

Answers to FAQs from within industry and government about the validity and feasibility of wood as energy & Showing the possibilities

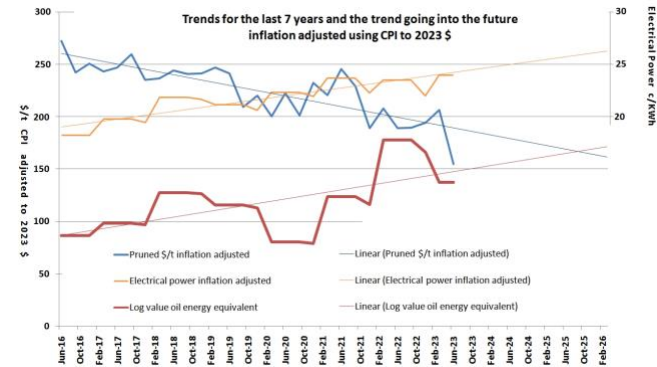
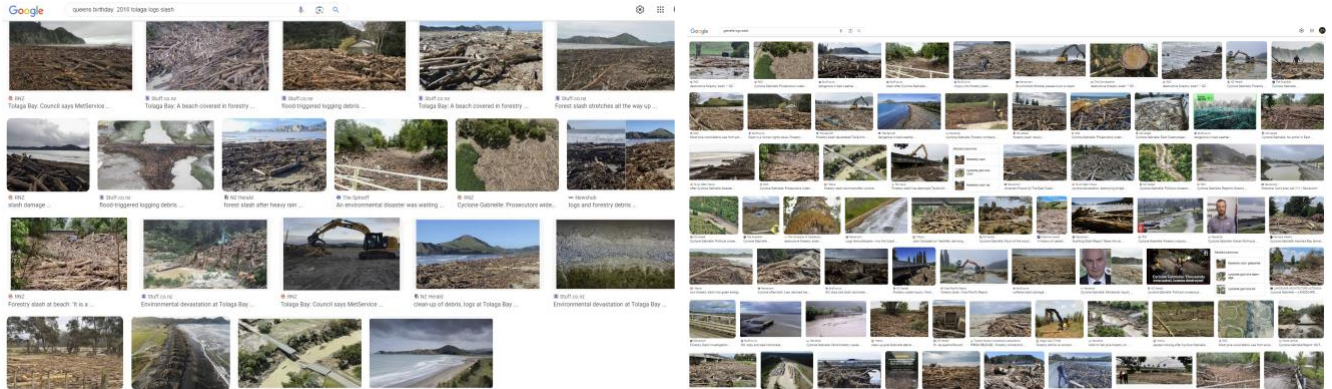
1. When we first started promoting the idea of wood as energy many were unconvinced that there was a useful supply of harvest residue. The 2018 Queen's Birthday Tolaga Bay weather event and the 2023 cyclone Gabrielle have imprinted on the minds of many that there is a useful quantity of harvest residue. The availability of slash is equivalent to 20-25% of the harvested log tonnage.
2. Since first promoting the opportunity of converting harvest residue into a valuable energy product. The global and domestic economics have further increased value of wood as energy versus declining real value of logs as wood thus most lower grade logs are worth more as energy.
3. In simple terms the domestic market is as big as the long term domestic coal market (2-3 million tonnes per annum), carbon tax giving biocoal a cost advantage over fossil fuel. Coal is used for making cement, milk powder, electricity and many other things
See NZ Battery Project.
4. Confirmation that biocoal is a drop in replacement for coal. Genesis Energy ran a trial at Huntley which showed "black pellets" are a feasible and easy replacement for coal. Genesis Energy have confirmed they are looking for a domestic supply.
See NZ Battery Project.
Biocoal should work with better performance in any system using wood chip or "white pellets".
5. Another uncertainty in people's mind is whether or not there is an export market for the product. Japan and South Korea together, import more than 8 million tonnes of wood pellets.
The global Wood Pellet Market was valued at USD \$8.4 Billion in 2022
6. The 'science' of torrefaction is well researched.
Over the last 10 to 15 years thousands of research papers have been written.
Many people have never heard of torrefied wood briquettes (biocoal) and equate it with biochar, charcoal or regular wood pellets this is not correct. Biocoal is recognized as one of the most appropriate forms of biomass as a global bioenergy commodity, due to energy density, durability, storability, grindability etc.
The potential of the biocoal production process to be self powered (**autodynamic**) is also thoroughly researched.
7. The quantity of the energy in the wood. In simplistic terms, one tonne of wood (radiata pine) has a bit more usable energy than one barrel of oil. Less than three tonnes of wood are needed to make one tonne of biocoal. One tonne of biocoal contains approximately 20GJ of energy which is similar to good quality coal.
8. Many people query why the biocoal process cannot be centralized in a large monolithic factory and why is it necessary to produce biocoal in the forest at the source of raw material.
Biomass is not an easy energy source which is why 200+ years ago the proto industrialized societies started to use coal as an energy source after using wood for thousands of years. The reasons why industrial nations then transitioned from coal to oil and gas was the same reason which is logistical efficiency, availability and energy density.
It is important to realize that fresh wood is 50% water, the sooner that this water is removed from the biomass supply chain the more energy efficient a biomass solution becomes. In forest production of biocoal is necessary to reduce double handling, stockpiling and excessive transport costs.
Torrefaction is the ideal process due to the byproduct energy that can run the process (autodynamism).
9. The global movement to limit "Climate Change", which the New Zealand government is party to, has brought changes to our economy that are designed to give renewable energy an economic advantage over fossil fuel. Carbon tax and Carbon Credits are part of this change. At the industrial and transport level "decarbonisation"

and “electrification” are increasing the demand for renewable energy. We are only just at the beginning of these changes. In July 2023, there are over 59,000 fully electric vehicles and a further 24,000 plug-in hybrids.

10. The NZ Battery project, have you heard of it? This is a project to address the likelihood of a shortage of electrical power during ‘dry years’. Historically Huntly power station had a stockpile of coal to act as a ‘battery’ for these times. Under the ‘Climate change’ regime the government is enthusiastic to eliminate coal consumption thus the talk of building the Lake Onslow pumped storage (for \$16b-\$30b), after several years of study the conclusion is forming that a stockpile (300,000 tonnes) of biocoal at Huntly to replace coal is the best option. Most of us have noticed that there are more EVs on the roads and they do need electrical power, heaps of it. New Zealand is blessed with very useful quantities of hydro electric and geothermal power however these sources of energy are not ‘elastic’ or dispatchable. (Our government is in denial “New Zealand is well placed to benefit from electric vehicles because more than 80% of electricity is generated from renewable sources and there is enough supply for widespread adoption of EVs.”) Every extra 1000 EVs will require 1MW of continuous generation capacity, note solar and wind operate at 20%-30% capacity and generate least when EVs are charging at night. Simultaneous to energy transition NZ also has a growing population. It is likely that for the next 15 years there will need to be a continuous supply of biocoal for Huntly to generate the electrical power to fill the short fall created by the increased demand from EVs. Maybe demand will continue beyond 15 years this depends on demographics and other technology like fusion and SMRs etc.
11. Lastly, the ongoing demand for biomass energy maybe reinforced by oil supplies being finite and global demand growing. “Peak oil” or “Hubberts’ peak theory” and “Limits to Growth”. We live in a society which utterly depends on energy.

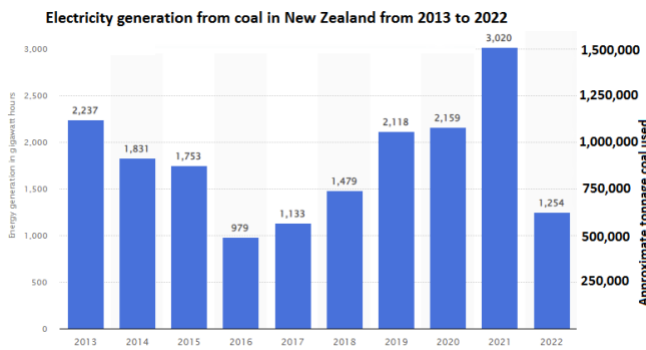
Appendix

- <https://www.google.com/search?q=queen%27s+birthday+2018+tolaga+logs+slash> (images)
<https://www.google.com/search?q=gabrielle+logs+slash> (images)
<https://player.vimeo.com/video/800341398>



- <https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/low-emissions-economy/nz-battery/dry-year-problem/>
<https://www.genesisenergy.co.nz/about/sustainability/future-of-huntly>

528,000 tonnes of coal was burned at Huntly Jul '21 to Jun '22. The previous 12 months it was 1,507,812 tonnes

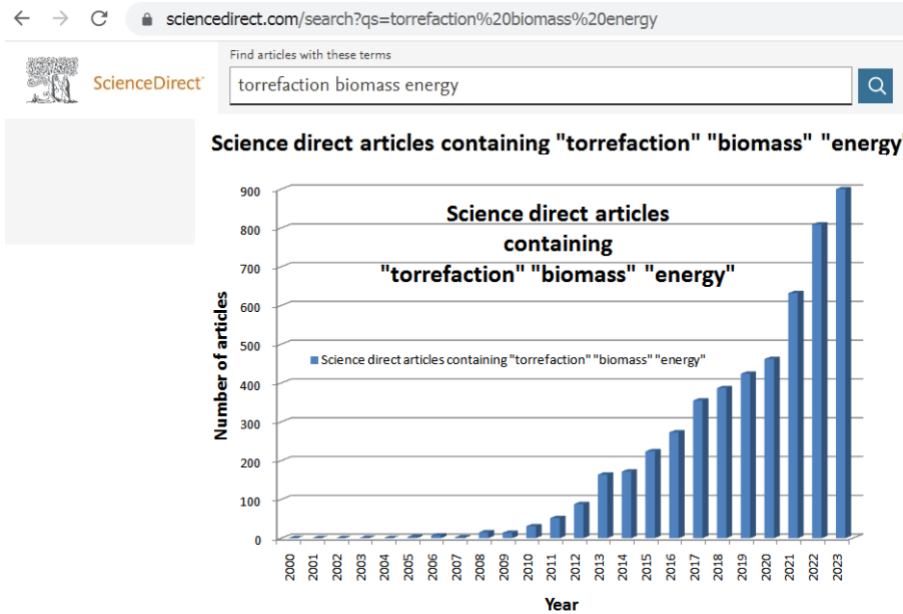


- <https://www.farmersweekly.co.nz/technology/huntly-wood-trial-hailed-as-leap-ahead-for-biofuel/>
<https://www.powergen.com/2023-conference-sessions/coal-to-biomass-conversion-at-the-huntly-power-station-lessons-learned>
<https://www.genesisenergy.co.nz/about/news/genesis-biomass-trial-successful>



5.

<https://www.futuremetrics.info/global-trade-sankey-map-2022/>
<https://www.futuremetrics.info/UpdateonJapanandSouthKoreaPelletImports>



6.

7. A barrel of oil weighs about 136 kilograms and contains 6GJ energy

The average gross calorific value of oven dried pinus radiata with a moisture content of 0% is assumed to be 20.2 GJ/t. Gross calorific value at 56% moisture content is 8.9 Gross GJ/t

A hectare of trees may produce 840 cubic metres of wood when harvested at 28 years

With a harvest age of 25–35 years, and final tree numbers of around 300 stems per hectare

A cubic meter of pine is about 1 tonne (average 960kg).

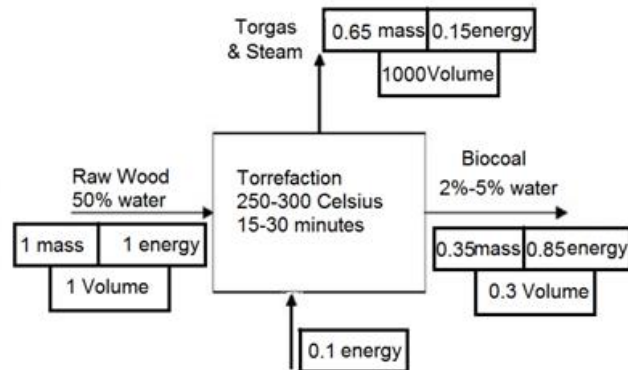
As a rule of thumb one complete radiata pine will be about 3 tonne (wet)

Which is enough wood to make 1 tonne of biocoal (18GJ-22GJ) with an energy content greater than 3 barrels of oil

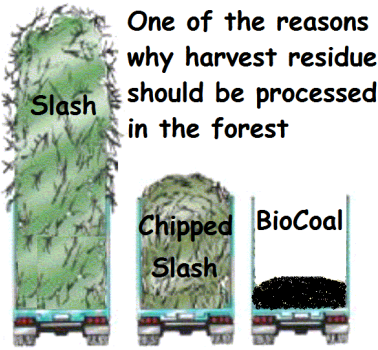
Thus a tonne of biocoal is worth about the same as 3 barrels of oil. (\$420NZD)

Brent Crude Oil As of Aug 24 2023 22:59 BST. \$83.36 USD

(\$83.36 United States Dollar equals \$141.07New Zealand Dollar 25 Aug 2023, 8:12 am UTC)

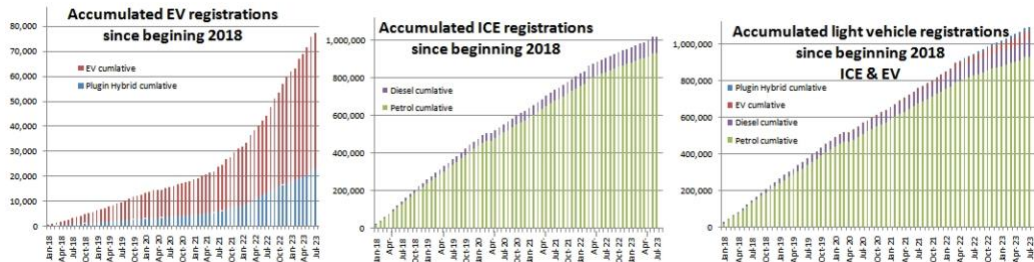


https://www.biocoal.co.nz/case_for_biocoal

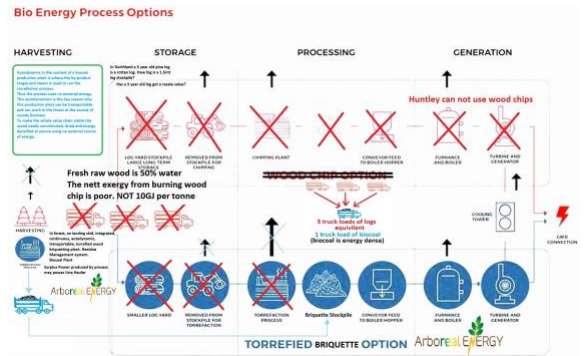


One of the reasons why harvest residue should be processed in the forest

- As of June 2023, there were 84,914 plug-in electric vehicles in New Zealand, consisting of 61,219 battery-electric vehicles and 23,695 plug-in hybrid vehicles. Plug-in electric vehicles make up 1.77% of New Zealand's 4,798,770 vehicle fleet. https://www.biocoal.co.nz/EV_tsunami



The annual average distance travelled across all models of EVs is 14,100 km/year, a quarter more than the 11,500 km/year for combustion vehicles. (Jevons' paradox)



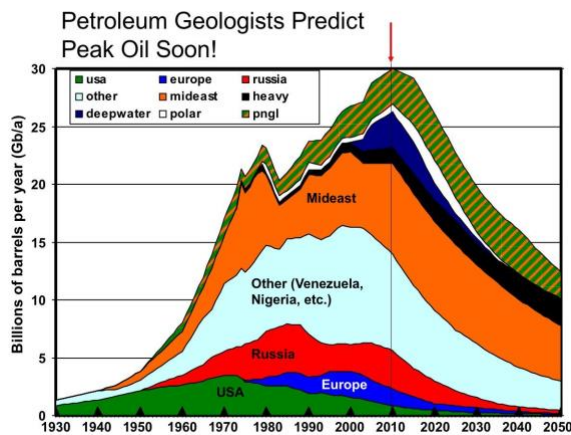
- Currently the NZ Battery Project is of the opinion that raw logs diverted from export stored at Huntly is an



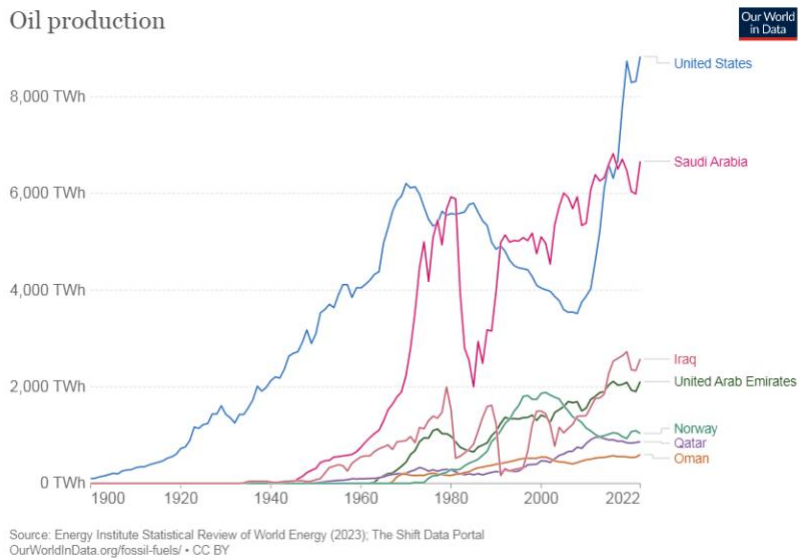
energy option .

<https://www.mbie.govt.nz/dmsdocument/26295-new-zealand-battery-project-indicative-business-case-and-appendices-february-2023>

11. https://en.wikipedia.org/wiki/Hubbert_peak_theory



Who really knows how much oil there is? Fracking releases oil that previously was thought to be unobtainable.



Thus previous predictions of gloom and doom have been delayed.

Nevertheless it is prudent for NZ to secure its energy security. Woody biomass bioenergy is a feasible option for New Zealand.