

Unlocking new revenue streams for rural landowners

Growth in New Zealand's bioenergy and biofuels sector is starting to drive an increased demand for greater quantities of biomass. Whether it is high quality wood fuel, biomass for transport fuels, or production of biogas. New Zealand's landowners are very well-placed to meet the demand and take advantage of these emerging revenue gaining opportunities.

The opportunities that exist include:

Wood fuel

Government, with the forestry and wood processing sector, have developed an Industry Development Plan¹ that sets out the wide range of opportunities which landowners can obtain from wood.

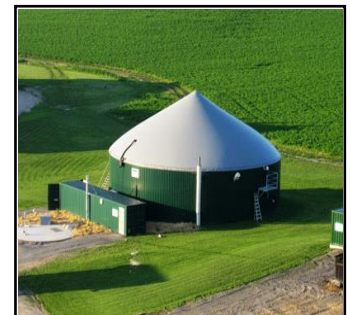
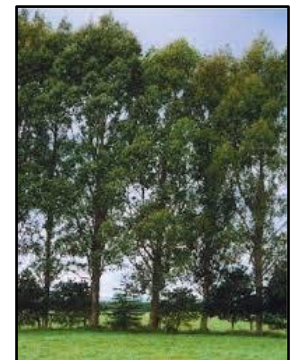
Wood fuel produced on farms can be used for the production of heat, or as a feedstock for the emerging transport biofuels market, and can be produced from small or large woodlots, shelter belts and purpose grown biomass crops, horticultural prunings and crop stubble. The growing or sourcing of these materials can all be integrated with traditional land uses and become important revenue streams for the landowner.

Farm forestry can include shelterbelts, protection of erosion prone slopes, and riparian plantings. It is often 6-9% of a farm that is not otherwise used for other agriculture, viticulture or horticulture activities.

Integrated tree planting can be a valuable tool of farm soil management and maintaining animal health, while also producing revenue that improves farm business resilience.

Organic matter

Landowners are often in a situation where they produce organic matter which becomes a waste. Integrating bioenergy solutions into traditional land use activities can turn this waste into a valuable resource. Such organic wastes will include animal wastes, dairy shed effluent, piggery wastes, agriculture crop residues, stable manure, poultry farm wastes and any on-farm animal processing materials.



¹ <https://www.bioenergy.org.nz/resource/forestry-and-wood-processing-industry-transformation-plan>

Interestingly, this is not so much a new opportunity, but is more about knowing how wastes and residues can be converted into feedstocks for bioenergy and other bio-processing options.

With the requirement for Farm Environmental Plans and emerging opportunities for mitigation of methane emission liabilities, the recycling of organic wastes and residues can, in a number of situations, result in a full offsetting of emissions. Being able to mitigate animal methane emissions via bioenergy and biofuels can be very financially attractive to improving farm business resilience.

Case study for the use of a wood chip heater on a dairy farm

This case study was undertaken to determine the viability of using a highly automated purpose-built wood chip type Low Temperature Hot Water (LTHW) boiler to provide hot water heating for dairy shed wash down along

The Bioenergy Association assists rural landowners establish new energy projects on their farms by linking groups of landowners together and assisting with identifying potential demand.

with space heating and Domestic Hot Water (DHW) for nearby farm houses. The farm was located in Pateoroa, Central Otago, and was a dairy conversion unit with a new shed and two farm houses. The peak heat load for the dairy farm was 59 kW and the annual heating energy consumption was 98 MWh. The investment costs, as well as the annual demand related costs (mainly fuel costs), and operation related costs for the different heating systems were determined. Given the current market situation, a minimum annual energy consumption of approximately 200 MWh or a smaller investment cost of approximately \$70,000 made the chip boiler system feasible.

Producing biogas on your farm

Biogas is gas produced during the breakdown of biological matter and which can be used to provide electricity, heat and transport fuel. Biogas can be produced using effluent from farms, crop residues, sewage or at landfills.

Small-scale biogas schemes can generate electricity or heat for use on the farm, within communities, in businesses and in homes, and in some cases can also export electricity back into the local network. Farms and businesses which export may be able to sell the electricity to a power retailer or to another user.

Similarly, if neighbouring farms work collectively to achieve economies of scale, they could produce gas for sale and injection into the natural gas network. This can be financially viable if near the natural gas pipelines.

Anaerobic digestion of farm organic residues and wastes can also produce a valuable pathogen free biofertiliser which can be used to replace synthetic fertilisers. Use of biofertiliser instead of synthetic fertilisers reduces the farm greenhouse gas emissions liability.

A prototype biogas system operated for several years on a Landcorp-owned farm at Eyrewell, North Canterbury.



Ponds used for effluent disposal can provide the raw material for a biogas system. Covers also help to reduce odour.

Manure from the farm's 900 cows was collected on a concrete pad outside the milking sheds and pumped into a tank digester. The gas produced was used to power an electricity generator that provided around a third of the farm's energy requirements. An arrangement with local retailer, Genesis Energy, meant that any excess electricity that was exported, produced revenue which reduced farm's overall cost of on-farm electricity.

The Bioenergy Association can assist rural landowners to identify revenue opportunities from their organic residues.

Growing eucalyptus can provide a range of economic benefits

The rapid initial growth rate, crown structure, foliage and high wood density of eucalypts makes them ideal for a range of uses, some of which can be integrated with the production of sawn timber or pulpwood. These include *foliage production, agroforestry honey production, coppice production, carbon sequestration, and land treatment of wastewater and solid waste.*

The foliage can be used as stock fodder as sheep, cattle and deer readily eat the leaves of a number of eucalypt species. Eucalypts offer an advantage over willows and poplars because they are less vulnerable to seasonal moisture deficiency.



The following points have been noted in a Southland trial:

- *leaves, bark, and small twigs of E. gunnii are palatable and at times they are more attractive than grass.*

Any eucalypt that is palatable to rabbits, hares and possums will be readily eaten by livestock. Some eucalypts are not readily digestible by stock—so check before planting.

Bioenergy Association is working with the NZ Dryland Forests Initiative (NZDFI)² to explore the market for using residues from eucalypt forests as an energy fuel. NZDFI is a collaborative research and development programme to develop a sustainable multi-regional hardwood industry based on planting genetically improved durable eucalypt forests on farms.

Growing crops like Miscanthus offers new opportunity

Miscanthus is a highly productive “green” energy crop that produces income from the second year after planting, and has an estimated life of 20 years, offering revenues over that period on a consistent and sustainable basis. It produces a high-quality fuel that can displace coal and other fuels, and also has a range of other uses.

Miscanthus and other crops are seen as an integral component of the recently developed New Zealand Bioenergy Strategy³



² <https://nzdfi.org.nz/>

³ www.bioenergy.org.nz/resource/is28-potential-for-miscanthus-fuel-supply-in-nz

Typically, the crop yields 17 tonnes per Ha and has a calorific value of around 17 GJ/tonne which means that a hectare can produce around 300 GJ pa, or more in favourable growing conditions.

The product is expected to be grown close to point of use, reducing delivery costs, with farmers devoting part of their property to this crop. From the farmer's perspective Miscanthus provides income from the second year after planting and requires little management or fertiliser once established. Income from the crop is expected to be based on a back-to-back fuel supply contract, and therefore consistent and predictable.



Using crops to improve soil fertility, with the residues sold to produce energy

Cereal growers in South Canterbury were contracted to plant a break crop which produced oil seed from rape which was sold to Biodiesel NZ for the production of biodiesel. The oil seed for energy produced an additional revenue stream with a different risk profile than cereals so farm business resilience improved. Having a break crop was important to maintaining long term sustainable soils fertility. Harvest contractors had work at different times from cereal harvest, and Biodiesel NZ had a reliable stream of feedstock for the production of biodiesel.



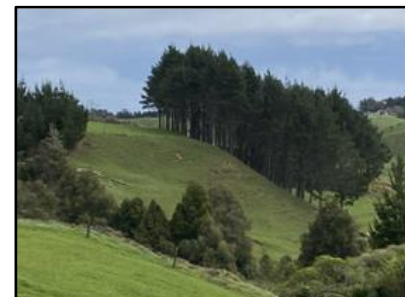
As producers of the feedstock the farmers could have included in their contracts for oil seed supply for specified quantities of biodiesel in return, thus reducing the need to purchase mineral diesel. The use of biodiesel for on-farm machinery should be recognised as a mitigation to offset animal emission liabilities.

More recently work is underway to investigate growing sugar beet as a break crop on recently converted central North Island cattle farms. The beet will produce sugar and the residues could go as feedstock to a nearby anaerobic digester producing biogas for horticulture heating and/or sale to retail gas companies for distribution through the national pipeline network. The additional feedstock from the sugar beet residues will allow the digester to be expanded to produce greater quantities of biogas and biofertiliser. The main beneficiary however is that the soil as a root crop every few years opens up the soil, and the addition of biofertiliser will improve plant growth.

Erosion control protects soils and can be a source of revenue

Coastal Taranaki has gullies with steep slopes, not hill country. Farmers in the area are planting up their gullies to provide erosion control and animal shelter. The slopes are too steep for dairy cows, and if grazed, erosion is encouraged.

The woodlots are sometimes very small while others follow a gully slope and are quite large. The harvesting is easy as machinery generally has flat ground above and at the bottom of a slope. The farms have easy road access.



Erosion control in Taranaki coastal gullies.