Bay of Connections

One region. One goal. One future.

Regional Energy Strategy

Brian Cox
East Harbour Management Services

Regional Economic Growth Strategy

Regional Economic Growth Strategy Vision

– The most dynamic and progressive region

-- Where we work together to achieve :

- Economic prosperity,
- A sustainable environment, and
- Improved well-being for all people

But what does the Growth Strategy say about energy ?

– Brief mention:

- Alignment between sub regions, and
- Investigate sustainable energy options for the future

(Seen as an enabler, not as a growth-engine in its own right)

Regional Consultation

Fact finding by consultation

Sector	Organisation
Government (including regional and local)	EECA (Energy Efficiency & Conservation Authority) Environment Bay of Plenty District Councils Department of Conservation Ministry of Economic Development
Maori Organisations	16 Maori authorities
Individuals	Number of individuals with an interest in energy
Education /research	Bay of Plenty Polytechnic Scion Waiariki Institute of Technology
Business/Industry	Pack houses - Eastpack Port of Tauranga Industry – SCA, Trevelyan's
Energy/Electricity	Electricity network companies - Horizon Energy, Powerco, Unison Networks Electricity retailers - Bay of Plenty Energy, Trustpower, MRP, Genesis Rotorua Energy Champion Transpower
Other Organisations	SmartGrowth Destination Rotorua Economic Development Priority One Toi - EDA

Forum – discussion of draft - key regional energy stakeholders

Report to Regional Governance Group

Regional Economic Growth Strategy

Key points for an energy strategy

The Bay of Plenty:

Is probably New Zealand's most energy rich region

- Particularly rich in sustainable energy

We need a paradigm shift in our thinking to exploit this

- Wealth creation not preservation

We have to:

- Move forward from our current mindsets
- Focus on energy, not just electricity

We need to address this collectively, and think smart

The opportunity is to create more wealth out of energy than current horticulture production

Energy – What We Could Achieve

Over the next 15-50 years we could attract investment of >$4billion in sustainable energy developments:

- Geothermal electricity generation ($2b plus)
- Geothermal direct heat supply to processing industries
- Transport fuel manufacture from forest wastes ($1b plus)
- Tourist related activities based on geothermal resources
- Use of wood fuel for industrial, institution and residential heating
- Hydro and solar energy

Based on the region's abundant sustainable resources

- geothermal,
- wood,
- solar

Generating >15% of NZ's electricity demand (becoming a net exporter)

Producing more than 10% of NZ's liquid transport fuels (ethanol & biodiesel)

Growing energy-intensive processing industries and tourism activities

With major benefits in terms of 1000's of jobs, skills, lifestyle and benefits to Maori etc

Regional Energy

The Region is resource rich:

In sunshine and rain

- Opportunity in solar energy, and hydro generation

In geothermal

- Under every part of the region
- World-leaders in industrial use at Kawerau

In forest residues

- Currently being wasted, and wood exported as log and chip

But currently energy poor:

- It imports electricity, and all gas and transport fuels

People rich:

- Pool of people from which to develop energy skills
- Includes Scion (international centre of wood-energy research)
- Builds on existing strengths - Kawerau, (worlds major geothermal heat user), Waiora Health Spa, QE Health
- Has two well established trades training providers
- Rich in energy and building trades skills development opportunities

Regional Energy Drivers

Increasing prices:

- Facing increased costs for hydrocarbon fuels (gas, liquid) and electricity
- With a carbon charge on all the above

Security of supply:

- Issues with electricity
- Constrained availability of gas

Economic growth:

- Forecast 3.5% pa over next 5-years (pre recession?)
- Population growth particularly around western area

Energy demand growth

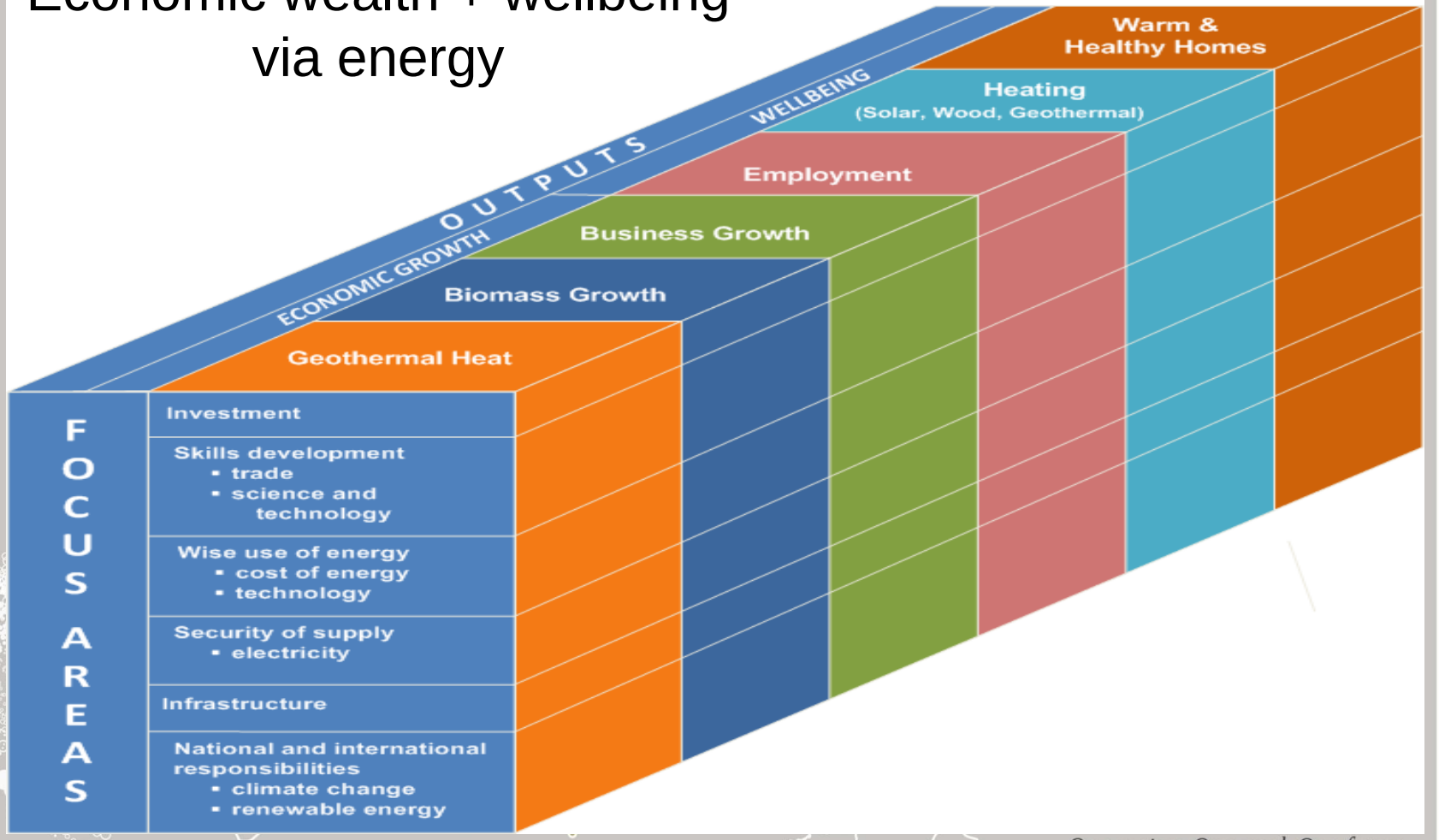
- Electricity & heat demand growth “commensurate” – but depends on industry type/use
- Electricity demand expected to grow 14% in next 10-years
- Driven by population, economic growth
- Government drive for warm and healthy homes
- Need for expansion of infrastructure

Development of Resources

- Need for new electricity power stations
- Renewable energy sources replacement for coal and gas – response to carbon tax
- Move to use sustainable energy sources

An Integrated Strategy

Economic wealth + wellbeing
via energy



Situation – National Energy Issues

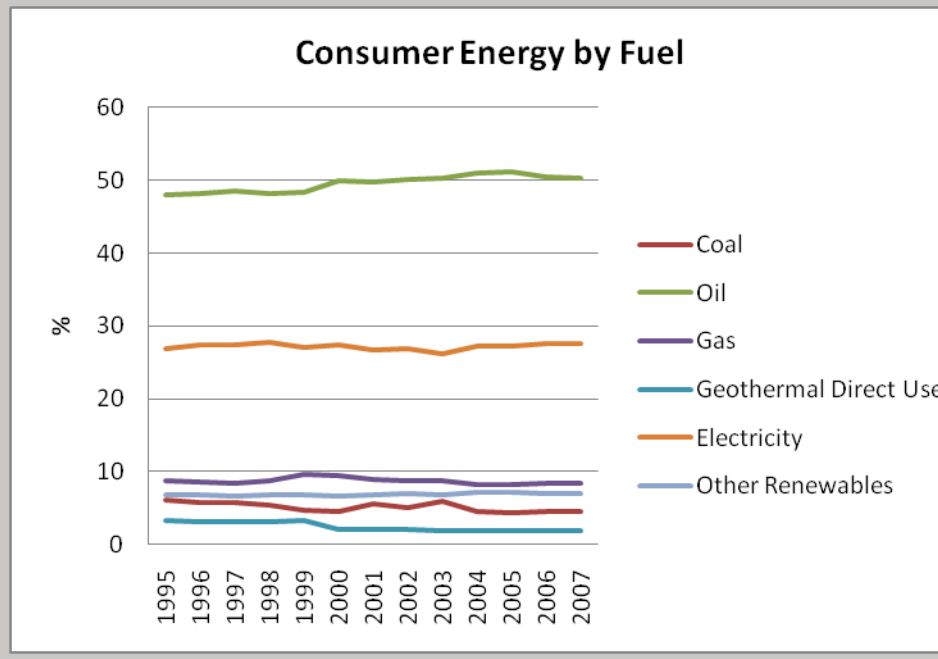
Transport fuel

Cost of energy

Security of electricity supply

Reducing gas reserves

Climate change policies



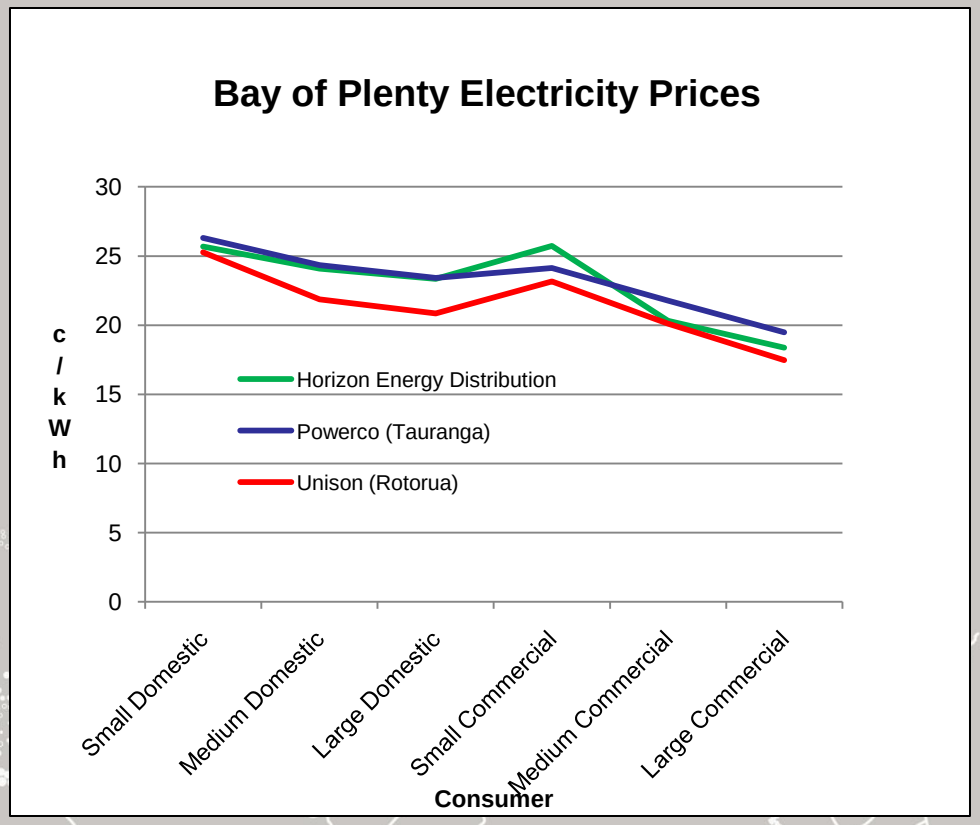
Situation – Electricity Pricing

Pricing is relatively high, and volatile, reflecting:

- Supply situation
- Constraints on supply network/nodal prices

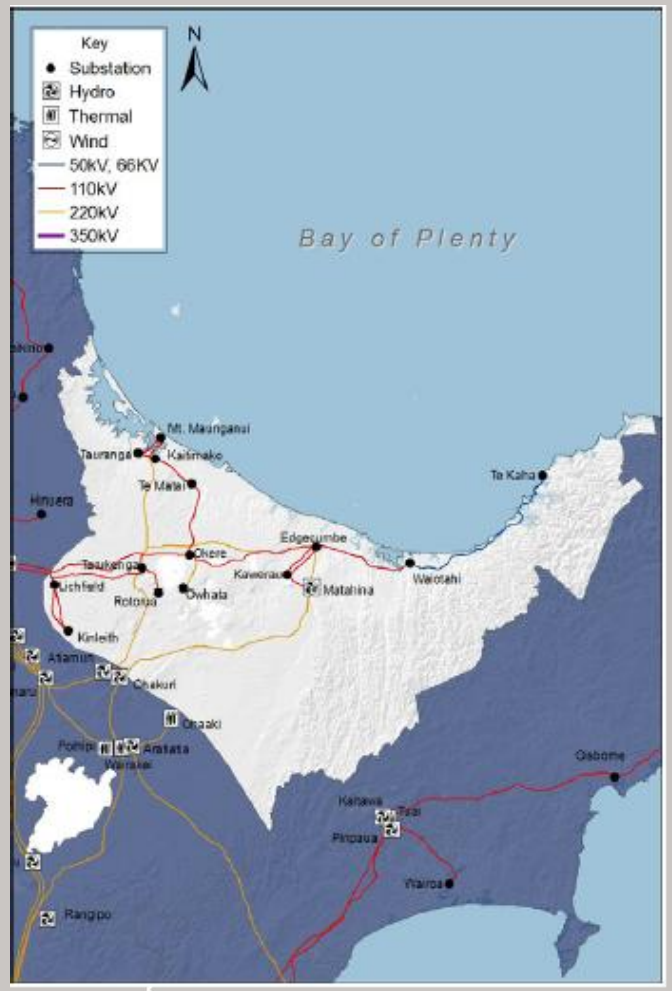
Industrial prices reflect national prices

with regional uplift reflecting constraints



Situation – Electricity Distribution Networks

- Transpower supplies three regional network companies:
  - Powerco: Western BOP
  - Horizon: Eastern BOP, and
  - Unison: Rotorua and southern BOP
- New 100 MW geothermal power station at Kawerau has reduced the loading of the circuits into the Eastern BoP
- But a single line supply to some areas diminishes security of supply; will require significant investment to overcome.



Situation – Electricity Supply

EASTERN BAY OF PLENTY - HORIZON ENERGY

Issues with Transpower supply

– Just one line (from Edgecumbe) to Waitotahi and on to Te Kaha

  – however new 100 MW geothermal power station at Kawerau has reduced the loading of the circuits into the Eastern BoP

Issues with Horizon's area

- Arise from only having a single line supply to some areas
  - e.g. Waitotahi/Te Kaha (Transpower) – reliability of supply is affected
- Issues are exacerbated by electricity infrastructure:
  - having long lead times
  - being subject to uncertain further delays possibility affecting investment decisions

Situation – Electricity Supply

WESTERN BAY OF PLENTY - POWERCO

Issues with Transpower supply

– recent upgrade to their system at Welcome Bay has alleviated some issues

– investigating increasing (110 kV) supply capacity in Western Bay of Plenty

– other work planned or being investigated along with Powerco e.g.Papamoa)

Powerco has some at-risk areas

– capacity in some localities to the north of Tauranga e.g. Greerton

– security of supply to a number of localities from single line supply or limited back-up capacity (large scale Te Puke growth a factor).

-quality of supply e.g. low voltage. Proposed substations should assist

- some cables in the Tauranga central city do not have suitable capacity

  - risk that outage times will be extended for some customers.

-an issue is access to corridors and land to provide adequate electricity infrastructure at the right time.

  - Requiring undergrounding may defer investment in new circuits

Situation – Electricity Supply

ROTORUA & SOUTHERN BAY OF PLENTY - UNISON

Rotorua region is supplied by 33kV radial feeders.

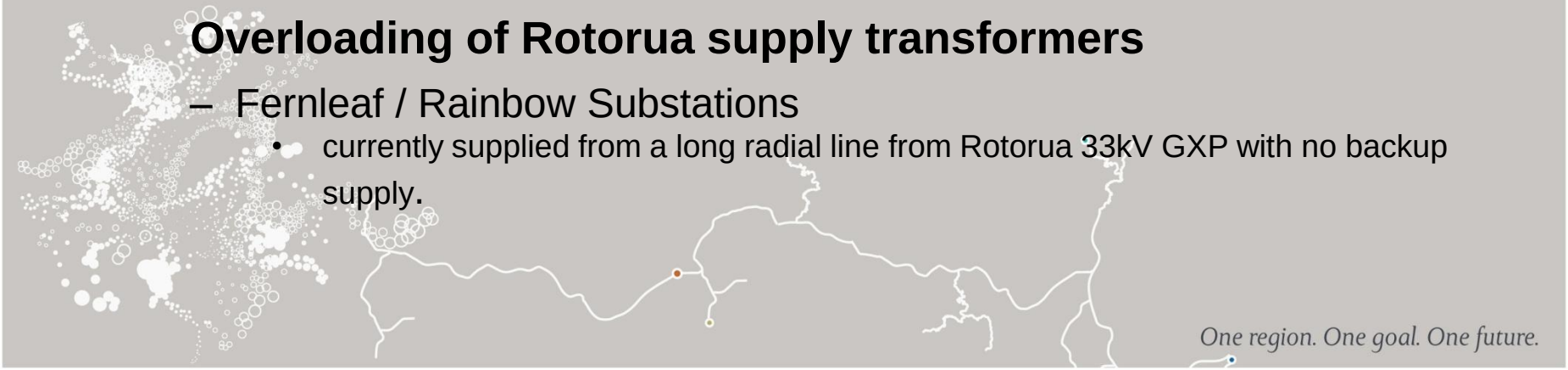
– Ok for rural consumers,
– Inadequate for the several large industrial consumers operating in the region.
– Will require significant investment.

Unison has some at-risk areas

– High load growth in the outskirts of Rotorua township cannot be supplied through existing rural 11kV feeder.

Overloading of Rotorua supply transformers

– Fernleaf / Rainbow Substations
  - currently supplied from a long radial line from Rotorua 33kV GXP with no backup supply.



Electricity Supply Actions

Development of 20-50 year infrastructure plans

- Provides a mechanism for annual review of electricity and gas networks.
- Requires network companies to discuss their asset management plans
- Provides opportunity for community to engage with infrastructure providers

Integration of infrastructure planning with urban development planning

- Ensures substations and lines planned ahead of land use changes eg subdivisions.
- Reduces NIMBY opposition

Transmission corridors

- Infrastructure providers have to secure land well ahead of need.

Business energy users cluster

- Develop collective energy management skills and practices programme
  - Energy auditing
  - Knowledge and skills development
- Lobby group for improvements in energy delivery services

Solar Energy Potential

Solar radiation for the Bay of Plenty region is approximately 1450 kWh/m²/yr, with no large variations across the region.

Building design

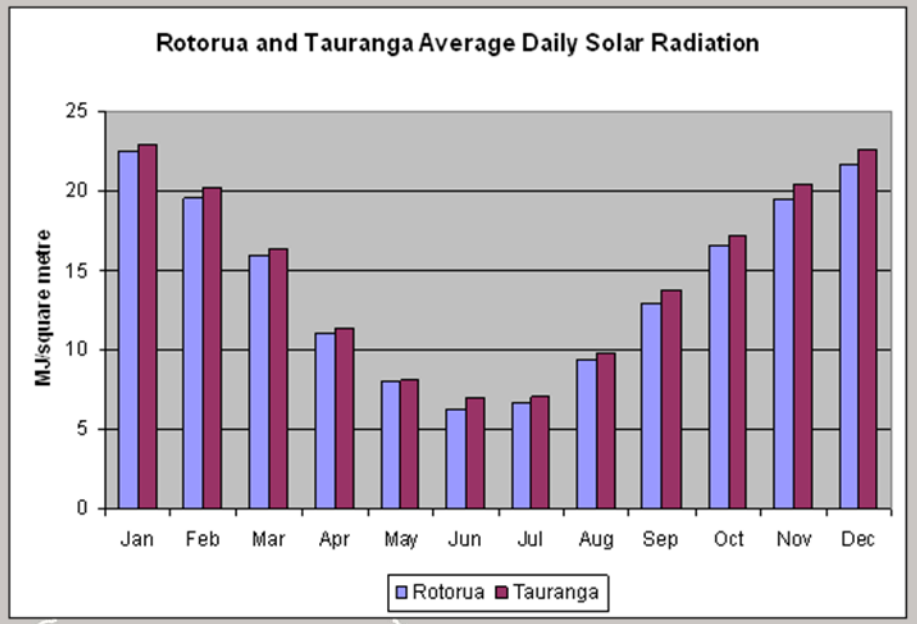
- Solar energy is cost effective for house heating
- Needs to be included in basic design.
- Needs to be a design criteria

Solar water heating

- Half the cost if included in a new house
- Proven product – number of small suppliers
- Requires improved skills of installers
- Current high cost of obtaining Building Consent

Electricity generation

- Cost effective at present for off-grid applications
- Costs fast reducing for on-grid applications



Situation – Housing

NZ has cold homes

- Health is related to warmth and health of homes

NZ has a lot of old homes

- Poor insulation
- Not designed to capture solar heating

Design for new houses

- Lack of appreciation of value of design in maximising use of solar energy for heating
- Good design for energy conservation seen as a cost not a benefit to home owner
- Adding solar water heating after the house is built can double the cost

Upgrading existing houses

- Need for knowledge of options amongst home owners
- Lack of skills within building trades on best practice
- Cost of getting a building consent high because of processing procedures

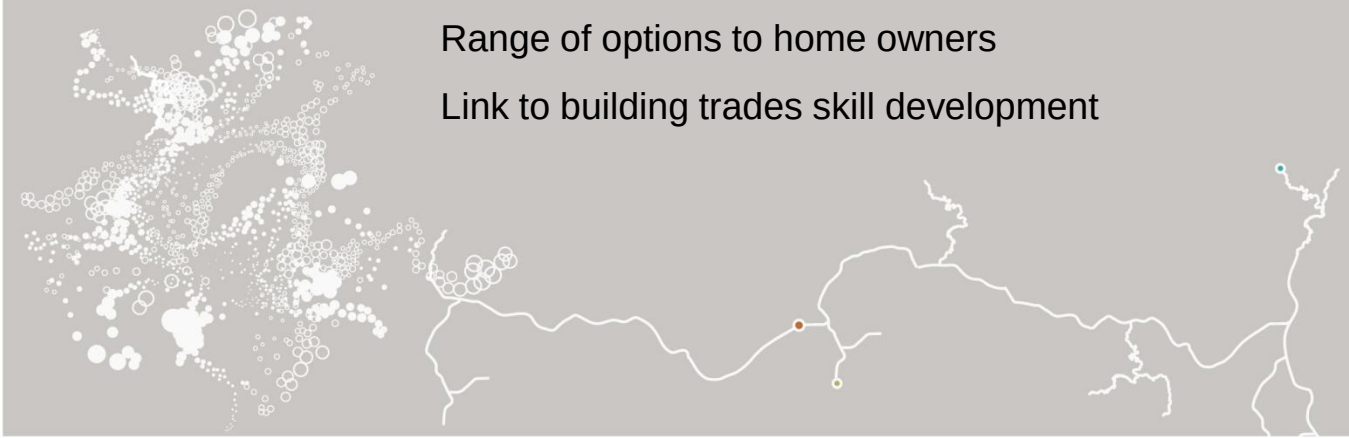
Warm and Healthy Homes Actions (1)

Promotion of warm and healthy homes

- Regional scheme
  - New home owners
  - Low socioeconomic groups
- Base on work of existing providers – Energy Options

Improve access to energy efficiency information

- Website based information eg extend Rotorua Energy Champion site
- Establish demonstration homes
  - Range of options to home owners
  - Link to building trades skill development



Warm and Healthy Homes Actions (2)

Improve building trades energy skills

Establish cluster group with trade associations, training providers, equipment suppliers etc to establish skills development training programme

Push to government for support for regional building trades training.

Securing Government funding for improving existing homes

Use Energy Options existing capabilities for whole of region

Streamlining & reducing costs of Building Consent

Standard procedures for minor works

Oil and Gas Potential

Gas supply

Current extensive gas network is underutilised

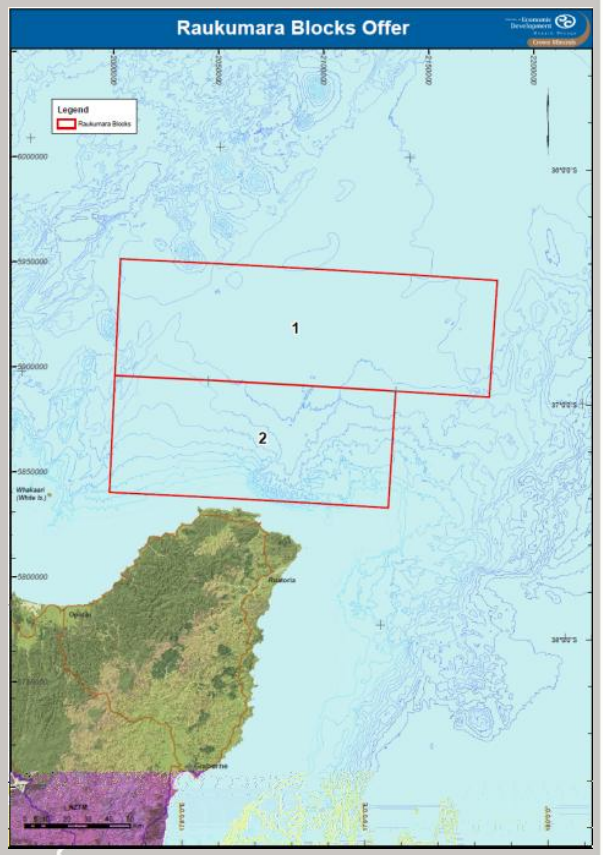
Direct use of gas is more valuable use of gas than for electricity generation

Opportunity is direct use or cogeneration of electricity

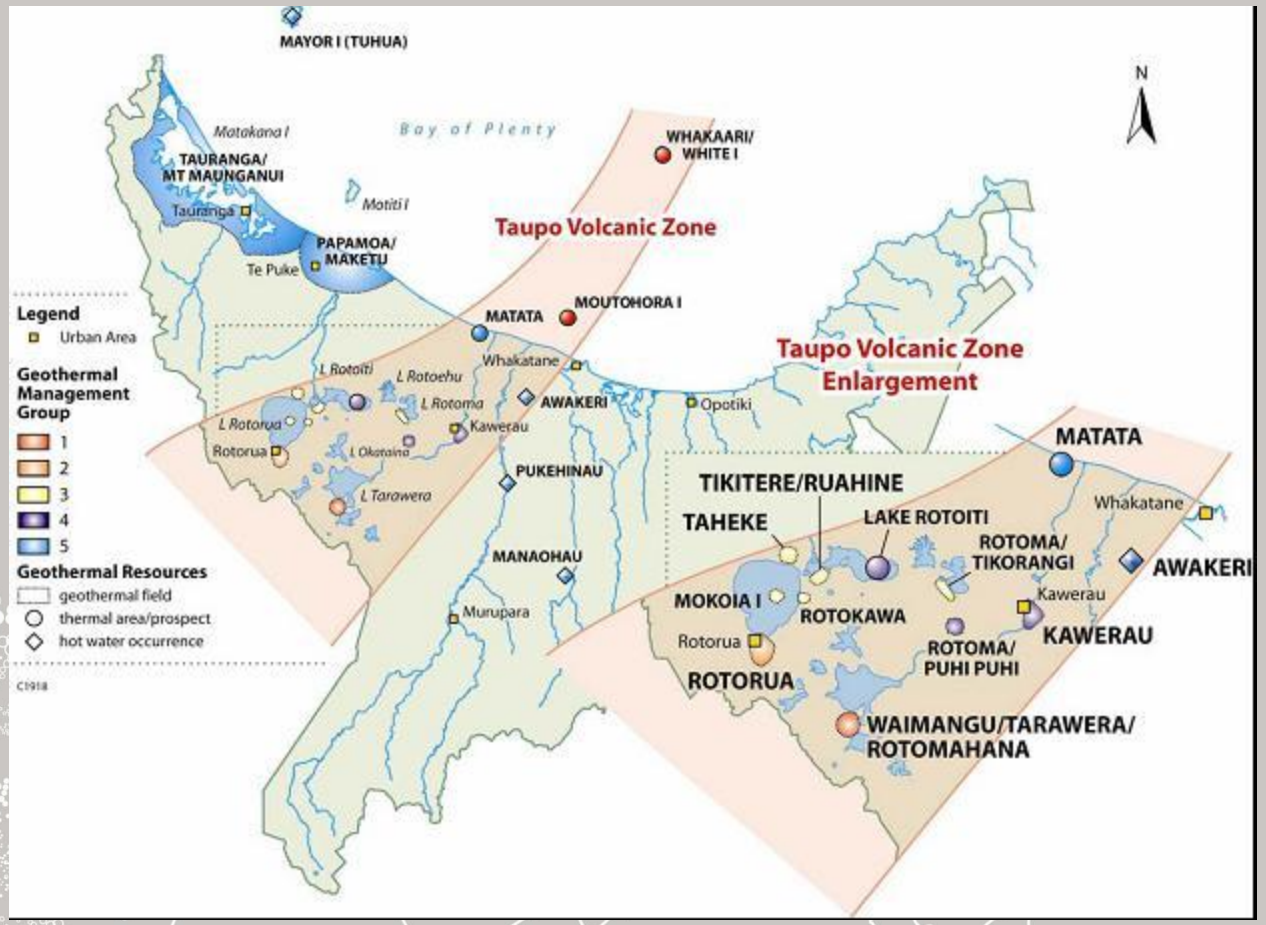
Oil exploration

The Raukumara oil blocks

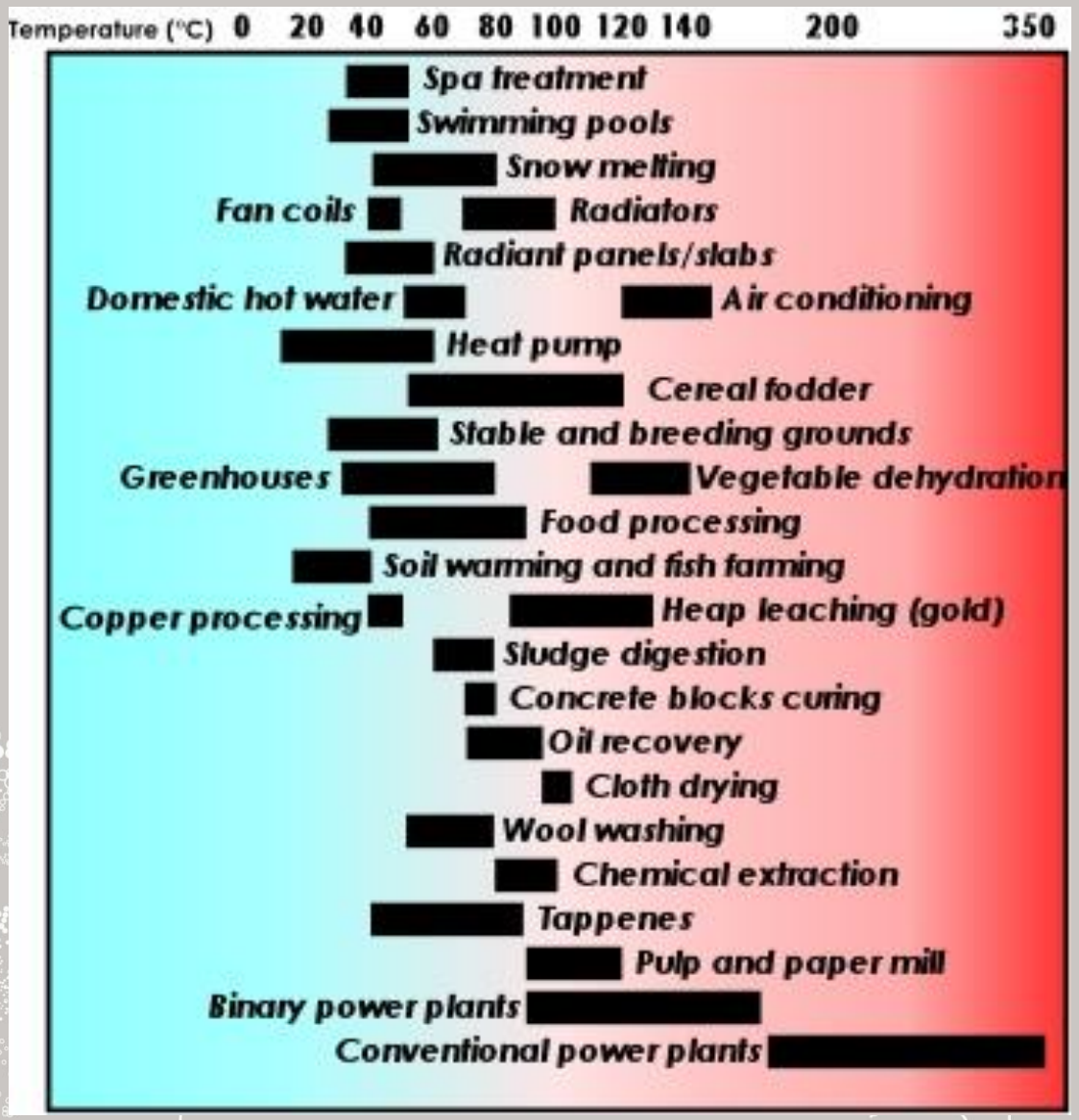
- Exploration support servicing through Port of Tauranga



Geothermal Potential – The Resource



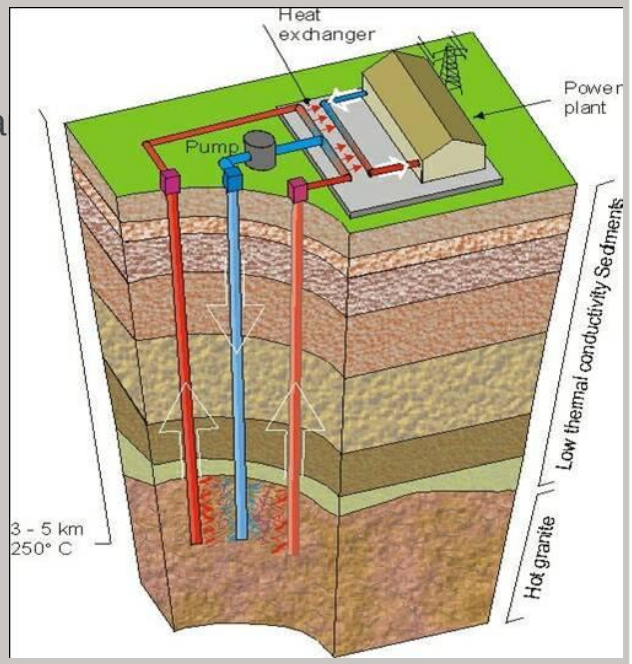
Geothermal Heat Opportunities



Geothermal Potential – Electricity Generation

Conventional technologies

- Land owners are key to access projects
- potentially $4billion in investment
- Large number of jobs in construction
- significant trades skills required for operation and maintena
- reasonable ongoing employment
- export of electricity
- security of supply
- sustainability/cap on prices ....



Deep enhanced extraction of heat

- Access to deep heat
- Requires large heat load for economies of scale

Low enthalpy technologies

- Emerging technology for low temperature heat sources

Geothermal Potential – Rotorua

Rotorua geothermal potential

Currently based on preservation and not use

Paradigm shift in thinking - mining geothermal heat and not extraction of fluid

Opportunities for:

- District heating
- Commercial heat supply
- Higher profile for geothermal health spa
- Skills development
- Employment

Opportunities elsewhere

- Geothermal expertise getting older and not being replaced.
- Rotorua recognised as an international geothermal centre

Rotorua is geothermal

Geothermal Potential – Health and Well Being

Geothermal health spa

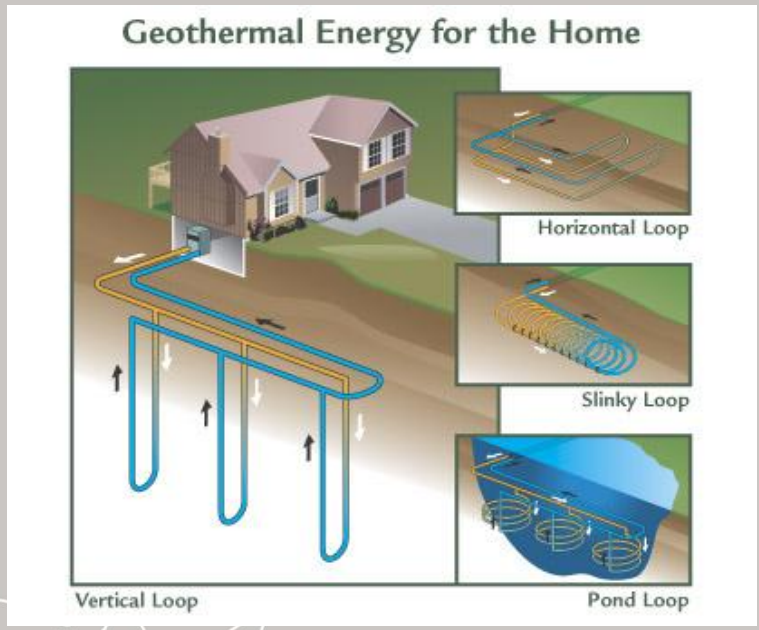
- Rotorua once was international health spa centre.
- Health spa adds to tourism opportunities
- Builds on international specialness of Rotorua
- Builds on QE Health and Waiora Spa

Recreational and tourism

- Builds on existing spa culture
- Significant employment opportunities

Residential heating

- District heating
- Shallow heat exchangers
- Geothermal heat pumps
- Removal of heat not fluids



Geothermal Potential – Commercial Heat

Horticulture

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Industrial heating

District heating schemes

Aquaculture

Geothermal Actions

Establish Rotorua Geothermal Cluster

- Develop geothermal utilisation strategy and action plan
- Establish R&D requirements
- Seek assistance from Government for Action Plan
- Undertake pilot district heating scheme

Establish Rotorua Geothermal Health Spa Cluster

Establish regional Geothermal Hothouse Heating Cluster

- Includes landowners, horticulture growers, and Hort NZ

Establish Geothermal Heat Extraction R&D Cluster

Establish Geothermal Aquaculture Cluster

Hydro potential – Electricity Generation

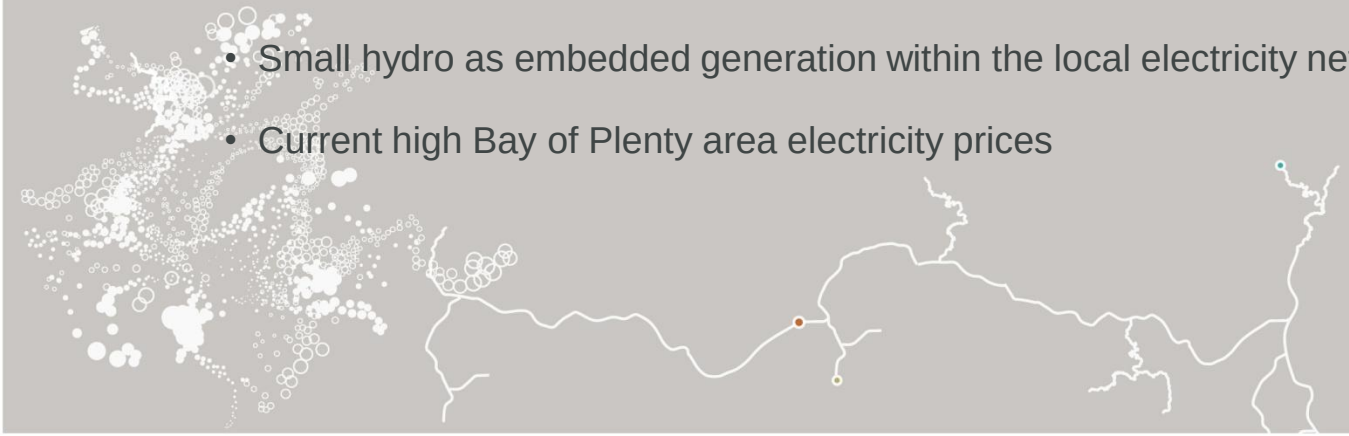
Resources

- Installed hydro capacity within region is currently 163 MW
- 3.5 MW of new capacity is currently under study by BOP Electricity
- The remaining hydro potential is about 681 MW in large, medium, mini and small scale projects
- But only around 20 MW appears to be outside the Department of Conservation area or native forests.

The opportunity

As a medium-term prospect:

- Small hydro as embedded generation within the local electricity networks, given
- Current high Bay of Plenty area electricity prices



Situation – Low Value for Forest Owners

20% of forest wasted

Millions of dollars lost each year

Situation – Wood Energy

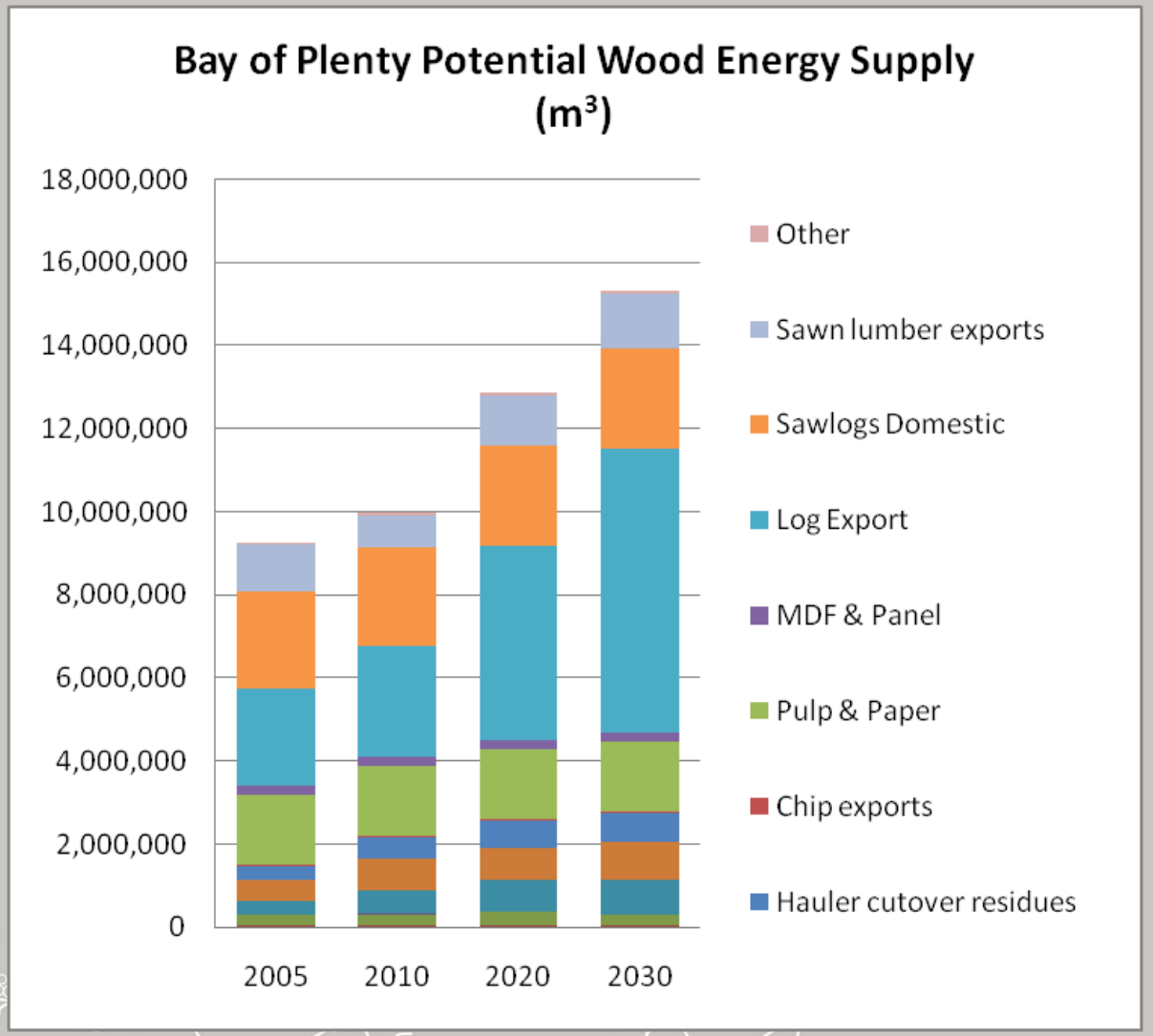
Wood fuel

- Sourced from wood processing plant or forest residues
- High quality wood pellets, quality chip unsorted forest residues

Uses

- Heat
- Electricity generation
- Production of transport fuel (ethanol, bio-oil, biodiesel)

Biomass to Energy Opportunities – The Resource



Data source SCION

Biomass to Energy Opportunities – Economic Growth

Increase returns for forest owners

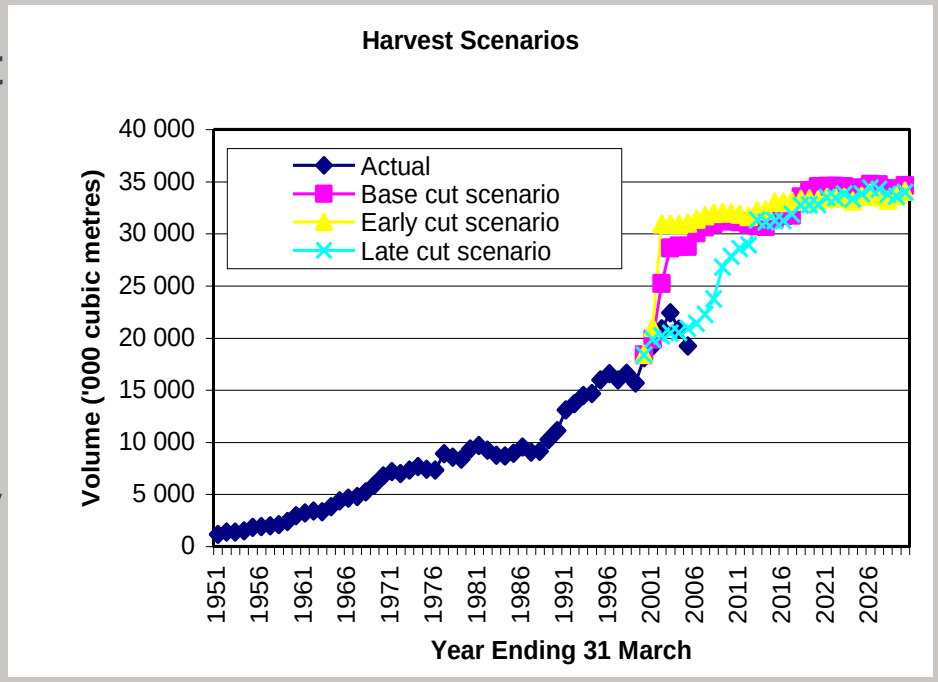
- Income from the 20% currently wasted
- High quality residue that has value as wood fuel
- Volume is increasing

Utilisation of lower quality lands (including fuel crops instead of forestry)

- NZ transport fuel could be produced from forestry on marginal lands

Contingency

- Pulp mills are ageing – where would their pulp logs go if they closed.



Opportunity – Wood-to-transport fuel

Lignocellulosic feedstocks

- Most abundant form of biomass
- Can be grown on low-value land
- High greenhouse gas reductions
- High net energy yield
- Greater yield per hectare

Examples:

woody biomass

agricultural residues

Perennial grasses

Biomass to Energy Opportunities –Transport Fuel

Lignocellulose to transport fuel

Proportion of liquid fuel and energy demand that could be met from existing residual wood forest resources (assuming 1.5% per annum growth in energy demands).

Per cost of wood/m3 (starting point 8.1b litres)

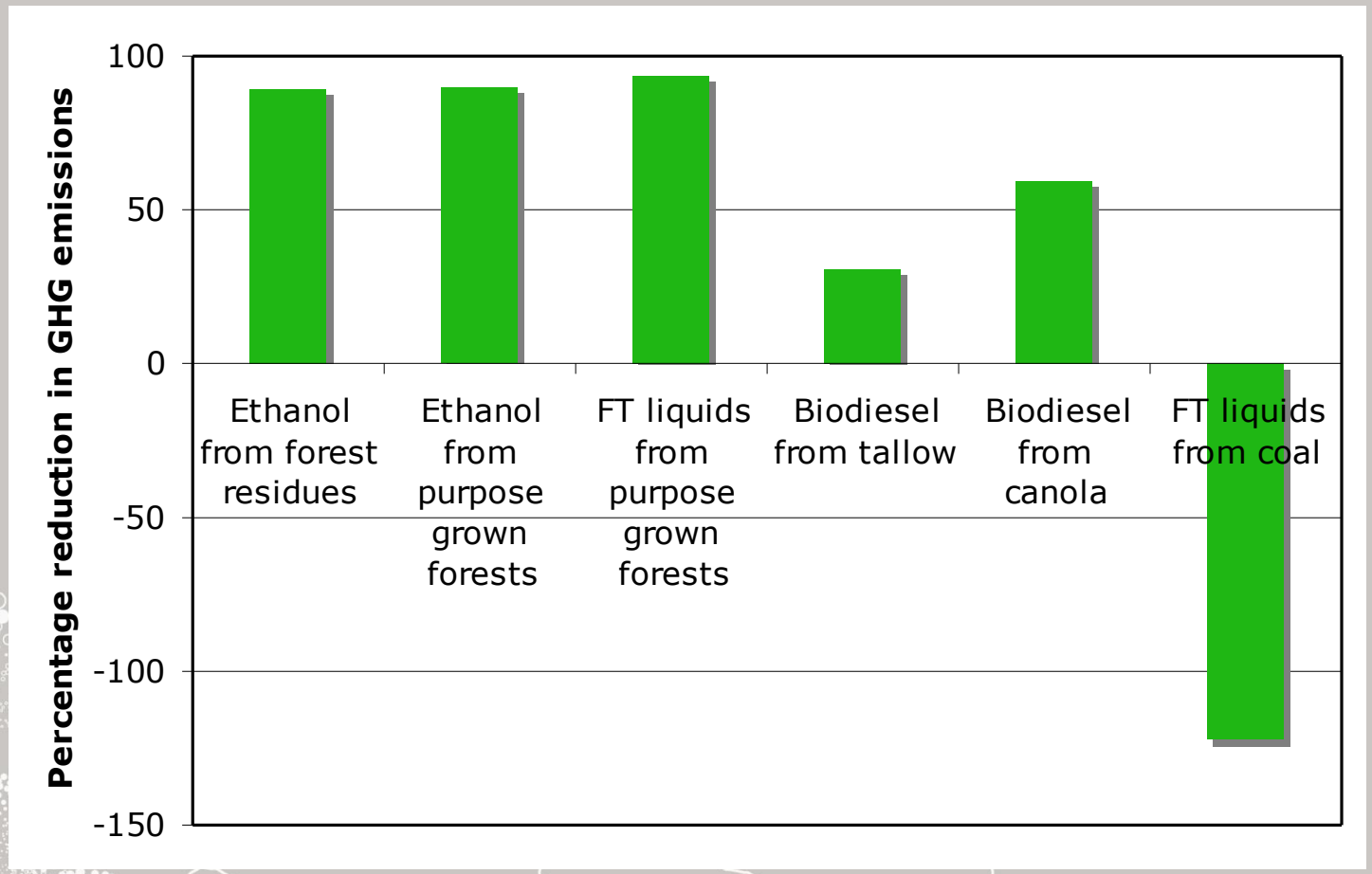
	2010			2020			2030		
	$50	$65	$85	$50	$65	$85	$50	$65	$85
% liquid fuels	7.4	12.1	23.2	8.0	12.9	27.3	7.1	11.1	28.2
% Primary energy	6.1	10.3	19.8	6.6	10.7	22.6	5.9	9.2	23.4

Source Scion

Bay of Plenty forests have the potential to provide a significant (30%?) proportion of this.

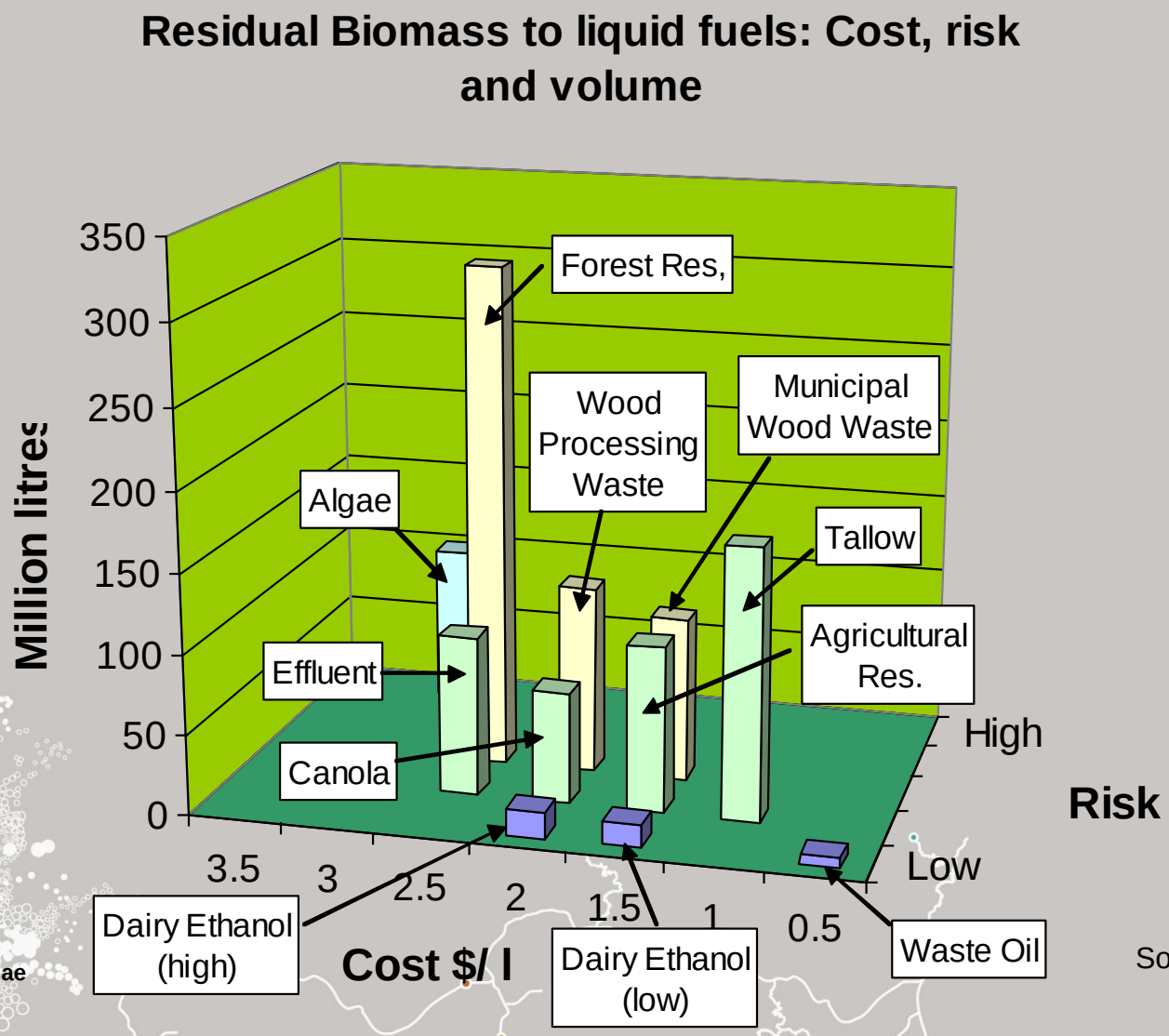
Biomass to Energy Opportunities – Transport Fuel

Green house gas reductions from biofuels



Source: Scion

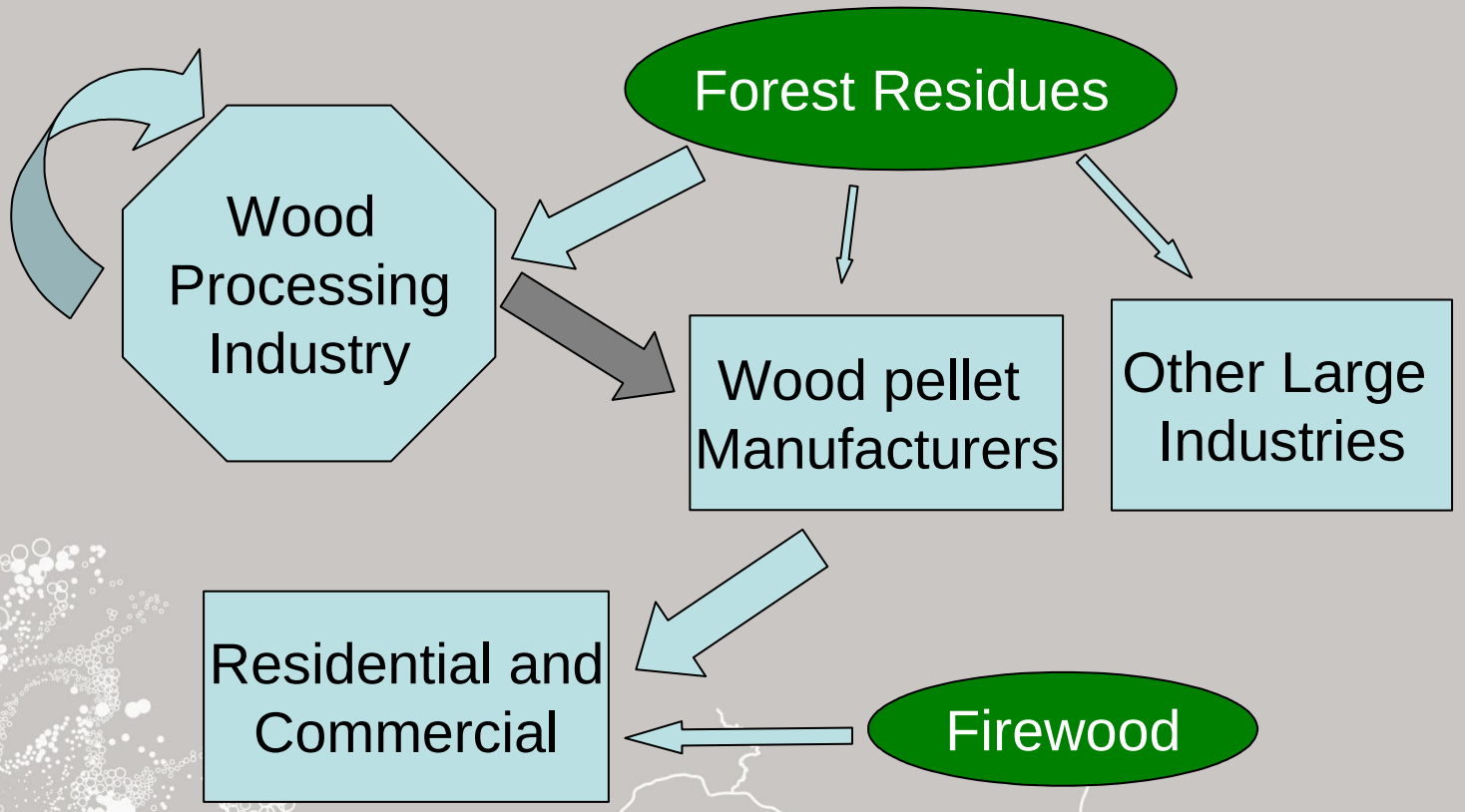
Biomass to Energy Opportunities – Transport Fuel



Source: Scion

Biomass to Energy Opportunities – Fuel Trade

With Carbon Tax



Biomass to Energy Opportunities – Actions

Establish Scion as a Centre of Excellence for wood to energy research.

Lobby government for an increase in funding for wood to energy research

Lobby for priorities for lignocellulose –to-transport fuel research

Local government and institutions to have procurement policies to consider wood fuel

Establish Forest Residue Wood Fuel Cluster

- Loggers forest owners and chip hoggers cluster to establish practices that improve quality and reduce cost of producing wood fuel from forest residue.

Enabling capabilities – infrastructure

Port

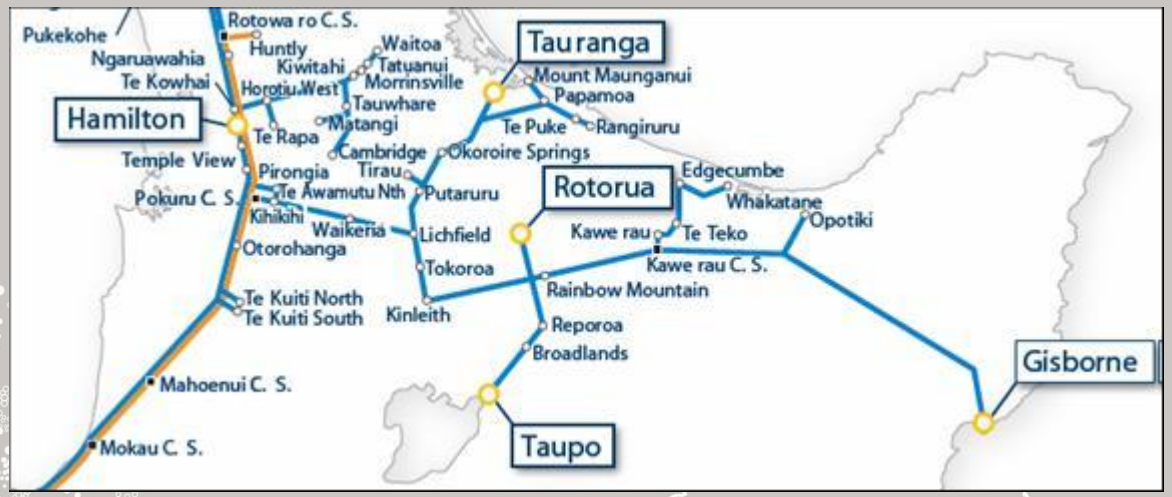
Export of wood fuel (& imports coal)

Host for development of Raukumara oil prospects.

Electricity distribution networks (and export of electricity)

Requires the region to take responsibility for planning and ensuring action occurs.

Gas distribution networks



Need for 20 & 50year Electricity and Gas infrastructure Plans

Annual monitoring and review mechanism

Enabling capabilities – Information

Rotorua Energy Champion

www.energychampion.co.nz

Website for access to information on energy

Directory of suppliers and advisers..

Information centres

Waiariki Polytechnic

Scion

BOP Polytech / Waikato University

Training centres

Recognition as centres of knowledge and learning

Ease of access

Enabling Capabilities – Skills Training

Science and Technology

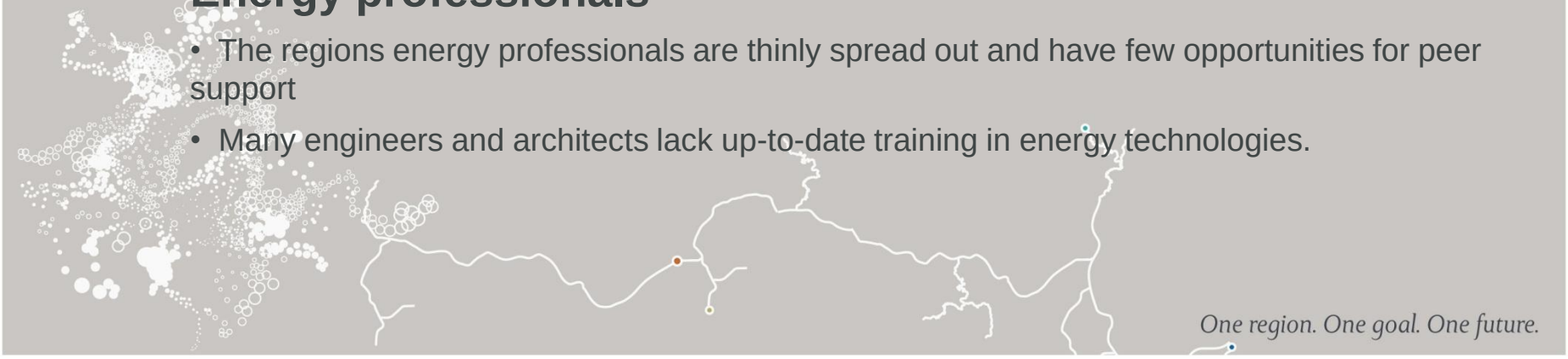
- The region has significant international expertise in Scion for research into wood-to-transport fuel research.
- The geothermal sector is becoming thin on experienced practitioners
- The funding for a substantial geothermal research programme has few drivers

Building Trades training

- There is a national shortage of trades people
- Few building trades people have knowledge and skills in energy technologies
- The region has a large number of people who would make very good trades people
- Large numbers of trades people with energy skills will be needed to achieve this strategy

Energy professionals

- The regions energy professionals are thinly spread out and have few opportunities for peer support
- Many engineers and architects lack up-to-date training in energy technologies.



Skills Training Actions

Science and technology

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Lobby government for an increase in funding for wood to energy research

Lobby for priorities for lignocellulose –to-transport fuel research

Establish Rotorua geothermal development research programme

Building trades training

Establish regional building trades cluster to establish a building trades energy skills programme including upskilling existing practitioners

Establish energy technology demonstration centres adjacent to Waiariki and BOP Institutes

Energy professionals

Establish cluster to develop a programme of activities for upskilling building professionals in energy technologies

Energy Strategy (1)

Geothermal

Maximise utilisation of geothermal energy for regional economic growth and well being.

- Heating
- Food production
- Geothermal health spa
- Electricity

Biomass-to-energy

Maximise utilisation of biomass for production of transport fuel and heat

Residues → transport fuel

Utilisation of wood fuel for heat

Establish Rotorua as the national centre for research on production of transport fuel from linocellulose

Energy Strategy (2)

Skills

Develop skills training programmes that establish BOP as centre of excellence in energy utilisation

- Trades training
- Energy experts

Warm and healthy homes

Ensure that technology suppliers and installers are competent

Improve access to information on options

Secure access to government funding

Energy markets

Establish 20 & 50 year electricity and gas infrastructure Plans

Ensure District Plans include transmission corridors.

Proactive interaction with energy market participants

Who is going to take responsibility

Governance

Similar to Regional Land Transport Strategy

- Except community representation – Regional Governance Group responsible
- Serviced and maintained by Environment BOP

Guidance from sub-region growth leadership groups (SmartGrowth, BrightEconomy,?)

Delivery

Generic delivery within sub-regions by Economic Development Agencies

Specific delivery by local support groups eg Maori Authorities

Establish special interest cluster groups

- Rotorua is geothermal
- Rotorua geothermal health spa
- Geothermal horticulture heating
- Focused warm and healthy homes programme

Leadership/ demonstration

- Government entities procurement policies

Monitoring and Review

6 months monitoring reports from EDA

- Collated by EBOP
- Report to all interested parties

Annual review of Strategy and Infrastructure Plans by Governance Group

Achievability

Needs collective decision

Yes we can.

Needs goals

BOP to be known as the community maximising the opportunities from renewable energy

Economic growth + wellbeing via energy

Must be collective

- Attract investment of $4b/6b/8b ... in sustainable energy developments over the next 15-years
- In electricity generation, process heat, tourist related activities and liquid fuel manufacture
- Based on development of abundant resources, esp. geothermal, wood, solar (phased development occurring in that order)

Becoming

- Net exporter of electricity (25%+ of NZ's requirements),
- Transport fuel and
- Energy intensive processed products +
- Tourism activities
- Rotorua again an International geothermal health spa

Jobs, skills, lifestyle, benefits to Maori etc

Electricity Supply Actions

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Transmission corridors

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Business energy users cluster

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  - Knowledge and skills development
- Lobby group for improvements in energy delivery services

Warm and Healthy Homes Actions (1)

Promotion of warm and healthy homes

- Regional scheme
  - New home owners
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- Base on work of existing providers – Energy Options

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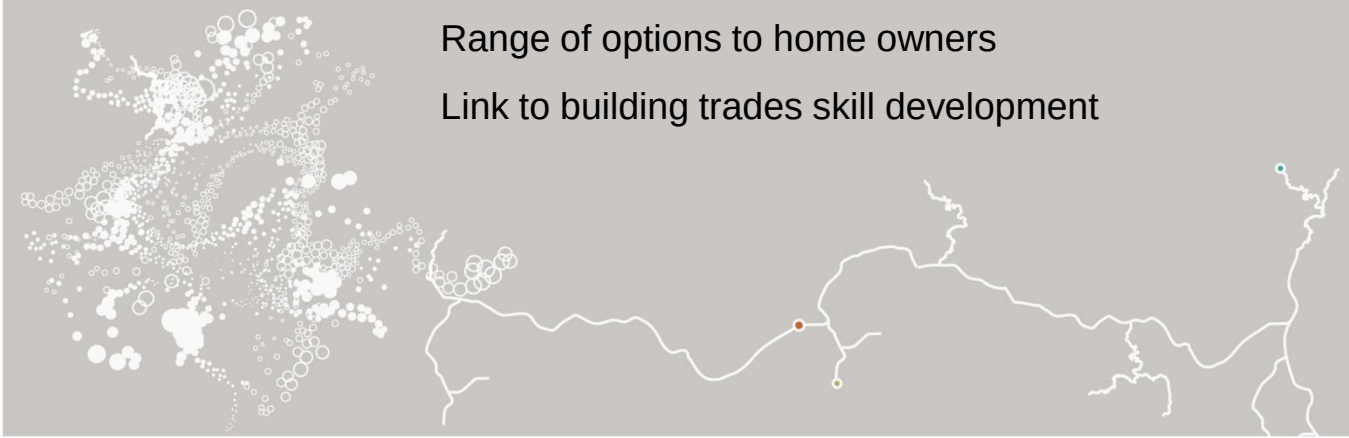

Warm and Healthy Homes Actions (2)

Improve building trades energy skills

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Push to government for support for regional building trades training.

Securing Government funding for improving existing homes

Use Energy Options existing capabilities for whole of region

Streamlining & reducing costs of Building Consent

Standard procedures for minor works

Geothermal Actions

Establish Rotorua Geothermal Cluster

- Develop geothermal utilisation strategy and action plan
- Establish R&D requirements
- Seek assistance from Government for Action Plan
- Undertake pilot district heating scheme

Establish Rotorua Geothermal Health Spa Cluster

Establish regional Geothermal Hothouse Heating Cluster

- Includes landowners, horticulture growers, and Hort NZ

Establish Geothermal Heat Extraction R&D Cluster

Establish Geothermal Aquaculture Cluster

Biomass to Energy Opportunities – Actions

Establish Scion as a Centre of Excellence for wood to energy research.

Lobby government for an increase in funding for wood to energy research

Lobby for priorities for lignocellulose –to-transport fuel research

Local government and institutions to have procurement policies to consider wood fuel

Establish Forest Residue Wood Fuel Cluster

- Loggers forest owners and chip hoggers cluster to establish practices that improve quality and reduce cost of producing wood fuel from forest residue.