



Te Uru Rākau
Forestry New Zealand

NZ Wood Fibre Futures: Stage One

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Who, why and what?

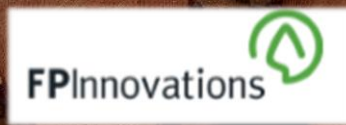
Te Uru Rākau – The Forestry Strategy

MBIE – Industry Transformation Plans

Forestry Ministerial Advisory Group – The Circular Bioeconomy

- Principles
- Two stage approach

Stage One awarded to BioPacific Partners



Te Uru Rākau
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A GLOBAL TECHNOLOGY SEARCH

MPI, MBIE & FMAG sought a commercially oriented report that would:

“... support New Zealand’s move to a net zero emissions economy by 2050 ... identify internationally competitive investment opportunities using plantation forest biomass ... substituting this renewable biomass as the feedstock in products and markets that would otherwise use non-renewable or petroleum-based feedstocks.

- *Analyses on two time-horizons – 5-10 years and 20-30 years.*
- *A preliminary assessment of what might be required from commercial parties and the government to successfully execute these opportunities.*
- *A ranked short-list of 3-6 potential opportunities (for each time horizon) that would warrant further investigation.*
- *Recommendations for further work and next steps.*

The RFP forecast a Stage 2 of the project, subject to the findings of Stage 1, which would *“... be a significant piece of work focused on working with key stakeholders, potential investors and Government to develop a detailed implementation roadmap based on opportunities identified in Stage One.”*



TECHNOLOGIES ARE OUT THERE

That can transform “woody biomass” into many things

- Biocrude oil – the base for a multitude of products
- Liquid biofuels – e.g. biodiesel, bio-aviation fuel
- Coal substitutes – torrefied wood
- High-value biochemicals, bioplastics, and biomaterials
- Wood-based construction materials – e.g. that can make skyscrapers out of wood



That are being actively developed by high-tech companies

- Often in collaboration with large corporations
- Especially in Europe and North America

That need the involvement of governments

- Particularly among New Zealand’s forestry competitors (e.g. Finland, Quebec-Canada, California-USA)
- They are driving these developments to lower emissions and reinvigorate their forest industries
- Involvement as lead co-investors, hosts for international capital, and “flexible regulators” using tools such as Low Carbon Standards



SHORTLIST TO PROCEED TO STAGE 2

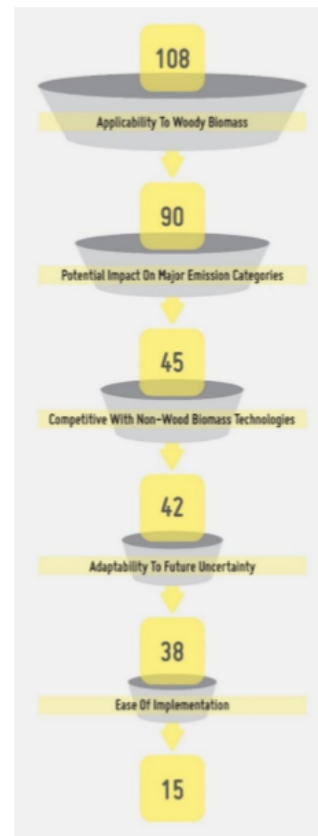
Technologies to produce **biocrude oil**

- A basic and very versatile product replacing fossil fuel imports
- Multiple options: to refine into fuels, or produce many other biochemicals and biomaterials
- Very active developments internationally
- Potential for export

Four lead candidates

- Envergent Technologies (Canada)
- Licella (Australia)
- BTG/BTL (Netherlands)
- Valmet/Fortum (Finland/USA)

Technology filtering process.



SHORTLIST TO PROCEED TO STAGE 2

Technologies to produce **liquid biofuels**

- The largest target in the energy category of New Zealand's carbon budget
- Include “drop-in” fuels (drop-in to the existing usage system) involving diesel, aviation fuel, and marine fuel
- Very active adoption globally, often driven by low carbon fuel standards

Three lead candidates

- CRI/Criterion Catalyst (Norway/Sweden)
- Haldor Topsoe/TechnipFMC (Denmark/UK)
- Lanzatech/PNNL/Aemetis/InEnTec (USA)



SHORTLIST TO PROCEED TO STAGE 2

Technologies to **replace coal**

- Coal used in the steel industry is a small niche but with a high intensity of carbon emissions
- Primarily relevant to New Zealand's major steel-mill, New Zealand Steel
- Many projects being pursued internationally, in Netherlands, Canada, Sweden and New Zealand

Five lead candidates

- Airex (Canada)
- CarbonScape (New Zealand)
- Cortus Energy (Sweden)
- Thyssenkrupp (Germany)
- Torr-Coal (Netherlands)



SHORTLIST TO PROCEED TO STAGE 2

Increased used of wood in the built environment

- Special case which emerged from research but not from formal screening process
- Represented powerful synergistic effects:
 - Increased domestic wood consumption and value capture
 - Increased primary value of logs
 - Generated more residual woody biomass
 - Reduced carbon emissions from concrete and steel and non-renewable insulation, and stored carbon in the buildings



Three commercial technologies produced by the following companies

- Factory Zero (Netherlands): wall and roof modules and energy wraps
- Dieffenbacher (Germany) & Siempelkamp (Germany): wood-based insulation
- Cross-laminated timber (CLT) & Glulam structural products entering now



TWO PATHS TO VALUE

High Value Solid Wood



Uses intrinsic strength and flexibility of wood
Stores sequestered carbon
Completely renewable
Replaces steel & concrete (substantially lower carbon)
Increasing global adoption (including multi-story buildings)

Offcuts, pith, sawdust

Low Value Woody Biomass



Little value as other biomass feedstocks easier to process

Creates new value from by-products with the right technology
Technologies can use other feedstock, e.g. municipal waste
Future value from wood-only by-products (e.g. lignin, tannin)

Other feedstocks
e.g. Municipal waste, energy crops

\$\$\$
Biofuels,
biochemicals

Creates drop-in biodiesel, aviation fuel, marine fuel
Specialty chemicals, Biomaterials & biocomposites



For context: NZ has sufficient woody biomass to produce 18% of current crude oil consumption, or 30% of diesel, or 70% of aviation, or >100% of marine fuel

... and multiple plants would be needed, located in multiple regional sites, to supply those amounts

Recommendation – Accelerate Investigation

AREA	TECHNOLOGY READINESS	PRODUCTION SCALE (/year)	FIBRE SCALE (/year)	FIBRE TYPE	EMPLOYMENT (FTEs, approx)	CAPITAL SCALE (USD, approx)
Biocrude	TRL 8	75 million litres	625,000 m3	Residuals	30	\$120 million
Liquid / Aviation Fuels	TRL 7-8	57 million litres	500,000 m3	Residuals	20	\$340 million
Solid Fuel – Torrefied Pellets	TRL 7-8	50,000 tonnes	150,000 tonnes	Residuals	10	\$55 million
Construction - Structural	Commercial	50-100,000 m3	60-120,000 m3	Solid Timber	30-60	\$30-50 million
Construction – Insulation	Commercial	Varies	-	Residuals	20	\$75-100 million



LOWER PRIORITY AREAS NOT RECOMMENDED FOR STAGE 2

Renewable Natural Gas (RNG)

- Candidates had weak competitive position price-wise against fossil fuels

Solid fuels (apart from coking coal)

- Difficult competitive position due to price and scattered centres of usage
- Already being partly met by wood pellets and potentially by torrefied wood

Biochemicals, bioplastics, biomaterials

- Generally less well-developed technologies (including some from New Zealand)
- Small impact on carbon emissions
- Make sense using by-products of existing plants, at small scale
- Covered by biocrude capability; space to watch for emergence of commercial candidates



THE CURRENT INVESTMENT ENVIRONMENT

New Zealand *not* well placed to attract investment because:

- Woody biomass is relatively expensive
- Limited in availability
- Little price signal to decrease carbon
- Global, specialist investors in this area are being attracted elsewhere
- Local investors are limited in number and in scale
- High uncertainty

This can be turned around by:

- Adopt Low Carbon Standard regulations which stimulate biofuel consumption
- Stimulate the use of wood in the built environment, leading with Government procurement, and extending Low Carbon Standards to recognise and value emissions related to building
- Develop international investor-grade investment cases, including commitments on these new policy settings, to attract international investors (Wood Fibre Futures Stage 2)
- Engage (or continue engaging) with Refining NZ and New Zealand Steel as key players
- Set a long-term path to maintain and build competitive advantage over 20+ years



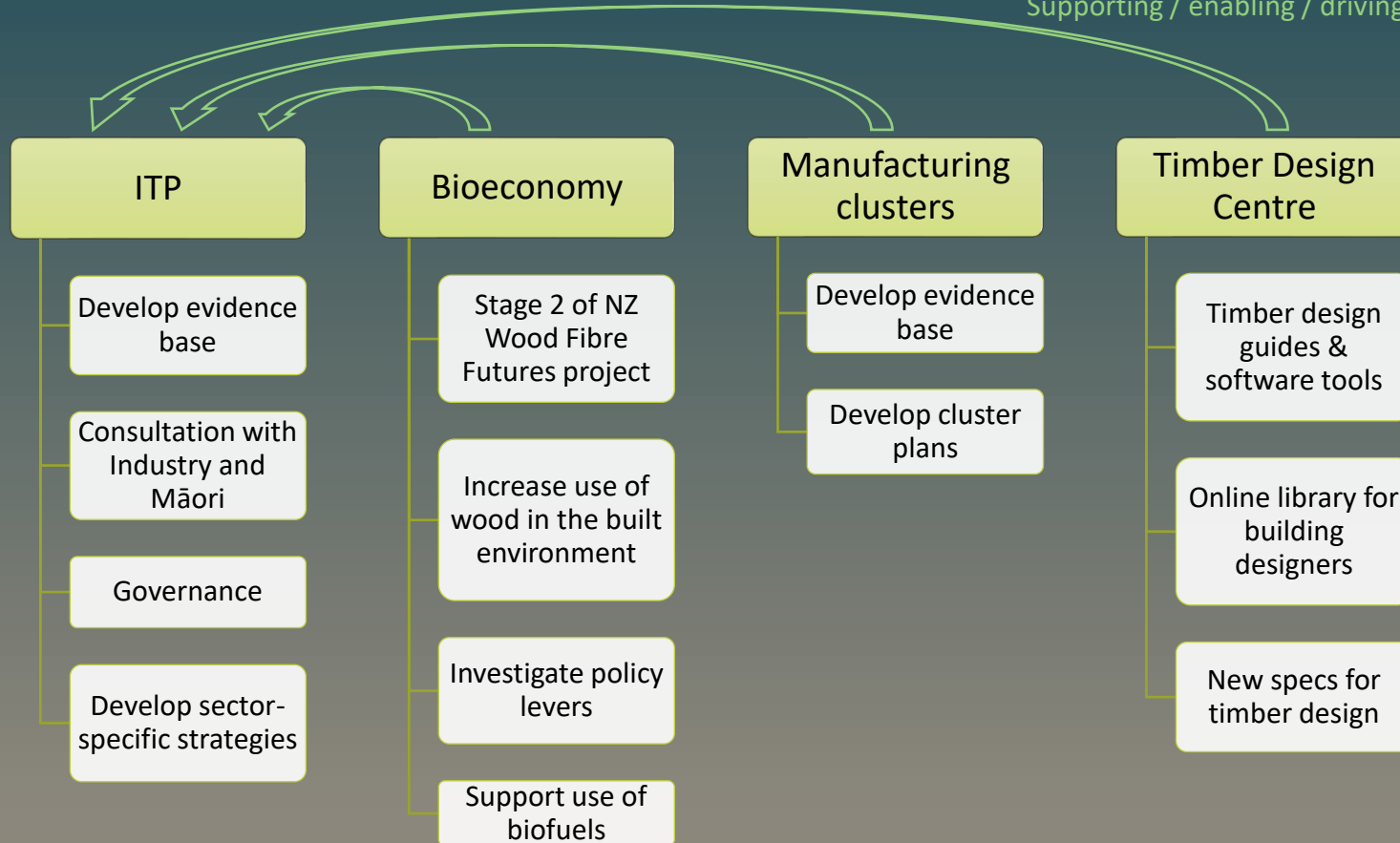
Next steps...

Stage Two

Activity	Date (indicative)
RFP on Government Electronic Tender Service (GETS)	15 October 2020
Proposals submitted	19 November 2020
Evaluation commences	20 November 2020
Evaluation concluded and Preferred Supplier selected	5 December 2020
Contract executed	Mid-January 2021
Draft report	30 May 2021
Final report	30 June 2021

Workstreams 2020-21

Sector Investment
Supporting / enabling / driving





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Any Questions?

