://www.transpower.co.nz/?id=4464 (December 2004).

This is based on identification of a number of key events and issues for power system capability in the wider region. The key contingent events identified are reproduced in Table 5 and are:

- Loss of Whirinaki-Wairakei 220 kV Circuit
- Loss of Gisborne-Tuai 110 kV Circuit
- Loss of Fernhill-Redclyffe 110 kV Circuit
- Outage of Redclyffe 220/110 kV interconnecting transformer T3 or T4

Table 5 confirms the vulnerability of the wider region to line outages, that there is no commitment to upgrades in the region by Transpower, and further that there is an opportunity perhaps for another party such as Eastland Network to undertake this role.

Contingent Event	Issue
Loss of Whirinaki-Wairakei 220kV circuit	Grid voltage falls to minimum stated asset capability and voltage stability limits reached.
Loss of Gisborne-Tuai 110 kV circuit	Loading of the other circuit reaches stated capability and voltage stability limits.
Loss of Fernhill-Redclyffe 110 kV circuit	Loading of the other Fernhill-Redclyffe circuit reaches stated capability.
Planned Outage and Contingent Event	
Outage of one of Redclyffe-Wairakei and either the Wairakei-Whirinaki or Redclyffe-Whirinaki 220kV circuits and the loss of another.	Loss of supply to region. Possible islanding with local generation. Partial load can be restored by closing the 110 kV circuit splits between Fernhill and Waipawa.
Outage of one of the Redclyffe-Whakatu 220 kV circuits and the loss of the other	Loss of supply at Whakatu
Outage of one of the Gisborne-Tuai 110 kV circuits and the loss of the other	Loss of supply at Gisborne
Outage of one of the Tuai-Wairoa 110 kV circuits and the loss of the other	Loss of supply at Wairoa
Outage of one of the Redclyffe-Tuai circuit and a Fernhill-Redclyffe 110 kV circuit and the loss of the other	Loading of the remaining Fernhill-Redclyffe circuit reaches stated capability. Operational measures include load management.
Outage of one of the Redclyffe-Tuai and Fernhill- Tuai 110 kV circuits and the loss of the other	Loading of the remaining Redclyffe-Tuai circuit reaches stated capability. Operational measures include load management.
Outage of one of the Fernhill-Redclyffe 110 kV circuits and the loss of the other	Loading of the Redclyffe-Tuai circuit reaches stated capability. Operational measures include load management.
Interconnecting Transformer Outages	
Outage of Redclyffe 220/110 kV interconnecting transformer T3 or T4	Loading of the remaining interconnecting transformer reaches stated capability.

Table 5 Power System Capability Issues Identified in the Hawke's Bay Region[19]

The existing Tuai – Gisborne 110kV lines have a normal (both lines in service) capacity of 60 MW and a contingent (one line in service) capacity of 31 - 34 MW. Eastland Network assesses that at existing forecasted demand growth rates the 31 - 34 MW contingent line capacity is now a constraint in 2004. The 60 MW both lines in service capacity will become a constraint in around 2012 – 15 at 2.5% pa load growth or sooner if large new load not currently forecast occurs. Eastland Network's preferred short-term solution to overcome these projected security constraints is the installation of local generation. Longer term solutions include construction of an additional line from Tuai or reconductoring of the existing lines, and local base load electricity generation plant. Eastland Network's current expectation is that an additional line will be required from 2011.[20]

The Transpower Gisborne substation faces constraints over the next 10 years, resulting from both the capacity of the 110/50 kV transformers and the volt drop on the 110 kV lines from Tuai. Meeting security standards is the main driver behind the need for upgrade. As load grows the security levels associated with Gisborne Substation will continue to diverge from this standard.

Following construction of a third transmission line a grid exit point will be required at Patutahi to avoid constraints arising in Eastland Network's 50kV distribution network[21].

[19] Source – Transpower System Security Forecast Report, Section 3 North Island, Hawkes Bay, December 2004.
[20] Source – Eastland Network Ltd, Asset Management Plan, 1 April 2004 to 31 March 2014, 30 June 2004.
[21] Note: this is an option to Massey Road but not a requirement.

The timing of transmission upgrades is very sensitive to load growth forecasts. To cover uncertainty, Eastland Network has concluded that provisional contingency capacity in its own and Transpower's network is needed now to cover the difference in planning/construction times and the expectation of new load. Further load management and peak lopping plant may defer capacity upgrades in the medium term. A commitment by either party to transmission upgrade is therefore deferred until the actions currently being developed (i.e., local wind and diesel generation and demand reduction initiatives through EECA and other programmes) are in place and the impacts on transmission capacity are confirmed. However for the longer term Eastland Network is preparing to secure easements and design its own additional 110kV line from Tuai to Patutahi.

Eastland Network normally carries 10 MW of excess capacity at key locations in its network to cover the 2 year lead time it would otherwise face to provide capacity for a large timber processing plant. This capacity is already in use to cover the existing constraint and so more would be needed for new load.

An issue that arises with the upgrading of Transpower assets is with regard to what design standards to be adopted. Eastland Network has demonstrated that it can often undertake capital investment at a lower cost to Transpower because it accepts a lower but appropriate design standard. An extension of this is the question of why Transpower does not transfer its transmission lines in the region to Eastland Network who could integrate them into its distribution network with resulting reductions in cost while retaining an appropriate level of service.

There appears to be no obvious reason why Transpower needs to own both the Wairoa and Gisborne lines. The region could be supplied from Tuai by Transpower. Ownership of both the transmission lines and the distribution network by Eastland Network would allow optimisation of supply from Tuai which would reduce the Transpower charges based on the current pricing methods, however the constraint on lines would remain.

The rules surrounding lines companies funding transmission investment need to be clarified. Lines companies need to be allowed to treat such investment as outside of the CPI-X pricing regime (see later in the document in section 15).

Until recently, there has been uncertainty over Transpower's plans for upgrades affecting electricity supply in the region. Now that Eastland Network has taken decisive action to make future investment in additional generation, this will give some degree of confidence on future supply to the region.

There is however considerable scope for the Taskforce to work with Transpower and Eastland Network as their respective plans for upgrades become clearer and develop over time. In addition, the adoption of a progressive planning approach to the upgrading of lines (co-operation between Gisborne and Wairoa Councils) is always an approach that will readily facilitate upgrades. It may be of value to have an agreed joint action plan. Some of the required actions are local while others involve pressure on Government.

The Taskforce can assist in areas such as:

- A simplified landowner transmission access approval agreement.
- Ability in legislation for a wider number of parties to distribute electricity.
- Proposing and supporting Resource Management Act amendments to cover heat plant and distribution as well as renewable technologies.

4.3 Distribution

Eastland Network distributes approximately 296 GWh of electricity to approximately 19,000 residential and 6,000 commercial electricity consumers. Of this total, 5,000 remote connections are scattered widely, across the two distribution networks covering 11,952km^2, resulting in an overall line density of less than 7 connections/ kilometre of line.

Zone substation capacities and present loads are shown in table 6. The loads shown are half hour maximum 2003/04 demands with normal load control policy in effect. Forecast peak power demands by the end of the planning period are also indicated. Growth forecasts have been averaged on a 10-year prediction to smooth out step increments introduced by new loads rather than base load growth.

Substation	Transformer Capacity (MVA)	Load 2003/04 (MW)	% of Installed Capacity	Growth (%)	Load 2014 (MW)
Te Araroa	1 x 2.5	1.06	40	1	1.18
Ruatoria	1 x 5.0/7.5	1.50	30	1	1.67
Tokamaru Bay	1 x 2.5	1.10	44	1	1.22
Tolaga Bay	1 x 5.0	1.23	24	1	1.69
Port	1 x 12.5	2.12	17	2	2.63
Kaiti	1 x 12.5	10.31	82	2	12.82
Carnarvon	1 x 12.5, 1 x 12.75	15.94	63	3	20.81
Parkinson	1 x 12.5	8.75	70	4	11.99
Makaraka	1 x 12.75	8.46	66	3	11.05
Patutahi	2 x 5.0	3.88	39	2	4.83
Pehiri	1 x 2.5	1.23	49	1	1.37
Ngatapa	2 x 0.5	0.54	54	1	0.60
Puha	1 x 5.0	1.90	38	2	2.37
Matawhero	2 x 5.0/7.5	7.6	76	4	11.69
TP Tuai	-	0.70	-	0	0.7
TP Wairoa	1 x 2.5 (11/33)	1.79	72	7	4.25
Kiwi	1 x 6.3	4.79	76	0	4.79
Blacks Pad	1 x 1.5 (33/11)	1.58	105	8	3.68
Waihi	1 x 6.3 (6.6/50)	4.81	76	0	4.81
Tahaenui	1 x 1.5 (33/11)	0.46	30	2	0.57

Table 6 Zone substations and present loads[22]

Eastland Network reported at the end of the 2004 financial year that the number of connections it had in the two districts were lower than the previous year with the number recorded at year-end being 24,876. Primarily, this was due to a number of low consumption connections being disconnected or their points of supply amalgamated. Many energy customers will also be purchasers of energy in several different forms e.g. electricity, gas, diesel and coal. The main parts of the distribution network (schematics) for Wairoa and Gisborne Districts are shown in figures 9 and 10 in the following sub-sections.

Eastland Network's Asset Management Plan has a strong emphasis on the use of distributed generation as a means of meeting peak electricity load requirements, deferring upgrades that would otherwise be required, reducing peak transmission capacity costs, and generally reducing electricity costs overall. The Asset Management Plan[23] identifies a number of planned improvements to the regional network. These are separate to lines upgrades that would be necessary to meet specific customer requirements. Where a specific change to the distribution network is required to meet customer capacity or security requirements these are a direct cost to that customer.

Eastland Network is in a difficult situation in that they don't interface directly with electricity customers as this is now through the electricity retailer. Many of the management tools that Eastland Network has available to them cannot be utilised because there are perverse incentives and regulatory constraints that act against them taking appropriate action. As a result costs in the region are probably higher than if they could implement optimal solutions.

Eastland Network is endeavouring to reconfigure the network in the city area so that where ever possible it is operated as 50kV rings this provides a high degree of security. The protection is designed to operate to disconnect any faulty section of the 50kV ring without loss of supply to other customers.

The 11kV distribution system has a high degree of interconnection between zone substations in the city area only.

The outage indicators for the distribution system interruptions have been dropping each year since the establishment of the current organisations and management structure and they are now by several measures better than general New Zealand performance.

4.3.1 Wairoa Area Electricity Supply

There are 4,910 TrustPower customers on the former Wairoa Power network. With approximately 3,900 typical residential customers and approximately 500 "low efficiency" sites, which use less than 2,000 units per annum.

The Wairoa area is supplied with electricity from the Transpower Wairoa and Tuai substations. Eastland Network has rationalised their electricity distribution assets to decrease transmission costs. Notably Eastland Network has installed a 1.25 MW diesel generator at Mahia in order to avoid Transpower transmission charges, provide summer peak loading network voltage support, and provide increased

[22] Source – Eastland Network Ltd, Asset Management Plan, 1 April 2004 to 31 March 2014, 30 June 2004.
[23] Eastland Network Ltd, Asset Management Plan at http://www.e-c.co.nz/eastlandinfrastructure/myfiles/AMP_VER_5.pdf

security of supply. The Mahia generator provides capacity support to meet high holiday demands and replaces a small diesel generator which has been in use over recent years. . Mahia provides a special challenge as there are a number of subdivisions underway and homeowners want quality supply at the same cost, yet some would only use it for short periods of time during the year. Further, there is no mechanism in place to recover the uneconomic cost of the 33 kV sub-transmission extension and new zone sub-Eastland Network has identified the following issues relating to each of its zone substations:

Wairoa (Transpower)—Direct 11kV network feeders have been rationalised back to Eastland Network's Kiwi substation. Total demand at this substation exceeds contingent capacity at peak periods when Eastland Network's Waihi generation is not injecting.

Blacks Pad—Tourism/holiday and lifestyle load growth at Mahia and dairy shed growth at Mahanga have presented an average growth of 5% at Blacks Pad since 2002. This is creating voltage and security limitations and upgrade planning is underway. The area is dependant on a 1.25MW Diesel Generator, installed to support both load and voltage for peaks. The development plan details upgrading work for the area.

Tahaenui—Stable load minimal change is forecast. The substation was installed in 2002 to overcome the inadequate 11kV supply originally used.

Being on a spur line for electricity supply, and with only 3 major electricity loads, means that supply to Wairoa is a more manageable situation than would normally occur. Eastland Network indicate that the capacity constraint at the Wairoa network grid exit point would have to be removed in order to supply additional electricity into Wairoa township.

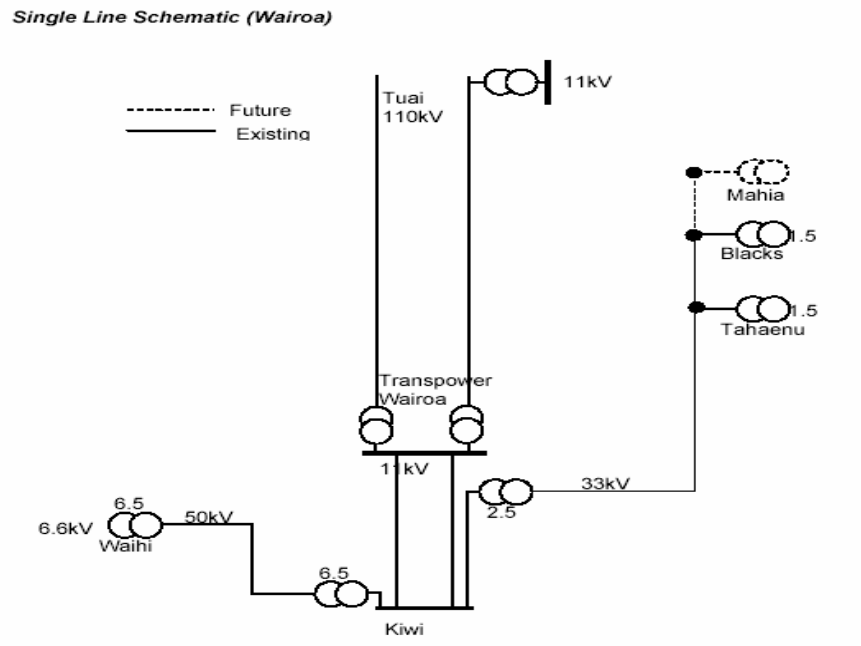

Figure 9 Line Schematic for Wairoa District[24]

4.3.2 Gisborne East Coast Area Electricity Supply

The East Coast area creates special difficulties for Eastland Network as it has a very long stringy network with very low electricity demand located in very spread out locations. The total electricity peak demand is around 5MW.

Maintaining quality of electricity supply is a challenge although significantly improved with the installation of diesel generators at key locations.

The East Coast has long lines and a small number of customers. Eastland Network consider these lines as not self-sustaining and requiring cross-subsidies from other customers if they were to be replaced or upgraded. Eastland Network is therefore investigating how the need for cross subsidisation could be eliminated by generating electricity close to where it was needed. Putting in generation would eliminate or defer the need for more new lines. But the building of wind farm generation would rely on community

[24] Eastland Network Asset Management Plan

support because Eastland Network has advised that they do not wish to go through protracted resource consent issues and costs. This had happened in some parts of New Zealand because wind farms were perceived to be visually intrusive and noisy. Eastland Network believes the East Coast is ideal for wind generation because there were no areas of high-density housing and plenty of exposed sites available away from settlements.

Electricity loadings on the East Coast are lower than the installed capacities of the sub transmission system. The load profile is flat, and there are few commercial and industrial loads. From an economic viewpoint, high levels of sub transmission investment made in this area cannot be justified, but long distances require high voltage and bulk supply has to be concentrated. Security provision would therefore normally require large, redundant assets. Eastland Network has adopted a design approach where security is provided by standby generation support. This approach has proven to deliver better service, reduce zone substation asset investment, and avoid 11kV network reinforcement cost. Actions already undertaken include removal of redundant transformers and replacement of outdoor switchyards with indoor 11kV switchboards providing room for generators on existing sites. There are potential noise issues with gensets that Eastland Network continues to address.

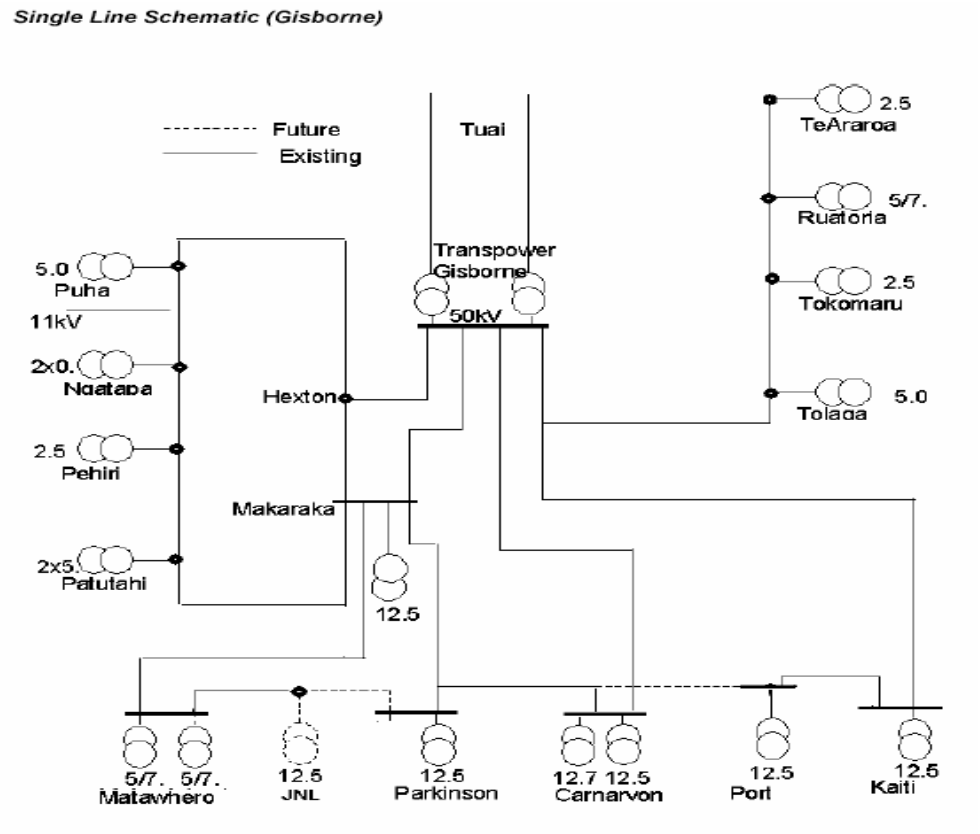

Figure 10 Line Schematic for Gisborne/East Coast Area[25]

Eastland Network has identified specific issues at each of its zone areas:

Te Araroa—Load growth is minimal, Growth change is smaller than weather pattern variance, there are a few commercial ventures being developed in this zone, and installed capacity far exceeds demand. There are no load issues requiring attention at this substation. A 1MW Diesel Generator is connected at the Zone substation.

Ruatoria—The overall load profile is very flat with a winter peak. This suggests load is predominantly very low through domestic installations relying on non-electric heating. This is expected in rural areas with good wood supply and low employment. Only minor load growth, if any, is expected, and this is likely to be dominated by weather pattern variance. A 1MW Diesel Generator is connected at the Zone substation.

[25] Eastland Network Asset Management Plan

Construction of a bioenergy cogeneration facility at the sawmill would improve base load electricity supply to the area.

Tokomaru Bay—The Tokomaru Bay substation has presented a peakier load profile than other coast substations in recent years. Substation capacity exceeds load requirements. Growth in terms of unit sales is high. This is attributed to summer/holiday load.

The Primary Health Organisation (PHO) in Te Puia (Ngati Porou Hauora) provides a number of opportunities for changes in electricity demand to the area. The Health Centre is in a position where it can utilise geothermal, and solar energy to substitute for electricity use. Te Puia is also an area where there has been substantial research undertaken and the Ngati Porou Hauroa currently has an energy project underway (see section 10 for further details).

Tolaga Bay—Tolaga Bay is showing higher unit growth although this is small in absolute terms. Patterns indicate that this growth is the result of new connections rather than growth in consumption. Peak demand growth is appearing as an increased winter peak, which has also shifted to later in the winter season. A 1MW Diesel Generator is connected at the Zone substation.

Kaiti—Kaiti substation feeds a large predominantly domestic load at the northeast end of Gisborne. Capacity constraint has been mitigated by the shifting of load to the new Port substation. Current security issues will be resolved with the completion of the Kaiti-Carnarvon 50kV link.

Gisborne Port—This substation was commissioned in 2003/04 to provide for new growth in the port and CBD areas of Gisborne and support the adjacent Kaiti and Carnarvon substations. Additionally it facilitates the development of N-1 security with the completion of the Kaiti-Carnarvon 50kV link.

Carnarvon—This substation recovered to secure load levels prior to the loss of Watties (6 MW) in 1999, Strong growth and a flattening of the load profile since 1999 has encroached into the secure load rating. Customer activity has less seasonal characteristics and this substation no longer has a distinct winter peak. The Kaiti-Carnarvon 50kV link and Port substation will resolve security issues.

The city feeders show volatile load changes that are directly related to the prosperity of retailing sector and a shift to summer load has occurred that is probably the result of additional air conditioning and refrigeration. Changes in the pattern of development of the town centre have also impacted on feeder load distribution.

Parkinson—The load at this substation was relieved in 2000 after the construction of Matawhero substation but has had strong growth primarily seen by reinstatement of equipment from the Watties site in this area. The overall load profile is particularly flat but individual feeders have distinctly different characteristics, reflecting the mix of industrial, commercial, agricultural, and domestic loads on this substation. Both Cedenco and Montana now have dedicated feeders from this site. These industries are driving load growth at this substation. The continued high rate of load growth at this, Carnarvon and Matawhero substations have necessitated sub-transmission development. This is reflected in projects being undertaken in 2004/2005 to install an additional transformer at Parkinson St. and develop a 50kV link between Makaraka, Matawhero and Parkinson St.

Makaraka—A 12.75 MVA transformer was installed at this switching station during 2001, taking load previously supplied via Parkinson, Carnarvon and Massey Road. This site is limited ultimately by the security capability between substations.

Patutahi—Overall growth at this substation is moderate and constant with a flat profile as expected in areas with cropping land use. The growth of lifestyle blocks on the Poverty Bay Flats is contributing to demand increases. Given load relief via the new substations at Makaraka and Matawhero there are no load issues at this substation. Reduction to a single 5MW transformer configuration is planned.

Pehiri—Pehiri load profiles indicate no appreciable growth with loading dependent on the operation of the quarry. It is strategically placed to facilitate potential forestry activity.

Ngatapa—This substation also has no significant growth and a very small peak. The load profile is typical for a sheep farming area with a clear winter peak. This site is key to provision of support to the Puha substation and Matawai area however 11kV line construction will be required to achieve this.

Puha—Puha is a relatively large rural substation that supplies a large area with no 11 kV backup capacity. Load growth in unit terms is low and the load profile very flat. A 1MW Diesel Generator is connected at the Zone substation that will support the load in part.

Matawhero—Matawhero substation was constructed in 2000 to release capacity at Parkinson Street and provide for additional meat processing load. This capacity has now been taken up and a second transformer was installed in 2003.

4.3.3 Network Company Regulation

Two key issues hare are worthy of particular mention:

1. Ownership of generation by lines companies, and
2. Limits on the sale of electricity by lines companies.

Eastland Network Ownership of Generation

Under the Electricity Industry Reform Act 1998 (EIRA) Eastland Network as an electricity lines business is constrained with the level of investment in generation that it can be involved in. This is a barrier to the region taking full responsibility for optimal generation / transmission solutions to energy supply issues.

While the government has loosened the ability of network companies to invest in renewable energy projects, Eastland Network would have to apply to the Commerce Commission for exemption to increase its level of generation above 50MW and 20% of the maximum demand for investment in hydro and geothermal projects.

Investment in a wind farm and other new renewable energy project is an activity that is exempt from the ownership separation rule under section 46A of EIRA, provided that the Company complies with the requirements set out in sections 24 (Corporate Separation) and section 25 (Arms Length Rules). In other words Eastland Network as a lines company must operate separately from the wind farm company in order to engage in the unlimited generation of electricity using wind. The arm's length rule require an electricity line business and an electricity supply business subject to common ownership to have completely separate managements and must act as if they had been dealing with another independent company. They cannot be seen to give either themselves or the other company an unfair advantage by virtue of the fact they share common ownership. Eastland Infrastructure therefore cannot use staff involved with management of the network, in management of the wind farm, which is one of the advantages the involvement of the lines business brings to management of the wind farm.

In order to protect customers against fluctuations in the electricity generated from a wind farm (i.e. the supply from the wind farm is not constant), the company may wish to purchase hedges to provide its customer(s) with certainty in relation to the price they pay for their electricity, when forced to purchase from the national grid to cover these fluctuations. However, the buying and selling of electricity hedges required to support wind farm electricity sales is not an exempt activity under this provision. Similarly section 5(2)(f) does not provide the necessary exemption from the ownership rule, as this provision only exempts those Company's "selling" hedges as being outside the definition of an electricity supply business. Section 5(2)(f) does not refer to the activities of "buying and selling hedges" as exempt, by implication the ownership separation rule applies to the Company when engaged is this activity i.e. Eastland Infrastructure could not be involved in two businesses operating separately – even if one of them was involved in generation from a renewable energy source – if that business was also engaged in the buying and selling of hedges to protect its customers against fluctuations in electricity supply.

A further constraint arises from section 46B of the Act which states that when generating electricity under section 5(2)(e) of the Act (i.e. generating and selling less than 5 MW per annum), or under section 46A, the public must be notified of the proposal to generate in each of the major daily newspapers in Auckland, Hamilton, Christchurch and Dunedin at least 30 days prior to entering into a contract to acquire or increase the ability to generate. A copy of the public notification must be provided to the Commerce Commission as soon as practicable after publication.

These provisions under the EIRA can be avoided if the Commerce Commission is prepared to grant an exemption to the application of any part of the Act. However there is no certainty to the longevity of an exemption as the Commerce Commission is also empowered at any time to withdrawn or vary such exemption and under the current terms of the legislation there are no restrictions or procedural limitations upon the Commission as to how they may exercise this power.

Network Company Limits on Sale of Electricity

One of the major barriers limiting the development of smaller local generation opportunities is the inability of lines companies to retail the energy produced by these initiatives. This situation requires serious review as the inability to minimise risk by managing retail opportunities is limiting opportunity in this area.

4.4 Local Generation

Electricity is provided into the Wairoa area from the 5MW Waihi power station. Eastland Network uses the Waihi power station for peak load reduction at $50/kW pa. The power station only has about three days storage so by using it for peak load reduction Eastland Network is able to limit the peak electricity

they have to bring in from outside the region. This reduces Eastland's network connection costs[26]. Eastland Network currently sells the energy output from its Waihi Scheme to TrustPower, the incumbent electricity retailer in Wairoa. In terms of the Wairoa network, in which the hydro plant is embedded, it makes a significant contribution for load management. The Wairoa network has a maximum demand of approximately 13.5MW and annual consumption of approximately 50GWh. The Waihi Scheme therefore presents 37% of demand and with an annual generation output of approximately 11GWh, 22% of the energy supply in Wairoa. Additional generation could be gained if the crest height was increased or the lake was desilted.

Eastland Network owns six containerised, mobile diesel generation sets (gensets) for the purpose of providing security and managing outage on Eastland's Network distribution network. This generation provides a total capacity of 5 - 7MW (or 6.5MVA) into the region. The electricity from the gensets is sold to Contact Energy. The contract consists of 2 rates:

1. if Eastland Network use the generators (low rate), and
2. if Contact Energy request the genset to run.

Contact Energy typically request the gensets to run when there is a Transpower transmission constraint eg Cook Strait cable out of service and spot electricity prices are high. The gensets are located at Te Araroa, Ruatoria, Tolaga Bay, Puha and Matawhero substations and also at Mahia.

The Te Araroa, Ruatoria and Tolaga sets provide security of supply to the East Coast when the spur 50kV line faults or poles are being changed for example. They also form the main source of generation when the 50/11kV transformers have to be shut down for annual maintenance.

The Puha genset provides security of supply for occasions when the old 50kV/11kV transformers are being maintained (now more frequent due to age and failing tap control units). The Matawhero genset has not been installed to address specific issues but keeps the set close for emergency use eg Te Kaha in November 2004 for 4 days

All Gisborne gensets contribute when the GXP is constrained to about 34MW i.e., 1 line or Transpower transformer out of service. This is usually done when load is low on planned events. The exact MW value of the constraint varies from 31 to 40 MW depending on various approaches or policies applied by Transpower. The Mahia genset is used for voltage support at peak load times eg Christmas and Easter and provides security of supply given 33 or 11kV line faults.

Eastland Network uses the standby generation in a peaking role during winter daily peaks i.e. the generators are run, as required, up to a few hours per day to limit the peak demand Eastland Network's aggregate system load profile presents to the national grid. This not only lets existing network and transmission assets be utilised more efficiently but is a lower cost alternative than Eastland Network would otherwise face to upgrade its network, and Transpower's, in order to meet new capacity demands from local economic development.

Eastland Network is currently investigating a 12 MW wind farm south of Tolaga Bay to address issues associated with the existing line between Tuai to Gisborne nearing maximum capacity27. The development could supply around 37 GWh of electricity annually to the Gisborne area (around 12.5 % of the total annual consumption in the region). They have previously investigated various ways to build distributed generation within the region to alleviate long-term transmission concerns and secure electricity supply for the future, without relying on the national transmission grid. Potential sources of generation the company looked into included hydro, biomass, waste gas, solar, coal, diesel and wind, but the company has advised that each had its own set of benefits and weaknesses. Eastland Network has repeatedly indicated that wind generation, in their view, is a very viable proposition for the East Coast.

4.5 Gas Reticulation Network and General Usage

Gisborne is supplied with gas by the high pressure NGC transmission line. NGC is the local distribution company in the area. In Gisborne City, virtually the whole of the urban area, including the industrial estate, is reticulated with natural gas. While the reticulated gas supply is known to have excess capacity, new contracts for gas supply to the area are likely to be difficult to secure in the immediate future. Genesis Energy is the gas retailer.

The initial draw to the City for the pipeline was the promise of at least 4 large users including the hospital, a Watties factory (now in Hastings), a large wood processing plant, and a couple of other large sites that

[26] Note: Due to low inflows and reduced storage as a result of Cyclone Bola the Waihi generation facility does not generate the volumes that would be expected of a plant its size.
[27] Gisborne Herald, http://www.gisborneherald.co.nz/archives/December2k4/news/news_04-12-2k4.htm, Dec 04

never eventuated. NGC is known to be keen to increase use and maximise the potential in the pipeline which is currently running well below capacity.

Eastland Network has identified there could be a viable 5.5MW opportunity for a gas engine installation in the area to handle peak electricity demand. It could target the portion of the daily peak load below that which diesel gensets are usually targeted. The lower portion of the peak in the area has a longer duration and therefore requires lower marginal operating cost generation. While gas is viable solution at this level and duration of generation, it is still too expensive to use the generation in a base load role as would be required by retailers for them to consider investment. However even more significant is the difficulty of being able to purchase sizable quantities of gas at a reasonable price because of the general shortage of gas supplies.

Economics of gas engines would improve if a host industrial process to utilise the waste heat and to manage load diversity against (which is possible given the extent of wood processing in the area) could be found. Installing a cogeneration genset at the Gisborne City swimming pool could be such an opportunity. And, while the gas-fuelled gensets would be constrained to their gas network connection (they are not mobile like the diesel gensets), Eastland Network sees a significant economic benefit that this generation could deliver to the region. In particular, not only would the distribution network be used more efficiently and transmission upgrade avoided but the utilisation of the region's investment in the gas network will also be improved. There is a clear opportunity for the region to be maximising the infrastructural assets gas network which is another high cost monopoly infrastructure asset the region is currently supporting.

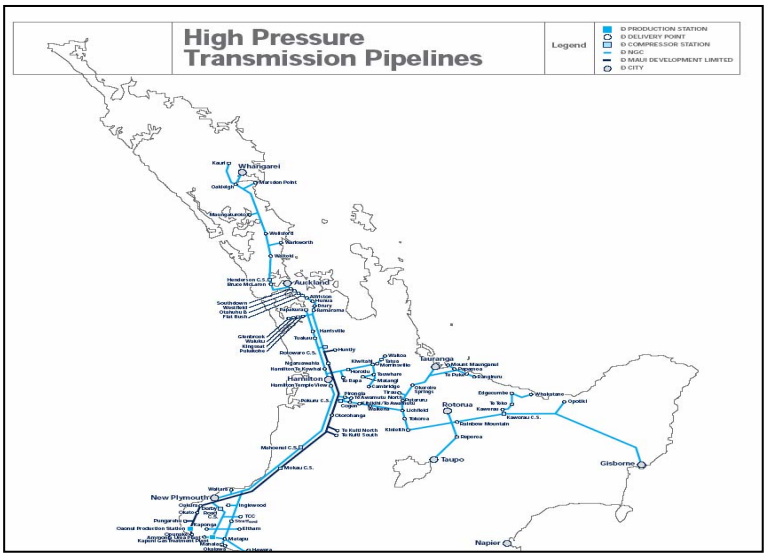

Figure 11 High Pressure Transmission Pipelines[28]

Bottled LPG is supplied by On-Gas a subsidiary of NGC who have recently been purchased by Orion Energy of Australia. It is used extensively in the region.

4.6 Transport Energy

All transport energy in the form of petroleum products is imported into the region. The population density is such that it can be expected that this will continue under current arrangements.

Longer term there may be some change if ethanol or biodiesel were manufactured from regional resources, or electric or petrol /electric hybrid vehicles became more popular.

[28] Source: NGC at http://www.ngc.co.nz

5 Current Energy Prices

This section of the report deals with current energy prices for electricity, reticulated gas (where available) and LPG, and firewood in the region.

5.1 Electricity

TrustPower is the dominant (incumbent) electricity retailer in the Wairoa area. Meridian Energy is the only other company offering to sell to residential customers. Genesis has indicated an intention to increase its customer base in the area.

The dominant retailer in the Gisborne area is Contact Energy. The retailers contract with customers and include the cost of distribution by the relevant lines company in their monthly invoice to the customer.

5.1.1 Time of use pricing

Large electricity users usually purchase their electricity on a half hour basis from an electricity retailer. The contract price may include a component that is "fixed" ahead of time for each half hour of the year, and a component that is based on the spot price that occurs for that half hour.

Customers with a high spot component may cover the risk of price fluctuations by taking a hedge contract with the electricity retailer. With a hedge contract the energy user pays the half hour hedge price and the retailer takes the *unders* and *overs* of the actual spot price.

Residential and small commercial electricity users have a fixed tariff split into a daily charge and a variable (per kWh) component. The majority of the daily charge arises from lines charges while the variable charge covers the energy component. Residential and small-use commercial customers are not charged differently according to the time of their electricity use.

5.1.2 Wholesale Electricity Prices

Wholesale electricity prices are set throughout the country by reference to nodal prices. These are the prices set at the Transpower grid exit points and for the North Island referenced to the price at Haywards near Wellington. The difference in nodal price reflects the system losses accumulating to that grid exit supply point, and any transmission constraints that may be in effect. The local lines company (Eastland Network) pays transmission costs to Transpower, and passes the costs on to the electricity retailers, which in turn pay for electricity received at these points. The retailers then add their margin and on-sell to their customers according to either a fixed price (monthly or half hourly), or "floating price" usually referenced to the half hourly spot price at the nearest grid exit point.

The grid exit point for the Wairoa area is located at the Transpower Tuai and Wairoa substations. The grid exit point for Gisborne and the East Coast is located at the Transpower Gisborne substation. Nodal prices in the wider region each follow the same daily pattern with some small price differentials with prices at Wairoa and Gisborne higher than their southern and northern neighbours. The price differential for Gisborne is higher by about 12-15% than those in Hawkes Bay, and about 3% for Wairoa. This differential is particularly noticeable from about 8.30 am to about 21.30 pm. Prices in the region are significantly influenced by those at the Transpower substation at Tuai, and follow these closely. Spot prices at the various regional substations during September 2004 are shown in figure 12.

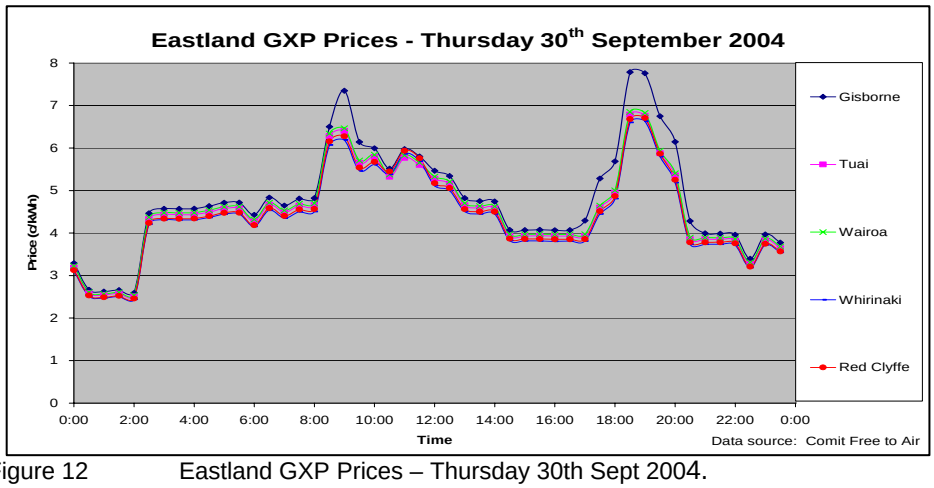

Figure 12 Eastland GXP Prices – Thursday 30th Sept 2004.

As nodal prices change on a half hourly basis it is always difficult to say what the local electricity price is.

5.1.3 Lines Charges

Eastland Network, as the local electricity distribution company in the region, transfers electricity from the grid exit points to customers. The charge for distribution depends on the capacity amount of electricity able to be taken by each customer. The capacity is set by agreement between Eastland Network and the customer.

The electricity distribution cost for delivery of electricity by Eastland Network is shown in Figure 13. Eastland Network charges are to the higher end of the scale as shown but it should be noted that these also include Transpower connection charges. When Transpower charges are removed Eastland Network is marginally higher than Unison and significantly better than Horizon (its immediate neighbours).

Tairawhiti region residential and small commercial customers pay higher energy charges over those in Hawke's Bay because of the lower population density in the region and the "spur" transmission prices that are approx 60% of Eastland Network's cost.

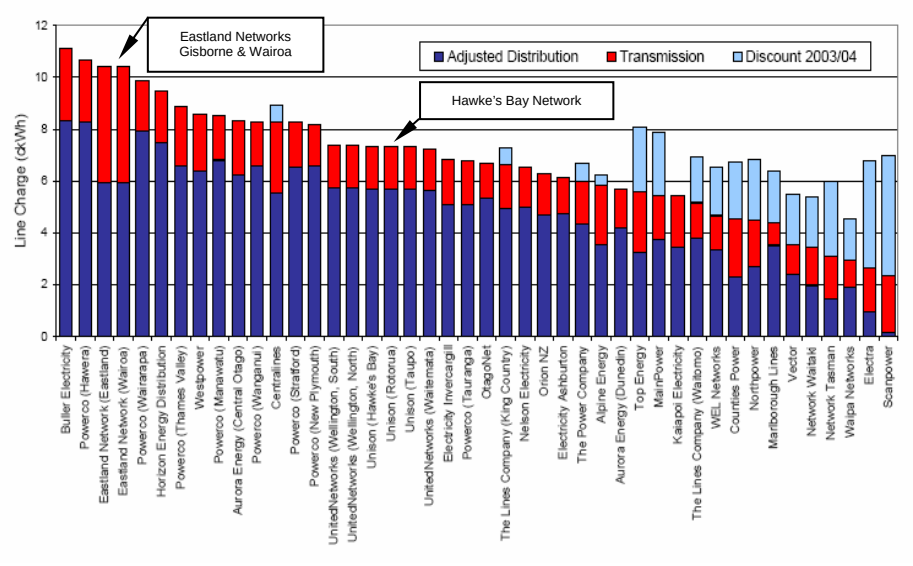

Figure 13. Comparative Domestic Electricity Network Prices[29].

Line charges in the Eastland/East Cape area for domestic and commercial electricity users are presented in Figures 14 – 15. Figures 16 and 17 illustrate the line charges for the Wairoa Area.

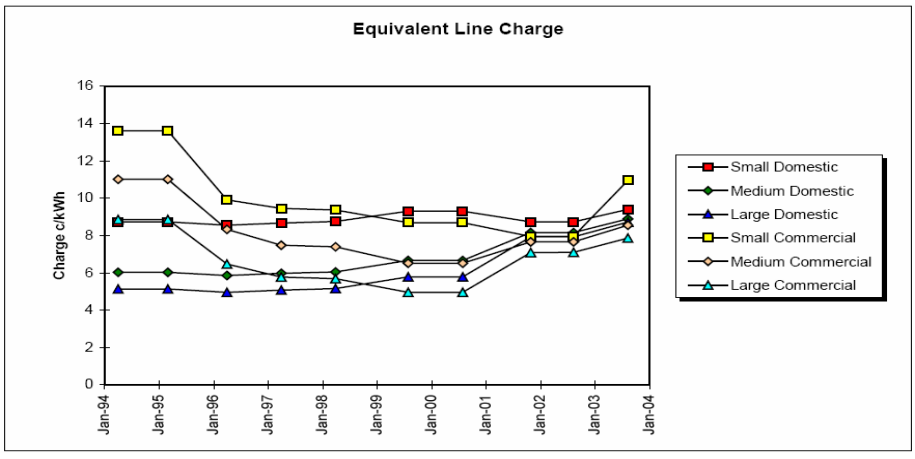

Figure 14 Equivalent Line Charge (Eastland/East Cape)

[29] Source Ministry of Economic Development

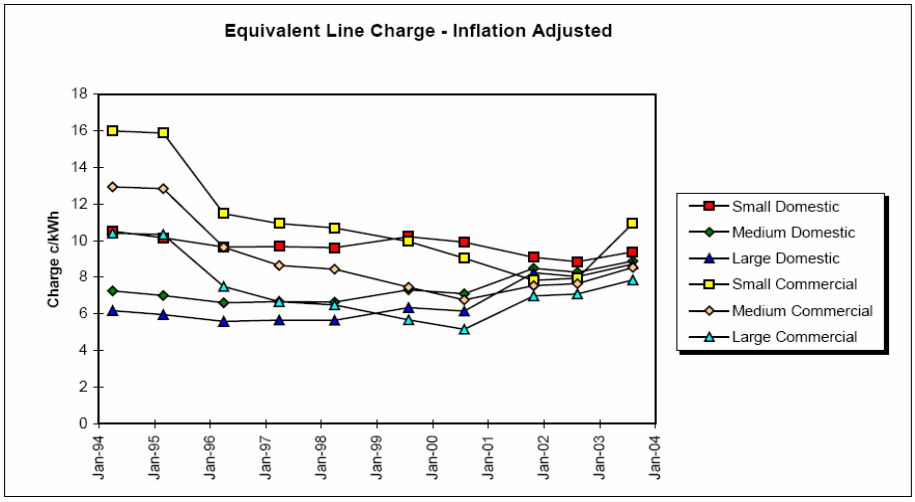

Figure 15 Equivalent Line Charge (Eastland/East Cape) (Inflation adjusted)

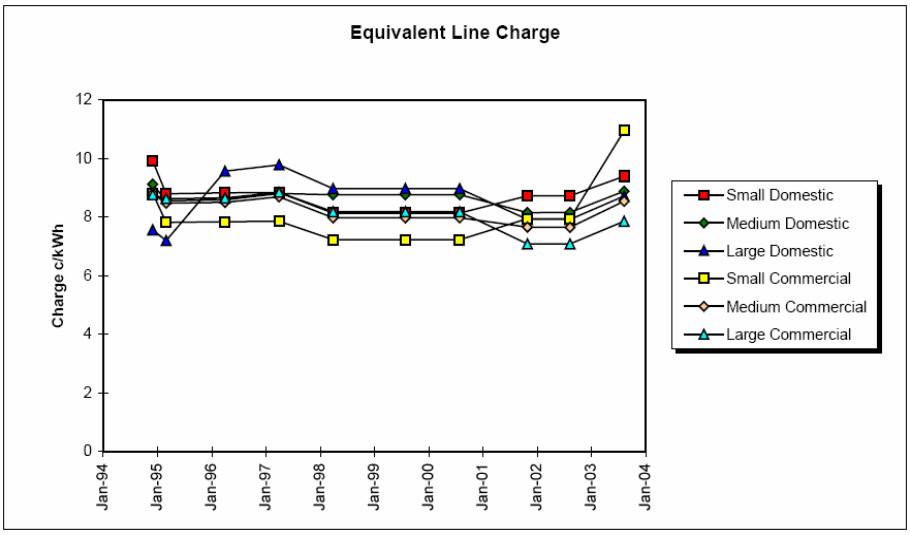

Figure 16 Equivalent Line Charge (Wairoa)

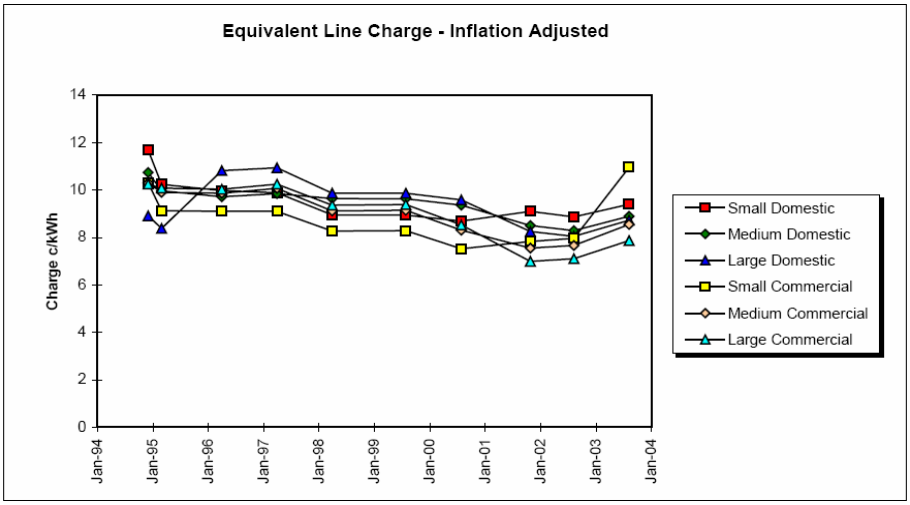

Figure 17 Equivalent Line Charge (Wairoa) (Inflation adjusted)

The figures illustrate clearly that in real terms that line charges have been dropping since the network company was restructured.

Eastland Network recognises that pricing has a role to play in asset management because it can be used to signal desired load characteristics. Other outcomes that the pricing policy promotes are as follows:

- *A Flat Load Profile*: a less peaky load profile results in better capacity utilisation. Asset costs are largely proportional to capacity so a fixed charge related to capacity automatically rewards efficient utilisation. Peaks can also be controlled through effective demand side management. On Eastland Network's network the large peak in daily profile is created by domestic load. However it should be noted that any signals (to change behaviour, i.e. reduce load) only reach the consumer if passed through by energy retailers.
- *Single Phase Domestic Connection*: approximately 66% less connection equipment is needed to provide a single-phase supply compared to a three-phase supply. Small loads such as domestic installations do not require three-phase power and are rewarded with an appropriate differential in pricing. This gives an incentive for single-phase conversion of rural network spurs where three-phase supply replacements cannot be economically justified.
- *Maintenance of Power Factor*: Gisborne has voltage constraints on its transmission supply. Poor power factor is penalised through higher capacity charges reflecting higher usage.
- *High/Medium/Low Density Differential*: Differential pricing based on customer density is necessary to signal the widely varying levels of investment per connection on the network. This is currently achieved via a simple urban/rural/remote split but is constrained by the Governments 10 % fixed charge regulation for domestic consumers.
- *Variable Component*: A variable component is maintained in order for Eastland Network to achieve revenue growth from load growth in order to fund new capacity and associated security. Variable pricing also provides a mechanism for returns for investments in energy efficiency. Variable pricing is achieved through ICP billing using data provided by energy retailers.

5.1.4 Residential Retail Prices

TrustPower sells electricity in the Wairoa area under three alternative plan types:

- Unrestricted 24 hour supply.
- Controlled supply – suitable for fixed supply such as hot water heating and night store space heaters. A number of options are available from 4 hours each day to 22 hours each day.
- Day and night. Different tariffs apply for day and night. This is suitable for appliances that can be used at the cheaper night rate.

Contact Energy sells electricity in the Gisborne area under a large number of alternative plans. The domestic tariffs are separated for 10kVA and 30 kVA connections and into rural and city areas. There is a controlled economy tariff for where the ripple control is used to turn off hot water for up to four hours each day. Table 7 summarises the residential electricity costs that have applied over the last few years.

	Approx. No.of Domestic Consumers as at 15-Aug-03	15-Nov-99		15-May-04		15-Aug-04		% Change 15-May-04 to 15-Aug-04		% Change 15-Nov-99 to 15-Aug-04		Total Increased Cost (+) or Annual Saving (-) 15-Nov-99 to 15-Aug-04	
Retailer		**Line**	**Retail**	**Line**	**Retail**	**Line**	**Retail**	**Line**	**Retail**	**Line**	**Retail**	**Line**	**Retail**
Eastland Network (Eastland)	**15,800**	**8.04**		**10.43**		**10.43**		**0%**		**30%**		**$191**	
Contact Energy			**15.45**		**21.58**		**21.58**		**0%**		**40%**		**$490**
Meridian Energy			**15.16**		**18.44**		**18.44**		**0%**		**22%**		**$262**
Eastland Network (Wairoa)	**3,300**	**8.44**		**10.43**		**10.43**		**0%**		**24%**		**$159**	
TrustPower			**15.57**		**20.21**		**22.85**		**13%**		**47%**		**$582**
Meridian Energy			**19.2**		**18.44**		**18.44**		**0%**		**-4%**		**-$60**

Table 7 Summary of Residential Electricity Costs in Eastland 1999 – 2004[30].

[30] Source: Ministry of Economic Development.

For residential electricity customers, around 45-55% of their delivered cost of electricity is due to the cost of distribution. The split between fixed daily rate and variable use rate will depend on the tariff chosen but generally around 25% is fixed.

Retail electricity prices for residential customers in Gisborne and Wairoa supplied by the incumbent retailers are presented in the following figure. Figure 18 illustrates how each of the electricity retailers has moved tariffs over the period.

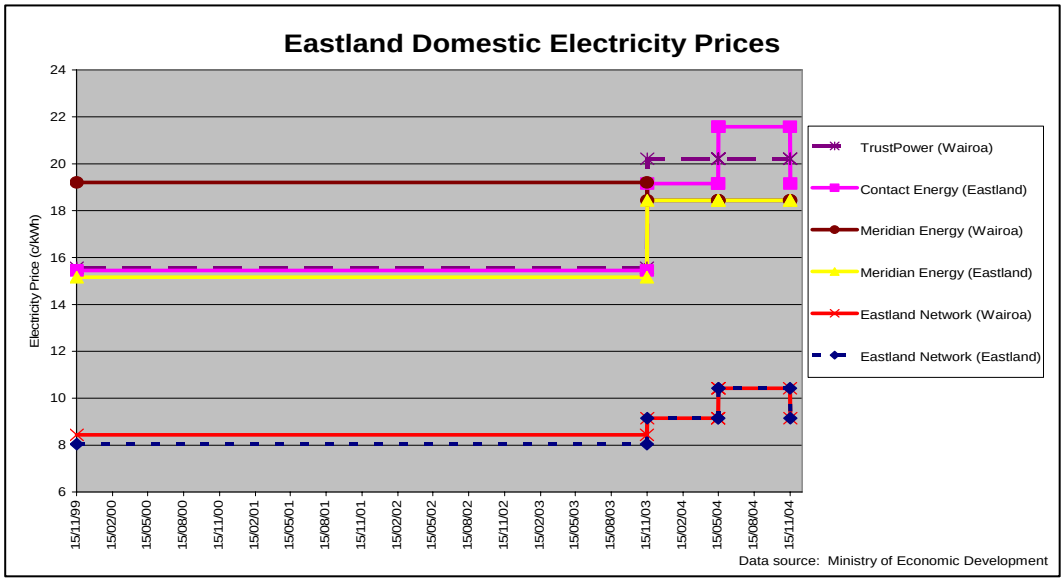

Figure 18 Eastland Domestic Electricity Prices.[31]

5.1.5 Commercial and Industrial Prices

The electricity prices for commercial industrial users are shown in figures 19 – 22). This shows delivered commercial electricity prices in April 2004 at around 11-13c/kWh with half the price being transmission and distribution charges and 25% set on a fixed daily rate.

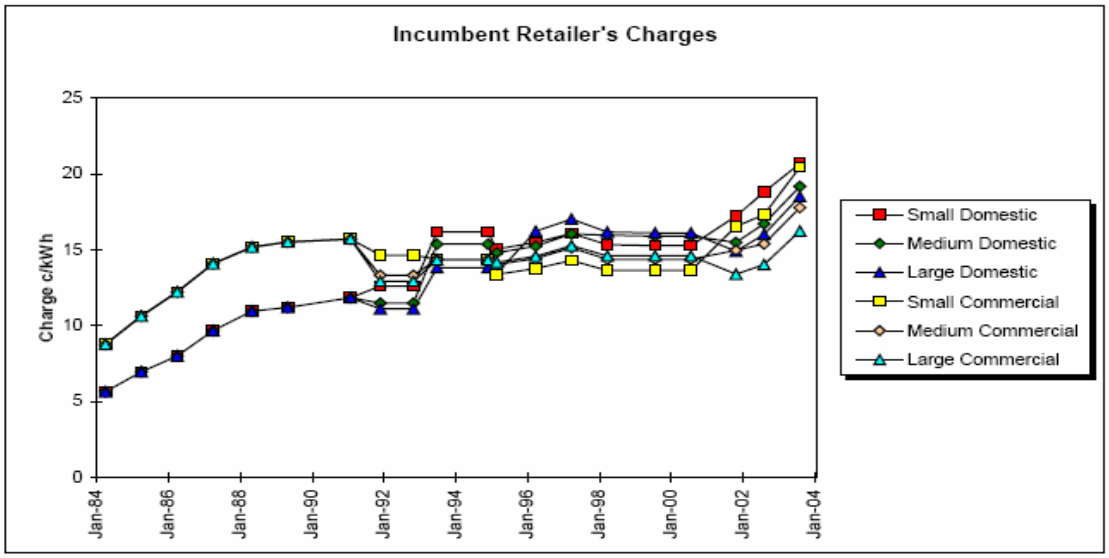

Figure 19 Incumbent Retailer: TrustPower (Line Owner: Eastland Network (Wairoa)[32]

[31] Source: MED
[32] Source: MED

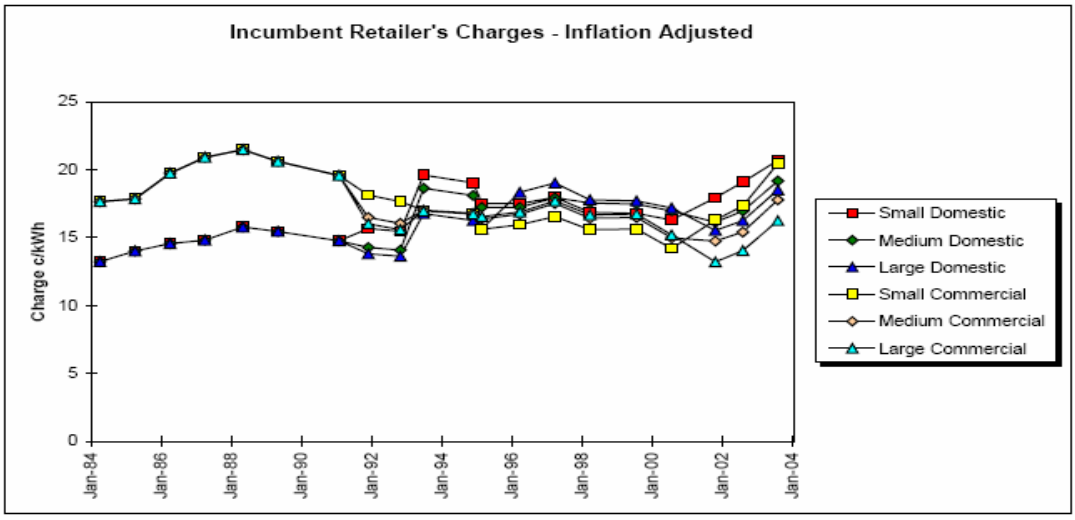

Figure 20 Incumbent Retailer: TrustPower (Line Owner: Eastland Network (Wairoa) (Inflation adjusted)[33]

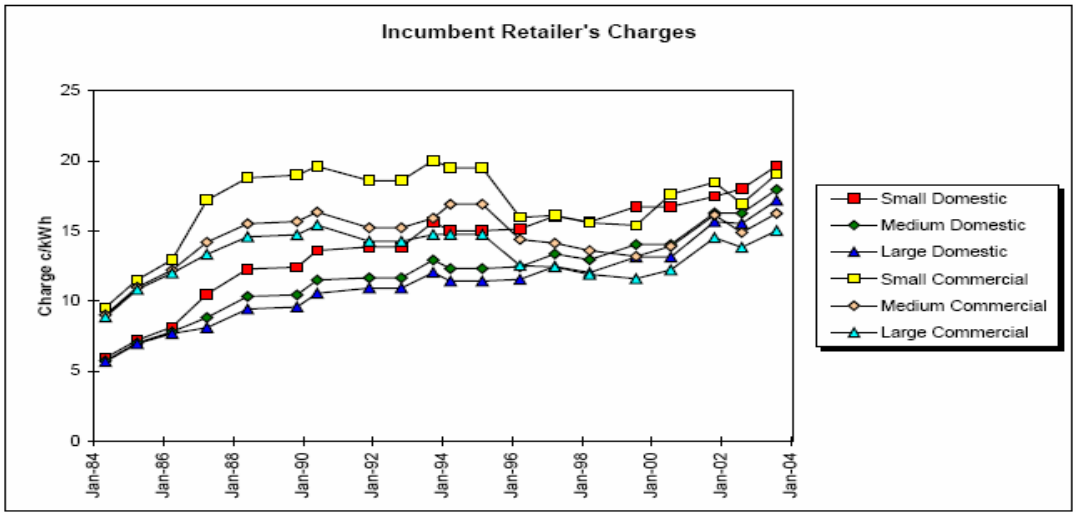

Figure 21 Incumbent Retailer: Contact Energy (Line Owner: Eastland Network (Eastland)[34]

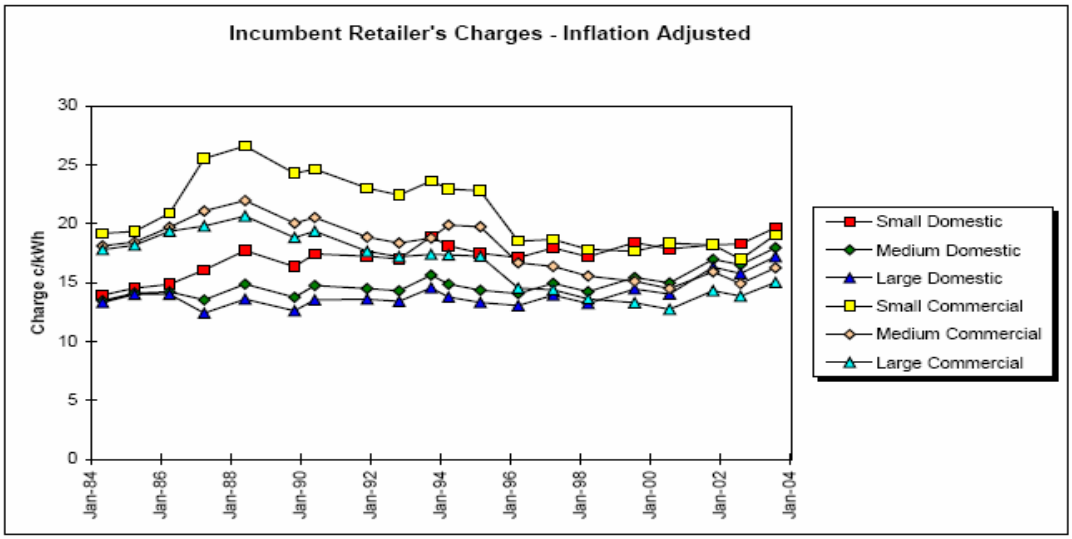

Figure 22 Incumbent Retailer: Contact Energy (Line Owner: Eastland Network (Eastland) (Inflation adjusted)[35]

[33] Source: MED
[34] Source: MED
[35] Source: MED

The variations in commercial electricity prices highlight the necessity for all commercial electricity customers to gain a good understanding of electricity contracts and how energy management can reduce costs. Experience elsewhere has shown that there is significant lack of knowledge of commercial electricity contracts and often misunderstandings of how billing is calculated. It is suggested that significant cost savings can be made for all business in the region if a series of seminars was held to assist understanding. This may need to be backed by on-going support from an independent regional based energy advisor.

5.1.6 Marginal Electricity Prices

The marginal cost of electricity within the Eastland Network area varies for domestic (household) connections. TrustPower is the incumbent supplier within the Wairoa area, with a marginal cost of 21 to 27 cents/kWh for *anytime* use, and 16 to 17 cents/kWh for *controlled* tariff. As the incumbent supplier within the Gisborne area, Contact Energy supplies domestic installations at a marginal cost of 13 to 14 cents/kWh for *anytime* use, and 14 to 15 cents/kWh for *controlled* tariff.

5.2 Gas

Several options exist for the supply of gas within the region. Network supplied gas is available from both Contact Energy and Genesis. Domestic gas supply charges are outlined in Table 8.

Supplier	Options	Cost (Excl GST)	Unit	Marginal Cost (c/kWh)
Contact Energy	Heating, water heating	8.55	c/kWh	8.55
	Daily Connection Charge	66.1	c/day	
Genesis	Heating Only	8.95	c/kWh	8.95
	Daily Connection Charge	64.14	c/day	
	Heating + Water Heating	6.5	c/kWh	6.5
	Daily Connection Charge	91	c/day	
On Gas (Bottled)	Heating Only	73 - 77	45kg Bottle	12.8 – 13.5
	Heating + Water Heating	68 - 72	45kg Bottle	11.9 – 12.6
	Annual Bottle Lease	126	2 Bottles Per Annum	

Table 8 Gisborne Residential Gas Supply Costs.

While there is gas capacity in the high pressure 100mm gas transmission line, owned by NGC, which runs from Opotiki to Gisborne city, securing a long-term gas supply contract at a reasonable price is the impediment to investment. Both Contact and Genesis require that the premises be connected to the gas mains as a prerequisite to service.

The cost of LPG is around 12 – 14 c/kWh depending on location. The Wainui area is within the higher price bracket for delivered LPG.

The cost of reticulated gas is around 6 – 9 c/kWh. Commercial reticulated gas rates vary depending on demand, with marginal rates of between 5.4 – 5.8 cents/kWh. Large commercial customers are understood to be able to purchase gas at $9/GJ.

5.3 Firewood

Radiata Pine firewood that has be cut and split and partially dried can be purchased for about $100 per Cord (approx $30 per m^3).

6 Available Regional Energy Resources

6.1 Gas

6.1.1 Gas Resources, Exploration and Supply

There is a long history of gas seepages in the Tairawhiti region. Gas was noticed in the Mohaka area during earlier hydro investigations and a small source of seepage gas was previously tapped in the Te Puia area where it was extracted along with the geothermal fluid. It is understood that a farmer used a gas seepage for on-farm electricity generation.

Westech Energy has been actively drilling on-shore for oil and gas in the Wairoa area. The principal Westech field is approximately 11km from Wairoa at Frasertown. A second field approximately 2-3 km from Wairoa is smaller.

Westech Energy completed its Tuhara-1B appraisal well near Wairoa in mid-2002 but failed to establish flow of gas commercial at that time. Following the withdrawal of New Zealand partner Orion Exploration during 2002, Westech has since been seeking partners for its three offshore permits, two off Hawke's Bay

and one off the Wairarapa coast. Westech is required by its exploration licence to drill a further hole in 2005. This will be undertaken adjacent to the existing Frasertown well.

Austral Pacific Energy (NZ) limited in partnership with Pancontinental Oil and Gas NL and Sun Resources NL have the rights to explore an area north of Tolaga Bay (mostly on-shore but some off-shore). The companies note that Waingaromia 2 was drilled in May 2002 to a total depth of 502 metres. Sub commercial flow of gas to surface from minor fractures.

Major prospects include:

- Arataha Dome prospect potential 254 mmbl oil or 430 Bcf gas potential recoverable reserves.
- Pauariki Prospect: 208 mmbl oil or 230 Bcf gas potential recoverable reserves.

Pancontinental report the area to be a very interesting and prospective frontier area[36].

Gas is currently available to Gisborne via the NGC gas pipeline from the national gas distribution network. While there is adequate gas pipeline capacity into Gisborne there is a general shortage of gas supplies available other than for normal residential and commercial sale. There is inadequate supplies of gas from the national market for any significant new use such as electricity generation. Any such significant use would have to be fuelled from locally sourced gas.

National gas supply is constrained because of the general shortage of gas supplies. It is also increasing significantly in cost and post 2007 if the carbon charge is introduced gas prices are expected to increase significantly above current price levels. This provides an opportunity for exploration and extraction of Tairawhiti sourced gas, and gas exploration in the area will have greater interest to exploration companies.

6.1.2 Gas Utilisation

The extraction of gas resources in the Tairawhiti region could be a source of electricity generation in the region. However any development will be driven by the national energy market rather than local needs.

At Wairoa the use of gas for local electricity generation requires an electricity load significantly greater than the 10-13 MW local electricity demand to provide economies of scale to support well development, pipeline construction and installation of local generating plant. While Wairoa is close to the gas fields the electricity demand is just too small unless development were to proceed for export of electricity from the area. Westech have the option of piping the gas from the area to probably Whirinaki for electricity generation where there is an existing power station, or installing a gas fired power station near Wairoa and exporting the electricity via the Transpower transmission lines. Further drilling is necessary in order to gain greater confidence on the resource size before either of these options could proceed.

A route to get the gas from Wairoa to the Whirinaki power station and connection to the national gas distribution network has previously been investigated. Alternatively a pipeline could go to Gisborne where it could connect to the national gas distribution network. The Whirinaki direction is more attractive because of the presence of the power station.

With rising gas prices the option of installing well head generators to prove the fields may become an attractive proposition for staged field development, particularly for the fields close to Wairoa. The requirement for wellhead generation could also be a requirement of resource consents in order to minimise emissions to the atmosphere.

Alternatively for testing the fields close to Wairoa the gas could be piped to the AFFCO plant for utilisation in their boiler as was earlier proposed.

If there were electricity generation at Wairoa or Gisborne nodal electricity prices would reduce.

Other than for electricity generation there would only be a medium industry demand for gas in the region because the most significant energy users are wood processors who have access to biomass as an alternative energy source. Principal direct use of gas could be by food processors and distributed electricity generation. The bottled LPG market is fast growing and if gas is at an appropriate price this could increase further. The use of bottled LPG instead of electricity for cooking and heating would provide a small contribution to reducing electricity demand in the region.

If there were an increase in food processing in Gisborne this could increase the use of gas if it were available at an appropriate price.

[36] Further details at: http://www.pancon.com.au/files/3_proj/3_38330.html

With the increasing value of gas and increasing electricity costs evaluation of gas cogeneration for commercial or community heating situations such as for the swimming pools has the advantage of cost and ability to supply electricity during peak electricity price periods.

6.1.3 The Value of Gas

Gas is potentially the most valuable energy resource that the Tairawhiti Region has along side wood. As an energy source gas is flexible, is safe, can be stored and is an easily used fuel. If the gas under Tairawhiti can be brought to the surface at an appropriate price then it could be used to firm the renewable energy that is currently and potentially used. While gas is a premium energy source for the region, it is the oil that exploration companies normally seek because it is internationally more valuable and it is the prospect of oil and increasing national gas prices that will dictate further exploration.

The highest priority activity that the region could do would be to encourage further exploration of the East Coast gas fields. To encourage further exploration Councils should review District Plan provisions to ensure that they make consenting of exploration, testing and pipeline installation as simple as possible. Where exploration licences are not taken up Councils should work to encourage exploration companies to come to the region and take up the licences.

6.2 Woody Biomass

6.2.1 Industrial Bioenergy

Woody biomass for use as an energy feedstock can come from a number of sources:

- *Forestry residue* - slash, tops and unmerchantable stemwood from trees harvested for saw or pulp logs. Forest residue may include the cutover depending on location of harvest.
- *Wood processing residues* – bark, sawdust, shavings, off-cuts, etc. from processed wood for pulp, panel board, construction timber, furniture, etc.
- *Woody crop plantations* – short rotation crops grown specifically for energy purposes, possibly in associated with land disposal of sewage and industrial effluent.

The conversion process to provide heat and electricity from woody biomass is commercially viable. There are several examples in the New Zealand wood processing industry.

Direct combustion of wood processing residues in 2-20 MW_{th} boilers or furnace systems is a common form of conversion in the forest processing industry throughout New Zealand producing steam, hot water, hot gases or hot air. A typical large sawmill in the Tairawhiti region could have a 10-20MW_{th} heat plant producing heat for timber kiln drying. Where surplus heat is available, electricity production may be feasible for use on site or for export to the grid. Electricity production from such a facility could have an electricity generation capability of around 1.5-2.5MW_e. A smaller sawmill site is likely to have a 4 -6MW_{th} heat plant only for kiln drying.

Currently wood-processing residue is considered to be competitive with coal or gas only for industrial heating. Biomass material from forest residue or short rotation crops is generally too expensive because of waste collection and processing and transport costs. However in the Tokoroa area where there are some mobile chipper/shredders working forest residue processing and delivery costs have decreased significantly. As can be seen in Figure 23 the cost of bioenergy will be very competitive with coal by 2007 when the carbon charge is introduced. Bioenergy from short rotation crops will take even longer.

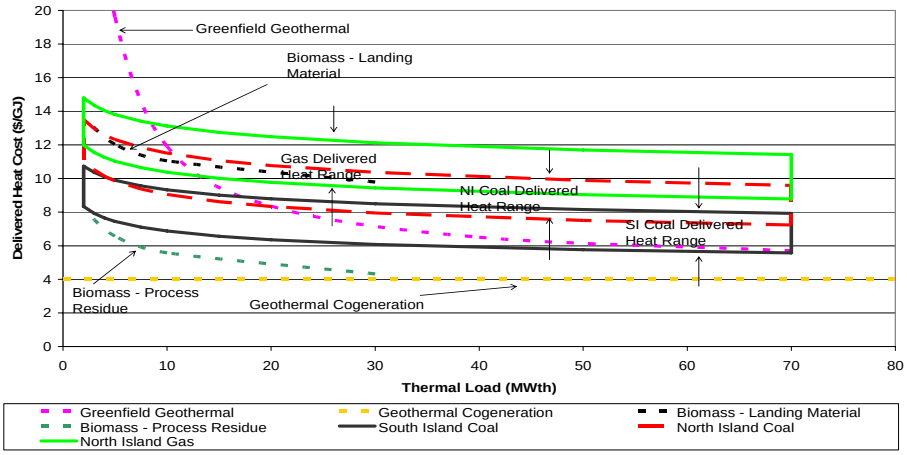

Figure 23 Comparison of Unit Heating Costs for various fuels post 2007[37]

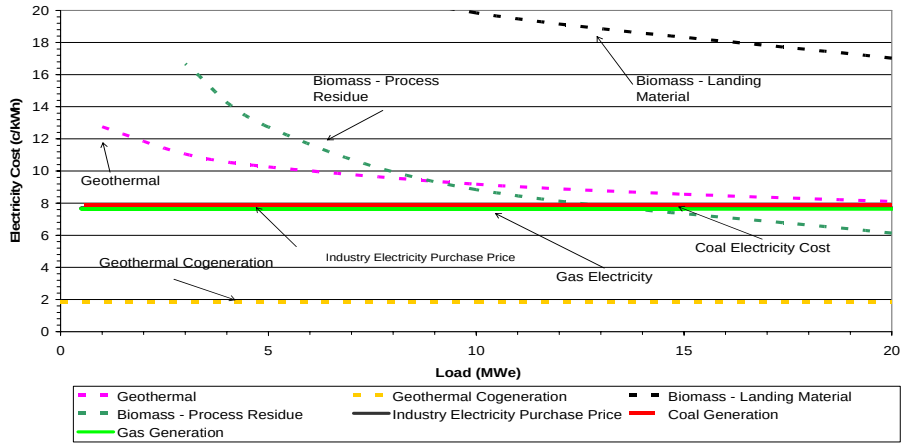

Figure 24 Comparison of Unit Electricity Costs for various fuels post 2007[38]

The economics of generation of electricity from a sole purpose bioenergy facility are such that while currently uneconomic, post 2007 with the introduction of a carbon charge under the Climate Change policy, electricity generation from bioenergy will begin to become economic. The economics will commence with investment in cogeneration facilities and then embedded electricity production leading to larger scale electricity production post 2010. Cogeneration is where there is a multi-use of heat for both process use and electricity generation. This combination often occurs on wood processing sites

Cogeneration provides a significant opportunity to hedge future industrial electricity costs but the capital expenditure is usually too great for a single site to fund by itself. Economies of scale may be realisable where several businesses can cluster to share capital costs. Recognising this, it is recommended that any new industry coming into the region should be encouraged to co-locate with other energy users.

The construction of cogeneration facilities is dependent on the host party needing heat. Generally there are two options available:

- plant sizing is optimised and plant is designed for electricity generation as the primary output,
- the plant is sized and designed principally to meet process heat requirements heat with excess heat being used for generation of electricity.

This can result in plant being suboptimal within a few years when processor products change. Designing a plant configuration that minimises this risk is necessary.

For the combustion of biomass in the non wood processing sectors such as education or health, the biomass can be processed into pellets for ease of transport and on-site handling. Currently this is not economic in the region.

In the longer term independent heat and electricity generating utility companies could establish in the region to produce electricity and/or process heat for sale, based on wood-fired technology. Installations ranging from 10 MWe to 30 MWe electric output appear to be necessary in order to provide adequate economies of scale. The fuel source could be cutover, arisings, residues, tree crops or mixtures of all four. However such heat plant would need to be 30-90 MW thermal and would consume a large quantity of fuel each day. It would be a big investment with significant commercial risks unless designed and built around dedicated forests for fuel.

6.2.2 Economics

The most likely sized bioenergy facilities for Tairawhiti wood processing sites are likely to be plant of around 2-3 MW_e embedded into a wood processor site. With the probable shortage of on-site wood waste it is likely that for any plant size greater than this the biomass will have to be supplemented by forest residue.

For a cogeneration facility using on-site wood processing waste it appears that for a 10 MWth boiler feeding all the steam into a 2.6 MWe second hand steam turbine generator would result in electricity being produced at a cost of 9-11c/kWh. Use of a new steam turbine generator would increase the cost of electricity very significantly. Where the plant is used in a cogeneration mode of operation the electricity

[37] Source: East Harbour Management Services
[38] Source: East Harbour Management Services

cost reduces substantially because of the "additional sale" of heat for process use. If forest residue was used the cost of electricity would rise to around 14-16 c/kWh because of the increased cost of the supplementary fuel particularly through the inclusion of transport costs.

There could be economies of scale in developing a collective bioenergy facility in the Matawhero area where there are a number of heat users and a number of parties producing wood processing residues. This could be in a combined heat and power facility producing around 10MW electricity and 45 MW thermal heat. Such a location is central for the collection of forest harvest residues from a number of surrounding forests.

6.2.3 Biomass Resources

There are large quantities of forest-derived biomass available in the Tairawhiti area. The location of forests is shown in figure 25 and the size of the resource is shown in Table 9. Currently a large proportion of the timber is cut and transported to sawmills or processing plant at Ruatoria, Gisborne, Wairoa and Napier. The remainder of the timber is exported through the port as logs.

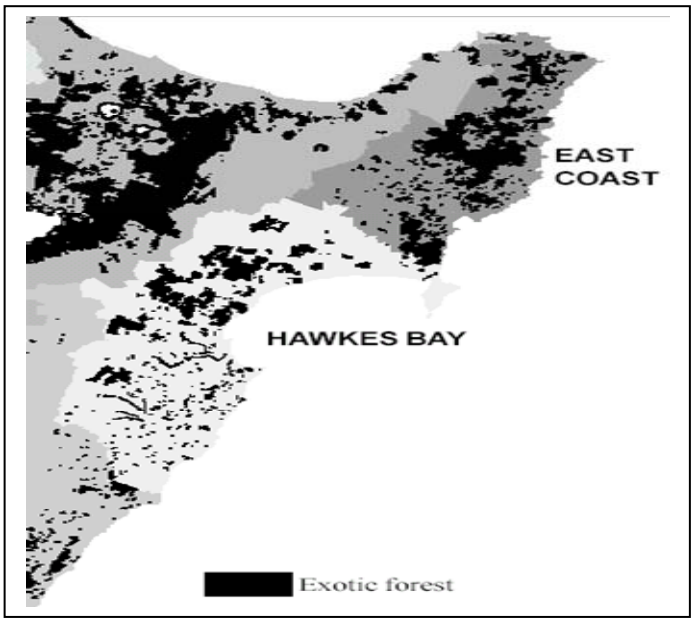

Figure 25 Forest Distribution[39]

Territorial authority	Area (ha)	Standing volume (000 m3)	Area-weighted average age (years)
East Coast wood supply region			
Gisborne District	153 311	26 757	11.37
Total	**153 311**	**26 757**	**11.37**
Hawke's Bay wood supply region			
Wairoa District	**52 027**	**9 353**	**12.72**
Hastings District	63 782	13 834	13.05
Napier City	237	39	10.85
Central Hawke's Bay District	7 321	1 839	15.04
Total	**123 367**	**25 065**	**13.03**

Table 9 East Coast Wood Supply[40]

Wood Process Residue—Wood-processing residue is the ideal fuel for a bioenergy facility as its use as an energy source usually avoids disposal costs that would otherwise be incurred. The ideal biomass fuel is when the processing residue is hogged to a homogenous chip size and its moisture content is regular. This comes at a cost but reduces storage costs and allows steady operation of the heat plant.

Most wood processors use heat on site and are able to use all of their waste for their own needs. Some are now becoming fuel constrained and have a shortfall and would complement on-site processing residues by importing from sites with an excess if the price was right.

While there are likely to be some sources of woody biomass available from small wood processors, there is no guarantee that they would continue as a source of fuel. Experience elsewhere has shown that such

[39] Source: MAFF (NEFD 2004 Publication)
[40] Source: MAFF (NEFD 2004 Publication)

sources of biomass may not last long as other parties also see their value and they are used either in new on-site energy facilities or are taken to closer users.

The value of waste woody biomass is increasing and it can no longer be always assumed to be a free fuel. There is also a further security of supply problem in that what is one person's waste today is another person's raw material for processing tomorrow.

Forest Residue—There is potentially huge quantities of residue from forest harvesting operations that could be processed into a homogenous fuel product. Current estimates are that this could cost up to 3-4 $/GJ ($40-60/tonne) delivered to a bioenergy facility. However, in the Tokoroa area, costs are reported to be down to $31/tonne delivered.

The economics of using forest residue as a fuel are fast changing as specialist mobile chipping/shredding equipment is becoming readily available. In the Rotorua/Tauranga area, there are now three units working and it is expected that one at least could soon be justified to start work in the Tairawhiti region. Mobile plant are able to be located at the harvesting skid sites where they can reduce the volume of biomass. This is then easily trucked to heat plant where it can be used as fuel.

Because of the lack of demand for heat energy and the availability of alternatives it is expected that forest residue is not likely to be suitable as a source of energy for heat production until post 2007, and electricity generation until at least the end of this decade. The cost of collecting, processing and transferring forest residue to a bioenergy facility adds an additional 5c/kWh to the cost of producing electricity.

A cogeneration arrangement would bring the timing of electricity production forward.

Wood/energy Crops—In a number of overseas areas purpose grown trees are grown solely as an energy source. With the abundance of forest residue already available it is unlikely that such plantings will occur in the region except as a strategic reserve for bioenergy plant owners.

Council Municipal Waste—Wairoa District Council could produce up to 20 tonnes of burnable material a day but experience elsewhere indicates that such waste can often be difficult and costly to handle. As the cost of disposal ($30/tonne) of burnable material increases over time it may become cost effective for the Council to install a tub grinder to process burnable material, particularly if a bioenergy facility was nearby. There will however still remain the cost of supervision and separation to ensure that non-burnable or non-processable waste is not mixed with burnable waste. A decision on installation of a tub grinder will depend on the quantities being received at the landfill suitable for commutation into fuel. A visiting tub grinder that is also processing residue from nearby forests may reduce waste processing costs.

Processing landfill waste is commencing at some NZ landfills but it is usually undertaken by independent parties who negotiate contracts with the Council and possible fuel purchasers. These parties utilise specialist equipment and are often able to spread costs over several activities. It can also be expected that they will only enter the market when they are able to sell the processed waste as fuel.

Agriculture Waste—With the large quantities of corn and other agricultural crops grown in the area there is an opportunity for the waste from the crops to be a source of energy. Currently such waste is probably either burned or disposed of by dumping. If there were a bioenergy facility nearby then there could be an opportunity value in selling it to the facility operator as a fuel, however the cost of transport usually makes it too expensive compared to other energy feed stock sources. Separation of clean organic matter from Gisborne derived municipal waste can be processed into shredded/chipped material for use as a fuel in a bioenergy combustor for production of heat or generation of electricity. The economics of scale would indicate that this would most efficiently be done in conjunction with bioenergy plant at say a local wood processing plant. Separation and processing of clean organic municipal waste can reduce the quantities of waste going to the landfill. The barrier to this occurring is often the difficulty of keeping other organic waste clean of inorganic rubbish. This should be estimated as one of the options for the new landfill design. Solid wastewater residue can also be burnt, however processing in a biogas digester is usually more economic. Over the next decade as environmental land use conditions are tightened crop waste will become more viable for processing into energy.

With the value of energy in New Zealand it is not expected that crops will be purpose grown for energy this decade, however as energy sources change purpose grown crops are likely to be of greater interest.

6.2.4 Domestic Heating

The value in using firewood for domestic heating is an issue which has not generally been recognised as an alternative to electricity for heating. The replacement of open fires with high efficiency wood burners can be one of the most effective investments homeowners can make. If the wood burner is connected with a wet-back to the hot water storage cylinder electricity costs for heating water could nearly be eliminated during winter. This could be around 30% of household electricity costs. If the wetback is

connected with a solar water heater then the heating of water by electricity could be eliminated year round. This would reduce household electricity cost by around a third.

6.3 Wind

6.3.1 Wind Potential

The Tairawhiti region has many characteristics that indicate that it could be a reasonably suitable area for the installation of wind farms. While there are several areas that have reasonable topography, previous investigations have indicated that wind speeds are not consistently very high. Figure 26 shows that the area is however one of the better wind areas in New Zealand.

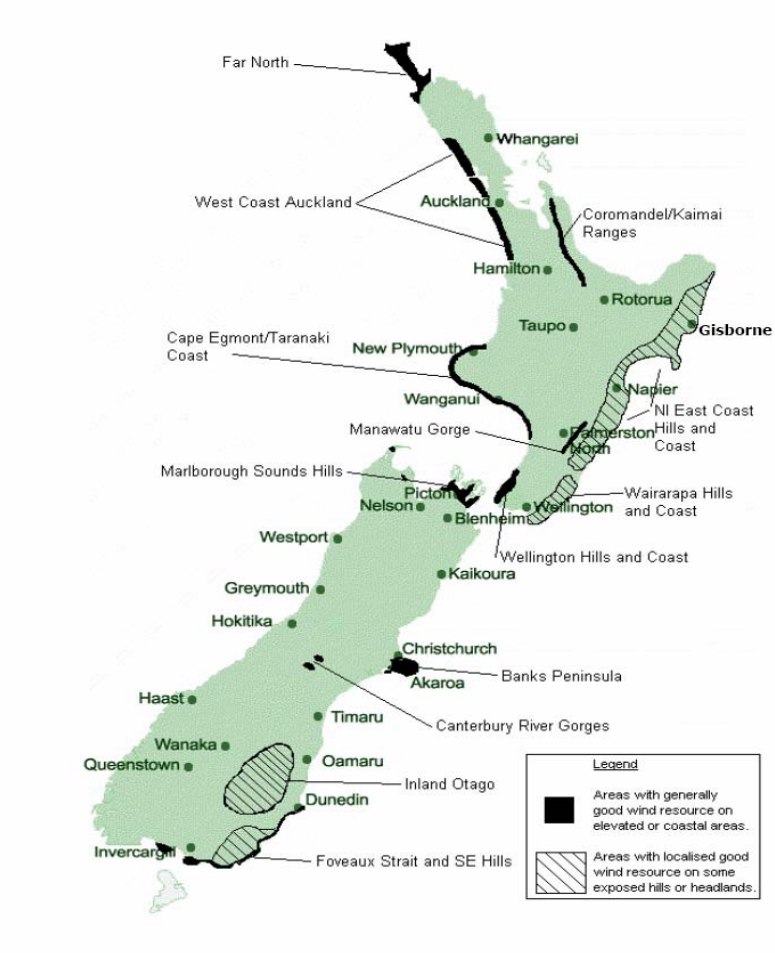

Figure 26 Wind Map of New Zealand[41]

The wind sites of most interest to developers are ridgelines along the coastal area but because of concerns about visual effects only those back from the coast are likely to be investigated.

Experience from wind farm selection indicates that it is niche topographic locations that have good wind speeds. These locations also need to be close to existing transmission lines if electricity is to be exported from the site. Access for long large vehicles such as cranes can be a significant cost impost on a project and need to be taken into account on site selection.

Measured wind speeds for the region have been obtained from measurements on low (10-30m) towers so publicly available data will under represent the actual hub height wind speed. Until more extensive wind monitoring is undertaken, there will be a large level of uncertainty of the likely wind energy available. The height for modern wind turbine tower (3 MW machines) is typically around 80m. Smaller machines are available and their lower weight and height make them easier to build but the economies of scale come from large 3-5MW machines. The larger machines also have les visual impact as there are fewer of them. There are two distinct wind areas – East Coast and Mahia.

[41] Source: Review of New Zealand's Wind Energy Potential to 2015, Energy Efficiency and Conservation Authority (EECA).

6.3.2 Mahia

Wairoa Power investigated a number of possible wind farm sites in the Mahia area and it assessed that up to 3MW could be generated on the Table Cape site on the Mahia peninsula. Eastland Network indicated that if a wind farm of that size were installed in the Mahia area this could be done without providing the need for Mahia – Wairoa distribution line upgrading. This would also be within the embedded load of the area and would provide network benefits.

The earlier Wairoa Power wind monitoring data has been reanalysed using current costs. Two sites were analysed, one that has extremely good topography and thus low capital costs, and a second better wind speed site. The better wind speed site has poor topography and only 1.65 MW of generation could be produced there. A second similar site would have to be found to obtain the target 3.3 MW sought. Figures 27 and 28 show the analysis results for two representative sites.

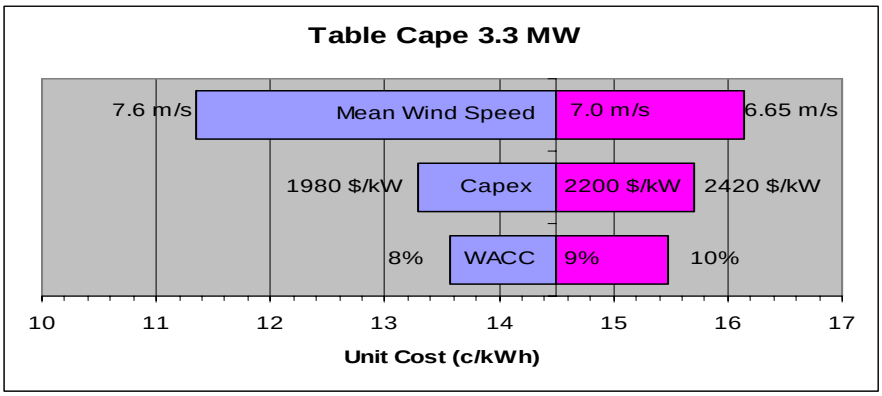

Figure 27 Table Cape site (3.3MW)

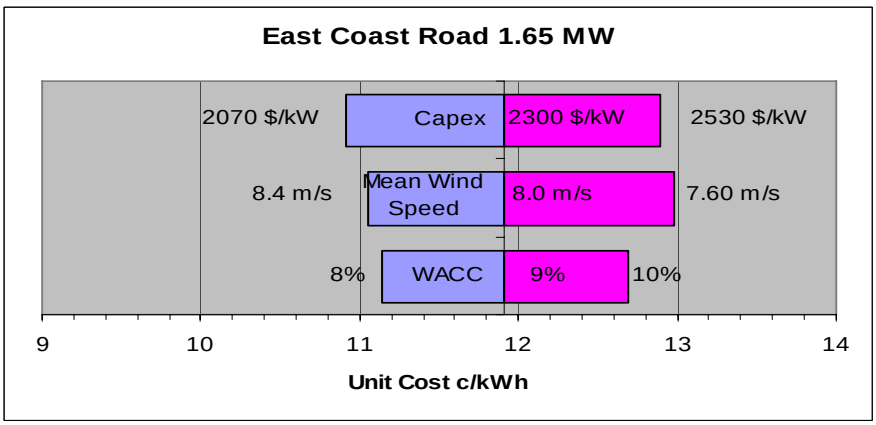

Figure 28 East Coast Road site (1.65 MW)

The previous monitoring indicated a wind speed of only 6.7m/s yet monitoring on higher towers north of Gisborne has indicated wind speeds closer to 8m/s. If the wind speed was around 8m/s, then the cost of electricity generated would be around 12 c/kWh which would be getting attractive for the Wairoa area and worth further investigation.

Interpretation of the analysis results indicates that wind speed and capital cost are the two principal drivers of the cost of generation at these sites. At the completion of the work undertaken by Wairoa Power, it had been recommended that further and more appropriate wind monitoring needed to be undertaken, particularly of the Table Cape area. The current analysis reconfirms this need. Further analysis should also be undertaken assuming modern large 3MW turbines in which case an estimated 12MW may be able to be obtained from the Table Cape site.

6.3.3 East Coast

Eastland Network has three monitoring sites on the East Coast and they are also using satellite weather information to overlie the geography. They have identified a number of sites as suitable for wind-generated electricity. Taking into account other factors, such as the cost of upgrading existing transmission lines that supply Gisborne. Most of the East Coast lines are old and required high levels of maintenance.

No actual wind data was available to the authors so for analysis purposes it has been assumed that wind speeds at 80m height above ground is likely to be averaged around 8m/sec on good ridge sites in this area. The consequence of medium wind speeds such as this is that the cost of electricity generated by the wind farms is around the 9 c/kWh range. This is only the cost of electricity generation. This cost would increase significantly if distribution line upgrading were required.

Eastland Infrastructure have been investigating and secured a relationship with the landowners for a wind site at Mokairau, between Gisborne and Tolaga Bay which has all the characteristics of a good site in the region i.e. it will be aesthetically located as it is not directly on the coast, it is on private property and away from other residential areas; it is adjacent to the existing 50kV sub-transmission line, which will allow the output to be easily transmitted; and it is close to the main road to enable easy access and transportation. The wind farm is likely to have three to eight wind turbines (up to 12 MW) installed. This would generate 41 GWh of electricity per annum which is around 14 % of the total annual consumption in the region and up to around 28% of the region's peak electricity demand. The total investment could be in excess of $20 million. Eastland Network report that the Mokairau location has consistently demonstrated good wind characteristics.

A preliminary investigation is also being done on a Waipiro Bay Horehore Station by Genesis Energy to see if it has potential as a wind farm. Data collection for the project had just begun. The need for road upgrading and a new connection to the 50kV electricity distribution line will be critical for costs for the project.

The importance of wind speed and capital cost is shown in Figure 29.

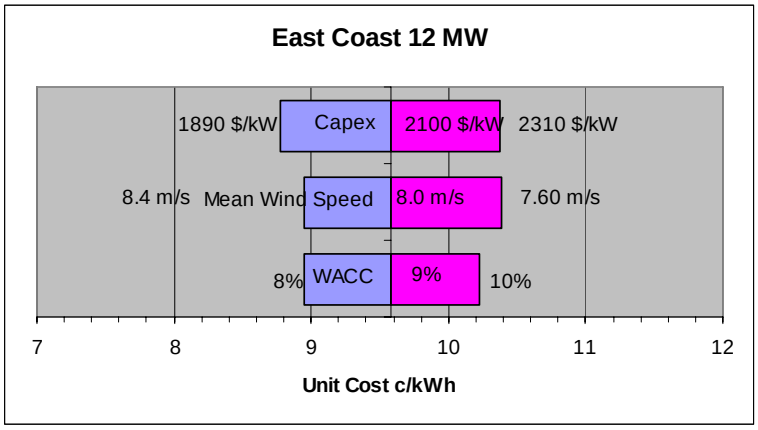

Figure 29 East Coast (typical site) 12MW

The level of capacity for wind generation into a local network depends on a number of factors particularly relating to the fluctuation of wind from moment to moment. If energy storage can be provided to support wind energy fluctuations, then increased levels of wind can be handled by the electricity network. This storage could come from hydro reservoirs or storage technology such as the Vanadium Redox battery being developed in Australia and trialed on King Island.

For thr East Coast area, there is adequate hydro storage that could be built to complement wind farm development. In addition, the local electricity demand is probably equivalent to about 40-50 load factor that can be expected of the 12 MW proposed wind farm

6.3.4 Small Wind Turbines

There is a market for small wind turbines to supply electricity in rural locations. Examples include the supply of electricity to remote locations such as houses, farms, pumps and telecommunications facilities. Unlike the larger grid connected wind turbines that generate electricity controlled with respect to voltage and frequency, small wind turbines for remote applications are usually optimised for battery charging. Inverters to generate AC electricity can in turn use this battery power.

Wind turbines for remote rural applications vary in capacity from a few hundred watts to about 10 kW. The consequent rotor diameters vary from 1-7 metres. Tower heights for these wind turbines typically range in height from 10 to 30 metres. The energy output increases significantly according to the size of the machine as illustrated in figure 31.

A turbine used to supply a single remote household would typically be rated at about 1 kW. Such a wind turbine may often not be placed in a resource-optimised location as proximity to the user is the most important factor. Also, some of the energy from the wind turbine will not be able to be accepted by the system, e.g., if the batteries are already full. These two factors mean that the maximum effective capacity factor for such a turbine is likely to be sized will be approximately 30% or less. This compares with capacity factors of up to 50 % for wind farm installations in optimum sites. In order to generate the same amount of electricity as the 32 MW Tararua Wind Farm, it is estimated that the installation of 50,000 small 1kW turbines would be required.

Hence, the installation of small remote area wind turbines is unlikely to make a significant contribution to the region's energy supply. Despite this, they are likely to be of increasing importance in providing energy services to areas where alternative energy supplies are uneconomic.

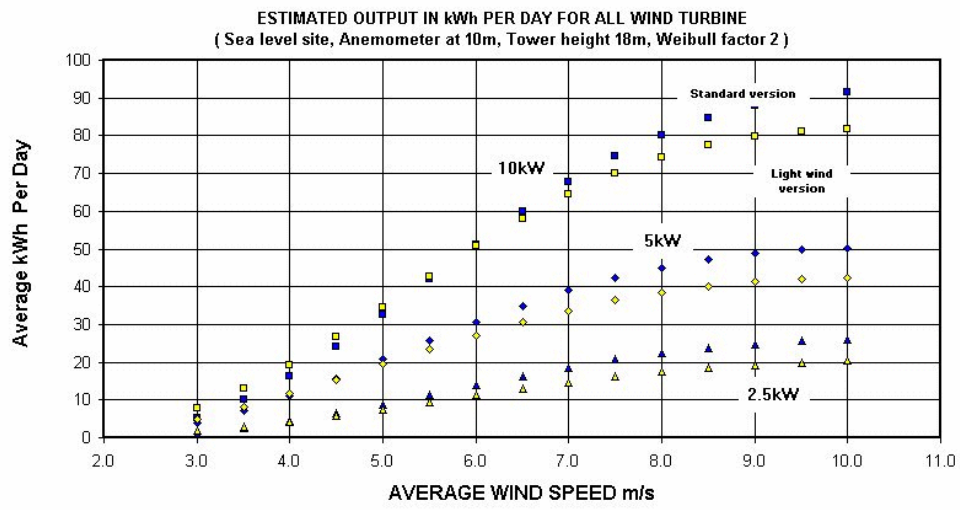

Figure 30 Estimated output in KWh per day for all wind turbines

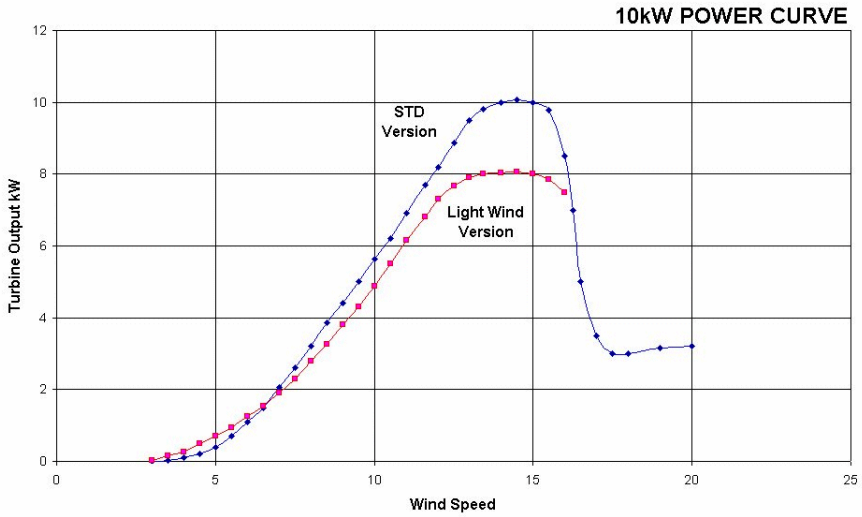

Figure 31 Wind Power and Turbine output (10 kW power curve)

6.3.5 Barriers

There is a lack of wind data useful for evaluating sites over the region, and potential developers need to undertake their own specific monitoring of the wind. Wind monitoring requires data collection using towers, which may be up to 80m high, approximately the hub height of wind turbines at present. The need for a separate notified consent for each tower means that potential developers will not be keen to install or move towers. With the preparation of District Plan Rules such applications should be able to be handled as non-notified applications.

The lack of publicly available information on the wind resource means that opportunities may not be identified particularly by landowners. In order to overcome a major barrier to the uptake of wind energy, it

is recommended that reliable wind data be obtained and made publicly available. The data would need to be at different elevations in order to identify the characteristics of the resource at different potential turbine hub heights. This would assist potential investors to identify wind energy investment opportunities.

The lack of commonly accepted information on the potential noise and other effects of wind turbine operation mean that investors have to undertake their own research and preparation of expert advice for each consent application. This is inefficient and creates a major cost barrier to the obtaining of resource consents. Much information is common to any application and it would assist wind energy developers to have this as commonly accepted reference information either as Rules in the District Plan, or in a format similar to the Air Quality Guidelines. These should be developed in conjunction with EECA and the Ministry for the Environment with encouragement to preparing a New Zealand Standard.

The most significant constraint to wind farm investment will be the technical limit to the level of wind-generated electricity that can be handled by the thin stringy network. Wind generated electricity is intermittent and as a result requires backup from other firm quick start generation such as from hydro or diesel generators. Modern wind turbine no longer causes transmission quality problems that they once did but the intermittent generation can cause frequency and voltage problems if there is too big a proportion of wind generation being injected into a network. Eastland Network will need to model the network with regard to specific applications. It would assist potential investors if limits identified by the modelling could be made public.

6.4 Solar

There are two solar technologies available to the region: solar water heating and the production of electricity using photovoltaic cells.

6.4.1 Resource

Figure 32 below shows that the region is attractive for solar energy being one of the best areas in New Zealand with Mean Daily Global Irradiation of 14.6 MJ/m^2 which is the same as Kaitaia and greater than Whangarei. The 2,184 annual sunshine hours is greater than Kaitaia (2,070) and Auckland (2,060).

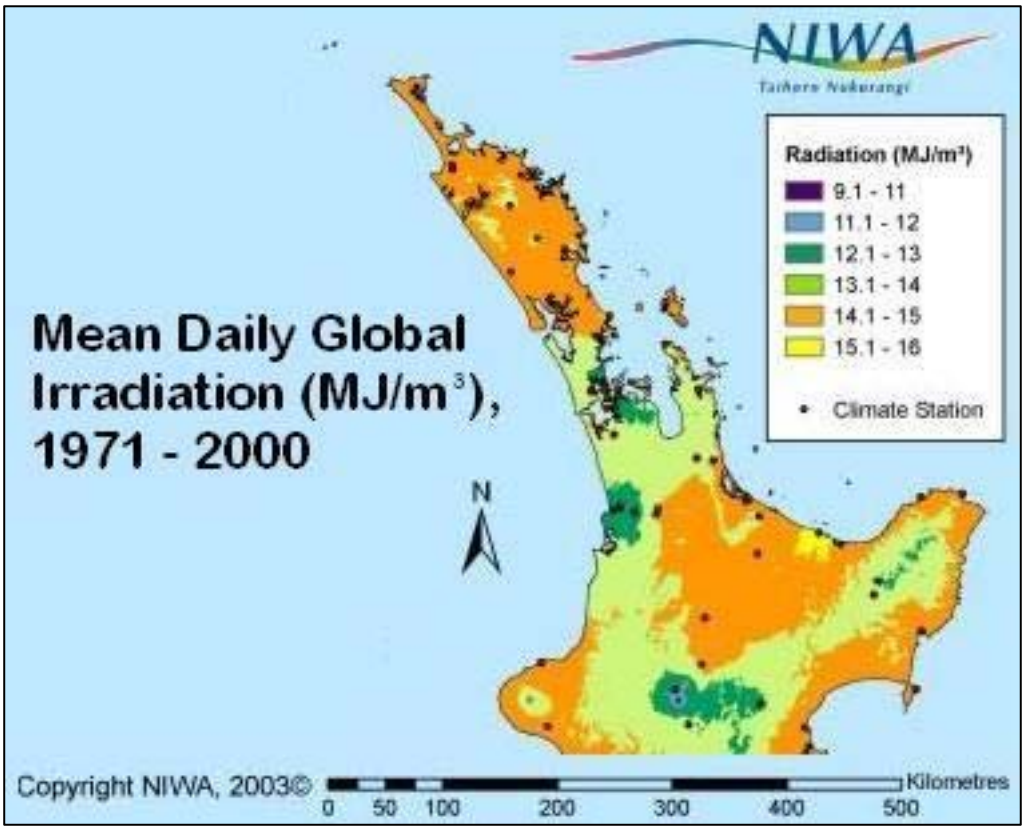

Figure 32 Mean Daily Global Irradiation (MJ/m^3), 1971 – 2000.[42]

The seasonal variation in solar irradiation for Gisborne is shown in figure 33.

[42] Source NIWA web-site.

.

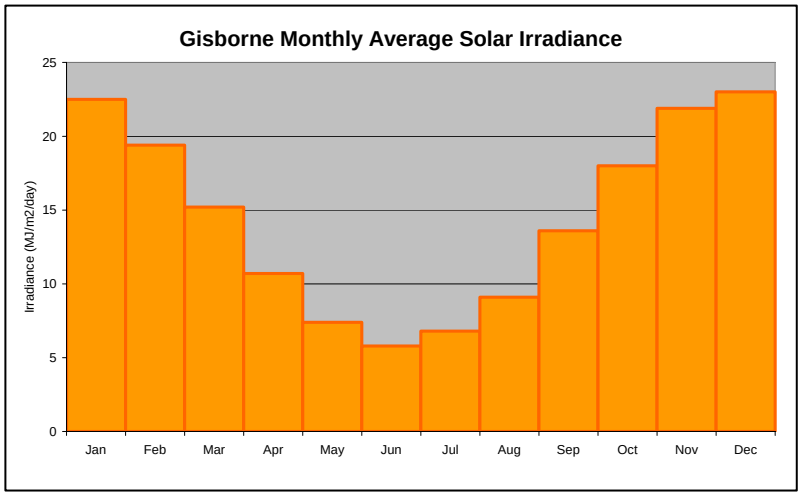

Figure 33 Gisborne Monthly Average Solar Irradiance

6.4.2 Solar Water Heating

Solar hot water heating systems are readily available in New Zealand and their performance is well established. While systems have been around for a number of years the market has not been developed because of the lack of strong industry players and public perception. The Government is currently supporting the expansion of the solar water heating market and this is having a marked effect in several regions of the North Island.

For a 2-4 children family, approximately 40% of household electricity is used to produce hot water. The installation of a solar hot water system can save approximately 70% of the electricity otherwise used to produce the hot water. This means that approximately 30% of household electricity (8,000kWh pa) can be saved by installation of a solar hot water system.

A solar hot water system can be installed in existing and new buildings. Costs of installation can be reduced if the system is incorporated in initial building design.

Solar water heating can be used as a pre-heater for industrial / commercial applications using significant volumes of hot water, e.g. AFFCO, fast food outlets, bakeries, food processors, rest-homes, motels, motor camps etc. There are a number of these applications where the installation of solar water heating can provide financial benefits to facility owners, while having a significant effect on the electricity supply to the region.

In a large commercial application, hot water can be available from solar systems at around 5c/kWh.

The installation of solar hot water systems has an up front capital cost but on-going electricity costs are reduced by 30% in a residential application. This results in the capital expenditure being paid off within about 8-10 years for 2-4 children residential dwellings, and approximately half this for industrial commercial applications.

The most significant barrier to uptake of the use of solar water heating in the region is the lack of knowledge and experience locally.

The New Zealand solar industry has been extending its capacity in areas such as Auckland but this has not yet been taken to the regions. National solar industry capacity building has been based on implementation of quality systems, knowledge and experience, and development of trained personnel. The region needs to build on this national industry capacity building.

The region can assist speed up the time before the solar water heating industry expands to the region by taking local initiatives. These could include:

- Local promotion of solar water heating by ‘mail-out’ with Council rate demands,
- Distribution of information on solar water heating with building consent information,
- Public seminars on solar water heating,
- Encouragement of local plumbers to be agents for system suppliers and
- Adoption by an existing community Trust of a solar water-heating programme.

The capital cost of a solar hot water system can be a significant barrier for many people. An attractive option is to make a monthly payment to an electricity bill rather than have an upfront capital expenditure with benefits occurring in the future. This can apply to both residential and commercial applications. In some overseas locations, this has been addressed by the electricity supply company, or another party such as a Trust or municipal council, installing the system and having a lease to buy arrangement with the building owner. This can be of particular benefits for rental property where the tenants of a property obtain benefits from reduced electricity costs but the investment is a fixture on the dwelling. The region may be able to set up such a scheme.

Housing NZ has a house modernisation programme which in some areas includes installation of solar water heating. Current joint EECA - Housing NZ initiatives are focussing on how a greater number of solar water heating systems can be installed in Housing NZ properties. A regional energy champion as proposed by this assessment would therefore also need to work closely with regional Housing NZ staff to attract any installations to the region.

There is currently a shortage of solar water heating system installers throughout New Zealand despite the increase in demand for this technology, Therefore, it is reasonable to expect that significant business opportunities may exist. However, it is also recognised that there is a role for skills development and this may be an initiative that the Tairawhiti Polytechnic may wish to pursue.

The value of a solar hot water heating system may not be reflected in the property value. The Taskforce should support the work of EECA on their proposed Home Energy Rating Scheme (HERS) and encourage its introduction on national basis so that the value of a solar water heating system is reflected in the value of a building.

6.4.3 Solar (Photovoltaic) production of electricity

Solar energy can be used to produce electricity at around 105-150c/kWh. In isolated applications such as on farms this is very cost effective. However, while photovoltaic equipment costs are reducing annually the technology has not yet reached the maturity level for wider mass-market application such that it could affect electricity supply to the region, particularly for on-grid applications. The difference in cost between on-grid and off-grid depends on the need for batteries or rectifiers.

The production of electricity from solar energy by use of photovoltaic (PV) cells is well established within a number of niche applications throughout New Zealand. These applications are generally in off-grid situations where the option of installing a power line for mains power would be uneconomic.

The main applications are:

- Consumer products – e.g., calculators, watches, toys. They also included individual power supplies (caravans, mobile homes, boats) and individual supplies for novelty products (home security, garden lighting, car sunroofs, fans and battery chargers).
- Industry applications – PV systems can be used in “professional systems” provided by companies active in the communication industry and the cathodic protection industry. New Zealand’s electric fence industry is a substantial and a good example.
- Standalone Power System (RAPS) applications – These are applications in the watts to kilowatt size range located at sites remote from the main distribution grid. This will be a pivotal growth area for applications like water pumping, water treatment, electric supply to rural uses and communications links.
- Grid connected distributed supply system applications – These systems are simpler than RAPS as they require only PV panels and inverter to provide AC voltage and connect to the local distribution grid. The main electricity supply acts as a storage facility, receiving electricity at times of PV surplus and supplying it at times of PV deficiency, hence there is no need for a battery system.

The competence of design and installation will be critical for the public gaining confidence in PV systems. Similarly, it is essential that owners know how to properly monitor the system. Throughout the assessment, the authors found installation that would fail through poor design or maintenance. If the public gain a poor perception of early PV installation from some failure, then the uptake of PO will be put back a number of years.

Currently, on-grid PV generated electricity costs around 105c/kWh. However, the unit cost is dropping rapidly such that over the period to the end of the decade, PV is likely to mature and enter the domestic-level grid-connected market. As such, PV will be competing against the retail cost of electricity (~20c/kWh) rather than wholesale alternatives (~6-7c/kWh). As for other solar energy options, there is significant development in the area of PV energy technologies and related energy management systems

and costs and efficiencies are being improved to the point where in some situations this technology may be a viable option for embedded energy requirements.

It is assessed that by 2012 and based on current technology the unit cost will be in the 31-48c/kWh range, and by 2025 in the 14-21 c/kWh range for grid connected applications.

6.4.4 Barriers

The main impediment to the uptake of PV technology has been its cost compared to grid electricity prices.

It is recommended that the region establish a photovoltaic electricity programme to assist potential users to properly install and monitor their systems. The programme should also develop demonstration sites so that potential investors in PV can gain first hand knowledge good design and maintenance skills.

Industrial Research Ltd (IRL) and Ngati Porou Hoaora have a PO research project underway at Te Puia. This project will provide useful information on the integration of PO into community electricity supply systems. As this project is funded from FRST public services it is recommended that information gained should be widely distributed to others in the region. This need not affect the development of commercial intellectual priority that the parties are gaining. A request of Foundation for Science Research funding is that there is a component that is passed on to the public.

6.5 Hydro Electricity

There have been a number of studies undertaken over the years into the hydro potential of the region. There is major potential for hydro electricity generation from the Mohaka and smaller opportunities throughout a number of the other river catchments. A key characteristic of the region's rivers is that they are very "flashy" and have a high bedload. These characteristics have been seen as an impediment to development. However with good design both of these characteristics can be managed. For example, a resource consent should allow for de-silting throughout the life of the facility. A de-silting disposal area therefore needs to be built into the project design.

The small hydro opportunities are likely to be of a size that is within the capability of the local electricity supply network at around 5 – 10 MW of generation at 12 - 15c/kWh. Most of these projects have not been investigated in recent years because they have previously been considered too expensive relative to gas generation elsewhere. However as embedded generation within the region's electricity network under current Tairawhiti region electricity prices they would appear to warrant further investigation.

6.5.1 Large hydro

The only large hydro opportunity in the area is on the Mohaka river. The Mohaka catchment has no existing hydro-electric power stations and no controlled lake storage. From its source in the Kaweka Ranges, the Mohaka River travels 172 km to the mouth at Mohaka in Hawkes Bay. The catchment is steep and rugged, and at 2430 km^2, is eleventh in size in the North Island. There are a number of potential scheme sites on the river and its catchments but these are not available for development as areas of the river have significant environmental attributes and are subject to a National Water Conservation Order. A suitable site for a dam in the lower reaches of the river near Raupunga about 15 km upstream from the mouth is not covered by the Conservation Order. The site is also in close proximity to transmission lines.

Previous investigations into options at the Raupunga site indicated two dam configurations were possible. A low dam with an 80m head and a high dam at 100m would have installed capacities of 85MW and 105 MW respectively.

The 1992 Planning Tribunal report and recommendations on the Mohaka River Water Conservation Order regarding electricity generation identifies that a 70m dam at Raupunga can be accommodated without endangering the outstanding qualities of the river. This idea appears to be reflected in the amended water conservation order where development may be allowed below Willow Flat.

The level of the lake and the height of the dam formed would need to meet the requirements of the Water Conservation Order. A 70m dam with an installed capacity of 75MW with a 50% plant factor would result in an annual average of 330 GWh per year of electricity being generated.

Development of the scheme would depend on land owner involvement (or sale of land) and involvement of Ngati Parawera who have ownership of the river bed and joint guardianship of the river with the Department of Conservation. The hydro scheme could be built for the good of the Mohaka community if they took a lead in its development.

6.5.2 East Coast Small Hydro Opportunities

There have been few opportunities investigated and the criteria for such investigations were often narrow and may no longer be applicable today. It is recommended that new investigations should be encouraged. Key areas will be those adjacent to existing electricity distribution lines.

Waiapu—This catchment has no existing hydro-electric power stations and no controlled lake storage. Several sites have been investigated in tributaries.

Mata—A short distance downstream of its confluences with the Waitahaia River the Mata River is joined on its left bank by the Mangaohiroa Stream. At this point, the river channel narrows to be flanked by steeply rising banks with rock outcrops, forming a suitable site for a dam. The scheme comprises a 40 m high dam with pipelines extending to penstocks feeding water to a power station with an estimated generating capacity of 15 MW giving approximately 67 GWh p.a. (50% plant factor).

Waingakia Diversion—The Waingakia stream affords potential for a 'diversion' type hydro scheme making use of the substantial fall able to be gained by diverting flows through to the Mata River. With a catchment area of 49.6 km^2, the Waingakia stream has an estimated long term mean flow in the reach of interest of 6 m^3/s, and by utilising head of up to 260 m, an annual generation output of up to 65 GWh would be achieved from a 15 MW generator (50% plant factor).

Waitahaia—The considerable natural fall in the upper reaches of the Waitahaia River affords potential for a 'diversion' type hydro scheme very similar in concept to that previously outlined for the Waingakia Stream. Although the flow in the Waitahaia River at a convenient diversion site exceeds that of the Waingakia Stream, the economically developable head is less than half as much, with the result that the Waitahaia Scheme is estimated to have a generating capacity of about 7 MW, giving approximately 31 GWh p.a. (50% plant factor).

6.5.3 Wairoa Area Small Hydro Opportunities

The Wairoa catchment is the fifth in size in the North Island, has existing hydro-electric power stations (e.g., Tuai, Kaitawa, Piripaua, Waihi) and lake storage (Lake Waikaremoana). Eastland Network also owns and operates its Waihi power station in the catchment.

Waihi—Eastland Network has investigated extending the height of the Waihi power station weir in order to gain additional peaking capacity. With the value of peak electricity reduction this should be able to be fully justifiable. A suggestion has been made that de-silting the lake should also be considered but no information is available on this option.

Mangapoike—The Mangapoike Valley rises in elevated country to the northwest of Mahia Peninsula, and the River itself flows largely parallel to the Hawke's Bay shoreline, in a westerly direction to join the Wairoa River at its downstream limit. A small part of the headwaters of this river is diverted for the Gisborne Water Supply and it is notable, considering the matter of road access to the river, that the upper reaches of the river are reached by road from the Gisborne direction while road access to the lower reaches of the river from Frasertown near Wairoa. No through road exists. Two options have been proposed, one with a high dam which would result in a 23 MW generating capacity, or a lower output one, approximately 11MW, which would significantly reduce the area of land inundated. The lower output option would deliver approximately 47 GWh p.a. (plant factor 50%).

Gisborne Water Supply

Investigations have been undertaken into installing a 0.5 MW electricity generation turbine in the pipeline taking water from the storage reservoir to Gisborne. Indications are that this project is not only technically feasible but would be a valuable investment for Gisborne District Council.

Extension of Waiharemoana Scheme

Genesis Energy is investigating an extension of the Waikaremoana Scheme. Such expansion would be unlikely to provide additional electricity generation for the region as it would be embedded inot the Waikaremoana scheme output.

6.5.4 Micro Hydro

With the isolation of some parts of the area and the stringy electricity distribution lines, there are areas where micro hydro electric generation is likely to be attractive in the future. Such distributed generation would avoid the need to upgrade old or undersized distribution lines where there are few electricity users.

The key aspects of a micro hydro plant are:

- Height of head of water from source to turbine
- Water flow

- Length of electricity line to energy user
- Synchronisation with other electricity sources
- Maintenance
- Backup electricity source during maintenance, low water flow, or fault.

The economies of scale for micro hydro plant is such that few schemes are economic unless included in part of an isolated integrated electricity scheme with other electricity sources such as solar and wind. The need for synchronisation creates significant additional cost and complexity to integration with grid commanded electricity supply.

6.5.5 Barriers to Hydro

The most significant barriers to any of the schemes possible in the region are potential environmental effects. The schemes referred to are all technically possible but the mitigation measures that may have to be taken for some schemes may increase the costs so that they are uneconomic. The potential environmental effects of the schemes listed are however possibly less significant than is likely with many other alternative projects that may have to be considered within the next decade if the community wishes to increase energy use.

The distance of hydro sites from existing transmission lines is a significant cost impost that results in most schemes not being economic.

Hydro has high upfront costs for investigation and construction. Investors are unlikely to spend the large sums necessary for investigating a hydro project if there is a low probability that the scheme would obtain resource consents. If the community wishes to have hydro as a source of secure electricity supply then the community needs to signal to investors that hydro projects are welcome. Landowners' involvement in projects is essential if projects are to proceed.

6.5.6 Opportunities for Hydro

Hydro energy can be accessed in a more benign way than some other sources of energy, which will be the focus of the future.

Construction of hydro electricity generation schemes can be undertaken in harmony with the environment and meet community expectations. The establishment of Regional Policy Rules that ensure a mitigation of effects will assist potential developers of schemes to feel encouraged to become involved.

Integration of hydro (particularly with storage) into the distribution network will allow greater embedding of wind-generated electricity if it is controllable. Hydro storage can also be treated as a storage battery for wind generated electricity.

Hydro energy will only proceed if the community accepts that modification of land use for such projects is acceptable (provide it is done properly).

6.6 Biogas

Biogas is commonly produced by anaerobic digestion as part of the treatment of wet organic waste. This occurs in municipal wastewater and sewage treatment plants, industrial operations that have liquid wastes containing organic material, and on farms using animal waste.

In many cases, because of small waste volumes and relatively high capital costs, treatment of the waste to produce biogas is not economical in itself but is carried out for other reasons such as waste management, or reduction in greenhouse gas emissions. Also, small-scale generation of biogas is rarely economic because of the high labour requirements and dilute nature of the effluent being treated. However, for larger volumes, as is the case with large dairy farms or industrial processing, the production of biogas can be economic, particularly if waste cleanup that would otherwise be required is avoided.

Biogas from the digestion of crop materials is typically 55% methane and from animal manures typically 65% methane.

The biogas can be used as a fuel in a number of different types of plant such as reciprocating gas engines, mini-gas turbines, Stirling engines, and fuel cells or by direct combustion in boilers or other combined heat and power heat plant.

Anaerobic digestion is a mature technology and is used worldwide, particularly for municipal wastewater treatment. Here the scale of treatment can justify the costs of installing and operating the equipment needed. Biogas from anaerobic digestion is essentially a continuous process so it requires a reliable continuous feed of material.

There are significant environmental benefits from waste digestion. These include reduced impacts of the effluents and solid waste disposal. Sludge from the digesters can be returned to the soil as fertiliser.

Dairy Waste—The estimated cost of electricity generated by a 20kW biogas unit on a large (460+ cow) dairy farm is around 17 c/kWh. Cost savings from avoided effluent disposal would reduce the effective cost of electricity generation. However, there has been very little work undertaken on this technology since the 1960-80 period. It is suggested that a work programme be initiated to investigate the environmental and financial opportunities, resulting from installation of digesters on large dairy farms particularly new operations, as they are converted to dairying.

Municipal Wastewater—Analysis of municipal waste indicates that around 55% of it is composed of organic waste that could be converted to energy in a digester. By installing such a system at the design stage would assist ensure that the plant was able to operate optimally. It is understood that a digester is proposed for the upgrade of the Gisborne sewage processing facility.

Industrial Liquid Waste—There are several industrial agricultural product processing sites such as at AFFCO Wairoa where the liquid waste could be put in a digester to produce energy.

Meat processors such as AFFCO in Wairoa produce approximately 22,000 tonnes per annum of paunchings, dung, and other animal waste that in AFFCO's case can cost close to $40 / tonne to dispose of. This material could be dewatered on site and used in a bioenergy facility. While achievable, the amount of energy used to dry and process the wet material can often out way the value of it as a fuel source. The most suitable and most economic use of this material as an energy source can be to put it into a digester to produce methane gas that can be used as a fuel. Modern digesters are very efficient and cost effective. This is an opportunity worthy of further investigation.

In a typical meat processing plant, the digestion of liquid waste can produce around 0.6 MW of electricity at a cost of around 7c/kWh.

Food Processing Residue—There are understood to be several other food processors in the region who produce organic waste which could be converted to energy however their relatively small size makes it uneconomic unless their respective wastes can be combined into a larger digester.

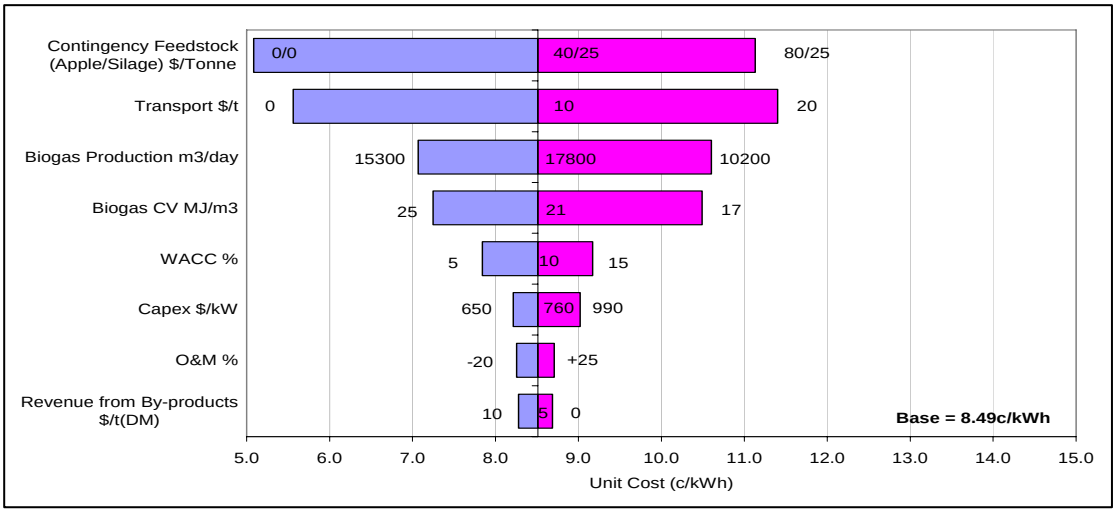

Figure 34 Cost of Biogas Production From Clustered Food Processor Group (80,000 tonnes p.a.).

The chart in Figure 34 above suggests that contingency feedstock and transport costs are a major contributor to the successful outcome of an anaerobic digester project. The cost of gas delivered from an 80,000 tonne p.a. digester is approximately 8-9 cents. This would be a big operation and require more feedstock than could be sourced from existing Gisborne processors.

It is understood that Cedenco previously operated a digester at this Gisborne plant but because of lack of year round continuous supply of feedstock, the digester was removed.

6.7 Geothermal

The two geothermal areas in the region at Te Puia and Morera are currently used to a very limited extent. There is potential for greater use of this heat. Electricity generation, heat extraction, ecotourism, and greenhouse heating are all possible while maintaining the environmental characteristics of the source.

The existing geothermal features indicate a higher temperature source must be at not insignificant depths below each area. Research should be undertaken into using deep drilling and hot rock energy extraction technologies to obtain heat for electricity generation. While not likely to be economic in the short to medium term, it is expected that such technologies will become economic in the next decade.

While the resource will be unlikely to be economic in the short term for electricity generation, it should be economic for extraction of heat for the hospital.

It is recommended that the region support research into extraction of deep heat at Te Puia.

7 Future Technologies

7.1 Ethanol

Ethanol for transport fuels is most commonly produced from sugar crops by fermentation and distillation, or from whey as is currently being undertaken by Fonterra. The most effective agricultural crops that could be used to produce ethanol in New Zealand are maize and sugar beet.

The production of ethanol from tallow is likely to be more viable if AFFCO and the other meat processors combined their quantities.

Generally blends of up to 10 % ethanol in petrol (E10) can be used in modern vehicles without any appreciable changes in performance and the Government has recently introduced legislation that allows an E10 blend of petrol to be sold in New Zealand.

No known research has been undertaken on the production of agricultural crops in the region for the production of ethanol. It is recommended that research into the topic should be encouraged.

7.2 Biodiesel

The production of bio-diesel from renewable energy sources is developing to the stage that production now occurs in a number of locations overseas. This could include pyrolysis of wood residues to produce bio-oil.

Production of bio-diesel from other feedstocks such as tallow could be undertaken but it is assessed that the economies of scale would indicate that it is more likely that locally produced tallow would be taken to a processing plant central to a number of feedstock sources. The production of bio-oil and bio-diesel is an area where it appears that it would be an opportunity for the region in the future. However, it is recommended that at this time the region should only monitor developments as it does not have any comparative advantages that would indicate early adoption.

7.3 Wave

Wave energy is extracted from the harnessing of energy transmitted to waves by winds moving across the ocean surface. Previous international experimental facilities have generally all failed because of poor site selection and the extreme forces of storm seas. However, there has been a significant upsurge in research into harnessing wave energy and it is expected that the first commercial facilities will be installed within the next few years.

There are a number of different wave generation technologies including:

Tapered channel/ reservoir systems: uses traditional tidal or hydro turbine generation plant.

- Oscillating column systems: uses air pressure generated by wave movement to drive turbines.
- Reciprocating mechanised systems: uses flotation devices to drive piston, pumps etc.
- Piezoelectric systems.
- Floating duck, or oscillating floating tube systems driving pistons, pumps etc.

Technology is currently best suited for small to medium scale generation, either on-shore or offshore. Local coastal topography and the availability of natural shoreline formation limit the size of the on-shore plants. Off-shore oscillating tubes systems up to 750kW are appearing to be particularly successful and are at the prototype phase of development.

There are no known natural features such as coves and multiple tapered channel structures on-shore systems in the Tairawhiti Region that would be suitable locations however the region could be suitable for off-shore facilities.

It is not recommended that this technology be pursued at present but it is expected that within about five years it could be worthy of consideration.

7.4 Ocean / Tidal Energy

Ocean current generation is based upon plant similar to wind turbines that are located in tidal estuaries or in areas of ocean current. Generally the viability of such opportunities would depend on the ability to distribute the power to the potential market in a cost effective manner.

There are no known locations within the region that may provide the appropriate tidal flow conditions necessary to investigate tidal energy opportunities.

7.5 Hydrogen

Over the next two decades, hydrogen produced from renewable sources of energy has the potential to offer "zero CO_2 emission" vehicles for road transport. Fuel cells are seen as the most efficient way to turn hydrogen into motive power. However a long transition to hydrogen from hydrocarbons is likely.

International developments and pilots in hydrogen for use as a transport fuel are underway. Direct use of hydrogen in internal combustion engines may occur in the future, but fuel cells are still 50 times more expensive per kW than petrol or diesel engines and hydrogen storage issues are yet to be fully resolved. The International Energy Agency's (IEA) view is that it will be well past 2012 before the hydrogen economy kicks in.

There are several possible sources for hydrogen:

- Electrolysis of water - Using electricity to split water molecules to create pure hydrogen and oxygen.
- From a fossil fuel resource a reformer can split the hydrogen off the carbon relatively easily and the hydrogen can then use as deemed appropriate. This type of process is also ideally suited to cogeneration opportunities.
- The chemical or thermal reformation of biomass feedstocks such as SRC (short rotation coppice) wood chips or methanol manufactured from biomass.
- The biological reformation of biomass using micro-organisms.
- The direct splitting of water using light with special catalysts or extreme heat.

Hydrogen has some disadvantages that require considerable research and development including that at present producing hydrogen requires more energy than can be obtained from it.

The region has a number of resources that could be used in the production of hydrogen so it is a technology whose development should be monitored. It is not recommended that any specific activities be undertaken at this time as the region has no comparative advantage that would indicate that it could influence development of the technology.

Hydrogen could be a viable technology for wind energy.

7.6 Fuel Cells

Fuel cells have developed to the stage where they are being used for specific applications, generally for the replacement for diesel generation of electricity. While the Tairawhiti Region has no particular comparative advantage for fuel cell development, it is a technology that could be applied in specific applications. A watching brief on the technology should be maintained.

7.7 Energy Storage

A major problem of most renewable energy is that it has to be used as it is derived. This results in it being used at times when it may not be most valuable. Research into storage technologies would be valuable and could be undertaken. It could help increase the uptake of renewable energy and increase its value. The additional potential benefits of storage technology include, a reduction in electricity use, improved energy quality and an ability to shift the time of supply.

There are several storage technologies that are worthy of consideration in the region but most are at their very formative stages.

- Ice Banks—for implementation in the dairy, meat and food-processing sector. The off peak electricity is used to create ice which is used for cooling during peak electricity price periods. Industry in the region requiring cooling should monitor research being undertaken elsewhere in NZ.
- Pumped hydro storage—There are likely to be a number of small hydro opportunities throughout the region where pumped storage would be viable.

- Vanadium Redox batteries – These are used on King Island (Australia) to smooth out the variability of the wind by storing excess wind energy and releasing it back into the system in a controlled way.

8 Future Energy Price Trends

8.1 National Energy

Future energy prices will be driven by the availability and cost of North Island gas supply and the introduction of a carbon charge in 2007 to act to reduce CO_2 emissions. The Maui gas supply is dropping and this has the following effects:

- Increased supply from other small gas fields,
- Increased supply from other energy sources,
- Potential for shortage of electricity supply in dry hydro years.

8.1.1 Increased use of coal and subsequent increase in coal price

It is estimated by some electricity retailers that with these national increases in energy cost that the flow on to electricity prices will be that by 2008 the wholesale price will be around 7.5c/kWh that is around a 50% increase above current wholesale prices.

This price of gas by 2008 is expected to have increased by 60% or greater.

The Government's analysis of possible future energy prices are provided from the New Zealand Energy Outlook to 2025. Figure 35 and 36 show the national movement in total energy. Results of the analysis are shown in Figures 37-38 for wholesale energy prices and Figures 39-40 for delivered energy prices.

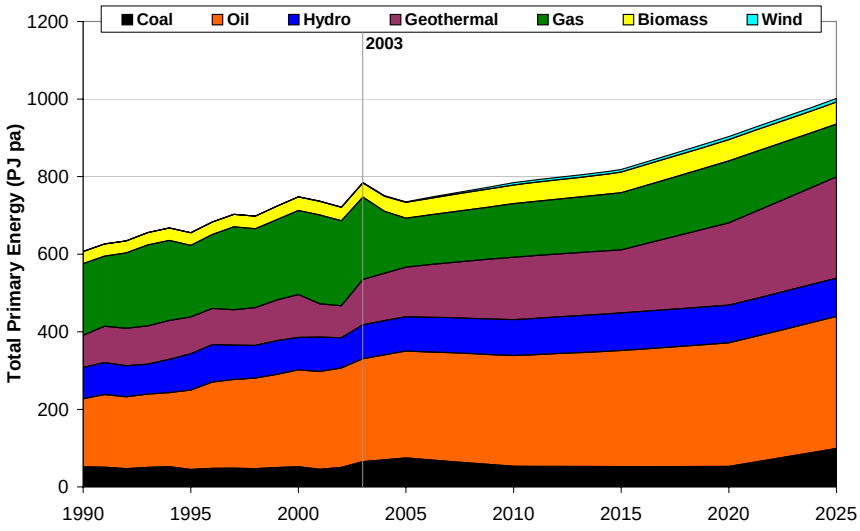

Figure 35 Total Primary Energy Supply 1990-2025 (Reference Scenario)

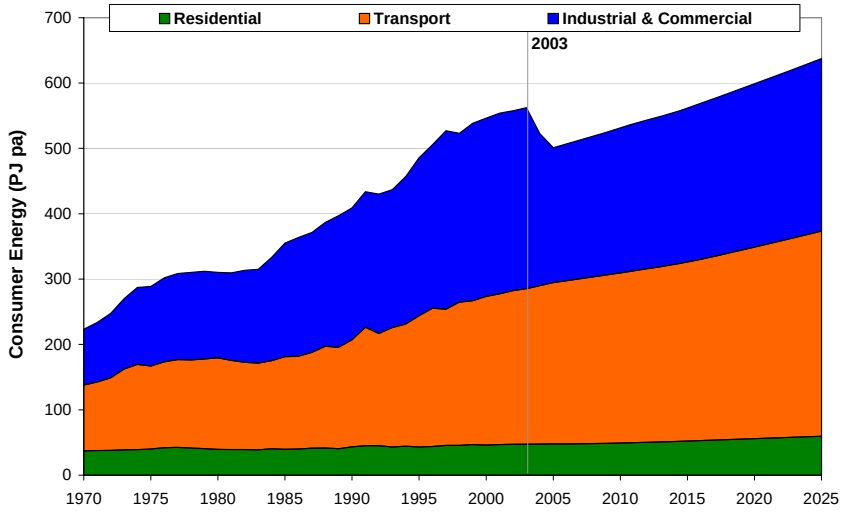

Figure 36 Total Consumer Energy by Sector 1970-2025 (Reference Scenario)

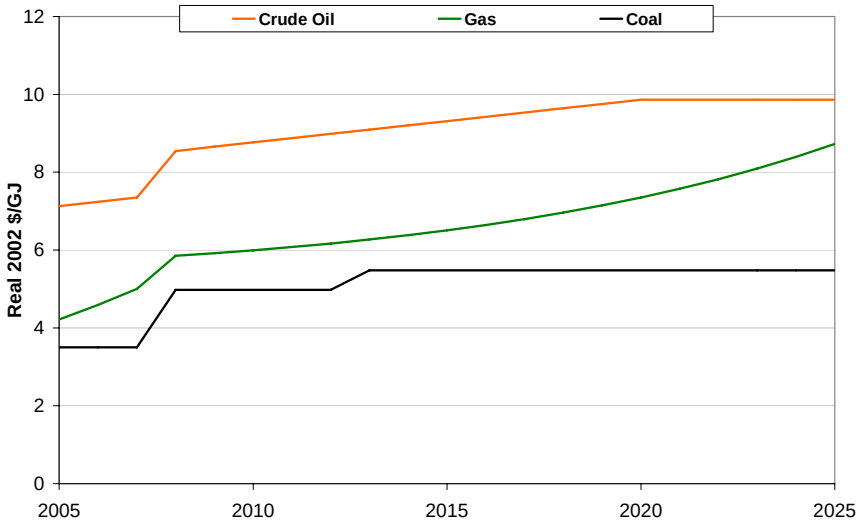

Figure 37 Wholesale Oil, Gas and North Island Coal Prices 2005-2025 (Reference Scenario)

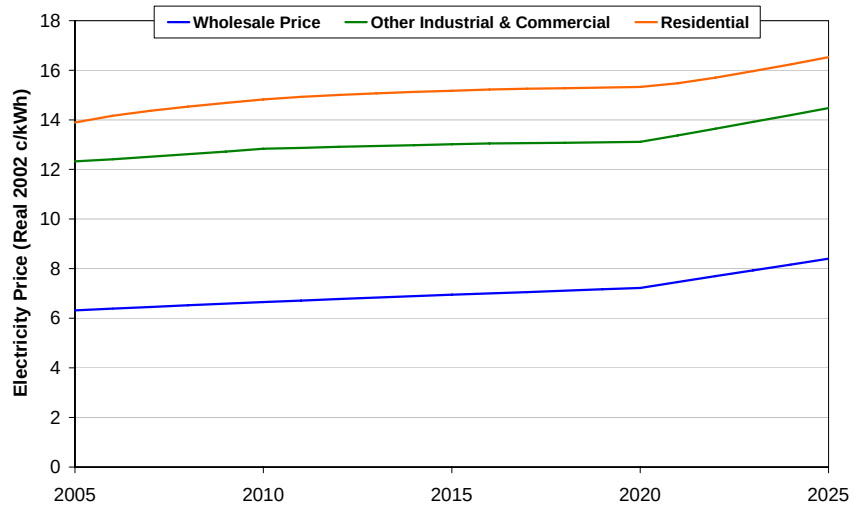

Figure 38: Wholesale and Delivered Electricity Prices 2005-2025 (Reference Scenario)

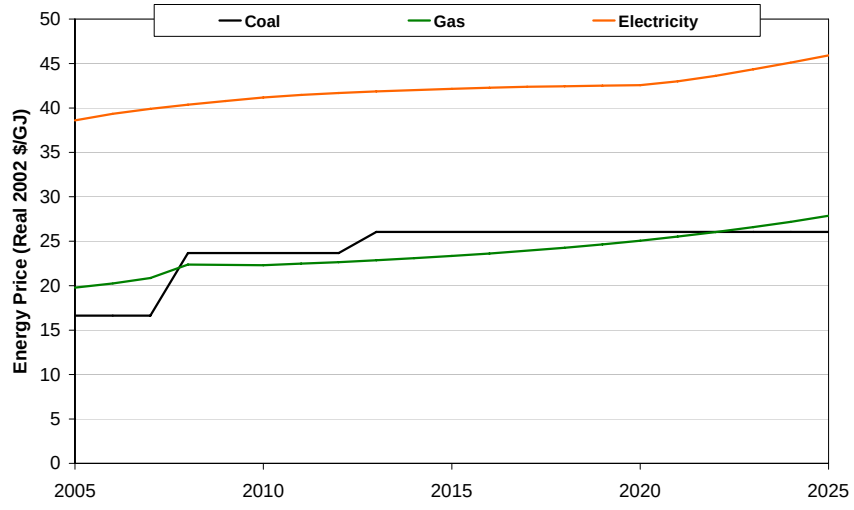

Figure 39: Delivered Residential Energy Prices 2005-2025 (Reference Scenario, excluding GST)

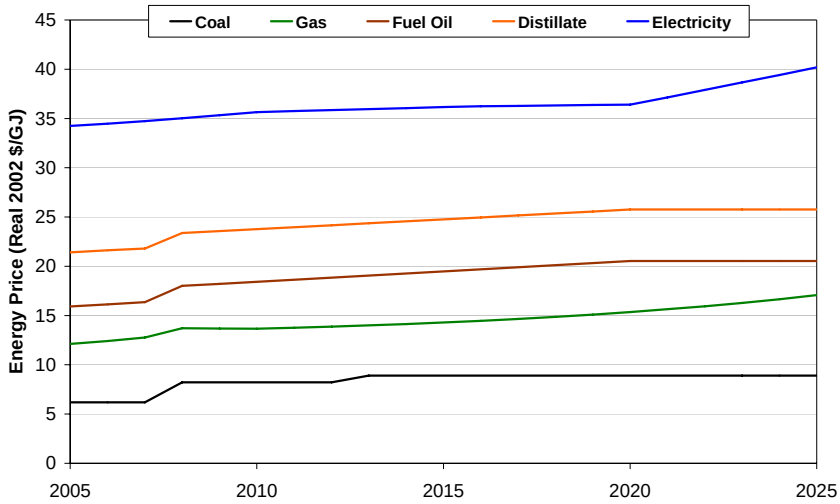

Figure 40: Delivered Other Industrial and Commercial Energy Prices 2005-2025 (Reference Scenario, excluding GST)

8.2 Regional Energy

The region is and will continue to be a price follower with regard to future energy costs. National transport energy costs are set by the international cost of oil and other energy prices are set by the cost and availability of natural gas. The region follows national energy price trends with the added impost imposed by being on a spur from the national energy delivery networks and having a low population density over a large area.

8.3 Projected New Electricity Generation Costs

The introduction of the carbon charge will mean that the relativities between fossil fuels and renewable energy will change. The projected costs for electricity generation post 2007 are shown in Figure 32.

It has been assessed that if the carbon charge is set at the maximum of $25/tonne of CO_2 and gas prices nearly double then the cost of heating using coal could increase by $4.5/GJ (1.6c/kWh).

As indicated in Figure 24, the use of bioenergy becomes very cost effective relative to coal if biomass is readily available in quantities and prices in line with these assumptions.

9 Demand Reduction/End Use Efficiency Opportunities

The balance between supply of and demand for energy can be affected by either increasing the supply or decreasing the demand for energy. There are a number of demand side initiatives that are available to the region. A key aspect about them is that many are within the ability of the region to implement without the need for involvement of external parties.

9.1 Ripple Control

Ripple control is a means for the control of electricity use in electricity supply networks i.e. control of the electricity consumption using an existing electricity network as a signal transmission path. The system enables remote on or off switching of different loads, typically hot water heating.

The Gisborne area has fully operational ripple control that has been used very effectively in managing peak electricity demand. Ownership of the signalling equipment and receivers lies with Eastland Network. Ripple control is one of the region's most valuable energy management tools as the Eastland Network Transpower connection costs are determined by the 12 highest half hour peak demand levels in a rolling 12-month period.

In Wairoa District, where the receivers are owned by the incumbent retailer TrustPower, ripple control equipment cannot make as significant contribution to peak load management. The authors understand that TrustPower has been removing receivers in the area.

9.2 Energy End-Use Efficiency

Investment in energy efficiency opportunities is one of the best investments that a community can make. By ensuring energy use is optimised, the home or business owner is able to use the expenditure saved on other things. Business costs can be reduced, or as most often happens, the money released is used to invest in other home or business equipment.

Investment in energy efficiency does not always lead to a reduction in the total energy used, but may result in reduced costs of production and increased productivity. Improving energy efficiency results in using less energy to achieve the same 'benefits'. If the end user can achieve greater benefits from using the same amount of energy, there is a possibility they will do just that. In industry, they may chose to increase production whilst energy use remains unchanged. In housing, they may chose to increase their comfort whilst energy use remains unchanged. The result is that personal or business objectives are maximised at a lower cost, or conversely less energy is required to achieve greater benefits.

Investment in energy efficiency is a key recommendation of this assessment as it will result in a freeing of currently inefficiently used energy to improve Tairawhiti business activity, thus leading to greater business growth, and the attraction of new business opportunities.

If improved efficiency reduces electricity demand, it would also assist in the deferral of the need for an upgrade of the transmission line into Gisborne.

There is very little information on how energy is used in Tairawhiti. However extrapolation of information obtained from EECA studies of other regions and nationally gives an idea of how energy is used in Tairawhiti and of the opportunities available.

9.3 Energy Efficiency Improvements for Business

Businesses and significant electricity users are generally in the situation that they use energy without having thought of the most efficient ways, or not having reviewed the way in which additional electricity using equipment has been added over the years.

Many companies also don’t have anyone on staff taking an interest in the electricity contracts they have signed. For a number there may be a more appropriate contract for them.

Two initiatives can be taken by the Wairoa and Gisborne business communities. The first is to organise a series of seminars to increase the knowledge base on electricity contracts and energy efficiency improvements available. Improved knowledge of alternative energy contracts available may reduce electricity supply costs.

Secondly, and at the same time, a programme of energy audits should be undertaken. Funds are available from EECA to assist with the undertaking of audits and support may also be likely for a seminar programme. Economies of scale of bringing appropriate personnel to the region is possible if seminars and audits are undertaken as a block programme.

Opportunities for improving energy efficiency in the industrial sector span a range of technologies such as motors, heat exchangers, process heating and cooling optimisation, mechanical vapour recompression, cogeneration, and infra-red heating, amongst others.

EECA reports indicate that by employing readily available technologies and behavioural changes, the following magnitude of savings could be expected in New Zealand industrial sector. Around 20% of the current electricity used could be saved, mostly in electrical motor drive systems.

- About 55% of the coal currently used could be saved. The major source of this potential saving is from improvements in the combustion efficiency of boilers and in the efficiency of medium temperature process heating.
- About 25% of the current wood fuel use could be saved, mostly in medium temperature process heat production.
- Approximately 4% of the oil currently used could be cut, mostly in the areas of low temperature process heating, medium temperature process heating and in mobile motive power.

With monitoring of electricity use, the power factor on industrial sites can be identified and if low adjusted to achieve cost savings. The installation of electricity time-of-use meters can provide the energy use information that managers need in order to identify opportunities for cost savings.

The large energy intensity variations across companies within any given group of the industrial sector indicate sizable benchmark energy saving opportunities. For example, in the forest processing industry, if all of the companies which consume more energy per unit of physical production than their respective sub-sector averages are lifted to their sub-sector average levels, then the forest processing industry as a whole could save up to 14% of its current energy use.

EECA also has a Fleet Transport Audit Programme that should be utilised for commercial transport fleets.

9.4 Energy Efficiency Improvements for Residential Housing

The government has a number of home energy efficiency programmes available. Funding for these is available on a contestable basis and is best accessed by energy trusts or other similar type entities that have the ability to negotiate contracts and manage their implementation. Funding was increased in 2004.

In addition to possibly achieving electricity demand reduction and reducing household electricity costs, the improvement in residential energy use has major benefits for health and welfare. Energy efficiency usually increases the winter household temperature with the result that warm people are healthy people.

There are a number or areas throughout New Zealand (e.g., Opotiki, Thames, Christchurch) where very successful energy trusts have been in operation for some time. These trusts have over time built up a body of experience, provided community leadership on energy use, and developed the skills of successfully obtaining government energy efficiency programme funds.

10 Residential Energy

The energy issues facing the residential communities in the Gisborne and Wairoa Districts include:

- the availability of basic quality of warm housing,
- high electricity and energy costs in the region,
- the reliability and quality of electricity supply to and in the area,
- the utilisation of alternatives to electricity for heating and cooking etc,
- the delivery of electricity to remote areas post 2013 and
- the use of single-phase lines to meet rural electricity users needs.

The Gisborne and Wairoa Districts suffer, as many of the geographically remote regions in New Zealand do, from widely dispersed communities and for many, low employment prospects and for some, subsistence living. The quality of warm housing for many in these areas is poor and combined with high electricity costs, can lead to health problems.

10.1 Residential Energy Programmes

It is often estimated that up to 8% of annual residential energy use could be saved through adoption of basic, widely available, low to medium cost energy efficiency measures. Many of these savings could be achieved quickly and at very little cost. This estimate has been reinforced during 2001 and 2003 when Government promoted savings were of that order. An 8% saving in Tairawhiti's residential electricity use would be about 13 GWh per annum.

A summary of some of the benefits from home energy efficiency improvements is shown in Table 21. For comparison with other supply opportunities it can be considered that over a ten-year period that investment in the residential energy efficiency items shown in Table 11 is equivalent to electricity supply at around 9c/kWh.

Energy Efficiency Measure	kWh saved/yr	Average Installed Cost*	Est. cost savings/yr at 17 c/kWh**	Est. cost savings over lifetime of measure	Simple payback (years)	Net benefit over lifetime of measure	Lifetime CO_2 emissions reductions (tonnes of CO_2)
Hot water cylinder wrap (R value 1.1; 1970's cylinder)	525	$120	$89	$714	1.3	$594	2.62
Hot water pipe lagging	120	$25	$20	$163	1.2	$138	0.60
Compact fluorescent light bulb (6 - 10,000 hour life)***	83	$8	$14	$68	0.6	$60	0.25
Low flow shower head (reduction in flow of 4 l/min.)	440	$50	$75	$598	0.7	$548	2.20

Weather stripping (all windows, doors and gaps)	168	$150	$29	$140	5.3	-$10	0.51
Under floor insulation	287	$900	$49	$512	18.4	-$388	1.88

Table 11 Estimates of Benefits from Residential Energy Efficiency Measures[43] [44]

Residential energy programmes can be thought of in terms of short-term, medium term and long-term activities as follows:

- ***Short term activities***

There are a number of immediate solutions that can be employed to improve the comfort and warmth in the homes of people in the region. Alongside measures required in some areas to upgrade properties to acceptable standards, initiatives include draft proofing windows and doors and retrofitting insulation in the ceiling and floor and pipe and water heater lagging. Other basic initiatives include using heavy curtains (for low income people these can be from curtain banks), Alternative heating to electricity (gas, wood).

Other savings can be made by homeowners seeking a low-user electricity tariff. From 18 October, electricity retailers were required to offer a low fixed-charge tariff to all domestic customers who use less than 2,000kWh of electricity a year. It's important to note that although the retailers must make the plan available its unlikely they will put people on to the plan automatically. Individuals need to ask to be moved on to the plan. In particular, this may be something that the Runanga's in the region could advise the older members of the community about.

- ***Medium Term Activities***

Many of the groups that took part in the research for this project were focussing on technologies and solutions aimed at solving a problem (possible non-grid supply post 2013) that is an issue that needs only to be addressed closer to the time. In the medium term, there are several initiatives that the individual and groups can be exploring to reduce their electricity usage (through efficiency and use of alternatives) while planning for what may or may not happen in 2013. In addition to those short-term measures outlined above, people could consider retrofitting existing houses with an alternative more efficient heating source than they currently use, for example, a wood burner with a wetback to heat the water. Other measures include the installation of solar water heating systems (currently supported through government grant schemes). Current, for homes connected to the national grid PV is not an economic option. If, however, a new house is being built, the cost of PV may be comparable to the costs of network connection depending on the property location.

The tradition of the Maori communities in the area is to live in groups and clusters and these homes would be well placed to share the costs and benefits from such co-operative living. This is an exciting possibility for housing clusters in the area.

- ***Longer term Activities***

In the longer term and in light of the lines companies not being required to maintain rural lines post 2013, PV cells may be an attractive option for new off-grid homes and for homes in remote areas. Cluster housing especially in the more remote locations in the region could combine PV with other renewable resources such as small or micro-hydro and small wind or with diesel gensets or bottled gas.

- ***Programme of Activities***

	Meeting current and future energy and electricity needs		
Short term → Medium term → Long term →			
Period	**Short term**	**Medium Term**	**Long Term**
Solutions	• Advice and understanding on ways to use less energy and be more efficient • Develop a curtain bank • Take advantage of insulation	• Small scale renewables option • Cluster housing and possible economies of scale for	• PV for off-grid new build homes and those in remote areas.

[43] Data source: EECA
[44] Notes:* Installed cost estimates are mid range averages for a single residence job. ** All savings estimates based on 110m^2 house, Gisborne climate zone and domestic energy charges of 17 cents/kWh.*** Lights are assumed to be installed by householder.

	programmes • Draft proofing • Consider alternative heating sources • Low user fixed charges • Solar water heating option and the organisations that can help • Retrofitting alternative heating options (eg wet back wood burning stoves)	technologies such as PV	
Difficulty/Cost	Minimal difficulty and no to low to medium cost	Medium to high cost	High cost
Funding Opportunities from Central Government	Insulation programmes for Community Card holders. Solar water heating grants/loans		

Table 12 Summary of Activities per Period

10.2 Programme Funding Problems

The region has been a recipient of some energy programmes to assist the provision of warm and healthy homes, however success in obtaining further funding is often constrained by local delivery problems. Some previous home energy related projects in the region have suffered from short project lifetimes with the resultant difficulty of trying to maintain continuity between the various rounds of central government funding. This shortfall and lack of continuity in funding in itself means that it is difficult to maintain a team. Projects not only need a longer lifetime, they also need money in advance to be able to secure materials and teams.

The need for training and access to a skilled workforce is also a significant issue in the area. A shortage of trades skills is a national problem as well as in the Tairawhiti Region. The Taskforce could play a significant role in securing supportive funding for community residential projects linked to training initiatives.

In addition to these financial and manpower resources difficulties, it is apparent that there is also a degree of confusion or misunderstanding in the area amongst some of the community groups in terms of what they could or should be doing to use electricity and energy more efficiently. A strong focus for some groups is that they should be securing off-grid electricity supply. This is without doubt the result of the delivery of some limited information through the media on the maintenance of lines post 2013 and information from the occasional passing consultant. The area could benefit from a more coordinated and structured means of communicating basic information on energy efficiency and tips to save electricity and use alternative energy sources.

Throughout the region, there are a number of people each trying to address energy issues. Many of these people have only a part time interest in energy with the result that it is difficult for them to keep up to date and to be able to be most effective. In order to address energy use and efficiency issues in the region there needs, in effect, to be an ability to bring these people together so that they can pool their scarce efforts and to be fully supported without each having to 'reinvent the wheel'. This will assist individuals to emerge and have the ability to make things happen collectively. The area needs a 'champion' that can effectively put forward the case of the region to organisations such as EECA, HNZ and WINZ. Strong coordinated leadership is required to get movement on a larger scale as opposed to the current uncoordinated, hit and miss approach.

Currently government agencies such as EECA have to deal with a number of parties all claiming to represent their local communities. Not only is this inefficient but it doesn't assist EECA to respond positively for funding assistance.

While government grants are available for a number of types of projects, typically opportunities for funding will are limited because of a lack of experience and demonstrated delivery capability. An ad hoc approach of piecemeal projects does not built up the capability to deliver on a sustained basis.

Government funding assistance often requires a 50% contribution for other parties. It is unrealistic to seek this directly from many beneficiaries of the energy improvement initiatives yet from a regional perspective regional benefits may be lost. A coordinated approach to seeking co-funding would assist leverage government funds. This is a role the Eastland , Community Trust and the two councils can assist with as they represent the collective interests of the region's communities.

Implementation of energy efficiency programmes also requires proven delivery capability and failed delivery taints future funding possibilities. To maximise the amount of funding from government requires the region to look to how it is structuring requests and then implementing delivery. Poor delivery performance by one can jeopardise the opportunities for many others.

10.3 Local Strengths for Delivery of Residential Programmes

While there are issues raised as disadvantages with regard to delivery of residential energy improvements, the issues are not insurmountable problems and the region has many advantages to outweigh them.

The communities in the Tairawhiti Region have a number of advantages over and above other regions in New Zealand. Along-side the richness of resources that has been eluded to many times in this report, the extent of the community spirit and the 'can do' attitude is very strong in the region. The commitment, determination and enthusiasm shown by many in the region's communities is something to be harnessed in the pursuit of solutions. Several individuals are already well informed and are pursuing practical and realistic solutions to improve the efficiency of their energy use and several alternatives to electricity are already being employed.

The networking ability of the iwi authorities in the area, in particular Ngati Porou and Te Runanga o Turanganui A Kiwa, could be very effective. Both organisations have websites, radios, and weekly/monthly publications all of which could be very effective means of sharing understanding and opportunities around energy efficiency. Initiatives such as the Poutama Trust (a Charitable Trust set up in 1988 to provide business development services to Maori) could also be an effective means to helping communities develop the skills and trades the area needs to realise the energy efficiency opportunities.

Business acumen and understanding is also strong and this was well demonstrated by the three iwi authorities in the area and in particular by Te Runanga o Turanganui A Kiwa and Ngati Porou. The Ngati Porou Runanga has grown impressively from humble beginnings to an organisation that now has a turnover of several millions annually and successful businesses in fisheries and forestry. On a smaller scale but equally as impressive are the activities of the Hicks Bay community which has been successful in securing EECA funding for a small residential dwelling insulation retrofitting programme in Hick's Bay. The group has no prior experience but has shown considerable commitment and persistence and has been rewarded with part funding for a small scale, retrofitting project. The project will commence subject to securing additional third party funding, and will be implemented by Energy Options, an energy service provider located in Whakatane.

The Maori communities in the area are major landowners and this is a significant advantage in the development of renewable energy resources in particular micro-hydro schemes. Further, the traditional living environment for many Maori families is one of close knit family groups or in hapu and this in itself presents opportunities for these communities in terms of the development of energy co-operatives and the ability to share costs for the development of local hydro resources and solar water heating for example. These types of 'living arrangements' may also present opportunities to develop off-grid electricity provision in the future.

Gisborne District Council is a recent member of the EECA EnergyWise Councils scheme. This membership should enable the council to get first hand access to assistance from EECA on how the council can develop and put in place understanding on energy efficiency within the council but most importantly within the wider community. The council has the ability to maximise their access to EECA through the EnergyWise Councils initiative in order to help the region and the communities specifically get access to information. In order to get maximum benefit from the membership, the council must pursue EECA as much as possible for assistance for the residential community and business community alike.

Another positive worth noting is the commitment that the Eastern and Central Community Trust (that last year donated more than $660,000 to groups throughout Poverty Bay) makes to the Wairoa and Gisborne areas. The Trust has funded a range of projects, from mobile classrooms to the Gisborne City Garden Competition and it is also known that the Trust has shown interest in financially supporting energy efficiency and insulation retrofitting projects in the area[45]. A regional collective working with the Trust would assist both the Trust and the region to maximise opportunities for improvement of energy use in the region.

Finally, another advantage the region has is the strong links with Central Government Ministers (in particular Maori and Social Development) influential in their ability to secure funding for the Taskforce initiative in the first place.

10.4 Research Initiatives

The region has taken part in a number of energy related research projects over the past decade. Some projects have focussed on residential energy efficiency opportunities in the region, and others have

[45] In discussion with Mike Fairfield, Strategic Partnerships Manager, EECA.

focussed on health and housing issues and also how homes in the area are using energy. While it has not always been the case, it is essential for the future welfare of the area that the results from research projects are used for the maximum benefits of the wider regional communities.

The most notable of the projects conducted in the area include:

- ***Home Energy End-use Project (HEEP)*** –The Household Energy End-use Project (HEEP) being undertaken by the Building Research Association of NZ (BRANZ) and financially supported by EECA has studied household energy use in a number or regions. As part of the random selection of houses through NZ, HEEP is monitoring dwellings in Gisborne and Wairoa. Some analysis of the data has been undertaken but full analysis will commence in 2005.

  The HEEP results provide a valuable database of information on household energy use and should be analysed specifically from the Gisborne/Wairoa perspective. At present analysis is on a nation wide basis. Analysis and use of the data can assist evaluation of opportunities to manage electricity supply to reduce peak loadings, for appliance suppliers to understand how consumers use their products, and assist prioritisation of investment options. One of the recommendations of this assessment is that the region should become closer involved in the study.

  In the areas studied to date, average household energy use is around 10,500 kWh/year, including electricity, natural gas and LPG. Average New Zealand residential electricity consumption is 7,800 kWh/year.

  Average expenditure on domestic fuel and electricity energy (excluding transport energy) is 3.4% of household expenditure that results in energy being a low priority item for homeowners. However, this is an average across the country. Analysis of the Tairawhiti region may indicate that there will be some households where this percentage is much higher and therefore for whom energy action is more significant.

  Building insulation is a key investment opportunity and while this is best addressed in the original building construction, it is still a very effective investment opportunity for existing buildings.

- ***Te Puia Springs***—A $1 million Government-funded solar energy project is being carried out at Te Puia by a team from IRL and Massey University. The small-scale solar energy system is one of three research projects instigated by Ngati Porou Hauora and is made more important by the fact that after 2013, power companies no longer have an obligation to supply electricity to rural populations.

  The East Coast is one of the many rural areas in New Zealand where the electricity network is often under capacity constraint and the "Power to the Coast project" aims to address the problem so that ultimately, economic growth in the region is not compromised. The project is ideal for Ngati Porou Hauora as they are one of the biggest users of electricity on the Coast and have opportunities to use an alternative energy source such a geothermal and solar. The two other energy research projects are the mapping and analysis of the geothermal field at Te Puia, and the installation last year of solar heating panels on the roofs of 10 houses at Te Puia, supported by ECCA.

  The goal of the four-year, $250,000-a-year solar energy programme is to address the inhibiting effect that the lack of network capacity has on local energy supply options. "The network is unable to service all loads at periods of high demand or future growth is restricted because the network is nearing capacity. Because of the way energy was used, these constraints might only happen at certain times of the day or year. The programme research that started in July 2003 was user-led through the Ngati Porou Hauora and was initially centred on Te Puia Springs. Ngati Porou businesses and organisations and Eastland Network identified many of the issues that needed to be addressed and were involved in the ongoing programme research. The small-scale grid-injection system installed last month was designed to demonstrate the principal of electricity peak reduction, through the use of energy storage and renewable energy. It used solar panels, a battery bank and an inverter to store energy during the day, then released it in the evening when the electricity grid was most heavily used. A high-profile example of capacity constraint was the installation of a new timber processing plant at Ruatoria that could not proceed, as this would overload the grid in the East Cape region.

It has been established that energy consumption levels are very low on the East Coast and there is little room to reduce the existing levels of demand. Analysis of initial household demand patterns indicates that small general-purpose distributed generation injection plants are a useful supply supplement. The pilot scale system installed at Te Puia will provide electricity on demand from both solar energy and a battery storage system. Other resources such as wind generation and, in the future, fuel cell generation could easily be connected into this platform.

Although this project is centred at Te Puia, one of the major advantages is that its findings would be transferable to any similar rural communities.

- ***Housing and Health Research Programme, Wellington School of Medicine***—The results of the housing, insulation and health study involving a number of houses in the Nuhaka and Mahia areas involved 1400 households and nearly 5000 people (100 houses each from the Nuhaka and Mahia areas). The programme researchers worked in partnership with locally based organisations in the trial areas, which along with Nuhaka and Mahia included Otara, Eastern Bay of Plenty, Taranaki, Porirua, Hokitika and Christchurch. Te Iwi O Rakaipaaka assisted the programme in Nuhaka, while Te Hauora O Te Wheke A Nuku helped out in Mahia. Households for the review were selected in 2001 and baseline interviews were carried out after the winter. Everyone in the nominated houses had their health, well being and power usage recorded, before the researchers randomly assigned half the houses in each community to be insulated.

  Community retrofit teams insulated the 700 homes over the summer, and participants were interviewed again after winter in 2003. After all participants had been interviewed, the houses not insulated the first time were also insulated. Preliminary results from the study show there was a small but significant drop in energy usage when houses were insulated. Houses were drier and slightly warmer overall once the houses were insulated, with residents claiming houses were significantly warmer. There was a significant improvement in the self-reported health and children living in the insulated houses, compared to those that were not. Adults and children in insulated houses reported visiting the GP less, and being admitted to hospital less often for respiratory conditions. The decrease of GP visits was significant for the adults. Adults in insulated houses were less likely to report sick days off work, and children in the houses were less likely to have days off school.

10.5 Funding Opportunities

A key component in ensuring the delivery of efficient and warm healthy homes in the area is securing funding. Funding opportunities can be separated into national and local categories as follows:

10.5.1 Central Government Funding Opportunities

Central government funding opportunities focussing on residential energy efficiency initiatives include the following:

*Energy Efficiency and Conservation Authority (EECA***)**—EECA's residential programmes aim to assist homeowners to improve the energy efficiency of their house and to improve the way they use energy in their behaviours at home, through providing information to middle-to-high income homeowners, and also the provision of information and financial assistance to low-income homeowners. In particular the EnergyWise Home Grants Scheme provides funding to organisations to improve the energy performance of older uninsulated homes by installing whole house retrofits. This work includes installing ceiling and underfloor insulation as well as other energy-saving products. EECA has a Strategic Partnerships initiative and a contestable grant funding scheme. The ratio of EECA funding to third party or other funding varies funding for these projects. Supportive funding typically is sourced from third parties such as Energy and Community Trusts and electricity retail and lines companies for example.

The Warm Home Energy Check (WHEC) is another EECA initiative. A WHEC is a detailed house assessment that gives a star rating to a house based on its energy efficiency. It is a useful tool for people to get advice on how they can improve the comfort of their home and make it a warmer, drier, and healthier house which is easier to heat. This initiative was trialled in Christchurch in 2002 although a national project is anticipated in 2005.

Housing New Zealand—Housing New Zealand have an extensive range of national programmes targeting energy efficiency of state and rural housing programmes, healthy living environments and modernisation projects. Housing NZ works in partnership with EECA to deliver warm home outcomes.

Housing NZ energy efficiency initiative is a 10-12 year project to improve the living environment of all HNZC homes built before 1977. The programme, which began in November 2001, involves checking all properties built before 1977 to see if the following energy efficiency features can be improved, or installed if they are not already in place:

- ceiling insulation,
- hot water cylinder wrap,
- insulating hot water pipes in the cylinder cupboard,
- under floor insulation,
- adjusting the hot water cylinder thermostat.

The programme also involves improving the heating and ventilation of the houses to promote a healthy living environment. This includes fixing draughty windows, and addressing condensation and dampness under houses. In many areas, community-based organisations are contracted to provide energy efficiency retrofits. Other properties also benefited from insulation installation through the Healthy Housing, Rural Housing and Community Renewal programmes. The energy efficiency programme aims to employ community-based work groups and people sourced through Work and Income.

Housing NZ's modernisation programme aims to improve HNZC homes built before 1980. The programme aims to:

- provide a more comfortable, healthy home with a more modern layout,
- be more energy efficient,
- reduce future maintenance costs and
- maintain the value of a public asset.

Housing NZ is one of a number of agencies involved in a "whole of government" response aimed at eliminating substandard housing in Northland, East Coast and eastern Bay of Plenty. The *Rural Housing Programme in Northland, East Coast and Eastern Bay of Plenty* programme is a five year project, which started in 2001. It involves communities in the target areas, HNZC, iwi social service housing providers, the New Zealand Fire Service, Te Puni Kokiri, Community Employment Group, Skill New Zealand, Local Government, health agencies and the Ministry of Social Development.

District Health Board—Located in Gisborne, Tairawhiti District Health (TDH) is a crown entity, established on 1 January 2001. TDH is responsible for funding, providing and ensuring the provision of health services for those in need of personal health and disability services.

Nationally, several DHB's are involved in part-funding energy efficiency projects and TDH could similarly be involved.

Electricity Commission—The Electricity Commission was established in May 2003 to address concerns from the Government that the existing industry arrangements did not provide for the effective management of the electricity sector. Of particular interest, in the context of electricity use, is that the Government Policy Statement on Electricity Governance notes

> *"The Electricity Commission has as a key goal the efficient provision and use of electricity. Electricity efficiency and demand side management help reduce demand for electricity, thereby reducing pressure on prices, scarce resources and the environment."*

In November 2004, the Commission called for Expressions of Interest on electricity efficiency. The Electricity Commission requests expressions of interest from parties who wish to be involved in the development of the Commission's electricity efficiency programme by designing and implementing pilot schemes for investment incentive initiatives and regional partnerships.

The Commission's focus in this work is on promoting regional partnerships and to engage with parties able to design and implement pilot schemes for initiatives focussing on compact fluorescent lamps, hot water efficiency measures, the replacement of old, inefficient fridges and the improvement of the efficiency of commercial lighting and industrial motors.

10.5.2 Energy and Community Trusts

New Zealand has a wealth of national and locally focussed Energy and Community Trusts all of which support a range of community needs some of which may be energy related. Trusts in the region are as follows:

J N Williams Memorial Trust (Williams Trust)—no further information available.

Eastland Community Trust—Eastland Community Trust owns 100% of Eastland Network Limited. The Trust reports a net value of $26.6 million, of which $20 million represents its investment in the company.

The balance of the Trust's assets are bank account and term deposits of a little over $6.7 million, representing a distribution made possible by the sale of the company's retail interests.

The Trust is constituted as a trust for regional economic development and the trustees see this as their primary objective of their grant activity. The Trust provides financial support to a broad range of local community projects in the Gisborne region (ECT does not extend to Wairoa District) but has no particular focus on energy projects. The Trust has recently refocused its activities on business investment opportunities rather than one-off grant funding for community projects.

The beneficiaries of the Trust are those people resident in the Gisborne District including businesses/organisations who consumes electricity or are ratepayers. Amongst the specified purposes of the Trust, it is specified that the Trust will focus on "supporting business, community and other initiatives which in the opinion of the Trustees are likely to encourage or sustain economic growth within the district that is or may be directly or indirectly for the benefit of the beneficiaries."

Eastern and Central Community Trust—The Eastern and Central Community Trust is an independent, charitable trust which regularly donates money to community groups within its area; donations amount to around $5 million per annum. These donations could include residential energy projects.

10.6 A Residential Energy Strategy

The highest priority energy investment opportunity for the residential communities in the region is that associated with having warm and healthy homes. The capital cost barrier for such an initiative is very significant for many of those who would gain most from this kind of investment. The Government has recognized this and has established a number of national housing improvement programmes that aim to both improve the basic quality of housing, offer measures to improve the domestic energy efficiency (insulation retrofit programmes) and also to improve the availability of alternatives to electricity heated water (solar water heating grants/loans) and in general improve community well being.

Despite these central government initiatives, the delivery of these programmes in the Tairawhiti Region appears to be somewhat limited due to:

- the need to find local co-funding (complimentary financial support to match central government dollars)[46],
- the lack of locally based service delivery providers,
- the need for assistance to establish local programme delivery capabilities (i.e. training and skills development) and
- the need for the region itself to be able to identify the sources of national funding they could be accessing and to successfully pursue and capture them (for example, EECA grants for retrofitting).

In addition to the difficulties in sourcing matching funding for government programmes, often, the nature of the funding that these programmes provide is short term. The lack of continuity in terms of funding duration for existing programmes means that there is an inability to keep trained installers/tradesmen available and involved. Programmes with a delivery horizon of up to three years could go some way to addressing the issue of continuity. In addition, an establish delivery agency in the area would be better placed to take on small and large-scale projects for government and non-government projects and also to serve the needs of the wider community (residential and business) on energy use, efficiency and general awareness. It is important that programmes in the area are supported by education and awareness raising on energy efficiency opportunities. The communities need to be better informed about measures that can be taken that are low or no cost in the short term while being able to plan for other solutions in the medium and long term. Section 1b of this report presents a number of options for the format or shape that an energy delivery agency in the Tairawhiti Region could take.

The residential energy initiatives that will contribute to warm and healthy homes are spread throughout the region. They are also such that in aggregate they may contribute to reducing electricity demand through a switch to other energy forms. Because of the wide spread impact on the region, it is recommended that the Taskforce develop a residential Energy Strategy within the overall regional Energy Strategy. A key aspect of the Strategy should be the provision of leadership and coordination so that scarce effort and resources are used effectively. The Strategy should also establish a mechanism for

[46] While other regions in the country benefit from the support of a committed Energy Trust, the Eastland Energy Community Trust in the Tairawhiti Region focuses on serving wide community needs (but not specifically energy) and believes that this is best achieved through investments and the return of dividends but not through the supply of supportive grant support to retrofit programmes for specific energy projects.

engaging with leading central government agencies - so identifying opportunities, and with local entities (groups organisations etc) - so better quantifying their delivery mechanisms.

The broad objective in this case, specific to addressing residential needs, must be to communicate the current and future energy needs and energy use patterns of the communities in the region and the opportunities from within the region to meet these needs.

Specific objectives could include:

1. Consider the development of coordinated energy services providers (covering insulation, solar water heating and general energy efficiency advice).
2. Consider funding basic levels of energy efficiency advice and information/awareness raising packages.

Strategies should be inclusive of all key community groups as in many cases the commitment of these groups to the communities in which they live prove to be key success factors in achieving the desired change. It is important that information is shared among these groups and opportunities to learn from one another's experiences and knowledge is maximised.

11 Business and Commercial Energy Supply

The highest priority energy investment opportunity for the business and commercial communities in the region is that associated with having a secure electricity supply, high energy/electricity efficiency use strategies and understanding around energy supply contracts.

The types of businesses in the region have been identified in Section 3 Typically they include Juken Nissho, Larsen, Sawmilling, Earnslaw One, Leader Brand, and Cedenco Foods in Gisborne and Clapham Sawmills, East Coast Lumber, and AFFCO Wairoa in Wairoa. Typically they are the largest users of energy in the region. Several smaller 'boutique' businesses have also grown in the region, for example, Manuka Honey Products.

In order to secure future growth in the area and maximise the economic benefits from the businesses in the area, it is important that the primary products produced in the area are also processed in the area. For example, this applies to the processing of logs in local sawmills (rather than have them leave the area as unprocessed logs), and the processing, freezing and packaging of fruit and vegetables grown in the area (rather than have them leave as raw product).

In order to process the primary products in the Wairoa and Gisborne areas, there is a need for secure supply of electricity and maximising energy efficiency opportunities and alternatives to electricity for heat etc.

11.1 Reduction in Energy Costs

Regional businesses are able to reduce energy costs through a number of the following opportunities:

*Energy/electricity audits—A*n energy/electricity audit evaluates the efficiency of all building and process systems that use energy/electricity. It is the basis of an effective energy management system.

Industry Benchmarking—Where there are similar businesses throughout the region, e.g., wood processors, the establishing of benchmarking of energy utilisation can assist movement of those businesses towards best practice.

Industrial/Commercial Energy Auditing—Energy auditing can produce significant savings in energy cost. The cost of auditing can be reduced if a number of businesses are audited as a group. This can reduce the cost of obtaining the most appropriate auditors through the reduction of transport and accommodation costs.

Cluster Activities—There are economies of scale from industries clustering together to negotiate energy contracts and to share expertise. Co-location around a shared energy cogeneration facility can allow optimisation of each party's energy demand to reduce costs.

Energy Contracts—With the introduction of spot electricity prices and more complex energy supply contracts, many businesses may no longer be obtaining energy on the most favourable terms to their requirements. Seminars and assistance on the range of contracts available can assist reduce energy costs. This is an area that is often not addressed by business, as they are often not aware of alternatives. Energy audits are usually the first identification that costs are unnecessarily high

11.2 Barriers to Implementation

The capital cost and level of knowledge of energy matters are barriers to many initiatives that cannot be underestimated. Despite the central government initiatives targeting the business/commercial sector to improve energy efficiency (EECA grants for audits etc), the delivery of these programmes in the Tairawhiti Region appears to be somewhat limited. It is presumed due to:

- the difficulty for businesses/groups to financially match EECA audit grant funding,
- the lack of awareness of energy/electricity use as an issue and
- the need for the region itself to be able to identify the sources of national funding they could be accessing and to successfully pursue and capture them (for example, EECA grants for audits and information materials).

The business community needs to be better informed about the different types of measures that can be employed to reduce energy use. In addition, it needs to be more proactive about securing grant funding from national organisations (in particular EECA) to be able to identify energy savings. Section 15 of this report proposes a number of formats or shapes that an local energy delivery agency in the Tairawhiti Region could take. While the main focus of a local provider is in meeting residential needs, the basic energy needs of the business community could also be met with such an agency. Alternatively, there is a wealth of Energy Auditors in New Zealand and the Energy Management Association[47] can provide details on these Auditors.

11.3 Funding Opportunities

Central government funding opportunities specific to energy efficiency come largely from EECA. The funding typically comes in the form of grants or loans and key projects are as follows:

- ***Energy Audit Scheme***—The fund aims to encourage organisations to undertake energy audits of their facilities and implement the subsequent audit recommendations. A grant part funds the cost of the energy audit. To qualify for the grant, recipients must complete an audit and achieve energy cost savings by implementing some of the audit recommendations. The resulting energy cost savings must equate to at least 70% of those savings obtainable from implementing all cost effective energy saving opportunities. Grants are generally limited to $10,000 per organisation per year.
- ***Large Electricity User Audit Grant Scheme***—This scheme assists large electricity users to undertake electricity audits of their major sites to identify cost effective energy efficiency projects. Grants available under the scheme are divided into:
    - *Sites consuming over 50GWh/annum*—Fully fund the cost of an electricity scoping study to identify the potential savings at a site and determine what further auditing, if any is required, and fund up to 75% of a detailed electricity audit where a scoping study indicates that this is appropriate.
    - *Sites consuming 10 to 50GWh/annum*—Fund up to 75% of a detailed electricity audit.
- ***Crown Loans Scheme***—All Government departments, Local Authorities, Crown-owned entities and public and integrated schools can borrow money under this scheme to carry out energy efficiency related improvements. The loan scheme is intended for the full or partial funding of projects to achieve energy cost savings. At least 50% of the savings must be in direct energy costs, with the remainder in related areas such as maintenance. The payback for the project may not be more than five years, i.e. the annual cost saving must be at least 20% of the loan.

In the last five years, there has been only one recipient of funding from these programmes in the Tairawhiti area[48]. As noted, EECA's audit programmes focus on large electricity/energy users which means that the many small to medium size businesses in the area (and nationally) miss out on these opportunities. It is understood however that this is an issue that the Climate Change Office (CCO) has identified this issue. It is anticipated that the CCO will fund an initiative targeting small and medium sized users of electricity. It is understood that this project will be delivered by EECA.

The potential for the development of alternative energy sources is assisted nationally by renewable energy associations such as the Solar Industries Association, the NZ Photovoltaic Association and the

[47] Energy Management Association NZ (www.ema.org.nz)
[48] Energy Audit Grant, Year 01/02 Tairawhiti – Gisborne Hospital (details supplied by EECA, November 2004)

Bioenergy Association all funded to some degree by EECA. Section b of this report provides additional details on renewable opportunities in the area, in particular on small hydro potential and on the significant biomass potential in the area, of particular interest potentially to the local saw mills.

In addition to EECA, businesses are potentially able to benefit from the recent electricity efficiency initiatives lead by the Electricity Commission.

Other potential opportunities could exist for energy users in the Region through contractual agreements with their electricity suppliers or local lines company for the deployment of electricity demand management initiatives. Demand management in the area could help manage the peak electricity demand in the area. Businesses can benefit directly by direct financial incentives and reduced rates for moving or shifting their electricity use to non-peak periods, and suppliers and lines companies benefit through more efficient use of generation and distribution assets. Companies themselves must pursue such opportunities. A better understanding of how they are using energy and electricity and how this could be improved, or alternative sources employed, is essential. Support from organisations such as EECA and the newly established Electricity Commission given the remit both organisations have in the areas of demand side initiatives.

11.4 Business Energy Strategy

As in the case of residential energy issues, the opportunities for the business/commercial community in the Region will only be realised with assistance from the Taskforce coordinating a business Energy Strategy. Engaging with leading central government agencies such as EECA on these matters and with the local energy suppliers and distribution companies is also essential. The future economic growth of the region will depend on ensuring that companies in the region are aware of how to use energy resources efficiently and the type and nature of central government funds available to help them do this.

Specific objectives could include:

1. Carry out a basic survey and develop a database of companies in the region. Organise them according to their annual energy use. Develop a better understanding of who is using what and where in the region. This could be a joint WDC and GDC initiative.

2. Set targets for annual energy audits, for example, the completion of x energy audits for x small, x medium and x large scale energy / electricity users. Consider the development of a Energy Services Provider (covering insulation, solar water heating and general energy efficiency advice). Secure support from EECA for the initiative and request EECA *'Emprove Sessions'* for local businesses[49].

3. Consider funding basic levels of energy efficiency advice and information/awareness raising packages for industry groups in the area (groups could be created by size or nature of activity).

4. Assist local companies, where possible, to secure central government funding for energy and electricity audits.

As in the case of residential energy, it is important that information is shared among all groups and that opportunities to learn from one another's experiences and knowledge is maximised. In particular, as a member of EECA's EnergyWise Council's initiative, GDC could take a lead role in ensuring the needs of the region (for both residential and business communities) in terms of energy efficiency advice are catered for.

12 Enabling Regional Resources / Technologies

12.1 Regional Energy Champion

To maximise the opportunities for Tairawhiti region in the availability and cost of energy, there is a need for a recognised regional Energy Champion. Without a champion many opportunities will be lost and others not recognised.

Initially, the Tairawhiti Development Taskforce could pick up this role and this project is the first of its initiatives. It is important that this continue as energy supply is currently undertaken by large national companies who generally won't have a local interest in the region. A regional Energy Champion can monitor their performance with regard to the region and be an advocate on behalf of regional interests

[49] For example from EECA's Emprove Programme (www.emprove.org.nz)

when necessary. The Taskforce can pass over the champion roles once a new entity has been identified to take up the challenge.

The energy market is now very complex and it is only active players who can keep up with regulatory and market changes. It is also difficult to keep in touch with the principal energy market players. A regional Energy Champion can keep well informed about market behaviour and assist local business take appropriate actions.

A regional Energy Champion can also facilitate the securing of Government funding and assistance from renewable energy and energy efficiency programmes. Accessing such assistance is often a matter of experience in knowing how to present appropriate projects. It can also be inefficient for a number of parties to be competing locally for the often scarce funds. Regional collective programmes are likely to be most effective in securing funds for the region.

12.2 Promotion and dissemination of information

A regional Energy Champion would have a central role in assisting investment in sound energy use within the region. By promoting programmes aimed at promoting public awareness of energy use practices, alternative technology, as well as providing programmes in association with the Tairawhiti Polytechnic, to facilitate skill development including trade related programmes. The shortage of trained people, particularly in the trades is a major barrier to the greater introduction of renewable energy and adoption of good energy use practices.

12.3 Local Business

Encouraging local business to take a greater interest in their energy use will unleash part of the opportunity the region has for improving utilisation of energy and thus reducing current or increased demand. As energy costs are significantly higher at peak demand times, obtaining a regional focus on peak demand can bring about a flattening of peak demand and a reduction in energy related costs.

Encouraging business to think about energy use /cost can encourage local entrepreneurs.

12.4 Community Attitudes

Encouraging the region's energy users to think about energy and recognising that it is an asset that can produce wealth for the region should be a key aspect of a regional Energy Strategy. Many of the energy resources have potential adverse connotations and it is easy to allow these to become barriers to untapping the energy wealth. The recent construction of hydro power stations throughout New Zealand has demonstrated how energy projects can be implemented in environmentally sensitive ways that enhance societal well being. There also needs to be recognition that wise use of fossil based energy such as diesel generators can allow greater value to be accessed from renewable energy sources. The key to the major success factor associated with community acceptance of energy initiatives is effective local community input and community consultation.

12.5 Electricity Metering

Development of a community having an efficient use of energy requires good information on where and how energy is used. This applies to all users although the larger energy users clearly need the most detailed information. This information can only be obtained from appropriate time-of-use meters.

The electricity market operates at a national level on half hourly production and use data. This level of data is also used by most major energy users, as supply contracts will usually have the price based on half hourly use. This applies for both fixed price and spot market contracts.

Time-of-use electricity meter technologies have advanced to the level of accuracy that half hourly data is easily measured, and through the use of Internet based communication systems, the data can be received in "real time". However, less sophisticated "next day available" monitoring is available with Internet access and this is more appropriate for most large energy users.

Of the large electricity users who have time-of-use meters, it is unknown how many of those are receiving and using the wealth of information that is available from the meters.

It is recommended that for any user who wishes to understand their energy use and take steps to improve efficiency of use, that time-of-use meters be installed. Not only will they have the data from which to analyse how they are using energy, but they will also be able to make decisions that will reduce their energy costs. They then have the option of obtaining (from some meters) Internet based data in "real time" or "next day".

While it can be expected that most industrial and commercial business will have time-of-use meters before the end of the decade, it is unlikely that residential users will do the same, unless there is a strong directive from Government or push from the region. This is because of the cost of meters and the significantly less opportunity that residential energy users have for altering the time they use electricity.

12.6 Energy Auditing and Benchmarking

Coupled with the metering of energy use is the undertaking of audits to ensure that it is being used efficiently. This in itself can be undertaken efficiently by having adequate local trained energy specialists and sharing the cost of audits. Many businesses have similar functions and if a specialist auditor has to come from elsewhere in New Zealand then it is efficient that they audit a number of businesses on a single visit. This can also provide good benchmarking information and identification of best practice.

12.7 Heat Technology

As the amount of heat plant increases, there is a corresponding need for trained heat equipment specialists. This is an area that is often overlooked but where skilled personnel can make significant cost savings.

12.8 Transport Energy

The region is dependent on transport for the cartage of goods into and out of the region and transport costs affect the economic competitiveness of Tairawhiti business and community wellbeing. Efficient road, rail and sea transport networks are needed to transport the future wood harvest and make the most of regional development opportunities associated with increased regional added value processing.

In 2001, the Tairawhiti Integrated Transport Study indicated that to make the most of the forest harvest, and create wood processing jobs will require a significant investment in the region's roads.

Key points from the study were:

- Port Gisborne is the preferred export port for forestry produce but is also the major constraint to accommodating increasing woodflows. Significant expansion of log handling facilities and log storage areas will be necessary to accommodate increased volumes.
- State Highway 35 north of Gisborne (the Coastal Route) is the more cost-efficient log haulage route for forests located north of Gisborne, compared with the development of a dedicated Inland Route.
- Gisborne City is the preferred centre for investment in wood processing in the region.
- It will be necessary to upgrade key local roads in order to expedite log transport within the region, including roads providing access to Port Gisborne within Gisborne City.
- Rail is not currently a preferred transport option amongst forestry companies, but Tranz Rail (now the Government) should be encouraged to retain the existing rail infrastructure and operations, to increase its customer base and to undertake 'other steps necessary to provide an economical service to the Region'.

Subsequently, Transfund NZ evaluated options and in 2004 the Government announced through the National Land Transport programme funding of $7.04 million for forestry related development projects in the Tairawhiti region. Tairawhit was one of only two regions eligible for regional development funding in 2004/05. In these regions, projects were identified in an agreed regional transport plan notified to Transfund by the Minister of Transport. Project prioritisation and programming was guided by the priorities outlined in each regional transport plan and by the relevant regional industry prioritisation group.

The continued development and maintenance of the Regional Transport Plan should be integrated with the development of a regional energy strategy. In particular, will be the continued emphasis put on the use of rail for transport of bulk good such as wood. The future of the Gisborne-Napier rail line has been in doubt for a number of years after Tranz Rail announced the line was uneconomic. The Government takeover of the rail network may offer some security over the line's future as wider regional transport energy benefits can now be included in decision making..

With an expected international increased cost of transport energy over the next decade, there will be a strong incentive for a regional energy strategy to consider transport energy options. While historically this has focused on infrastructure the opportunity now arises to consider biomass sourced transport fuels such as ethanol and biodiesel.

12.9 Government Climate Change Policies

The government has initiated a number of policies in response to signing the Kyoto Protocol. These are national policies and related specifically to reducing carbon dioxide production (CO_2). To assist the reduction of CO_2 policies that encourage investment in renewable energy have particular significance for the region. The Government through the Climate Change Office of the Ministry of Energy have a programme of Projects to Reduce Emissions The programme supports initiatives that will reduce greenhouse gas emissions over the first commitment period of the Kyoto Protocol, 2008 - 2012, beyond the reductions that would have occurred without the project, by awarding them emissions units, or "carbon credits". Emission units are internationally tradable and add to the financial value of a project that will reduce greenhouse gas emissions. They are available for projects that are additional to business-as-usual, which means they help bring forward projects that would not otherwise be economic. Tender rounds are expected to be held annually.

Projects must also take place in New Zealand and result in a reduction in the total greenhouse gas emissions that will be reported by New Zealand in the greenhouse gas inventory. However, the country of origin of the applicant is not a factor in the assessment. International firms are able to participate in the tender, either directly or indirectly by way of a relationship with a New Zealand-based company.

Projects that bid into the tender can be Joint Implementation (JI) projects under the terms of the Kyoto Protocol. Projects can elect to receive either Assigned Amount Units (AAUs) or Emission Reduction Units (ERUs), which are assigned to JI projects.

The Government anticipates that investors would be private or publicly listed companies, state owned enterprises, local authorities, and individuals. Subsequently, they may sell the emission units that they receive either to governments or to private buyers. This will depend on international rules and the market at the time.

The credits from this programme would apply to most of the energy investment opportunities that can be expected to be developed within the region.

The government has also indicated that a carbon charge is likely to be introduced in 2007 which would be applied to all fossil fuelled energy sources. While this will bring about significant price increases for most regional energy, it will also encourage investment in renewable energy sources which does not incur the charge.

12.10 Government Agencies

There are a number of Government agencies that have funding programmes for achievement of specific national objectives. The Energy Efficiency and Conservation Authority (EECA) is the most prominent with regard to energy. More recently the Electricity Commission also appear to have funds available for pilot projects with a focus in electricity efficiency. Accessing funds from these programmes is best achieved through having experience of previous programmes and being able to align the regional and national objectives.

13 Potential Investors in Energy Opportunities

There are a number of potential investors for energy opportunities in the region and many of these are already active. However, as energy based projects are usually long term investments they only attract investors 'in for the long haul'. There are also some "natural" investors who would not be interested under the current regulatory environment for investment in energy opportunities.

A critical requirement for investors is their ability to capture benefits from their investment. This is extremely difficult for many energy efficiency type opportunities where the benefits to the region may be high but the ability of an investor to capture any of these benefits is low.

Meridian Solutions—Meridian Energy offers to sell electricity in the region but does not have a strong presence. It does however have a subsidiary, Meridian Solutions who invest in and own energy (heat and electricity) supply facilities located on hospital or industrial sites. Meridian Solutions has indicated an interest in further investment in energy facilities associated with wood processing or other large energy uses in the region.

Genesis Power—Genesis Power owns the hydro facilities making up the Waikaremoana hydro scheme. They are currently investigating extending the scheme and are actively monitoring a wind site in the East Cape area. Genesis Power has also expressed an interest in investment in bioenergy facilities and wind in the region.

TrustPower—TrustPower is the dominant electricity retailer in the Wairoa area and own a number of wind farms and small hydro plant throughout the country and could be likely investors in further generation facilities. In discussion, they have indicated that the size of the hydro schemes in the area would be too small to interest them.

Contact Energy—Contact Energy is the dominant electricity retailer in the Gisborne / East Cape areas and own a number of wind farms and small hydro plant throughout the country and thus could be investors in further generation facilities in the region. Contact has indicated that it intends to extend its retail operations into the Wairoa area.

Contact Energy currently has contracts to purchase generation from the Eastland Network diesel generators throughout the region where they have customers. The generation from the diesel generators can assist Contact hedge the cost of electricity it purchases at the Gisborne grid exit point.

Contact Energy is currently operating a small home insulation retrofitting programme in the central Gisborne area using Energy Options and EnergySmart as service delivery companies.

Eastland Network—Eastland Network is already the most significant investor in energy opportunities within the region. While Eastland Network is well placed to assist reduce the costs of electricity within the region the regulatory environment within which it operates often restricts the incentive for it to invest.

While Eastland Network is owned by the Eastland , Community Trust (whose beneficiaries are within the Gisborne/Wast Cape area) but not within the Wairoa area), this does not have a bearing on investment decisions as the company investment criteria is the same for both areas.

The clarification of regional benefits vs company benefits is an issue that may need to be addressed when evaluating and establishing future energy investments. For a number of projects, it may be necessary for the region represented by the respective District Councils to assist with funding to ensure regional benefits are achieved. This will require a close working between the respective District Councils and Eastland Network. It confuses decision-making if Eastland Network is expected to internalise into its decision-making region benefits of specific energy projects.

Eastland Network has established a substantial knowledge of most energy forms within the region and is actively pursuing a number of initiatives. The extent of the level of knowledge and experience within Eastland Network appears to be underestimated by some regional parties, yet in a number of aspects Eastland Network are industry leaders. It is recommended that Eastland Network should be involved more in regional energy initiatives, particularly by both District Councils. This may require more contact and communication between the parties.

District Councils—The two District Councils undertake a number of infrastructure decisions that may involve investment in facilities that have an energy component. Councils are in a position where they should evaluate the infrastructure alternatives particularly taking into account future energy costs. Gisborne District Council has already done this with the proposed city sewage works with the inclusion of an anaerobic digester.

Councils can also be role models with the demonstration of energy efficiency or energy supply (eg solar water heating) by including appropriate energy equipment on council facilities.

In order that Councils are able to effectively consider the energy aspects of their areas, they need to have an Energy Strategy plan in the same way in which they have transport or social services strategy plans. With such plans, they can then take into account any energy implications arising from council decisions. The Energy Strategy could be for each council alone or could be a full Tairawhiti regional strategy. Regardless, it will be essential that the Strategy is regularly updated as for any other District Plan.

A number of energy service implications arise through subdivision or land use changes. Councils should consider the energy impacts of such activities and if necessary use their ability to impose financial contributions from land owners. These levies can be used to assist with electricity network upgrading if it were needed as a result of the land use change.

Where an area is suffering poor electricity supply, Eastland Network cannot justify improving the supply service, and there are no specific energy users who are causing the poor service then Councils may see a regional benefit in contributing to upgrading the service on behalf of the community.

Eastland Community Trust—The Trust receives its funding from the commercial operations of Eastland Infrastructure, the port company and Eastland Network. The Trust is able to invest these funds as it sees fit so is ideally placed to be an investor in energy projects. Because the Trust has the Gisborne and East Coast communities as its beneficiaries, it could invest in energy projects that would benefit the region but would not be undertaken by other parties because of the difficulties of capturing the financial benefits, or

where the financial return was below the investment criteria for those parties. Essentially, by being an investor on behalf of the community, it would be able to capture benefits that other parties could not secure.

Maori Runanga and Incorporations—There are a number of regional energy resources which are collectively owned by Maori. The management of these may be undertaken by Runanga or various incorporations, some of which, such as the Ngati Porou Hauora have well-established administrative teams. These community-based entities are well placed to implement community energy programmes and facilitate investment in the development of energy resources.

Oil/Gas Exploration Companies—There are a number of New Zealand and international oil exploration companies who have been involved in oil/gas exploration in the region. Several have indicated a strong interest in continuing their involvement in the region but the economics is not currently suitable for them. With the pending increases in gas price in the North Island, there will be a stage whereby their interest will increase. Effort should be put on encouraging them to return or for new companies to arrive.

Commercial/Industry Owners—The existing owners of commercial and industrial activities in the region should be the first to be encouraged to invest in cost effective on-site cogeneration / embedded small wind generation, solar, energy management, bio gas. By integrating these investments into existing on-site production facilities, the capital costs can be reduced.

For many, energy efficiency investments the business owners are able to capture the economic benefits of their investment. These benefits could not be captured by a third party. The business owners also have opportunities for working in clusters and sharing costs.

Many of the industrial owners have limited cash flow and access to capital can be a major constraint on investment in facilities that would be financially attractive. Joint ventures or other arrangements with potential investors may be options. , Achieving uptake with this group of investors will be assisted by facilitation through coordination, training and shared experience.

Farmers—Dairy and agricultural farmers are reasonably large users of energy. Wool and meat farmers are less significant energy users but they are located in areas where energy will become a significant issue over the next few years. The farming sector is also the sector with the most opportunities within their own control.

While access to capital will be a constraint to some, for the majority it will be the lack of role models and case studies to show by example the opportunities that they each have. This group of investors are also direct beneficiaries of the output from their investment. Achieving uptake with this group of investors will be assisted by facilitation through coordination, training and shared experience.

Residential—Investment in home energy efficiency improvements such as insulation, installation of solar water heating, and installation of efficient wood burners for space and water heating are already recognised as sound investments for homeowners. A benefit of these investments is that they can be undertaken as funding is available, can be staged, and the financial benefits accrue directly to the homeowner.

Private Investors—There has been little recognition within New Zealand of the energy investment opportunities available. Because a major barrier to many energy projects is access to capital funding, the structuring of suitable investment entities is now becoming recognised. Many of the investments are low risk because of the essential nature of energy. Where energy users can convert capital expenditure into an operating cost through leasing or other financial arrangements, there are distinct commercial benefits to business.

14 The Portfolio of Opportunities

The assessment shows that the Tairawhiti region is energy rich and is already pursuing a number of energy initiatives however current activities are largely uncoordinated with no short, medium or long-term Strategy or prioritisation of issues and actions. Continuing the current business as usual approach to addressing energy issues in the region is not a viable and cost effective option. Specific and targeted action and a step change in the priority currently given to energy issues in the region will be essential.

In order to reduce energy costs and thus enhance regional business competitiveness, it will be necessary to provide for long term secure electricity supply and the development of alternatives to electricity use by taking proactive action amongst both business/commercial and residential groups.

14.1 Portfolio of Solutions

The future energy needs of the region are likely to be met by a portfolio of opportunities. Some opportunities will be extensions of current programmes while others will require users (residential and business) in the region to think about alternative approaches to managing their energy use. Other opportunities will also require paradigm shifts in thinking about how the same outcomes can be achieved using less and/or different energy sources.

Some energy development opportunities that are economic currently may be easily achievable and while they can have a large positive impact on an individual or an organisations energy use, they will only have a small impact on the region's energy supply-demand situation. Some of the potential high value opportunities may however be more difficult to achieve in the short term, or be at a high risk of not obtaining a good return on expenditure, certainly in the immediate future.

There is no single activity to be undertaken to address the energy supply and use situation in the region and neither is there likely to be a solution provider from outside the region. The onus is on the region to take control of the issues and pursue the most appropriate solutions. The pursuit of a portfolio of opportunities within a Strategy that addresses short, medium and long-term issues would be key. It would enable the region to build on those cost effective opportunities immediately available and will lead to a strengthening of the existing commercial base of the region. From this platform, improvements in energy use can be made and new opportunities pursued as they become economic.

In addition to current initiatives that are available, there are several opportunities to pursue new initiatives that can result in improved energy utilisation, reduced energy costs, and enhanced community wellbeing. This approach can be pursued within the existing resources of the region and by building delivery capabilities. It is also incremental with costs spread over the whole community, with benefits captured directly by investors.

A portfolio approach is a sound risk management strategy. A portfolio of future energy supply investment opportunities could consist of a mixture of the following in the short to medium term:

- Delivery of electricity from the Transpower transmission grid,
- Additional local hydro and wind generation,
- Continued use of diesel generators to cover short term energy constraints,
- Improved management of electricity spot prices by use of local generation and demand side management,
- Awareness raising on energy efficiency and use,
- Energy efficiency and peak demand management improvements for business,
- Energy efficiency improvements for residential housing,
- Implementation of a warm and healthy home programme,
- Increased installation of solar water heating systems,
- Development of co-operative community living opportunities,
- Extension of ripple control,
- Processing of organic waste in biodigesters to produce biogas,
- Increase in number of bioenergy cogeneration plant at wood processor sites,
- Increased use of bottled LPG,
- Use of woodburners with wet-backs (space and water heating),
- Continued support and assistance to gas exploration and extraction,
- Use of Council facilities as role models for energy use from solar, biodigesters, and small hydro,
- Increased installation of double glazing,
- Increase in the number of installations of photovoltaic solar electricity generators for off-grid homes,
- Increase in the number of micro-hydro installations and
- Increased use of forest residues as an energy feed stock.

In the longer term, the following can also be expected to be used to meet energy supplies:

- Wave energy,
- Pyrolosis oil from woody biomass and
- Biodiesel from organic wastes.

14.2 A Regional Energy Strategy

To maximise opportunities it is recommended that the Taskforce develop a Regional Energy Strategy. This would encompass specific implementation strategies and action plans prepared by each of the Council and Runanga members of the Taskforce.

A Regional Energy Strategy would sit alongside other regional strategies such as for tourism, transport and employment. The Strategy would ensure that energy, as an issue, becomes embedded into current and future planning processes for the Region.

14.3 Promotion of Tairawhiti Energy

Tairawhiti is not generally perceived to be energy rich but it has a large amount of untapped energy much of which is accessible and of adequate quantities that can provide a large number of small opportunities. Promotion of the region's energy will encourage utilisation and entrepreneurial development. Provision of an attractive investment environment in the region will enable a competitive edge over other regions. This approach can assist in the reduction of energy costs, deliver on energy innovation and efficient use and encourage economic growth.

The region is fortunate that it has a wide range of energy options and low population density likely to mean that developments would have low adverse effects. This assists with assessment of resource consents.

In terms of location, sitting on a spur from the national energy infrastructure networks provides the region with an ideal opportunity to take control of its own destiny without the complication of networking with neighbouring regions.

Promotion of Tairawhiti energy should of course also cover utilisation so that the community is conscious of how its wellbeing and costs of production can be improved by the wise use of energy.

14.4 Tairawhiti Development Taskforce – Establishment of an 'Energy Champion'

The Taskforce needs to take action to coordinate activities and establish an Energy Champion that can provide leadership and facilitation of energy projects. This is a key success factor in the delivery of a Regional Energy Strategy. New Zealand's energy industry is fragmented and power is concentrated in the hands of a few larger electricity companies who are supply driven. No one else has the region's energy interests at heart except the region itself. An Energy Champion will be able to coordinate resources and be a focal point for energy issues in the region. It should be a source of information and advice and a convenor of meetings/discussions and project implementation.

It is clear that Central Government wishes to financially assist the promotion and uptake of energy efficiency and renewable energy across the country. For reasons of efficiency, national agencies like to work through local groups, industry associations or regional clusters. The Energy Champion needs to be in a position to become experienced in accessing Government funds for specific programmes and to encourage and help potential investors. The champion can also coordinate and assist individual initiatives to be successful.

The Energy Champion needs to be able to work with other parties such as Eastland Network, Ngati Porou Hauora, Runangas, Councils and private sector providers. While these parties are still likely to be the primary delivery entities each only has an involvement in part of the energy sector. The Energy Champion should in particular establish a close working relationship with Eastland Network in order to draw on their extensive analytical abilities and experience of most aspects of energy sector activities.

14.5 Regional Implementation of the National Energy Efficiency and Conservation Strategy

The Government established a National Energy Efficiency and Conservation Strategy (NEECS)[50] in 2001. The NEECS is a very comprehensive series of programmes relating to all aspects of energy efficiency and conservation. Many of the initiatives listed in the NEECS are being pursued by a wide range of parties and are directly applicable at a regional level. It is recommended that by active consideration and involvement with appropriate parts of the government's programmes that the outcomes can be easily used to assist improve energy utilisation in the region. By active participation, the region will also be able to ensure that the expenditure of Government funds within the Region is maximised.

14.6 City and District Council Initiatives

[50] http://www.eeca.govt.nz/strategy/strategy.aspx

The Councils have the opportunity to provide the leadership and role models for establishment of an enhanced energy future for the region. The Council policies and actions can provide encouragement and reduce implementation costs.

The following areas are key:

District Plan Policies—Councils can include encouragement for good energy utilisation through District Plan Policies. These may include:

- The rules for subdivision,
- Avoidance of shading effects on receipt of solar radiation by neighbours,
- Good energy utilisation in building design,
- Recommendations on building energy efficiency standards and
- Rules for energy use in specific areas.

Both Councils have stated in various planning documents (Regional Policy Statements, District Plans, and their LTCCPs) that effort needs to be focused on energy efficiency use and new generation in the region. The information provided is however high level and almost aspirational and falls short of actually letting the region know what the councils are doing, how and why, over what timescale, and where they can get more information on energy issues. Several Councils across New Zealand are providing this information to their ratepayers proactively through their web sites and through monthly newsletters, articles in the local papers and annual reports on what has been achieved. The Hawke's Bay Council publication 'Environmental Lunchbox' offers an ideal format for councils to inform the local community on a range of activities and provide tips on a range of activities on a regular basis.

The authors are aware of the existence of an Energy Group in the Gisborne District Council and while this is a great start, the activities of the group or areas of focus of the group are largely unknown. The activities of this group must become more visible.

The Tairawhiti Development Taskforce also has an Energy Group that is still in its initial planning stages. Further the identification by the Tairawhiti Development Taskforce's Strategic Plan of energy infrastructure and housing issues, and the subsequent commissioning of this study is a significant step forward on a path to the development of a Regional Energy Strategy.

The power of communication and the need for long-term awareness raising campaigns on energy issues cannot be underestimated. There are national campaigns into which the Region can dip for advice and information but the Councils are best placed to deliver this advice and information on the ground. While there will always be competing needs for council funds in the long term the council has a key role in delivering on sustainable energy policy and what is in effect a key component of the economic, environmental and social development of the Region. The Region alone can secure positive energy outcomes. The Councils can complement the extensive investigation and development work on a range of energy project initiatives being undertaken by Eastland Network.

Long Term Community Council Plans—The LTCCP is a distinctive form of strategic plan to map future activities for regions - including work to develop and implement other plans. An LTCCP is the key mechanism that councils can use to promote outcomes.

The Gisborne LTCCP makes limited reference to energy issues other than noting how individuals heat their homes and how they are responsible for their own environment. The principle report outlines community and economic development issues but makes no mention of energy generation and use issues in the area. Now that energy has been identified by the Taskforce and the development of an Energy Strategy for the area has been proposed, reference should be made to a Strategy and the local community consulted in time for the publication of the next LTCCP which must be adopted by 1 July 2006.

The Wairoa LTCCP notably identifies electricity reticulation and good quality housing as key components of a good quality of life for the people of the district. While energy/electricity issues are not discussed in any great depth in the report, the council has, since the drafting of the first LTCCP, commissioned a District Energy Study. The council will have a key role in raising awareness amongst the community of energy efficiency and electricity alternatives that contribute to a better quality of life.

The next drafts of the LTCCP's for both Districts presents a significant opportunity to embed the issues of energy efficiency, energy generation and use in the Region as a key community issue. In advance to the preparation of the next LTCCP's, it will be important for both councils to take steps to ensure that the energy issue makes its way on to the community radar. Awareness raising and information provision will be a key component of this.

Building Design—The Councils can provide information on good building design that will improve energy use in buildings at the design stage. This is the most cost effective time to introduce change. The Councils can make available to all ratepayers information on a number of initiatives that the ratepayer can take including:

- Building orientation to the sun,
- Design to capture and retain passive solar energy,
- Double glazing,
- Solar water heating,
- Installation of high efficiency space heaters,
- Installation of efficient wood burners for space and water heating,
- Good insulation,
- Internal energy distribution.

This information can be provided with rates demands, through building inspectors, and at the time enquiries are made with regard to building consents. Distribution through these channels can be low cost and will encourage good energy design in buildings to become a way of life.

Home Energy Rating Scheme—The introduction of a Home Energy Rating Scheme (HERS) can provide a mechanism for assisting the cost of energy efficiency improvements to be reflected in building valuations. These schemes have been operational in Australia and the UK for some time. Particular success is emerging from mandatory schemes. A pilot New Zealand scheme (Warm Home Energy Check) was developed by EECA almost two years ago. The scheme is only available in the Christchurch area and will need more encouragement from each Council if it is to emerge as a national initiative and indeed one that will get buy-in from home owners.

The HERS is based on an energy efficiency rating being established for each building according to the degree of energy efficiency attributes, eg double glazing, solar water heating, insulation etc) that has been included in the building. The aim is that when a building owner sells the building that the rating is an attribute that encourages a high price.

Council Facilities–Councils can provide a good role model by including energy efficiency measures such as solar water heating in their own facilities. If ratepayers see the Council using solar water heating, for their own use (office buildings), council owned services and other properties such as schools, hospitals and doctors surgeries and community swimming pools, then they are going to be more likely to consider it themselves. ECCA provides financial loans (Crown Loans Scheme[51]) to encourage Councils to be role models. Councils must be aware that these funding opportunities exist and actively and persistently pursue them.

Building Consent Processes—Many energy efficiency initiatives often require modification of building structural elements and thus require a building consent. The requirements of obtaining the consent and compliance monitoring can some times be more costly than the cost of the equipment and installation. Installation of solar water heating systems is a case in point. Councils are encouraged to adopt standard acceptable solutions for installation that means that if complied with result in a near automatic issue of a building consent. Such processes will greatly reduce the cost of installation of many energy efficiency measures. Recent developments in the Building Code aim to deliver on an improvement in the sustainable energy aspects of new home building.

Regional Plan Policies—Council can include encouragement for good energy utilisation through Regional and District Plan Policies. These may include:

- The rules for water allocation,
- Establishment of emission standards for heating systems, and
- Liquid waste discharge rules (meat and food waste processing) for biogas production.

EnergyWise Councils—The Gisborne District Council is now a member of the EECA EnergyWise Councils initiative. This membership should be vigorously pursued as an access route to Central Government funding for specific energy efficiency and renewable energy programmes, information and printed matter. In particular, the Council has a key role in addressing why few businesses and homes in the Region have benefited from grant funding programmes.

Resource Consent Processes—The process of obtaining of resource consents for energy projects is often long and expensive. Invariably the energy projects, whatever their size or nature (renewable or non-renewable) have the potential to affect the environment and surrounding communities in some way.

[51] http://www.eeca.govt.nz/programmes/businesscosts/crownloans.aspx

Often, for example, they can result in a change in the land use. Regional policies and the use of Rules and Guidelines and other standardised information can reduce processing costs. Making Council expectations clear to prospective developers and directing them to national guidelines (for example the EECA national guideline for wind development) will help the process. Local guidelines can and should be developed from the national guidelines and should be made available through the council's web-sites or through the web-site of a newly established Energy Champion. It is important that the councils are seen to be being vocal about these issues. By saying nothing, the region could be losing valuable opportunities. Finally, securing expertise on energy project details (on an ad hoc basis) can help the council evaluate and process applications efficiently.

Resource Consent Conditions—It is useful when there is potentially a number of similar resource consent applications likely to be lodged that standard format of resource consent conditions be established for the region. This kind of initiative has been spoken about at a national level and could well form part of a recently stated government initiative on the development of National Policy Statements on infrastructure issues (including energy) as part of the recent review of the Resource Management Act[52]. A standard format can assist a developer as they can see from the outset the conditions that they can reasonably expect to be attached to a resource consent. This process also assists those who may wish to object to an application as they will be able to see possible conditions and are then able to focus on the adequacy of the conditions.

Water Allocation—The establishment of water allocation rules, which incorporate hydroelectric generation as well as extraction, recreational uses, and preservation of native fora and flora would assist consideration of multiple use of scarce water resources. Water allocation is an issue that is increasing in importance on a national level (given the issues around the Waitaki River) and will be an issue that the councils will need to keep abreast of and be ready to address.

Regional Funding contributions—Nationally, infrastructure issues such as water and sewerage are funded by financial contributions imposed by the Council. This levy is a reflection of the costs to provide infrastructure services. Increasingly there are a number of situations where energy infrastructure upgrades are required and it is appropriate to apply financial contributions to them also. As the regional benefits, of say an electricity line upgrade, may accrue to all in the local community as well as the initiator of the works it is appropriate to consider that the cost should be shared between the developer and the Councils and should not be met solely by the lines company.

14.7 Access to Energy Information

The establishment of a directory of information sources would assist many individuals and business in the region to identify, consider and implement energy projects. This could be accessible on Council or a special regional energy website (through the proposed Energy Champion. The directory could cover:

- Resource data,
- Technology,
- Suppliers of equipment,
- Energy efficiency opportunities for residential and commercial users,
- Specialist advisors,
- Names of trained installers of energy equipment,
- Links to other information providers,
- News on current local and national energy initiatives.

14.8 Funding of Energy Efficiency Improvements

The capital cost of many energy efficiency improvements is often a major barrier to their implementation. An example of this is solar water heating systems. In some overseas areas the local council or a special purpose entity has established an innovative alternative to buying the systems outright which is to offer the systems through a lease-to-buy programme. In these programmes the council or special purpose entity installs and owns the system and the building occupiers who gain the benefits make a monthly payment through their rates or electricity bill to pay off the eventual purchase of the system. The level of payment is set according to the level of energy saving that they receive. Such a scheme is analogous to how television sets were often purchased during the initial days of the introduction of television in New Zealand.

[52] http://www.mfe.govt.nz/publications/rma/improving-rma-national-interest-sep04/improving-rma-national-interest-sep04.html

The installation of solar water systems could reduce electricity use for many in the region. Water heating using electricity accounts for around 40% of the total electricity bill. It is recommended that such a scheme be investigated for the Tairawhiti Region.

14.9 Promotion of Demand Reduction / End Use Efficiency / Solar

Residential and business opportunities are usually not pursued for demand reduction opportunities unless it has been a dry year and electricity suppliers are short on supply. The establishment of regional programmes in association with national bodies (for example similar industries like food processing or cold storage in partnerships with electricity retailers or lines companies) will assist the dissemination of knowledge and thus could increase the uptake of these demand-side opportunities.

The promotion of solar hot water systems can have significant payoff for individual hot water users and for the region itself. To achieve the identified benefits there is however a need for both the wider promotion of the benefits and assistance with getting information to potential system users. Councils are in an ideal position to assist this through the provision of information with rate bills, on their website, and when building consents are being sought.

14.10 Regional Attitudes to Energy

The Tairawhiti region is in the fortunate position of having a reasonable amount of untapped energy resources within its boundary. Promoting the region as being energy rich with support from balanced and informative consent application processes will encourage entrepreneurs to identify and pursue opportunities in the region. This may happen first within existing businesses. For example, farmers pursue interests in wind generation of small-scale hydro generation on their land. As local trades people gain more experience and confidence in these kinds of developments they too are better placed to pursue them. Setting and proactively communicating a positive attitude frees thinking, encourages innovation, and provides opportunities for managing risk.

There are a number of ways in which energy supply and price certainty can be improved but people need encouragement and information (in a language they understand) to spot the opportunities. For the majority, energy or electricity is a commodity they use as part of their regular business activities. Positive and ‘can-do’ attitudes can subsequently spread to the large energy users considering locating in the region when they see that energy risks can be managed and community attitudes are favourable.

A positive attitude to energy development and use helps recognise the inter-relationship between energy resources, the community and environmental values important to the Tairawhiti Region as a whole.

14.11 Leadership Programme

If opportunities for energy utilisation are to be pursued and achieved there needs to be recognition throughout the community that many opportunities are already within the reach of energy users. Within communities most opportunities are lost because they are not recognised, they are considered unachievable and in general information provision to these groups is poor. A community needs assistance to be able to recognise and pursue these opportunities for savings. This can be facilitated by an Energy Champion. An example is the recent introduction into legislation that electricity retailers must offer low users of electricity a low fixed charge[53]. While electricity retailers are obliged to make the tariff available, the onus is on bill payers themselves to pursue the opportunity. As there are high rates of LPG usage in the region for heating or cooking its likely that many households will be eligible. A further example is the ability to benefit from national insulation retrofitting programmes. EECA’s retrofitting projects tend to have a minimum of 100 houses per project. Individuals cannot access EECA funds directly but need to be part of a project.

An Energy Champion would have to be able to build on a sound and realistic experience in the energy market and knowledge of opportunities. Access to Government funding support is very much dependent on knowing ‘the system’ and understanding how it operates. Organising workshops and training others will broaden the community knowledge base.

The Energy Champion and other regional energy players also need to work with large energy companies to build relationships with key individuals, get a better understanding of their local priorities and ensure that Tairawhiti’s interests are maximised. At present, the energy market is supply dominated and energy suppliers are price setters. This position is reinforced because of the lack of competition and market rigidities arising from supplier risk management approaches. A regional energy programme or ‘Strategy’

[53] Bill payers using less that 8000 KWh annually are eligible for a low fixed charge.

could facilitate the demand side by helping to identify opportunities and thus better balance supply and use in the region.

14.12 Access to Central Government Funding

Central Government has a national Energy Strategy (the 'NEECS' managed by EECA) and other initiatives from the Electricity Commission, from Housing New Zealand and from Trade and Enterprise and WINZ that the region can tap into and build on. Leveraging Government funds by regional initiatives will reduce the cost of implementation of a regional strategy and help Central Government deliver on their objectives for communities (residential and business), for training and employment initiatives etc.

14.13 Getting the Base Right

The large number of energy efficiency and renewable energy opportunities potentially available to small and medium businesses or 'enterprises' (SME's) within the region require promotion and facilitation. It is inefficient to leave them individually to identify and investigate opportunities when sharing knowledge and experience would reduce take-up costs and by working as clusters they could realise even more efficiencies by sharing facilities and expenditure.

Promotion of energy opportunities with small and medium sized enterprises needs to be seen as an investment opportunity. Much of the promotion of energy efficiency and renewable energy has been carried out by enthusiasts with the result that it is often perceived as alternative rather than a mainstream investment opportunity.

Similarly community programmes have been promoted because "energy efficiency and renewable energy is good for you" rather than being a sound or good investment. Coordination of community action programmes along commercial lines rather than "because it is good for you" will change attitudes and ensure a wise use of scarce funds.

Small and medium sized enterprises are often not seen to be the largest potential beneficiaries of energy programmes and they are left to do things themselves while the focus by central government agencies has rested with the largest energy users. In practice most business are very small and they do not have the focus, staff or experience to address energy costs most appropriately. Opportunities for a large number of small gains are therefore lost while a small number of medium sized gains are pursued. Large regional energy benefits can be achieved if specific and focused small and medium sized enterprise energy programmes are established and coordinated by a regional Energy Champion.

Assisting business (including farming) energy use through energy auditing, contract negotiation, and benchmarking will assist regional business to be cost competitive.

14.14 Energy Research and Education Centre

The Tairawhiti Polytechnic could establish a regional centre for energy research and education. This could build on the energy programmes currently run by the Polytechnic and include seminars, workshops and general promotion of good energy use practices. As a 'centre of excellence' in the region it could provide a high profile for the region's energy wealth and facilitate utilisation, and a focus for community education.

14.15 Knowledge is Power

Most energy investment opportunities are lost because they are not recognised, or if recognised, the potential investors do not have the information or role models to encourage them. Providing information on the local energy resources and assisting the acquisition of knowledge and experience will empower business to look at opportunities for reducing energy costs.

14.16 Possible Solutions to Electricity Transmission Constraints

There are a number of opportunities for gaining additional supply capacity into the region that will allow deferral of transmission line upgrading and these involve:

- new local electricity generation,
- peak load reduction and
- general overall area electricity use improvements

Implementation of some or a mix of these however will only defer the timing of transmission line upgrade – it will still be needed at some time in the future.

14.17 Electricity Demand Management

Business energy users are often able to purchase a component of their electricity based on electricity spot price and have the rest at a fixed unit price. Whether a company takes a fixed price electricity supply contract, or takes electricity based on spot prices is usually a risk management decision. Where a company has an ability to control and vary the amount of electricity used, then in this situation it can be advantageous to have the variable quantity covered by spot prices. When prices are high, the amount of electricity used can be cut back to reduce costs. If a company is highly exposed to the spot prices, they will usually take a financial hedge to cap prices paid.

For companies with manageable electricity demands, part exposure to spot prices can be financially beneficial.

A difficulty of the current electricity market has been that it has been difficult to obtain hedge contracts. It is also been difficult for some companies to secure fixed price contracts and have been 100% exposed to spot prices. Many companies have also had little experience working without fixed electricity prices.

Companies having even only a small percentage of their electricity demand exposed to spot prices have a strong incentive to have load management and planned load-shedding capability. Examples are:

- Restricting pumping of water to off peak times,
- Restricting heating of water to off peak times,
- An ability to turn off freezers/chillers for periods of up to two hours and
- Rescheduled high electricity use activities.

14.18 Backup Generation Plant

The installation of additional embedded generation in certain parts of the distribution network may assist Eastland Network maintain supply voltage. If the embedded generation is intermittent, such as for wind generated electricity, there will a need for backup from controllable and quick start generation such as provided by diesel or hydro generation plant. Gas-fired co-generation plant are also an alternative where there is an adequate electricity generation capacity.

14.19 Extension of Ripple Control

Ripple control is generally not favoured by network companies and electricity retailers as their use reduces electricity sales volume. A large proportion of both Gisborne and Wairoa energy users are fortunate in that they still have a ripple control network. Eastland Network uses it to reduce peak network costs. This is achieved more effectively in the Gisborne area where Eastland Network owns both the signal equipment and the receivers but less so in Wairoa as TrustPower owns the receivers. The authors understand that TrustPower is embarking on removing a number of receivers in the Mahia area. This in the face of clear Government calls for an increase in the use of demand-side tools such as ripple control. The community may also like to see ripple control being used and should seek regular reports from Eastland Network on how it has been used and the benefits gained.

If ripple control was used extensively in the region, coupled with the installation of solar water heating, it would be possible to ensure adequate availability of hot water.

Ripple control needs to be seen as a beneficial tool for communities to reduce peak energy costs rather than something to be avoided. However, it should be noted that the benefits of load control will only be recognised when electricity retailers send out effective pricing signals to consumers.

For those who do not wish to be affected by ripple control, they have the option of either paying an uncontrolled electricity price, or installing a solar hot water system.

14.20 Time of Use Metering

The installation of time of use meters empowers electricity users to manage their energy. From these meters, they can receive information that will allow them to take action to reduce costs. Introduction of time-of-use metering by each business would also allow integrated load scheduling between major electricity users in order to smooth peak electricity demand. The Councils could take an active role in encouraging the installation of advanced metering technologies with the larger users in the region.

14.21 Funding Energy Efficiency and Solar Programmes

The Government operates a number of energy efficiency grant programmes through EECA. These funds are usually contestable and are structured specifically for community or business based implementation.

There are also specific capacity building programmes that can be accessed to assist development of energy efficiency in the community.

A number of communities who are successful at accessing these funds have done so through establishment of community based trusts and charities; for example, community trusts or energy trusts.

EECA also has business-focussed programmes which offer part funding for energy/electricity auditing and the provision of advice. The Council's need to offer support to local businesses to pursue these financial opportunities. The region has experienced limited or no discernable benefit from these schemes in the last 5 years. The region must actively pursue these funds.

EECA and the Solar Industries Association have established a no interest loan scheme for solar water heating. This has been very effective in overcoming the barrier of the cost of solar systems. The Region, through its Energy Champion should ensure that a local programme is implemented.

14.22 New Electricity Generation

Encouragement can be given to land owners and energy companies to build new electricity generation facilities. These could be based on small or micro-hydro, wind, or distributed bio-energy generation.

Each is technically viable and the cost is near current market prices. However, the decision on investment in any of these will principally be driven by the ability to sell electricity at a viable price.

Wind—There is a reasonable wind resource throughout the region. Technically, there is likely to be more than the region can use so the limit on uptake will depend on the ability of the region's network to handle intermittent energy generation. Where backup energy sources such as diesel or hydro are available, then the limit on wind penetration will lift. Another constraint is that the most attractive sites are often distant from transmission lines and the wind speeds are only moderate. Both these aspects reduce the economic viability of sites.

Hydro—Technically there is large hydro potential on the Mohaka (90MW). This would allow export from the region into the national electricity network. If the river guardians and adjacent land owners wished to develop this resource for community good, then they could partner with an energy company on terms they could lay down.

There is an estimated technical 80MW of small hydro generation opportunities in the region. Many of these have only had partial investigation. Landowners interested in gaining alternative income from their land could investigate these opportunities in partnership with energy companies experienced in such projects. Some landowners need to be alerted to the opportunity the natural resources on their land actually presents to them.

In addition to small hydro opportunities, there are also a large number of micro hydro opportunities from which electricity could be generated for isolated energy users. These will most likely be for off-grid applications or where existing electricity distribution lines would otherwise require expensive upgrade. Again, landowners need to be alerted to the potential opportunity that awaits them.

Solar—Generation of electricity for off-grid applications such as on farms will increase over the next few years as the costs of equipment reduce in cost. The total level of uptake is however not likely to be significant and is likely to be for new uses rather than as a substitute for on-grid supplied electricity.

Geothermal—Low temperature electricity generation could be feasible at Te Puia. This would require further investigation. Drilling to deeper hot rock is likely to improve the technical feasibility but may increase costs beyond commercial feasibility.

Gas—If further exploration in the Wairoa area were to find quantities of gas that made it economic to extract, this would be a valuable source of electricity generation for the region. There is probably little that the region itself can do other than facilitate exploration and extraction along side the efforts of national government.

14.23 Priority Opportunities

A picture of the opportunities that are available for improving the energy supply and cost is set out in Table 13. This shows the assessed economic cost on a cents/kWh basis from section 6 and assessed quantity of energy that may be affected by implementation of the opportunity within the region. To get a measure on the significance of each opportunity, investors need to look at the variable component of their electricity prices that they can effect by the investment. The fixed component of electricity supply will generally not be affected by implementation of these projects. Target opportunities should be less than 17-20c/kWh for residential applications and 8-12 c/kWh for industrial applications. (However, it should be

noted that some industrial applications may be able to affect both the fixed and variable component and the target would be 15-18c/kWh). The target for wholesale electricity should be 7.5c/kWh post 2007.

Opportunity	Cost (Cents/kWh)	Regional uptake to 2015 (GWh)
Domestic energy efficiency	9	13
Commercial energy efficiency	9	6
Domestic solar water heating	8-10	2
Commercial solar water heating	6-7	1
Photovoltaic – on grid	105	0.02
Photovoltaic – off grid	150	0.02
Small hydro	12-15	150
Micro hydro	?	?
Wind – direct water pumping	?	?
Wind	9-14	110
Industrial biodigester	7	2
Bioenergy (wood processing residue)	9-11	20
Bioenergy (forest residue)	14-16	10
Geothermal	?	?

Table 13 Summary of opportunities and associated costs.

The additional possible 300 GWh per annum of energy achievable in the period up to 2015 is equivalent to the total electricity demand for the region.

With the electricity projects currently under investigation, if all of these proceeded to construction then the current level of electricity demand could be met within this decade from local generation. This would be about 50% of peak demand.

In Table 14, the opportunities are grouped and ranked in a priority order to indicate how they can be approached through a regional strategy. The priority ranking takes account of economics, strategic benefits, and ease of achievability.

Suggested Initiatives	Activity	Action Required
	Community recognition of energy	Promotion of energy as a valuable regional resource; promotion of opportunities and associated costs.
	Wind farms	Assistance to potential developers to obtaining access and resource consents
	Small hydro based electricity	Assistance with establishment of small hydro stations, awareness raising with landowners, use of case studies etc
	Gas exploration	Encouragement of gas exploration
	Industrial/commercial energy efficiency	Assistance through provision of information, workshops, cluster activities, benchmarking, auditing and efficiency basics (seek support from EECA)
	Residential warm and healthy home programmes	Assistance through provision of information, awareness raising initiatives, public presentations, demonstration sites, media (seek support from EECA)
	Commercial/residential solar water heating	Promotion of benefits, demonstration sites, lease to buy schemes
	Bioenergy cogeneration	Assistance with resource consents and case study development
	Transmission upgrade	Clarification of options (short, medium and long term), secure access, resource consents

Table 14 Prioritised Investment Opportunities

14.24 Meeting Increased Demand

The opportunities shown in Table 22 for providing the approximately 10 - 40MW of electricity demand in the region which could be achieved by 2015 would include component of peaking generation to improve reliability of supply in the area and also avoid the need for expensive transmission upgrades,. A small or medium amount of generation capacity is achievable at generation costs of 9 – 15 c/kWh and significantly from renewable and bio-energy sources, and potentially gas. This gives a balance to the portfolio of resources, particularly in a dry or windless year through improved reliability and greater certainty of supply to the region. This is in addition to opportunities for reliable supply that could be obtained from the demand management opportunities discussed in section 11.

There are a number of hydro, wind, bioenergy electricity generation opportunities available in the region and while their development is technically feasible. In reality, it will be dependent on land access, economic viability and resource consents. Note, however, that the costings are based on preliminary information that would need to be more fully investigated and developed with other parties.

The regional economy is based on distributed communities with supportive community networks. This lends itself to a range of distributed and innovative energy solutions some of which can be community owned and operated.

14.25 Energy Firming and Peaking

A considerable barrier that is likely to emerge in the future to attracting new major industry to the region is the inability for that industry to obtain a firm electricity supply at an appropriate price. Because of supply constraints the need for local firming capacity would improve supply capability. This has to be a key area of focus for a future Energy Champion in the region since attracting new business to the area and encouraging the expansion of existing business (in particular the processing of primary materials) is of paramount importance.

The availability of gas within the region would provide the most flexible form of firming renewable energy supply. The exploration for gas and its extraction has to be a high priority in the list of regional energy opportunities.

Finally, the process of coupling wind with hydro energy firms the wind by using hydro as an energy storage reservoir.

14.26 Upgrade Electricity Transmission Capacity

The upgrade of the Tuai – Gisborne electricity transmission network so as to be able to handle an additional electricity flow under a contingency event would also provide adequate capacity to the region The frequency of this contingent constraint occurring is not high and as a result it would not be expected that upgrading would be prioritised for some years.

The priority could change if it was possible to demonstrate a firm need. To overcome this “chicken and egg” situation it is recommended that the region work closely with Transpower to sort out the preferred option, including access to land and route designation, so that the upgrade could occur quickly if a major energy user came along. It would also remove the uncertainty affecting the region with regard to energy supply options available.

If the upgrade option could be readied and “put on the shelf” then it would provide more certainty to attracting a new business to the region. The alternative is for an alternative ownership structure to emerge; i.e., ownership of the line moves to Eastland Networks.

14.27 Develop Gas Supply

Because of its flexibility, gas is one of the most valuable energy sources that the region could develop. However, while it is high value, the cost of exploration and extraction are potentially high with a high risk that it would not eventuate.

From a regional perspective, effort should go into promoting the resource and the attractiveness of the region’s support infrastructure to potential international investors in order to attract a developer. If it comes off, the region is a significant winner.

However, because there is no gas infrastructure in place, this will be a significant barrier unless it is economic for existing industry to use or new industry can locate nearby. Electricity generation is likely to be the most economic use unless a large reserve is found.

14.28 Sustainability

By the region taking control of its energy supply and use strategy and implementing an action programme, it would be able to influence the long-term cost and quality of energy used in the area. Without these actions the region will be a follower of national energy costs and continue to use energy inefficiently. There is considerable potential for the region to show initiative and leadership and present a positive face to investors (large and small, local and national alike). The solution to the current and future energy issues in the area is a joint one. No one party has the monopoly on the best ideas and only through a partnership approach, and the implementation of an inclusive Energy Strategy, can the most efficient outcomes be achieved.

Sustainable economic growth and community wellbeing will be assisted by good energy use at the lowest cost. Potentially the region could generate enough electricity to be fully self sufficient but this would be difficult technically but at a high cost because of the need to manage electricity supply at all times, "not just when the wind is blowing".

The region is in a good position to achieve a high degree of self-sufficiency for energy supply (excluding transport energy). This would have a marked effect on regional energy prices and flow through into community wellbeing.

15 Barriers to Improving Regional Energy Supply

The following section identifies a number of barriers to improving regional energy supply. Barriers have been arranged into two sections—'regional' barriers and 'national' barriers. The reasoning behind this is to illustrate to the Taskforce those issues that they are best placed to address and influence directly, i.e. the regional issues, and those issues that are national barriers. While the Taskforce's ability to influence the national barriers is uncertain, it is essential that the Taskforce members are aware of them, understand why they have been identified and as a minimum, know how to work around them. For some of the barriers they will relate to both a national and regional issue. This is well illustrated with skills shortages that is both a national issue and a regional one.

15.1 Regional Barriers

15.1.1 Relative Economics of Regional Energy Supply

While the region has extensive energy opportunities that technically could alleviate pending electricity supply constraints, many of these (such as some hydro and wind sites) are not economic now or in the next few years. However, from the end of the decade, there are other opportunities that will become economic and the region should plan for them.

15.1.2 Lack of Regional Coordination and Collective Action

Throughout the region, there are a number of people who are interested in energy and are pursuing specific small scale localised projects. Generally, and except for Eastland Network, they are isolated from each other and not visible in national fora. Starting from scratch to establish a knowledge and experience means that it is a struggle to make any headway in securing national funds and getting projects off the ground.

15.1.3 Lack of Skills and Experience for Installation

There is a general low level of technical skills for implementing many of the energy investment opportunities available to the region. Implementation is generally undertaken by enthusiast trades people who "learn by doing". Opportunities are spread over quite an area. This has meant that no obvious focal point for activities around installation and maintenance, and information and advice, has emerged. Specific efforts directed at creating such a focal point will be necessary. The provision of sound advice and high quality services to the people of the region is of paramount importance. Otherwise, there is a real possibility that 'failures', in terms of systems being installed by inexperienced and improperly trained tradespeople or inappropriate advice given out will send the wrong message to the community and inhibit future uptake. There is a need to establish reliable delivery mechanisms that will provide economies of scale through regular involvement with a range of appropriate technologies.

15.1.4 Access to Government Funding

Several government agencies have funding that targets small-scale electricity generation opportunities, energy efficiency for the residential and business community and general awareness raising. Despite the availability of these national funds, the region appears not to be accessing them due to of lack of coordination, awareness, familiarity with processes and in general because of a lack of collective action. Individuals and small community groups often do not have the experience to access government funding or to implement energy solutions that are durable and will provide optimal benefits. While there is currently no communication between them, no sense of shared objectives, and no coordination, the potential for this is significant. A strong community spirit exists amongst many groups in the region and needs to be tapped into.

Most government agency funding requires cost sharing. Where the benefits accrue to the region there is a need for the community to collectively provide some regional contribution.

15.1.5 Low Density of Population and Long Stringy Electricity Lines

The low density of the population means that there are generally long stringy electricity distribution lines to few electricity users. This results in the region having asset capital and maintenance costs being spread over few energy users.

15.1.6 Local Authority Attitude to/View on Energy Projects

Energy is often portrayed in Policy Statements and Plans in a negative light as if it has a high probability of producing adverse effects. This is not necessarily always the case and while effects are a possibility with all developments it is essential that planners consider the bigger picture and address both the potential positives and negatives in a proposed development. While the possible adverse effects of energy developments are valid concerns, if the region wishes to make positive use of its energy wealth these concerns should be noted as issues that energy users must address, rather than assuming that the adverse effect will result. Good design of energy projects can result in projects that minimise adverse effects and this should be a clear objective of Policy Statements.

The Gisborne Regional Policy Statement recognises the important role of energy management to the economic, environmental and social well being of the Gisborne District. The Council also recognizes its role in promoting the sustainable management of energy and its responsibility to promote energy efficiency and the use of renewable energy resources in the region.

However, the Statement sets these issues out well, the objectives and activities listed are short on details and the actual activities that the Council will undertake to deliver on the stated objectives[54]

The Council needs to make it clear in wide communication and updates to the community and potential investors how it is supporting government initiatives on renewable energy, how is it promoting energy generation from renewables and for example, what does the council mean by 'environmentally acceptable' developments.

The silence on these issues is something that the Council must address. No information speaks volumes and leaves potential investors or developers going elsewhere and communities and businesses in the area uncertain of what to do or where to go for help and advice. A proactive approach to the provision of advice and information through the Council's web site and local press and radio stations would be a good start. The provision of information is a key element in the on-going process of raising awareness on these issues in the wider community.

The Wairoa District Plan (and the Hawke's Bay Regional Policy Statement) make limited reference to energy efficiency and the development of energy resources in the District. Some information is provided on the Wairoa Council web site but nothing that is comprehensive or would constitute valuable information to local residents or businesses or potential investors/developers about local energy issues and the Councils stance on them.

In general, there are a number of positive steps that the Councils can take to address energy issues in their region through both raising the issues they want to address and following through in terms of providing additional information about how they will deliver and monitor on their own performance. This approach can go along way to setting a positive baseline for community attitudes on energy use, while ensuring good environmental outcomes.

In addition to the standard Local Government planning documents, the Long Term Community Council Plan (LTCCP) is a relatively new addition to the Local Government policy 'tool box' under the Local Government Act 2002. The Act sets out a clear purpose for Local Government - to promote communities social, economic, cultural and environmental well being. The LTCCP is about empowering communities, planning for the future and ensuring the well being of individuals. As a reflection of what the community wants and needs, the importance of these plans for the future of the region cannot be underestimated. The first plans for both the Wairoa and Gisborne Districts make limited reference to energy as an issue for their districts at all and in particular nothing on the importance of a secure electricity supply to the economic well-being of the region, the opportunities for businesses to save energy or use it more efficiently, and the benefits of warm and healthy homes in the region. The development of initiatives aimed at growing community understanding and awareness on both these issues is essential. It will help elevate them to an issue of relevance for the local community. There will be an opportunity for the LTCCP's of both Wairoa and Gisborne to address both of these issues when the Plans are renewed around 2006.

15.1.7 Wrong Messages lead to Inappropriate Investment

There appear to be a number of conflicting and, in the view of the authors, misleading messages being communicated to some members of the public in the region around their need to 'prepare' for 2013. These appear to arise from a combination of visits to the region of enthusiasts or sellers of particular technologies and reports in the media referring to Section 62 of the Electricity Act 1992 that only requires electricity distributors to maintain services to the rural community up until 2013. An example is

[54] Note, it has not been possible to access a copy of the Gisborne District Plan.

investment in photovoltaic (PV) electricity generation for on-grid applications so that homeowners are self sufficient by 2013 when the obligation to maintain rural electricity lines ceases. Photovoltaic electricity is a good investment today for new or existing off-grid applications (e.g., a new home may find a favourable comparison between the costs to connect to the network vs the installation of PV) but is unlikely to be economic for current on-grid applications. Homeowners would be better putting the expenditure into insulating and maintaining their homes and some homeowners could benefit from the installation of solar water heating and the associated reduction in their electricity costs.

15.1.8 Gas Exploration and Extraction

While the extraction of gas from the region could provide the most valuable and flexible energy resource in the region, it is also the most expensive and risky investment opportunity. Decision on exploration and extraction will depend on national energy costs but the region may be able to set an environment where exploration is encouraged through having an accommodating and proactive resource consent process.

15.1.9 Limits to Renewable Energy Penetration

There are limits to the amount of intermittent electricity generation such as from wind that can be accepted into a distribution network. Often, this has been assumed to around 20% of peak load demand. Eastland Network will have to model specific wind projects to be able to advise prospective investors of the network's capability to handle any new generation. The maximum capacity that the network can accept will need to be clearly communicated.

15.1.10 Controllability of New Generation

Many of the electricity supply and demand investment opportunities in the region do not produce electricity that can be easily controlled in terms of when it is produced and when it is needed most. This is both on a daily basis and on a monthly basis). For example, electricity is most valuable at peak times (7:00am – 9:00am and 4:00pm – 6:00pm) but wind energy in particular may not be available at that time. It is clear that while investment in renewable energy resources in the region may reduce the need for electricity to be imported into the region, it will not remove the need and neither will it completely reduce capacity constraints.

15.1.11 Awareness Raising and Access to Resources

If the Region is to maximise the value from its rural energy resources, it needs to ensure that access to resources is facilitated. At present, there are some resources, particularly renewable, that are unavailable for utilisation because landowners simply are unaware of the resource they have on their land and they are therefore unaware of the opportunities for development proposals. General information and case studies outlining what other rural landowners have achieved and how they did it will be a useful starting point.

15.1.12 Access to Information

Potential investors, small/medium enterprises such as farmers are often hindered from investment in energy opportunities because of the lack of information about the opportunities. This may be in the form of resource data or role models (in the form of case studies). There is often also a lack of information on the technologies available, those that are appropriate and their availability, and where to find experienced installers.

Not only is the information difficult to obtain but there is no appropriate vehicle for storing the information and assisting its dissemination to potential users. A focal point for information and advice in the Region is essential.

The lack of wind data in particular creates a barrier for farmers and small/medium industrial enterprises from considering the vast number of wind opportunities available. Public availability of wind maps to a realistic scale would overcome this barrier.

The preparation of case studies, reference sites and handbooks would show the opportunities available and indicate the financial benefits achievable. This is applicable to opportunities around both energy efficiency and the development of local energy generation resources.

The education and transfer of knowledge needs both coordination and a facilitator whose task it would be to ensure the delivery of regional projects. As a facilitator, the individual would also be a good conduit to Central Government for accessing specific programme funds that are available for energy generation, use and efficiency activities.

There has been extensive research into energy opportunities in the region. In many cases, the information and data has been held only by those directly involved and little useable data or other information has been passed on to others who may benefit from it. It is essential that the research results be shared and built on so that there is a transfer of knowledge and build up of expertise. It will be hard for the region to benefit otherwise.

15.1.13 Resource Consents

As the process of issuing resource consents is 'effects' based, potential investors in energy projects have to provide information on the potential effects of their proposed developments. This can involve extensive research and investigation and can be very costly which often limit the accessibility of such developments to larger developers or consortia of smaller developers. In order to reduce costs and encourage good outcomes from the process it would be advantageous to all parties involved if information that is common to a number of potential opportunities are prepared as standard references. Further, it would also be advantageous to potential investors if the councils clearly spelt out their requirements/expectations (in terms of information) on a range of types of developments.

Over the next two decades, wind turbines and possible some small hydro are likely to be distributed in a number of locations in the region. In order to facilitate these applications, the process for obtaining resource consents must be as efficient as possible, and at minimal cost so as to ensure that investment in wind is an attractive opportunity for all potential developers (irrespective of size). It is important to appreciate that excessive costs will effectively prohibit local farmers and land owners from accessing this resource.

15.1.14 Accessing Guaranteed Energy Supply

While the region currently has adequate energy supplies, it has reached the point where the lack of access to future adequate quantities of guaranteed energy at an appropriate price will inhibit the region's ability to attract new energy intensive industrial opportunities. The pending electricity capacity constraint, both into the region and within parts of the region, provides a significant energy supply risk for existing and potential industry wishing to operate business in the region. If the region is able to guarantee energy supply at an appropriate price then industries are more likely to locate in the region.

Future price increases are a given in all parts of New Zealand. If the area is to maintain its competitiveness (nationally and internationally), it must establish a coordinated Energy Strategy and a prioritised action programme to ensure that the current untapped energy generation opportunities can be realised and that the benefits from the increased participation of the demand side can be realised (energy efficiency and energy use patterns).

15.1.15 The Cost of New Supply Options

An energy user seeking supply of electricity has to pay the full costs of any necessary electricity lines, transformers, or other equipment. This makes it important that as many alternative options as possible to network connection are considered. Alternatives may include installation of their own energy system - it may be that they can meet their energy requirements by other energy forms such as solar (PV or solar water heating), bioenergy, small or micro-hydro systems, wood-burning wet-backs offering space heating and water heating, and LPG gas for heating or cooking.

Most people do not have good information on the options available to them. Some may not even consider that there are alternatives while for others, it may simply be too expensive for them to consider and then fully investigate. The value of case studies and role models that may assist individuals in the evaluation of the options should not be underestimated. Homeowners or business owners will be able to see (and relate to) what is possible and see what specialist assistance they may need and where to get it.

15.2 National Barriers

15.2.1 Fragmented Energy Market

The New Zealand energy market is very fragmented with a number of players focussing specifically on generation and retail activities – the 'gentailers', and lines companies, or electricity network companies whose main focus is transporting electricity on a local level. While in theory, customers are able to change their supplier, in each of the Wairoa and Gisborne areas principally only one supplier provides electricity in the area. The remoteness of the area and sparse population means that suppliers have limited incentive to seek new customers. Lines companies also now have the potential to generate small amounts of non-renewable electricity (up to 50MW) (with no limit to renewable generation). Despite this, the isolation of some wind and hydro sites from electricity distribution lines make this difficult.

With the market as it is currently set up, electricity suppliers are the point of customer contact yet the local network company could through greater interaction with energy users implement energy management techniques that could reduce energy costs throughout the region. Without contractual connection to energy users, such actions are difficult.

On a national level, this fragmentation means that there are significant inflexibilities in the market and its few players mean that there is little competition. On a regional level, it means limited choice for customers. In both the Wairoa and Gisborne/East Coast areas, the lack of competition in the electricity

retail markets keeps prices up and reduces innovation in energy products. This is typical of most NZ areas so is unlikely to be changed without government intervention.

15.2.2 Lack of Incentives for Investment in Energy Efficiency

Investment in energy efficiency is best undertaken by those able to directly gain the benefits of the investment. Those benefits may come in the form of reduced energy costs or increased productivity. The barrier to such investment is often the capital cost, particularly for residential homeowners who may have higher priorities such as food and education, or business that do not have the profitability to increase capital expenditure.

There is also little incentive for energy sellers to advise customers of actions that they could take which could improve energy use effectiveness or reduce cost. It is in their interest to retain a low level of understanding or awareness of opportunities amongst their customers as proves a significant barrier to reducing sales. For example, from 18 October, all retailers were obliged to offer their customers a low fixed charge (for users using less than 8000KWh annually). Customers must request their retailer to move them on to this low rate tariff, as they are not typically advised about it.

Where the beneficiary of energy efficiency investment is not the home or commercial building owner, i.e., a tenant, then the investment barrier is even higher.

There is little incentive for energy retailers to promote energy efficiency as any reduction in energy use reduces revenue. The exception however is when electricity retailers are over-contracted at fixed price during times of hydro electricity shortage where spot prices are extremely high. Any action that electricity retailers may have taken at such times will however be limited because of the Government investment in reserve generation such as from Whirinaki. Power station where price is capped at 20c/kWh.

15.2.3 Lack of Incentives for Lines Companies to Invest in Energy Efficiency

While Eastland Network endorses the concept of energy efficiency, there are some perverse effects resulting from regulation that make such an investment a poor business decision. Two key issues are:

- Revenue and consumption—Although 90% of a lines company's costs are fixed they can only get $0.15 per day as a fixed charge. Most of their revenue is gained via the variable charge which is of course energy sales (kWh) driven. Less consumption for them equals less revenue.

- Price regulation—Electricity network companies are under price regulation by the Commerce Commission. They cannot increase prices beyond that set by a formula related to movements in the Consumers Price Index (CPI). This is referred to as the CPI-X regulation. Under this regulation, prices when applied to the base years quantities (i.e., kWh consumption per tariff type) must meet the CPI-X test. When there is energy efficiency the base years quantities (in terms of consumption) remain the same. When there is no change in quantity there is no ability for the network company to rebalance their tariffs so that they can be revenue neutral to improved energy efficiency, with the result that they are heavily penalised.

On the other hand, there are good regional system benefits which Eastland Network could achieve through energy efficiency initiatives, such as reduced maintenance costs, fewer outages, reduced electricity transfer losses etc. However, these benefits (such as reduction in electricity transfer losses) may not flow to Eastland Network but to the incumbent electricity retailer who currently pays for losses.

With such a perverse regulatory environment, it is encouraging that Eastland Network has been pursuing investment in renewable energy projects and energy supply management.

15.2.4 Access to Capital

While there are many energy investment opportunities available to business, their access to capital funding is a significant constraint to realising many of the benefits. Access to capital is essential to both investors who are considering the development of renewable generation projects or those users of energy (business and residential) who, with an immediate investment could realise long-term savings.

The long-term benefits of many renewable projects don't fit well with financiers who look for short-term returns and may be risk averse in particular with respect to investment in renewable energy, an area or technology that they are unlikely to be familiar with.

In addition to the difficulties of businesses getting access to capital for energy efficiency improvements, for many homeowners, access to the capital needed to upgrade their homes in terms of insulation or consider the purchase of solar water heating equipment is also difficult.

Access to subsidised Government programmes focussing on energy efficiency gains are offered by EECA to both the business and residential sectors. Despite this, for many, being able to locate the

additional co-funding is still a major barrier. Other funding opportunities exist from Trade and Enterprise and are focussed on business development, export opportunities and the development of cluster activities. Funding from this source still requires matching co-funding.

15.2.5 Sale of Electricity

Where a cogeneration (heat and electricity produced) or other similar facility is operated and there is surplus on-site electricity, the ability to sell the electricity is a valuable revenue driver. Currently, there is a difficulty in finding anyone to purchase the electricity other than at around 85% of the spot price at the grid exit point (with an allowance for losses). Even if a purchaser can be found it is difficult to be able to get a price that makes the sale worth entering into. If the energy is controllable and able to be scheduled to high price times of the day, then it is easier to find a purchaser. The transaction costs of setting up a sale and purchase agreement; with an associated distribution agreement is generally too high and ultimately kills the project.

For photovoltaic and other small sources of generated electricity, it may be possible to have a net metering[55] arrangement. This is generally not supported by the major energy players but the benefits are such that it should be worked through with relevant parties. (Government officials are currently addressing this issue and it would appear that a net billing[56] (as opposed to met metering) initiative may result. The timing of these activities is uncertain but it is unlikely to be within the next 2-3 years.

15.2.6 Low Value Renewable Energy and the need for Storage Initiatives

Because electricity generated from wind, run of river hydro and solar is not economically storable this generation may have low value. Support should be given to national research efforts being channelled into investigating technologies for storing renewable generated energy. The ability to store energy in batteries or other such media could enable some households in remote rural areas to become fully independent of the national grid system.

15.2.7 RMA Legislation

Earlier this year, amendments to the Resource Management Act delivered on the Government's preference for national co-ordination of controls on greenhouse gas emissions. The amendments give greater emphasis to climate change and energy matters in Resource Management Act planning and decision-making. Specifically, and at high level, the amendment makes provision for renewable energy. While this is a major and positive step forward, there are a number of specific issues that still limit the effectiveness of the Act, for example, the definition of renewables is limited to only covering electricity generation and does not cover heat production. Further, there is no provision for the access of transmission lines to any resulting development. This is a particular issue for the development of wind farms and small-hydro developments that are typically remotely located.

Responding to consultations on these issues is an effective means for the Taskforce to communicate how these issues, such as those identified above, are impacting on, and potentially harming regional development opportunities. The Taskforce must take opportunities like these to make its voice heard.

16 Regional Energy Delivery Mechanisms

The study has demonstrated that the Tairawhiti region is rich in resources, and has a real enthusiasm from within the community for improvements in energy efficiency and the use of alternatives to electricity. What is currently lacking however is a local means of delivery of the energy services and of information to both the residential and business communities on initiatives they can take. These activities are often outside the scope of energy supply companies.

A delivery mechanism to pick up these activities requires champions and service providers who would have a key role in delivering improvements to the region, improving the understanding of and opportunities for the communities (residential and business) to access and secure funding, and in general improve the energy security of supply from a demand perspective. The need for such champions and service providers is significant and presents an exciting opportunity for the region for residential and business/commercial energy users alike.

The community has traditionally looked to the energy supply companies, particularly the local electric power boards, to be leaders of the delivery of energy services. This is no longer the situation because of

[55] One meter with the ability to run in two directions (depending on whether the owner is importing from or exporting to the network).
[56] Two meters running side by side, one showing imported electricity the other showing exported electricity.

the fragmentation of the roles of such entities, and their requirements as companies to focus on financial returns to their shareholders. The community now has to look at how it can take action itself to ensure that its interests are looked after, and to find appropriate entities to undertake activities that are currently "falling between the gaps". The gaps are in:

- The provision of residential energy programmes,
- Assistance to local commercial/industrial businesses to reduce energy costs and
- Investment in new energy facilities.

The energy supply companies will continue to be a major part of the 'energy solution' and community based entities will only ever complement their activities.

16.1 Community Based Energy Services Entities

Nationally, there are a number of energy services entities providing energy efficiency advice and delivering residential energy efficiency programmes. They have all had quite different beginnings, some have emerged from Energy Trusts, some are Energy Trusts and others are the initiatives of their owners. Leading examples include:

- Energy Options, Jo Hunt, Whakatane (http://www.energyoptions.org.nz/)
- EnergySmart, Robyn McKeown, Tawa (http://www.energysmart.co.nz)
- Community Energy Action, Christchurch (http://www.cea.co.nz/)
- Negawatts, Grant Dunford, Wellington (http://www.negawatt.co.nz/main.php?page=144)
- Huntly Energy Efficiency Trust, Pamela Story, 07 858 1407.

All are successful in their own right, they work with and on behalf of national bodies such as EECA and Housing New Zealand, with all the electricity retailers, Local Authorities and District Health Board's but there is plenty of room in the market for more such organisations.

These organisations play a key role in the training of local people enabling them to deliver energy efficiency and insulation retrofitting services. And, while they maintain a strong presence in their area of origin, each organisation has successfully expanded to meet a national demand for the services they offer.

16.2 Local Delivery Mechanisms—Options for Services Providers

In terms of the form that a local energy service provider could take, three possible models or options emerge:

- A small locally distributed 'virtual' organisation,
- Building on an existing organisation or
- Development of a Tairawhiti Energy Trust as an independent service provider.

A discussion around each option is presented in the following sub-sections.

- ***Small locally distributed 'virtual' organisation***

This kind of arrangement would essentially be a 'virtual' company with around 6 bases throughout the region. Each base would be no more than an interested/committed individual and/or a local electrician/plumber. This approach would help reduce costs but inevitably such a set up may find it hard to establish a track record with the key funding agencies and may struggle to meet all of the needs of the area in terms of residential and commercial/business energy advice and service provision. Further, it is likely that this kind of set up would find it difficult to maintain a team of service delivery providers outside of funded projects without outside help; projects tend to be small and it would likely to be hard to get and maintain skills. Potentially, this set up is less attractive to central government agencies.

- ***Building on an existing organisation***

Essentially, in this model existing organisations, such as the two Councils in the region or the iwi authorities or the regional health provider Ngati Porou Hauora (Te Puia Springs Hospital and Community Health Services), could take the lead role. In particular, the Gisborne District Council has an energy team and the obvious organisational and structural advantages (for example, administration and management skills and services). Ngati Porou Runanga also has these organisational and structural advantages in their favour (for example, administration and management skills and services and business development and management skills and experience) and have also already initiated preliminary planning documents around the needs of the Ngati Porou Runanga in the region. Ngati Porou has successfully created a fishing business and a forestry business although the provision of energy use and efficiency advice is not a current skill available to the Runanga (although this in itself is not a show stopper). Both the other iwi

authorities (Turanganui A Kiwa and Ngati Kahungunu), despite recognition of the issues and enthusiasm for progress, are less developed in terms of being readily able to undertake energy programmes. Ngati Kahungunu in Wairo have somewhat less resources at their disposal but despite this are preparing to work with Housing New Zealand in the delivery of maintenance and improvement services to 50 homes in Wairoa. Finally, the maintenance team at the Ngati Porou Hauora, has developed practical skills through the installation and maintenance of solar water heating systems in Te Puia Springs. While single handedly, it could not deliver energy programmes for the whole region, the experience the tradesmen have gained from this previous EECA initiative on solar water heating is invaluable and efforts should be made to ensure that these skills are not lost.

Each of the organisations noted above has strong skills and shows considerable enthusiasm for improving energy security and efficient energy use amongst their communities and businesses in the area. Despite this, no single organisation currently is in a position to be able to deliver all the services to meet the needs of the residential and business communities in the area. Finally, although they were not consulted in the course of this study, it is unlikely that other non-Maori groups in the area (such as the Citizen's Advice Bureau or various religious community help groups) would be able to individually undertake the provision of energy services in the area.

- ***Development of a Tairawhiti Energy Trust and an Independent Service Provider***

The third option is the development of a regional service delivery provider as part of an Energy Trust. In this model, the organisation would be independent and would be funded specifically to undertake energy projects for the benefit of the Tairawhiti communities (residential and business). It would be an organisation that emerged from the work of the Tairawhiti Taskforce.

The proposed organisation would be an inclusive organisation working for the residential and business communities (Maori and non-Maori) in the region and having representatives from all parties.

The Trust would have a Chairman and a Board of Trustees that would be populated by as many of the local parties noted previously, for example:

- 2 councils (Gisborne District Council and Wairoa District Council)
- iwi authorities (Te Runanga O Ngati Porou, Te Runanga O Turanganui A Kiwa, and Ngati Kahungunu Ki Te Wairoa)
- Eastland Community Trust
- Eastland Networks Ltd.
- Eastern and Central Community Trust (http://www.ecct.org.nz)
- Regional health providers - Tairawhiti DHB and Ngati Porou Hauora

Other Community organisations such as

- Citizen's Advice Bureau
- Wairoa Senior Citizens Association
- Tairawhiti (Gisborne) Age Concern
- Gisborne Greypower
- Salvation Army
- Anglican Care
- Methodists in Gisborne.

Ideally, the Trust would set up an energy services delivery agency/company in the same way that the Eastern Bay Energy Trust set up Energy Options as a separate service delivery company. As in the case of Energy Options, this model would have a shop front (in Gisborne, for economies of scale) and would deliver energy 'clinics' in the region.

The proposed services delivery organisation would require a full-time Manager who, while being independent of all the groups making up the Board of Trustees, is able to demonstrate a sound understanding of the needs of all the groups making up the organisation. Ideally this individual should have an interest, understanding and experience in providing energy use and efficiency advice to residential and business organisations. In addition, the Manager should have experience in securing third party funding and interacting with Central Government organisations.

A core staff of 3 would be recommended with 'partnership' agreements with local tradesmen (electricians and plumbers) to deliver services. Established service providers country wide (for example Energy Options, EnergySmart, Negawatts etc) should be engaged initially to develop local skills, provide training and help the organisation establish a core team.

A key service from the organisation would be regional energy clinics. A clinic could take a number of forms but essentially it would be run by contracted or part-time employees of the Trust who are located all

over the region (from Hick's Bay to Wairoa). The idea is to offer help and advice to local businesses and homeowners on a regular basis and to act as a point of contact within the community to respond to peoples needs. These individuals would carry out awareness-raising sessions or refer people to retrofitting projects or assistance available from central government organisations. In time they could qualify as warm home energy check assessors[57]. The aim is to spread awareness and understanding and to meet the needs of the Tairawhiti region by those best placed to understand their needs, i.e., the community itself.

The energy clinics could also be based around specific existing entities such as Ngati Porou Hauora.

16.3 Sources of Funding and Support

In terms of sources of support funding, there are several and the setting up of the proposed organisation is likely to be attractive to EECA. In reality, the Trust would help deliver on EECA programmes targeting the residential sector (retrofitting programmes) and the business/commercial sector (energy and electricity audit grants). It is understood that the area has not benefited from either of these programmes significantly in previous or current years, which is disappointing. As a member of EECA's EnergyWise Councils programme, it is important that Gisborne District Council extracts as much value as possible from EECA so that the local residential and business communities can benefit. Further, the council is best placed to create a register of homes and businesses in the area and so establish their needs and also to develop a register of local trades skills.

Other potential supportive funding or initial funding could come from Te Puni Korkori (TPK) and WINZ (for training and education initiatives), and grant funding for projects from Housing New Zealand, Eastland Community Trust, and Eastern and Central Community Trust, in addition to EECA funding. National Trusts are also a possibility.

17 Next Steps

The energy assessment has identified that the region has opportunities to improve energy supply and firm energy costs if it takes proactive and coordinated action building on the existing initiatives being undertaken. The key to coordination and optimisation of regional effort requires leadership from a regional Energy Champion. Currently and because of the ad hoc activities that are being taken, opportunities are being lost and knowledge and experience is not being shared for the wider community good.

Eastland Network is taking significant action with new investment in wind farms and backup diesel generation but because of the regulatory environment in which Eastland Network operates there are significant opportunities that are outside its area of interest. Tairawhiti 'Incorporated' needs to fill those gaps to ensure that reliable and secure energy is supplied to the region at the lowest cost.

A key aspect of coordination will be the establishment of a regional Energy Strategy providing priorities and facilitating action. The Taskforce is well positioned to undertake preparation of the Energy Strategy.

Within the framework of the Strategy, it would assist delivery of desired outcomes if energy services delivery is organised so as to build delivery capability. It is recommended that because of the "thinness" of existing experience and skill base that this be around the functions of a Tairawhiti Energy Trust modelled on similar organisations in Christchurch and Whakatane. The Energy Trust would not necessarily do everything itself but would work with other service delivery entities such as Eastland Network and Ngati Porou Hauora. In the same way that Ngati Porou Hauora has clinics throughout the East Coast, cells of energy installer excellence could be established at appropriate locations.

The success of the implementation of an Energy Strategy will be through effective collective and inclusive action and capability building within the region.

Additional References

DLAB-2002 "Regional Labour Market Report: East Coast", prepared by the Department of Labour, December 2002

[57] It is understood that the EECA Home Energy Rating Scheme (HERS) which was piloted in Christchurch in 2002 is set for National rollout at some future date.

WONI-2003 Identification of Potential Hydroelectric Resources, for Ministry of Economic Development, 2004.

BAY OF PLENTY

MWD 1982-1 "Assessment of Local Hydro-electric Potential – Bay of Plenty Catchment Region". Ministry of Works and Development Hamilton District Office, December 1982.

BOPE 1994 "Proposed Kioreweku Hydroelectric Scheme Rangitaiki River – Bay of Plenty – Assessment of Environmental Impacts Report", Bay of Plenty Electricity, June 1994.

GISBORNE

MCBL 1981 "Small Hydro-Electric Potential – West Poverty Bay Region" by Mandeno, Chitty and Bell Ltd for NZERDC, July 1981.

T&T 1978 "Hydro-electric Potential – East Cape" by Tonkin and Taylor for NZERDC, November 1978.

HAWKES BAY

BA 1981 "Wairoa Region – Study of Hydro-electric Potential (Stage II)", Barrowclough Associates, 1981.

ECNZ 1992 "Grey River Water Conservation Order Hearing, ECNZ Evidence", 1988.

W20/92 "Decision No. W20 /92, Mohaka River Water Conservation Order, Report and Recommendations of the Planning Tribunal"

T&T 1981-3 "Hawke's Bay Region, Assessment of Local Hydro-electric Potential", Tonkin & Taylor Ltd, 1981