BIOENERGY ASSOCIATION OF NEW ZEALAND
FREQUENTLY ASKED QUESTIONS

What is bioenergy?

Bioenergy is heat, electric power, light or transport fuels produced through the conversion of biomass resources.

Biomass is any recently derived organic matter from plants (as opposed to ancient organic matter like coal or oil), which is can be used as a store of chemical energy.

Bioenergy is a flexible energy form and can widely substitute for fossil fuels (replace hydrocarbons with carbohydrates) and readily complement other renewable energy sources such as wind, small-scale hydro, photovoltaics (solar cells for electricity) and geothermal energy.

What are the advantages of bioenergy in New Zealand?

- Biomass resources are predictable and manageable – unlike say water in hydro lakes, the volume of the available resource can be predicted in advance and managed to meet energy demands.
- Biomass can be stored and transported and used where and when required.
- Bioenergy can be used in conjunction with existing infrastructure – for example, the wood processing industry already uses biomass to fire boilers and kilns, and electricity generated from biomass can be transmitted through the existing local networks and the national grid.
- Bioenergy is largely carbon dioxide-neutral, therefore it does not contribute to increasing greenhouse gas emissions. Where bioenergy substitutes for fossil fuels, significant greenhouse gas emission reductions can be achieved achieved.
- Using wood waste for energy reduces the quantity of material going into landfills and the amount of methane emissions from waste disposal.
- Increased uptake of bioenergy will be based on existing industrial uses and does not require technology developments (technology improvements will however improve the economics of energy conversion at the margin).

What is the current status of bioenergy in New Zealand?

In the 1999 year around 25% of New Zealand's consumer energy was from renewable sources. In primary energy terms hydro accounted for 35%, geothermal for 44% and wind, biomass and wastes make up the balance of 21%. Biomass (predominantly as woody biomass) contributes around 35PJ of primary energy and this provides about 29PJ of consumer energy. Based on estimates of energy consumption within the wood processing industries around 86% (25PJ) was used within this sector. The pulp and paper industry used approximately 21PJ largely for heat, panel and veneer industries used 1 PJ and the sawmilling industry used around 3PJ for timber drying. Electricity generation from co-generation facilities amounted to around 1PJ. Of the energy consumed using biomass, 52% was sourced directly from the use of solid woody biomass fuels derived from wood processing, the remainder was from black liquor in the pulp and paper industry.

New Zealand use of bioenergy is underpinned by a significant forest industry with the current planted area of plantation pine being about 1.7 million (M) ha and an annual harvest of 18 Mm^3 roundwood. The harvest is expected to increase to about 30Mm^3 by 2010. Most of the harvest was used within the sawmilling and peeler industries, for pulp and paper production and also exported as unprocessed logs. The rapid increase in harvest from the production forest will give rise to a large potential forestry derived source of woody biomass.

What is the future potential for bioenergy in New Zealand?

BANZ estimates that at current levels of log production, there are around 4 million tonnes of biomass left in the forests every year. This assumes:

- Only 50% of this is readily recoverable, so say, 2,000,000 per year
- Only 50% is within reasonable distance (say 60km) of a heat demand *(more work needs to be done in this area to look at the geographical match between resources and heat demand)*: So say only 1,000,000 tones per year of forest residue is economically available.
- Add to this figure the amount of clean (untreated) wood processing residue currently being dumped, conservatively estimated at 700,000 tonnes per year *(more work required here to verify : WasteMinz could supply some numbers?)*
- Also add other green waste (prunings, trimmings etc) going to landfill and other clean construction and demolition waste and there is at least another 300,000 tonnes available per year.
- This leads to a total resource availability of at least 2,000,000 tonnes of biomass per year.

Such a level of resource availability, based on an average calorific value of 10GJ/tonne) means there is around 20 million GJ of biomass fuel readily available - which can only increase as forest harvesting rates increase and harvesting processes are improved to allow more forest biomass to be economically recovered.

20 million GJ equates to around 14.6 PJ of output heat (or 19.4 PJ input heat assuming an efficiency of 75%)

Assuming a thermal heat plant is run at an overall utilisation level of 77% then this equates to an installed capacity of around $600MW_{th}$.

Is this a realistic level of increase for bioenergy in New Zealand?

An analysis of the existing gas, oil and coal use in New Zealand reveals a current usage rate of 92PJ's within the industrial, agricultural and commercial sectors (EECA figures – Energy Data File July 2001). This sector also uses 79PJ's of electricity, of which a good proportion will be for space and water heating.

Note that this analysis has not considered the residential sector, where 6PJ's of gas and 42PJ's of electricity is used currently. A substantial portion of the residential electricity usage will be for space and water heating. At a later stage mechanisms to increase renewables within this sector should be considered (such as energy island, district heating, solar heating etc. The Norwegians consider this sector to be equally easy to switch to renewables, with a relatively simple administration system) Technology developments such as the pelletising of fuel to improve its handling characteristics will improve the ability for uptake.

Allowing for expansion in the dairy and forestry sector alone the current 92PJ's will rise substantially. Thus a 19.4 PJ target for this energy sector represents around 20 % of the total sector based on current size, but probably closer to 15% by the relevant date of 2012.

In total it is estimated that at least 130PJ's of energy are used in New Zealand for heat at the present time, likely to rise to at least 150PJ's. In that respect the recommended target for this sector represents around 12%.

At approximately $600MW_{th}$ this equates to an average uptake of $60MW_{th}$ per year over the 10 year period. To put this into perspective uptake rates over the years 1999, 2000, and 2001 averaged around 40MWth per year.

What needs to be addressed to improve the uptake of bioenergy in New Zealand?

There are a number of policy options that can be taken by Government and industry to improve the investment environment for bioenergy projects. These include:

- Provision of better information on bioenergy technologies and their economics to potential investors.
- Assistance with the design and development of wood residue collection and processing protocols for biofuels, in particular addressing how to dry and minimise fuel variability at reduced costs.
- Introduction of tax advantages to reduce the high up-front capital costs.
- Introduction of carbon mitigation measures. BANZ supports the introduction of a renewable energy certificate scheme for heat production.
- Support for research and development on bioenergy processing plant in order to optimise it for New Zealand conditions and fuels.
- A paradigm shift in thinking within the energy sector from electricity to heat.

What are the benefits of a Reneweable Energy Certificate Scheme for the Industrial Heat Market?

As only a limited number of companies are likely to qualify for a negotiated greenhouse agreement (NGA), based on the "competitive-at-risk" concept BANZ proposes the introduction of a Renewable Energy Certificate (REC) scheme that addresses the thermal heat use (i.e. a t-REC scheme) for the NGA cluster of companies. The fundamental inequity of the NGA scheme is that the big emitters negotiate an exemption from a carbon tax, leaving the smaller emitters to bear the cost burden. A thermal t-REC scheme would address this inequity.

The REC scheme as developed in Australia focused on electricity with the result that the certificates encourage optimisation of heat plant for electricity generation at the cost of process heat production. In industrial situations where cogeneration improves the efficiency of energy use from around 40% to 80% it is commercially attractive to optimise for total energy use, not just electricity. A t-REC provides balance to the incentives and is as administratively simple to monitor as an electricity REC as heat can be measured as easily as electricity.

Such a scheme would allow the big emitters to co-operatively identify opportunities for their members to be displacing carbon emissions, including identifying least cost renewable heat generation.

For Further Information:

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NGA's, whilst simple in principle, will inevitably lead to accusations and finger pointing : Any agreement reached by one company/industry will set the benchmark for the others. Furthermore it will lead to different treatment for different industries, thus compromising the integrity of the principle of equal treatment for all. Lengthy debate would be removed from the whole NGA process as There would be benchmarks available for total energy use.

The NGA cluster should be allowed to identify and fund renewable energy/abatement projects outside the cluster, thus leading to least cost abatement.

Administration of the scheme would be simpler than a nationwide scheme, as the participants would be limited to NGA companies, thus saving costs.

Non-NGA companies would have less reason to complain of unequal treatment, and could also benefit from the NGA cluster paying for their renewable energy (if it is a least cost project).