Energy Efficiency and Conservation Authority
Te Tari Tiaki Pūngao

Stewart Island: Renewable Energy Options

February 2012

New Zealand Government

EECA BUSINESS

EECA energywise

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EECA – who we are, what we do?

- Energy Efficiency & Conservation Authority (www.eeca.govt.nz)
- EECA's primary purpose is to promote and support energy efficiency, renewable energy, and energy conservation;
- Crown entity (we report to the Minister of Energy & Resources);
- We're here to help consumers (at work and at home) get more value out of every dollar they spend on energy;
- Examples of our programmes are:
  - Home insulation scheme (quality controls, information, and subsidies to encourage retrofitting of insulation into older homes);
  - Business programme (information, training, and subsidies to increase business energy efficiency in everything from lighting to transport);
  - Crown loans (providing loans for schools or Councils to address the cost barrier for say a wood-fired boiler to displace coal , or efficient street lighting);
  - Products programme (EECA uses a mix of voluntary and compulsory labelling to inform consumers, and uses regulation to set minimum energy performance standards for some appliances).
  - We also have a key role in supporting renewable energy of all types at all scales (transport biofuels to electricity, rooftop PV to large wind farms and hydro dams, and emerging marine technologies)

Renewables in NZ

Resources (in future, we could be 100% renewable in energy)

- NZ is incredibly lucky to have extensive renewable resources, well beyond our medium to long term needs.
- NZ could be self sufficient in renewable transport fuels in the medium to long term:
  - Electric vehicles for the light vehicle fleet are a good option for NZ (including series-hybrids with long range capability);
  - We have enough marginal land to plant radiata for production of second generation ‘drop-in’ biodiesel for the heavy vehicle fleet;
- We have enough wind, hydro, biomass and geothermal resources to meet our electricity needs (including EVs) for the foreseeable future;
- 2,300MW of renewables consented, another 1,500 awaiting consent decisions.

Renewables in NZ

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Costs

- NZ is different to other countries, here wind and geothermal are currently the cheapest grid scale electricity generation options (~8c/kWh);
- Biofuels are not currently cost competitive but fossil-oil price is rising, biofuels cost is stable or reducing; it's just a matter of time before biofuels are competitive…
- Scale is important; large hydro may cost ~10 c/kWh, but small scale may be 15 c/kWh or so.
- Fossil fuel prices are rising faster than renewables costs.
- In terms of avoiding diesel genset costs (50+c/kWh, even solar PV + battery systems are potentially viable).

Renewables - Stewart Island

Option	Order of Magnitude Cost	Consentability	Percentage renewable
Hydro + transmission	15-40c/kWh	Requires careful design to mitigate (or remedy) effects	100%
Wind-diesel	~45c/kWh	Relatively easy	~50%
Solar photovoltaic + batteries	~50c/kWh	Relatively easy	100%
Biodiesel	~60c/kWh	Easy	100%
Wave	>> 50c/kWh	Requires careful design to mitigate (or remedy) effects	?

100% renewable electricity systems

- 100% renewable electricity? It can be done, it's just a matter of cost eg
  - NZ's first electrification in Reefton was 100% hydro;
  - NZ has hundreds of off-grid homes where micro-hydro or PV/wind and batteries are cheaper than 1-2km of new distribution line required to connect to the grid;

- Three rules of renewable electricity systems in NZ:
  - The larger the system, the greater the diversity of resources (and loads), so the lower the cost of delivered electricity; and
  - The more that the electricity demand profile can be matched to the seasonality/variability of the renewable resources, the lower the cost of the system;
  - Even with a diversity of resources, matching supply and demand will not be perfect, energy storage is very helpful (e.g. hydro storage, batteries, hot water cylinders, or heated swimming pool etc)

100% renewable electricity systems

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Examples of consequences of the three rules:

- The cost of renewable electricity (c/kWh basis) for Stewart Islanders should be less than that of a home that is off-grid and powered by renewables (if they can do it, you can do it).
- If it's a hydro based system without storage, then it doesn't make sense for homes to use solar water heating, even though domestic water heating is often the largest energy use in the home – hot water cylinders can be heated overnight without adding to the capacity of hydro (kW) plant;
- If it's a photovoltaic based system, it really does make sense to have solar water heating (or 'wetbacks' on the woodburner), because they are lower cost than adding more photovoltaic panels to the system (i.e. which would otherwise be required);
- It generally makes sense to reduce peak demand, as this reduces the size of generation needing to be built, so reduce demand on winter evenings (eg turn off anything that's not in use to avoid waste, use efficient light bulbs, consider woodburners in place of electrical heating, use ENERGYSTAR appliances etc)

System design is critical. The load, available energy storage, fuel substitution options, and the renewable resources, all need to be considered together.

What does this mean for you?

- You have a direct impact on the costs of your new electricity supply – if you can lower your electricity use at the time of peak island demand, then the system will cost less to build (so, you save money directly, as well as indirectly);

- You need to consider your criteria for choosing a new system so trade-offs can be made; how would you rank the importance of cost of electricity, percentage renewable, environmental effects, security and reliability of electricity, ability to allow for demand growth, ability for local repair and maintenance etc;

You think you can't make a difference?

- Consider just lighting alone… less than 10% of your overall electricity use
- You get the same light output from an incandescent bulb, as you do an efficient CFL or LED light, but the efficient lighting uses much less electricity;
- Lighting contributes to peak demand (winter evenings, so any savings here reduce the generation capacity that needs to be built.

Incandescent	**CFL**
100 Watt input	22 Watt input
7 bulbs in 'use'	6 bulbs in use
70 kW (100 homes)	13.2 kW (100 homes)

RESULTS

- Each home **saves about $75-100** per year in electricity use
- **Collectively, 57 kW saved** in terms of peak generation needed, so about 12% smaller generation capacity just in lighting savings alone - the new generation plant would be at least $200,000 cheaper to build (assuming hydro).

A role for EECA?

EECA can help with:

- Information on energy efficiency in the home and at work;
- Information (and maybe subsidies) for residential insulation and clean heat devices such as wood burners;
- If the local or regional Council is involved and the project meets the necessary criteria, possibly contributing to capital costs of the new renewable power system via a Crown Loan.
- The starting point is www.eeca.govt.nz or 04 495 8260

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Any questions?