

REVENUE FROM FOREST DERIVED ENERGY

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Forest owners are sitting on significant wealth if they are able to extract the energy resources from their forest lands. In many cases the non-timber energy products could be of greater value than timber. As the demand for energy continues to increase, and it will never decrease, now is the time to start thinking strategically about extracting the energy wealth from forest areas.



Drivers for Energy

The drivers for extracting revenue from forest lands are:

- The increasing high prices for energy
 - New Zealand is energy rich but future new supply will come from a multiple number of energy sources eg small gas fields, small hydro, wind farms
 - All these new sources of energy will be at an increased cost because the easier opportunities have already been utilised.
 - High spot electricity market prices are making manufacturers think about their energy costs and alternative opportunities.
 - New Zealand's international competitiveness is dependent on a low cost of energy
- The need to find replacement for petrol and diesel transport fuel
 - While the internal combustion engine is expected to remain dominant for transport there will need to be a paradigm shift in thinking about the fuels for these engines. Organic derived fuels (ethanol and biodiesel) will increasingly become more common.
- The increasing requirements for heat
 - The growth in domestic wood processing is dependent on kiln dried wood
 - Many existing heat producers use coal which is increasing in cost
- The increasing cost for disposal of wood processing and forest residues.

These drivers of the energy market provide incentives for forest owners to broaden the range of product extracted from their forest lands. Major additional products can be based on energy. The opportunities are going to be specific to the location and characteristics of each piece of land but already some forest owners are changing their product mix. This could apply to some degree to nearly all forest owners.

The value of energy products is increasing at a greater rate than the value of timber products and already the price of energy is increasing at a rate that makes new non-timber energy products from forest lands economic today. Forest owners need to think strategic as the 30 year harvest rotation period is within the timeframe of future energy needs.

Extracting Energy Revenues From Forestry Areas

Energy can be extracted from a number of different parts of the forestry value chain. These can be grouped into forest derived sources such as;

- Wood processing residues
- Forest harvest residues
- Purpose grown tree crops

In addition owners can extract energy from the forest lands themselves. This can be;

- Geothermal energy from under forest lands
- Hydro energy from rivers through forest areas
- Wind farming on ridge tops and high wind areas
- Solar farms on north facing slopes

Non-Timber Energy Products

The energy can be extracted in a number of different forms. These include;

- Heat from combustion of woody biomass
- Electricity from combustion of woody biomass
- Transport biofuel
- Biofuel for sale to domestic and industrial applications – pellets, hog/chip
- Chemical derivatives
- Geothermal heat and electricity
- Wind generated electricity
- Solar heat and electricity
- Hydro generated electricity



Energy From Forest Harvesting

This is our most cost effective source of energy as we already collect and partly process the raw feedstock. (Having partly processed it we then throw it away). We need to complete processing the residue into a usable form, and take the next step and deliver it to where it is most useful as a source of energy

- Thinnings and prunnings
 - Prunnings too difficult to collect
 - Thinnings can be harvested in some situations
- Harvest residues
 - Landing residue easy to collect and process
 - Cutting residues can be collected in some situations.
- Processing revenues

Residues not waste
(However we mainly waste the residues)

Purpose Grown Forest Crops

Purpose grown crops make a good strategic backup energy source but they are currently not economic. Because SRC will follow use of vast quantities of forest residue it will be at least next decade before this is an economic source of energy. However we need to start thinking seriously about purpose grown crops very soon.

Transport Biofuel

From a woody biomass perspective this is still at the longer term research phase. Ethanol and biodiesel will come from oil crops in the short term and these are unlikely to be economically grown in NZ. However other new technologies such as the production of cellulose ethanol by use of enzymes are fast developing.

Transport biofuels are one of the fastest growing energy areas where;

- Peak oil is driving the need for diesel and petrol replacements
- Govt policy to introduce blended
 - ethanol in petrol
 - Biodiesel in diesel
- Initially supply probably principally by import
- Import to be replaced by indigenous supply
 - Tallow
 - Woody biomass

Woody Biomass as Fuel

This is a traditional source of energy which is well established and can be expected to grow as residues become economic.

- Currently 6% (30 PJ) of total consumer energy (546 PJ) is provided by bioenergy (2003)
- Process heat = 34% of NZ energy demand (Excl. Comalco)
- Bioenergy growth projected at 1.9% p.a. over next 20 years (= 1 * 15 MWth boiler p.a.)
- Fuel most within control of wood processors
- Uses waste materials, Forest residue, Process waste
- May require backup from coal, gas, forest residue or imported fuel
- Need to focus on fuel handling and processing
- Economics improved when biomass processed to be homogenous fuel

Making Woody Biomass More User Friendly

A significant increase in the use of woody biomass will evolve from the focus on processing residues into a more user friendly form. These are currently economic and will allow replacement of coal as a heat source;

- Pellets
 - Has all the good characteristics of coal
- Chipping and hogging in the forest
 - Already economic (Kinleith CHP plant)
 - Ease of handling and transport
 - Reduced transport costs

Heat Plant Opportunities

- Most people focus on electricity and forget heat
- Heat opportunities are local
- Bioenergy, geothermal and solar heat is economic now
- Heat and cooling information is poor
- Few published role models or case studies
- Use of biomass waste for energy is;
 - economic today for heat
 - close to economic for electricity generation



Heating Costs, No Price Increases or Carbon Charge

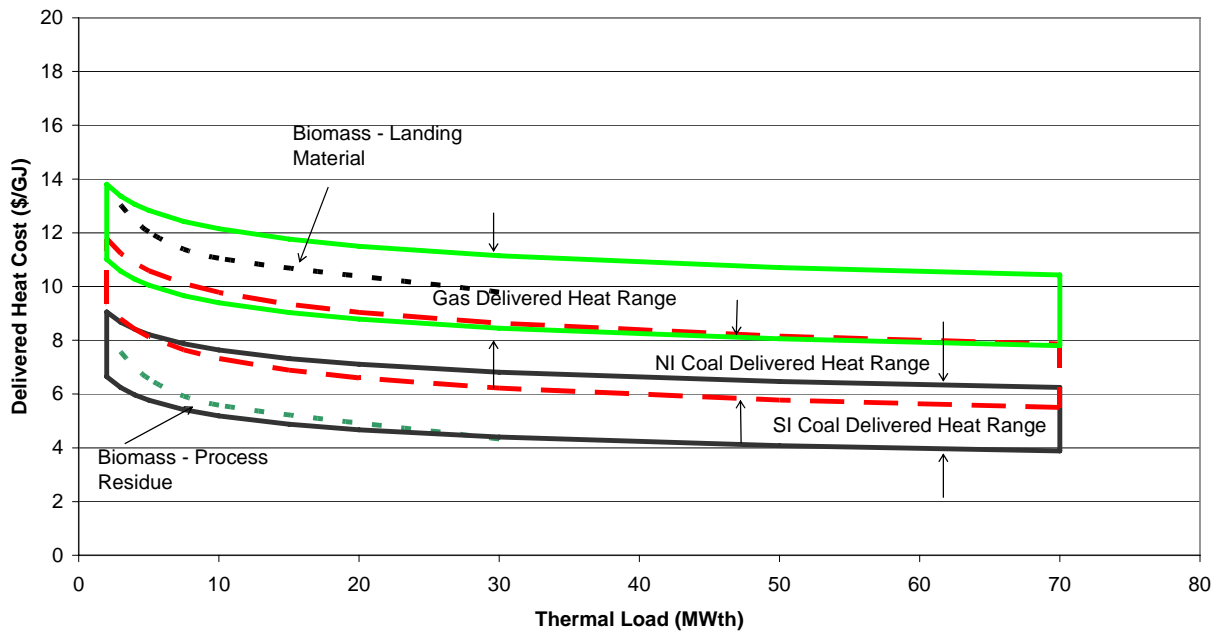


Figure1: Cost of Delivered Heat from Different Energy Sources

(June 2005 data)

Electricity Generation from Bioenergy

- Currently only economic if on-site wood waste
- Economics depend on avoiding waste disposal costs
- Coal is a good supplementary fuel for bioenergy plant
- Cogeneration of heat and electricity improves economics
- Forest residue as fuel currently adds 5c/kWh to cost of electricity generation

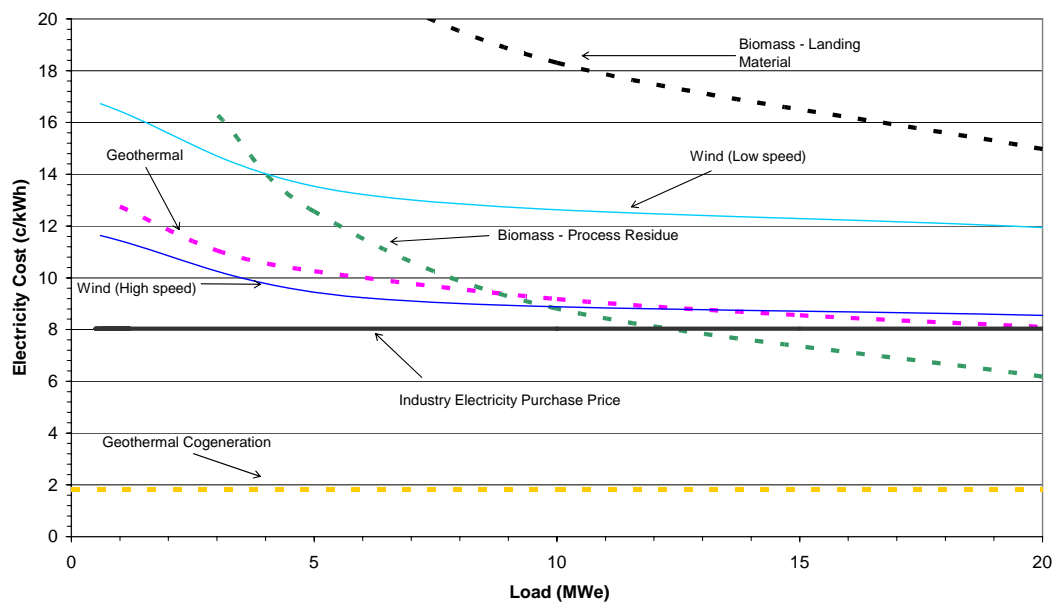


Figure 2: Comparative cost of generating electricity from different energy sources

(June 2005 data)

Extracting Energy from Forest Lands

Access to the land can provide access to energy resources. Landowners can be part of the harvesting of energy from their land or they can set up contracts with third parties and collect a royalty.

- Wind farming.
 - In high wind areas the installation of wind turbines will generally be significantly more profitable than growing trees.
 - Access to the wind farm can also allow a sharing of roading costs. (Wellington Regional Council forests)
 - Landowners can be an investor or receive a royalty
- Hydro, solar and geothermal energy.
 - Some lands are located in close proximity to rivers with hydro potential or overlie geothermal resources
 - Forestry and geothermal development coexist
 - Small/medium hydro can be built in appropriate valleys
 - Ridges adjacent to heat users could have arrays of solar panels

Strategy—Vision

If forest owners want to optimise value from energy extraction from their forest lands they need a paradigm shift in thinking about their assets. The two places where it is economic today are;

- Residues
- Access to the land

‘Revenues from forest residues’

Residues = \$\$\$\$\$\$

Forest owners need a collective Strategy and an Action Plan which could be based on;

- Fast follower of those already doing it
- Get access to international research
- Indigenous biofuels programme
- Transport biofuel R&D Opportunities
- Coalition between researchers (Scion), forest owners, fuel suppliers

