



# **The Opportunities and Realities of NZ Becoming Self Sufficient in Liquid Biofuels**

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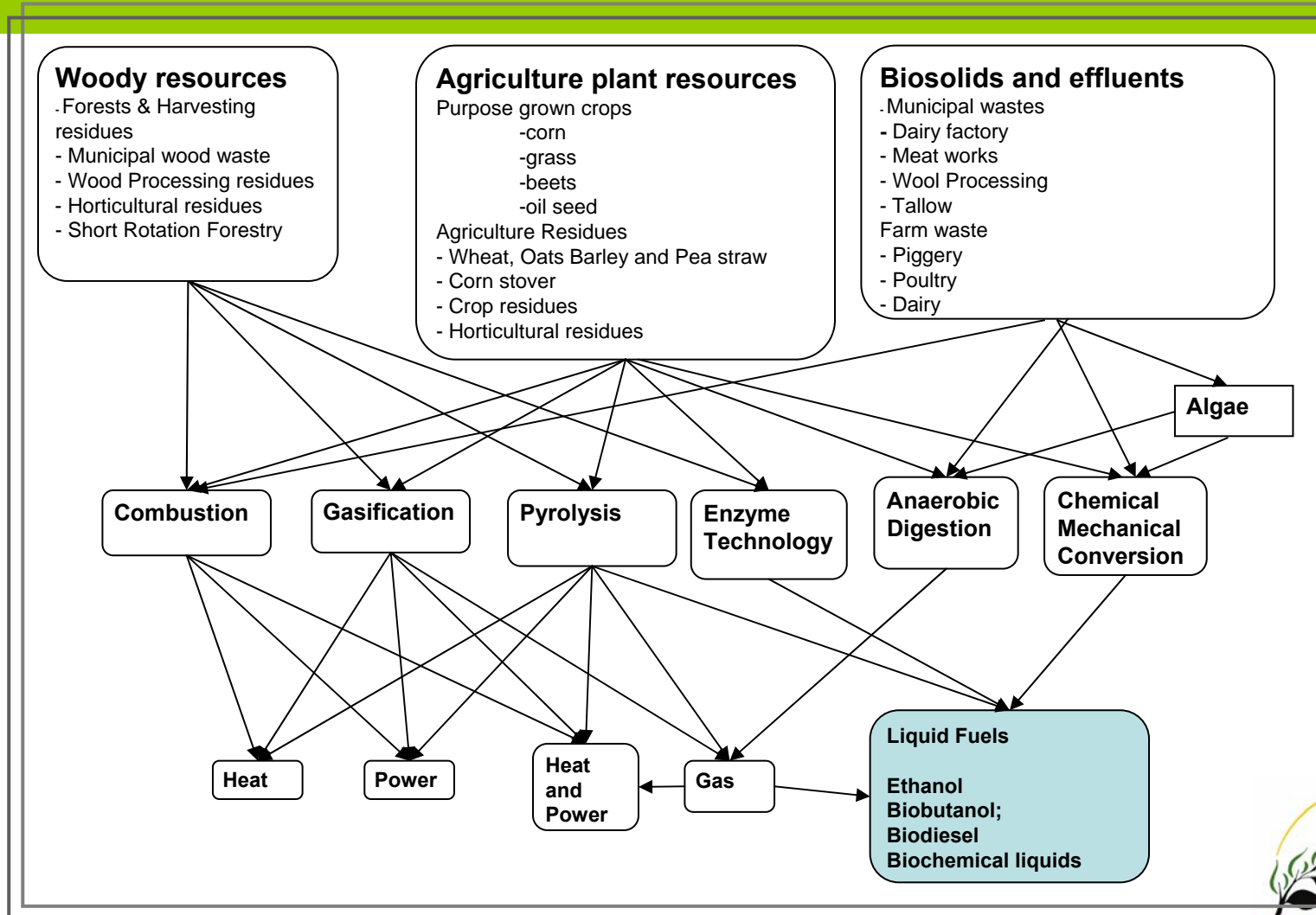
# We Don't Have To Wait

- NZ has many options now and in the future
- Growth in liquid biofuels depends on
  - Establishing demand
    - Biofuel users
    - Infrastructure
  - Production plant investors
  - Feedstock supply management
- Government policies
  - Targets / obligations create volume
  - Provide confidence for investors
- Fuel quality standards –reliability of product
- Level playing field with regard to imported biofuel
  - No price subsidies
  - Sustainability of sources

# Feedstock Options

- Ethanol
    - Whey
    - Grain, grass and sugar crops
    - Woody biomass
  - Biodiesel
    - Used cooking oils
    - Tallow
    - Oil seed crops
    - Algae
    - Woody biomass -> bio-oil
- Whey, cooking oils, tallow are utilised now but limited supply
- Crops economic and extensive availability
- Woody biomass is the biggest opportunity but the technology is not proven

# Range of Paths to Follow



# Production

- Feedstock suppliers require certainty
  - Crops require lead time for planning, planting and harvesting
  - Woody biomass 10-25 years rotation
  - Algae growing and processing requires infrastructure
- Other technologies will be viable –
  - Coal to liquids plants.
  - Competition for biomass feedstocks used for heat
- We will need a range of technologies
- Feedstock costs are a significant proportion of biofuel cost (50% to 80%)
- Effect of biofuel production on feedstock market
  - Additional cash flow for feedstock producers
- Can reduce waste disposal costs

# Fuel Quality

- Transport market requires high quality fuel
  - Safety when used in boats and vehicles
  - Engine protection
- 1st generation technologies are relatively simple
  - DIY can create problems for the market
  - Processing to required quality is not cheap
- Production standards must not be relaxed
  - Poor quality fuel will affect confidence of users
- Vehicle warranties
  - NZ has high proportion of imported older vehicles

# Agriculture and Horticulture Processing Residues

- Whey
  - As a by-product limited by dairy processing
- Tallow
  - As a by-product limited by animal processing
  - Price set by export market
- Used cooking oil
  - Contamination from different oils
- Straw
  - Avoids emissions from burning
- Waste paper
  - Contamination
  - Zero additional collection costs
- Food processing residues
  - Seasonal supply
  - Competition from other uses

**Quality and consistency of supply of feedstock is critical**

# Arable Crops

- Currently well established cropping industry
  - Existing equipment for growing and harvesting
  - Experienced in efficient growing techniques
  - Established distribution and storage arrangements
- Liquid biofuel crops value to farmers
  - Provides an additional revenue stream
  - Extends number of crops in a rotation
  - Improves land management
  - Can provide a secure market
- However competition from other land uses





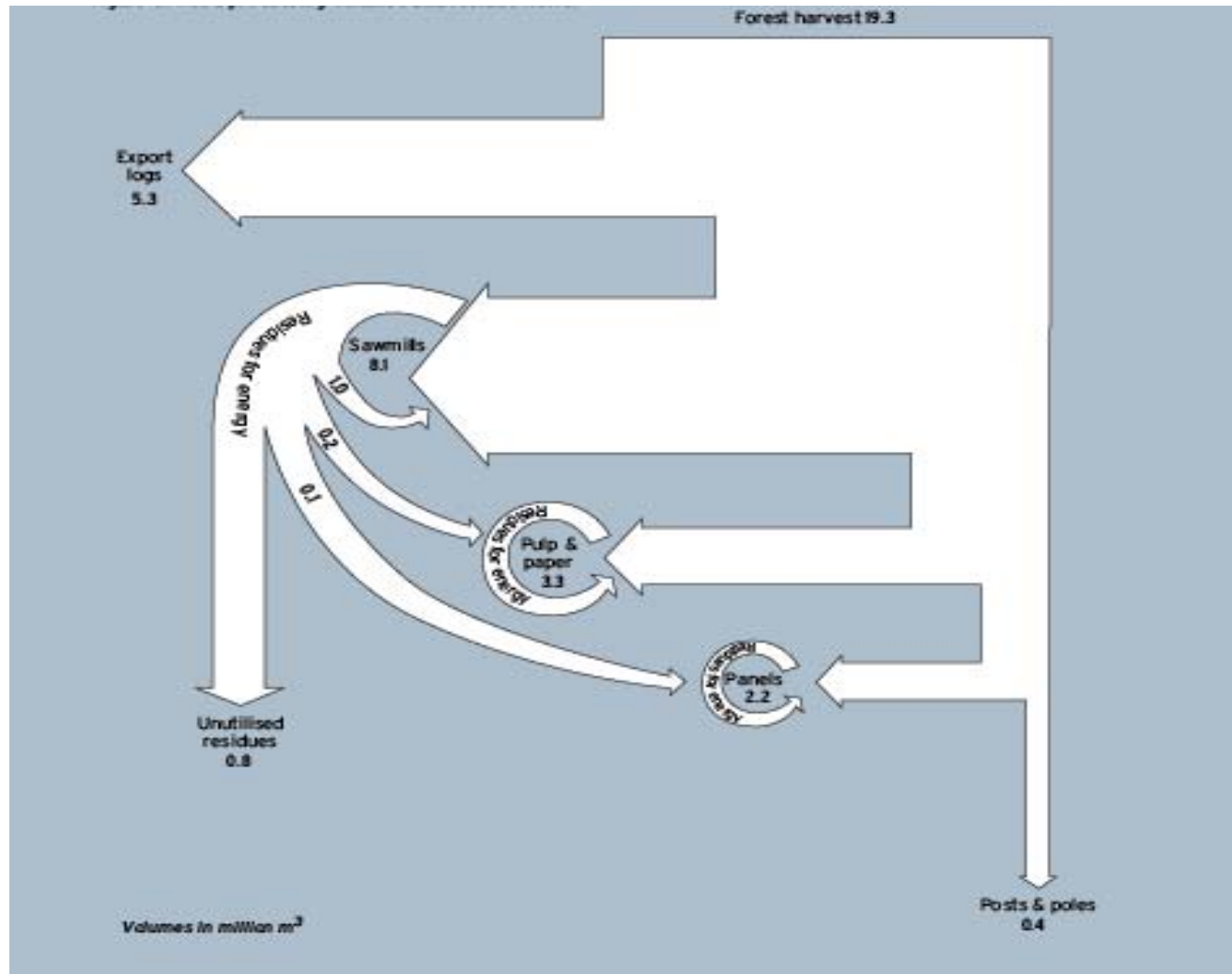
# Arable Crops

- Ethanol
  - NZ has well established industry based on whey
  - Sugar crops have been grown in southland
  - Well established 1<sup>st</sup> generation technologies
  - Significant international research
  - 2<sup>nd</sup> generation technologies => grasses, straw, stover
- Biodiesel
  - NZ has small but established industry
    - Used cooking oil
    - Tallow
  - Is already underway
    - Biodiesel NZ – rape seed oil
    - Large scale processing plant underway
    - Already >5,000ha of oilseed rape is in the ground in NZ

# Woody Biomass Availability

- Woody biomass
  - 8.7Mill ha of medium to low quality grazing land
  - Total heat and transport fuels could come from around 3.2 million ha of energy production forests.
  - 37% of available medium and low quality grazing land
  - Low grazing quality land is elevated and steep – suitable for trees.
- An energy forest sector would take a number of years to establish
  - Trees take a number of years to grow
  - Difficulty of attracting investors in energy forests when no proven demand
  - Tree crops not viable when unused residues available
  - Woody biomass -> bio-oil
- Woody biomass is the biggest opportunity but also most difficult

# Woody Residues Availability



# Rich Foresters Throwing \$\$ Away



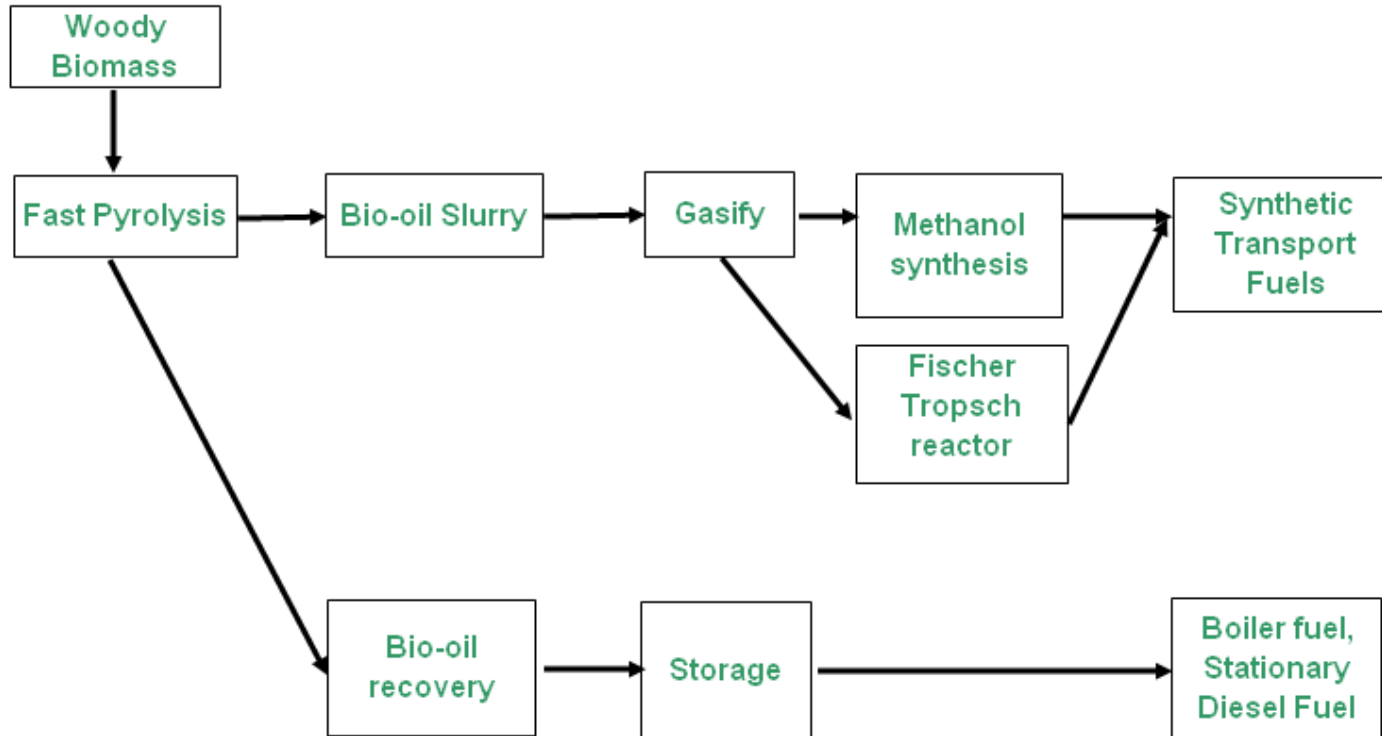
# Residues Turned into a Valuable Commodity



# We Have On-site Residue Processing Technology

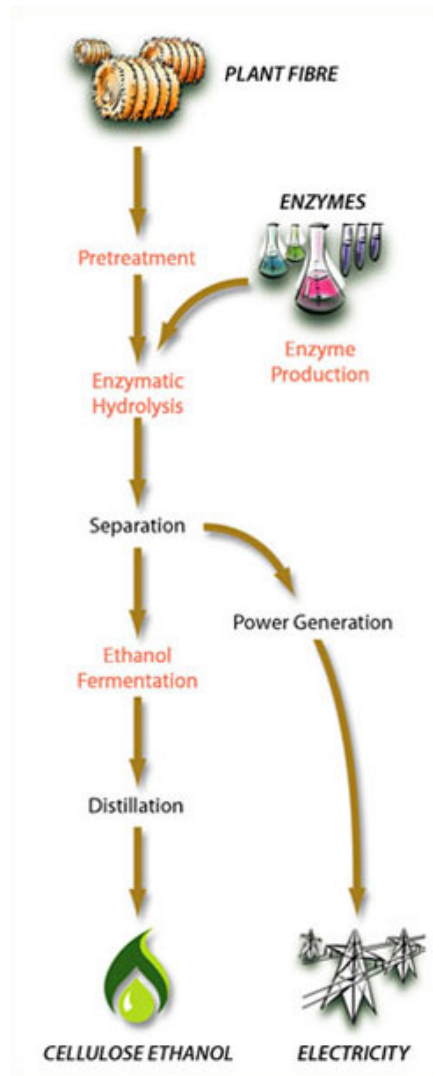


# Bio-oil Technology



- Small mobile pyrolysis equipment
- Can concentrate energy at source and then transport

# Iogen Cellulose to Ethanol Technology



- Opportunity for large number of woody biomass feedstocks
- Still at developmental stage
- Will open significant opportunities



# Algae

- Laboratory scale is proven
- Issues of scale for move to commercial operation
- Need to focus on technologies that use less land
- Issues of harvesting
- Energy intensive conversion to liquid biofuels

# National Benefits

*Revenues from*

*Agriculture and horticulture  
processing residues*

*New arable crops*

*Algae*

*Forest residues*

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*Immediate climate change benefits*

*Biofuels Sales Obligation can be achieved*

*Can transition to a sustainable liquid fuel  
future*

# Risks

- Misinformation about food vs energy issues
  - Protection of existing fossil fuel interests
  - Global debate is influenced by subsidies
  - Increase in protein consumption driving demand for grain
  - Protection of existing vehicle manufacturers
  - New Zealand can be isolated from the debate
- Overseas subsidies can undercut local production
- Government will back off Liquid Biofuels Obligation
- Poor quality fuel will affect market confidence in the product.

# Strategy—Vision

## Strategy

- Build NZ industry on existing feedstocks
  - Whey, tallow, oil seed crops
- Expand to use biomass residues that are currently being wasted
- Transition to 2<sup>nd</sup> generation technologies when commercialised
  - Woody biomass
  - Algae

## Government Actions

- Access to oil majors distribution network
- Stimulation of demand for liquid biofuels through the Biofuel Sales Obligation to provide market confidence
- Set quality standards
- Ensure local market not undercut by:
  - Imports sourced from unsustainable of feedstock sources
  - Imports of subsidised product