Innovative Products with Forestry
- Biofuels and Biorefining

Paul Bennett

Content

Creating value from forestry through utilisation of wastes (eg. bark, sawdust, waste wood) or creating new purpose design feedstock opportunities.

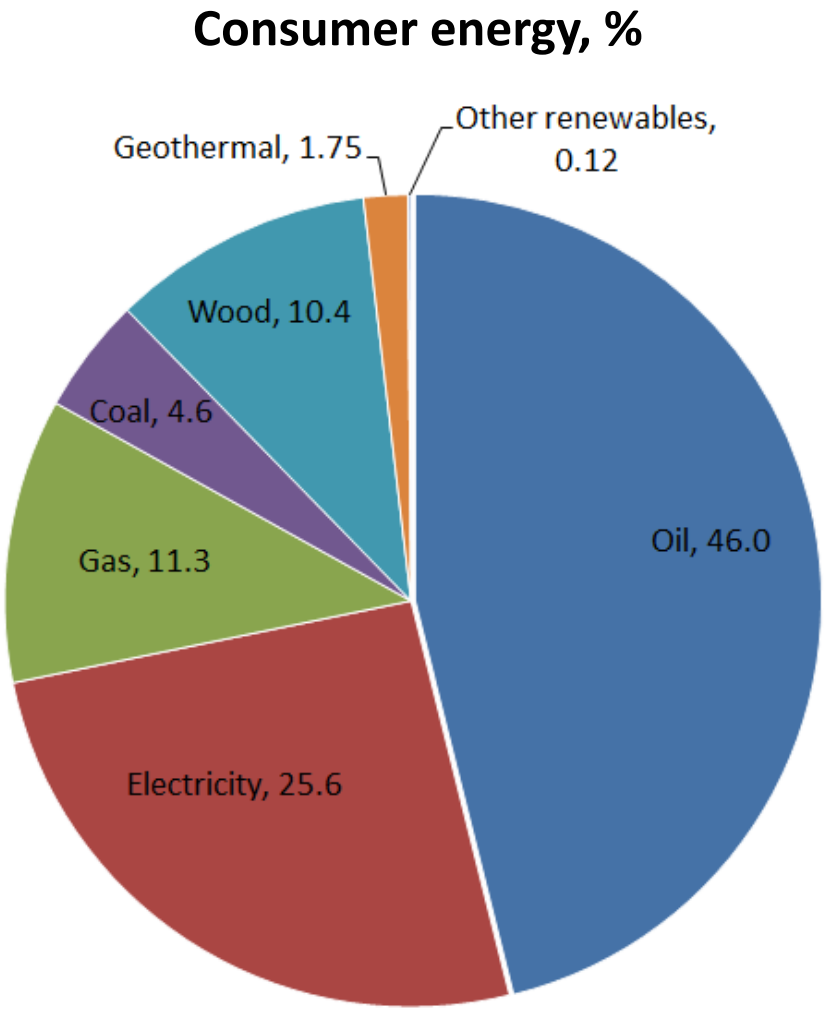
In this talk focus on higher value products as an example of what could be achieved.

- Strategic drivers
- Potential products
- Market pull

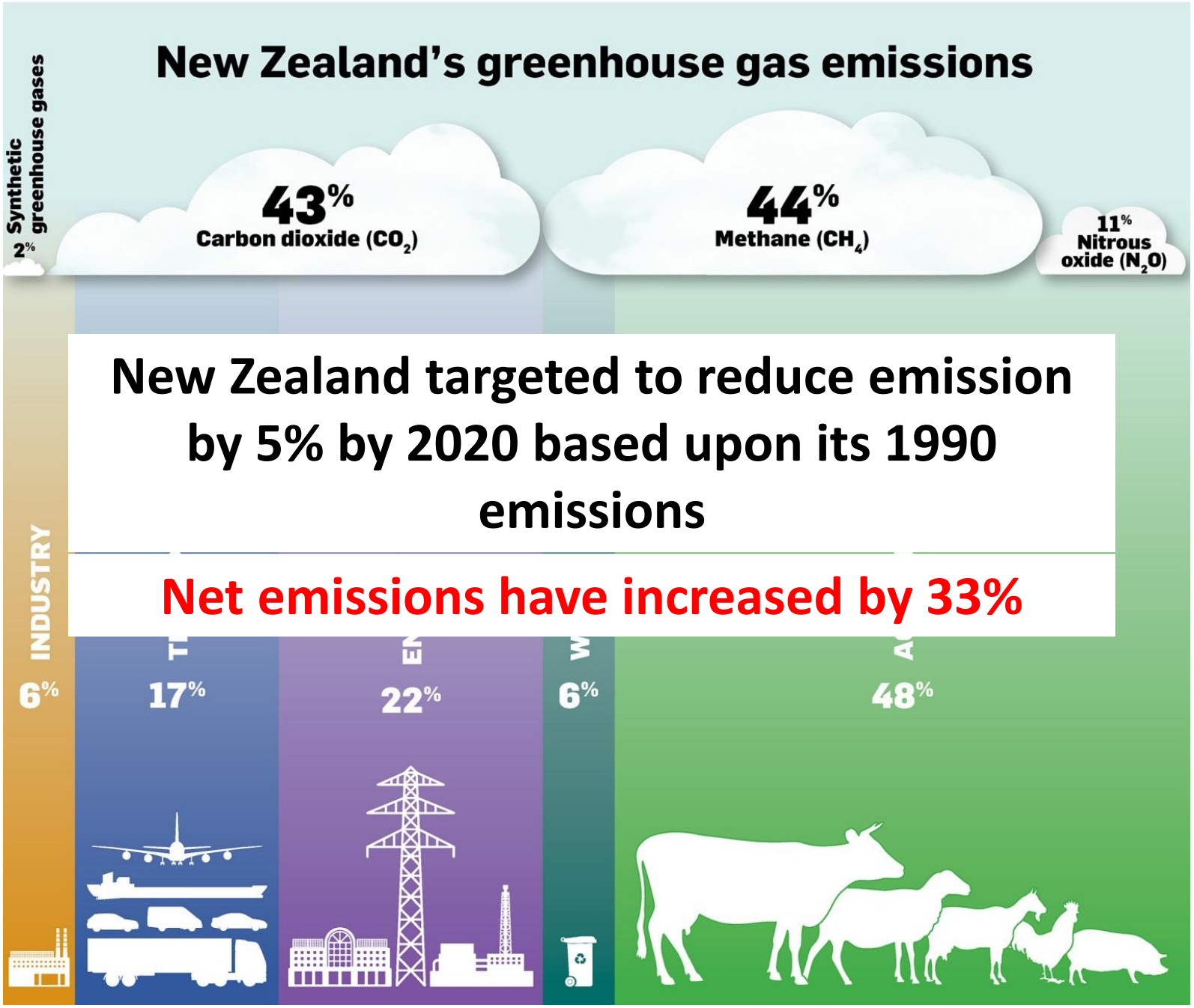
NZ energy context

- Almost all oil imported ($8.3 B)
- 73% of electricity from renewables, targeting 90%
- Biofuels <0.1%

  No mandates & limited incentives for biofuels
- Renewable heat in wood processing sector



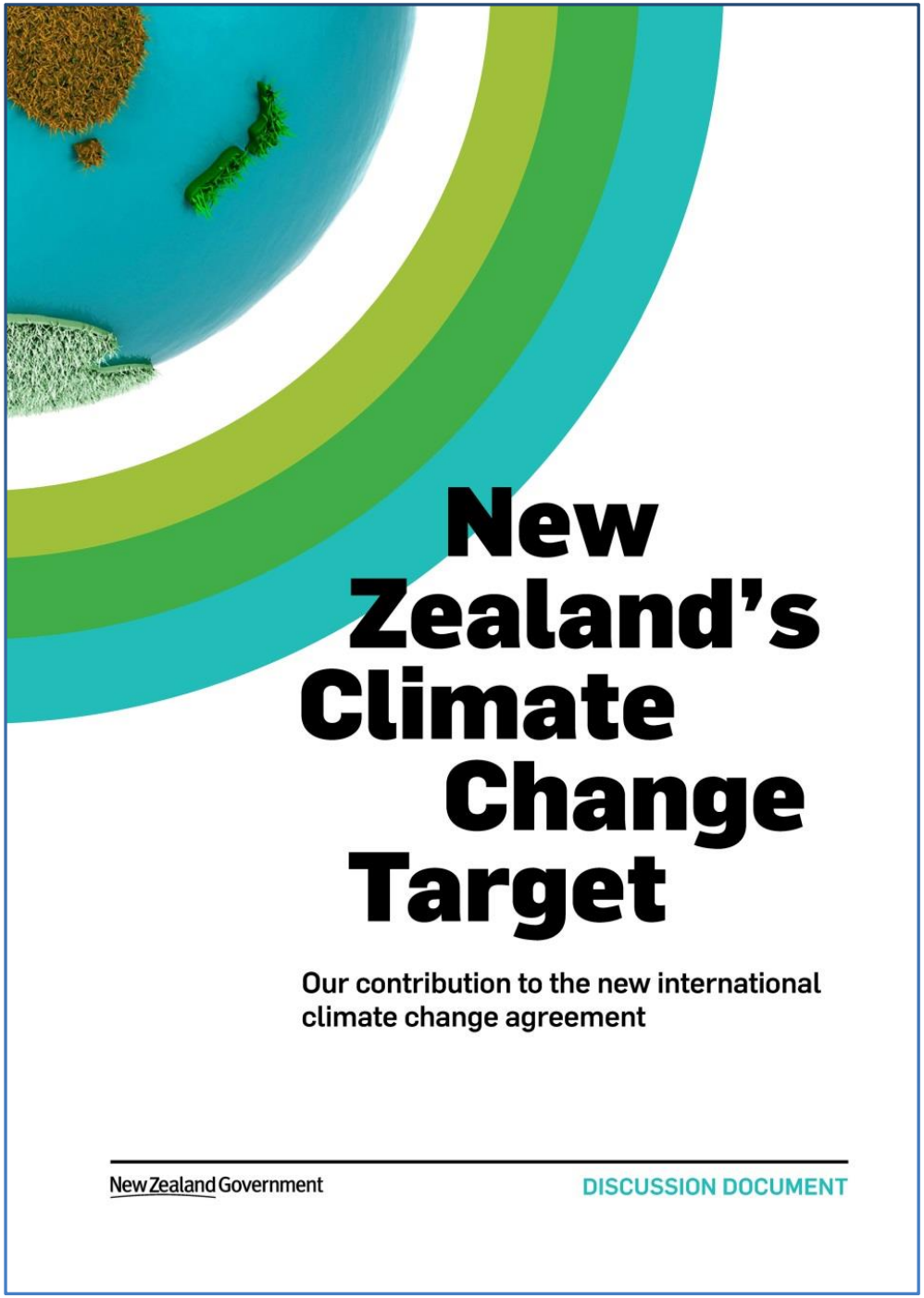
Source: MED – Energy in New Zealand 2013
http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/energy-in-new-zealand-2013/Energy-in-New-Zealand-2013.pdf



New Zealand targeted to reduce emission by 5% by 2020 based upon its 1990 emissions

Net emissions have increased by 33%

http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/climate-change-consultation-document.pdf



"Advances in electric vehicles and biofuel technology offer potential to reduce emissions in the transport sector"

"Biofuel technology is also emerging and could provide an alternative source to oil"

"Depending on the scale of production, there may also be potential to export biofuels overseas."

"Investing $42million in biofuel research."

"Encouraging and supporting permanent afforestation such as through the Permanent Forest Sink Initiative."

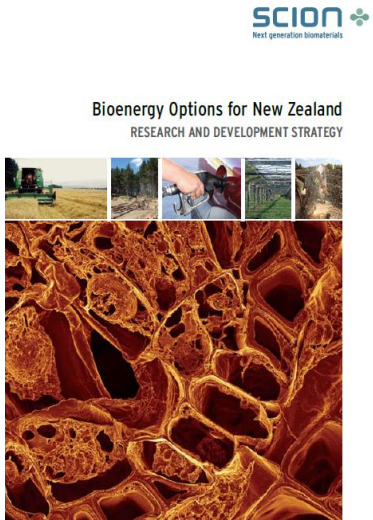
http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/climate-change-consultation-document.pdf

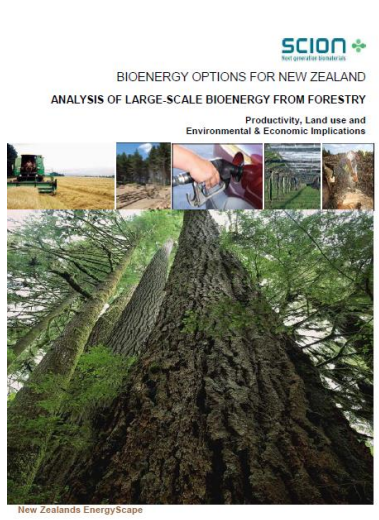
Bioenergy options for New Zealand study

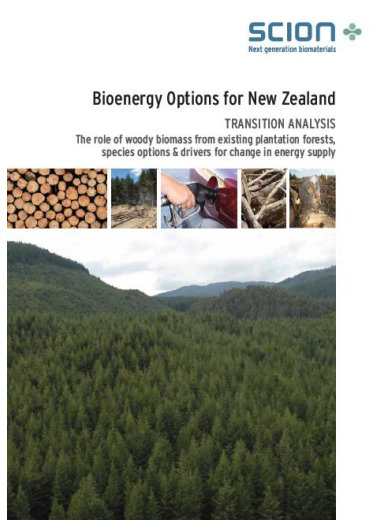
- Bioenergy's role: heat and liquid fuels
- Current biomass residues: small contribution – 6%
- Most significant opportunity:

  Bioenergy from forestry on marginal land

  - Large scale
  - Low environmental impact







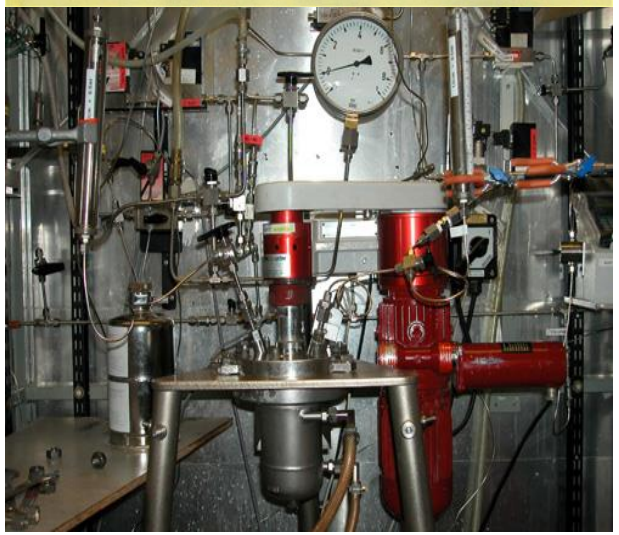
So what does this mean?

Opportunity for new revenue from low value land

But it requires;

- long term vision and support
- new high value products from wood to drive overall economics

Opportunities abound

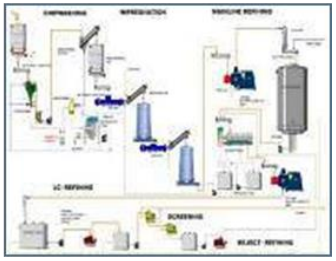


New uses for forest biomass and waste:
a competitive sugar platform for chemicals and energy

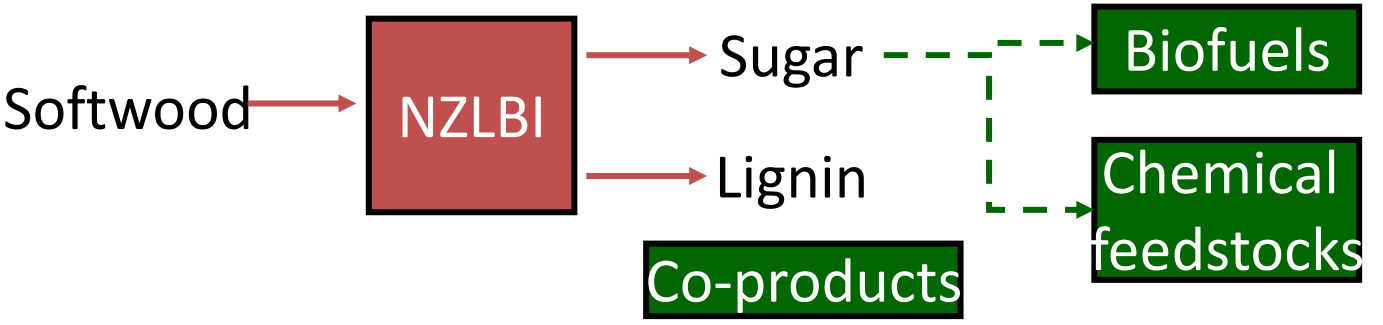
AGRONOMICS
BIOMASS
COLLECTION

ENZYMATIC
SACCHARIFICATION

FERMENTATION



DISTILLATION

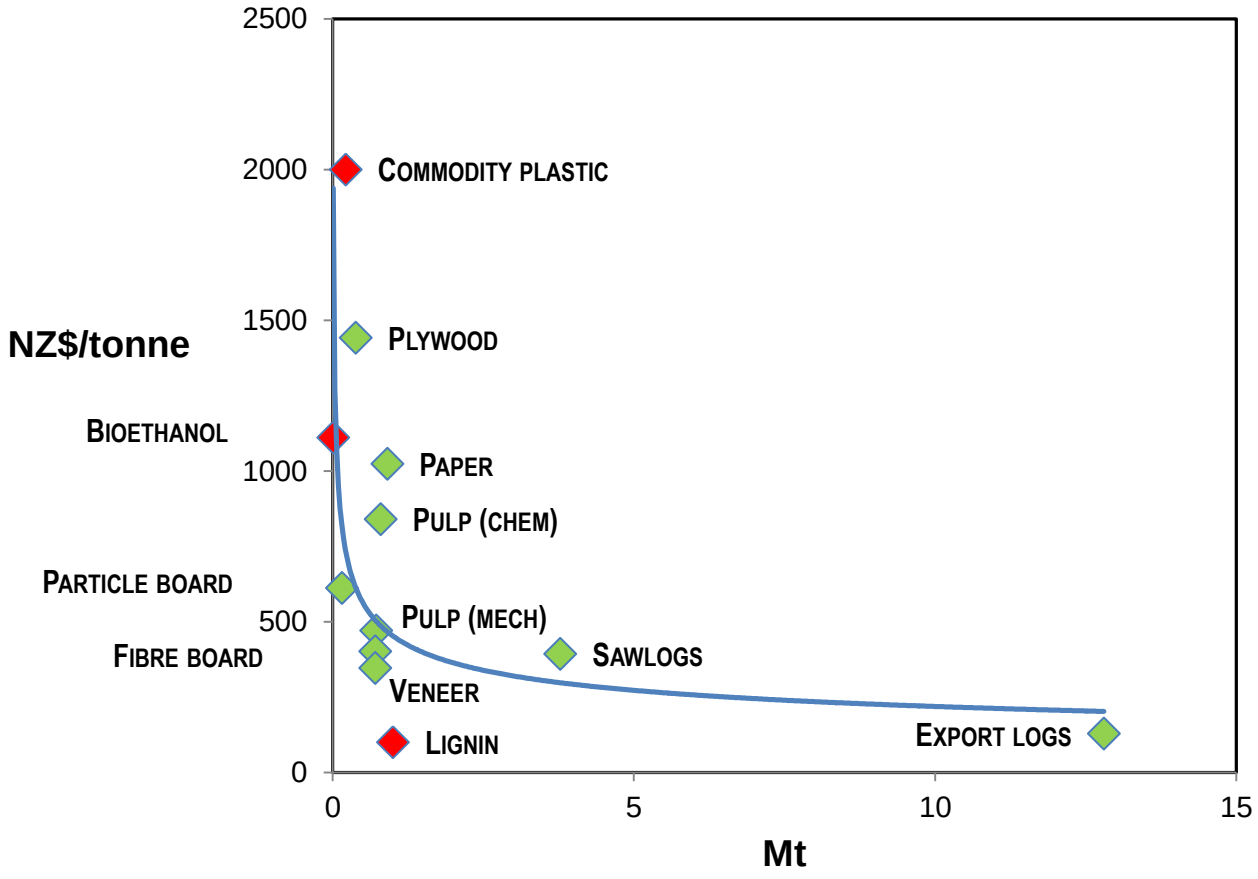


Woodforce

- Wood-based product as a mechanical reinforcement for thermoplastics
  - Competes with glass fibres
  - Wood fibres bound in pellet
  - Compatible with commercial compounding equipment

http://www.woodforce.com/

Product Values



2013 Global Market Size (million tonnes)

	Fossil based	Biobased
Plastics	299	1.7
Chemicals	330	50

Market pull

"We are working to completely eliminate the use of nonrenewable fossil fuels in our plastic bottles while maintaining quality and recyclability"

Market Pull in New Zealand

we do more than meet industry standards – we seek to raise them"

Summary

- NZ's position in Forestry gives a unique opportunity for biofuels and biochemicals production
  - To drive NZ bioethanol/biofuels from Pinus Radiata will require further cost reductions in process and/or valorisation of co-products.
  - High value co-products could largely determine the overall process economics, whilst biofuel production driving throughput and meeting NZ's strategic drivers of energy security and GHG emissions

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