

# The role of bioenergy in economic growth from forestry, agriculture and waste

Bioenergy

Value added bio-materials

Export of biomass feedstocks and biofuels

By 2040

30% of transport fuels from wood/fuel crops

A 60% increase in biomass use to produce heat



# Wealth and wellbeing via bioenergy

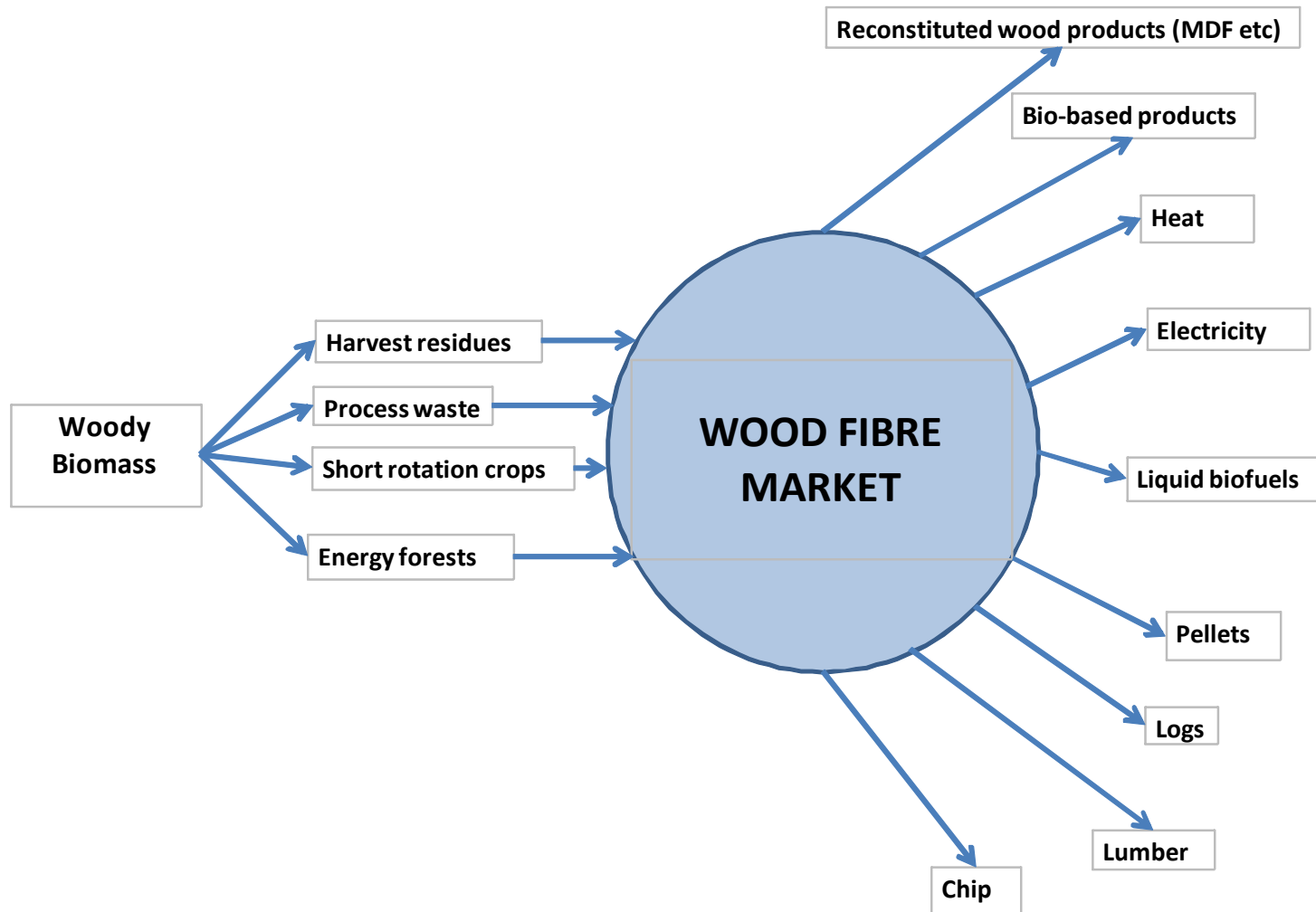
Multiple national benefits are realised via bioenergy:

- By extracting additional value from existing wood and organic wastes,
- Leading to economic growth from new energy crops that:
  - improve forest and other land owner business resilience
  - reduce international energy supply-side risk
  - facilitate climate change goals, and
  - help underpin NZ's international green trading platform
  - generate value-added export revenue

# Potential added-value opportunities

- Building on proven bioenergy technologies from existing feedstocks:
  - Wood fuel for heat:
    - Forest harvest and processing residues
    - 60% increase in biomass use to produce heat
  - Biogas – municipal, dairy waste, food processing residues
  - Liquid biofuels
    - biodiesel – used cooking oil, animal fats, canola, forest residues
    - bioethanol – whey, black liquor, forest residues
  - Utilising organic waste
  - Links to change to stimulate production of value added bio-materials
  - Leading to 30% of transport fuels from wood

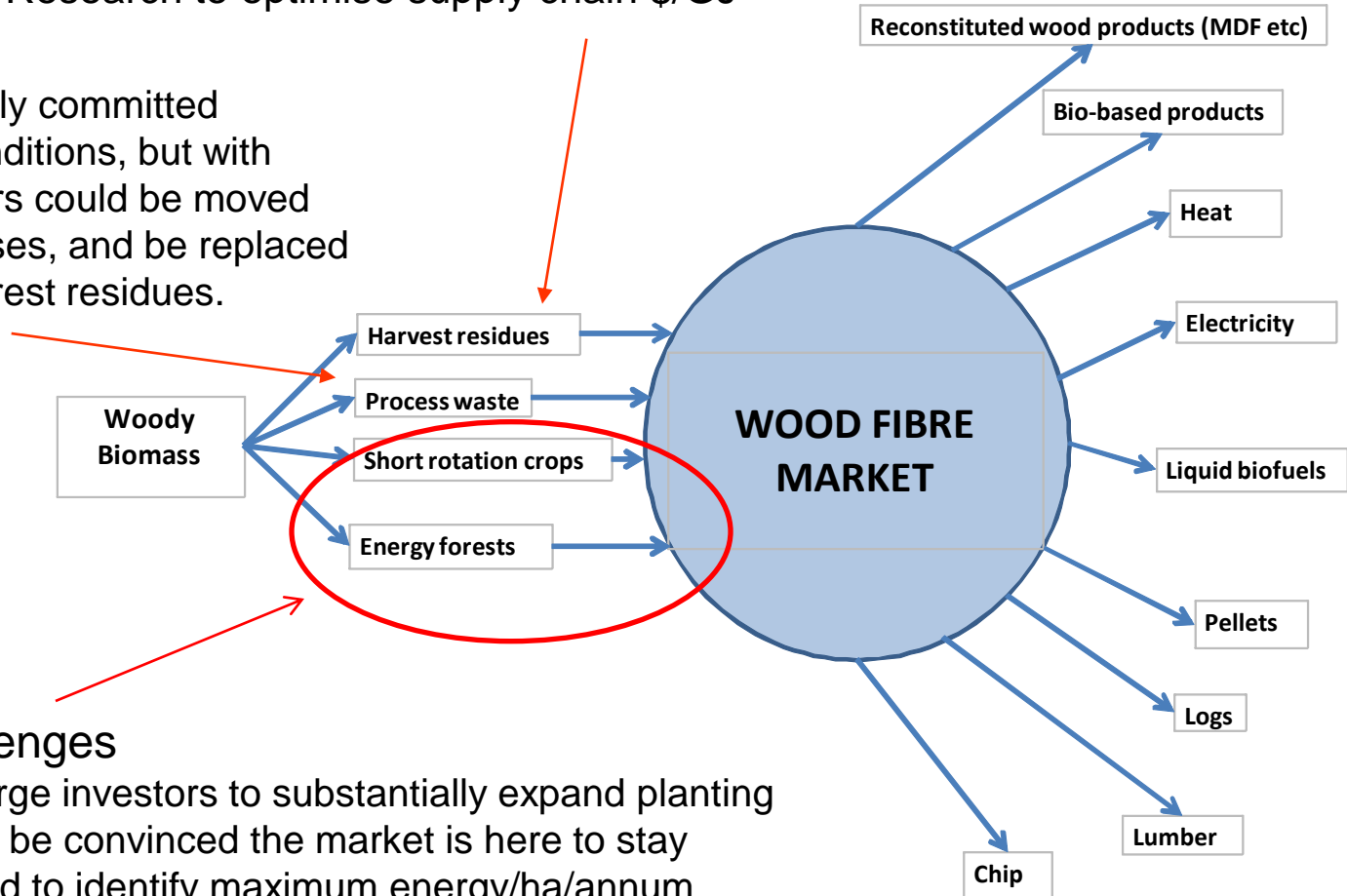
# Wood crops - extracting additional value



# Extracting additional value - the focus of effort

Research to optimise supply chain \$/GJ

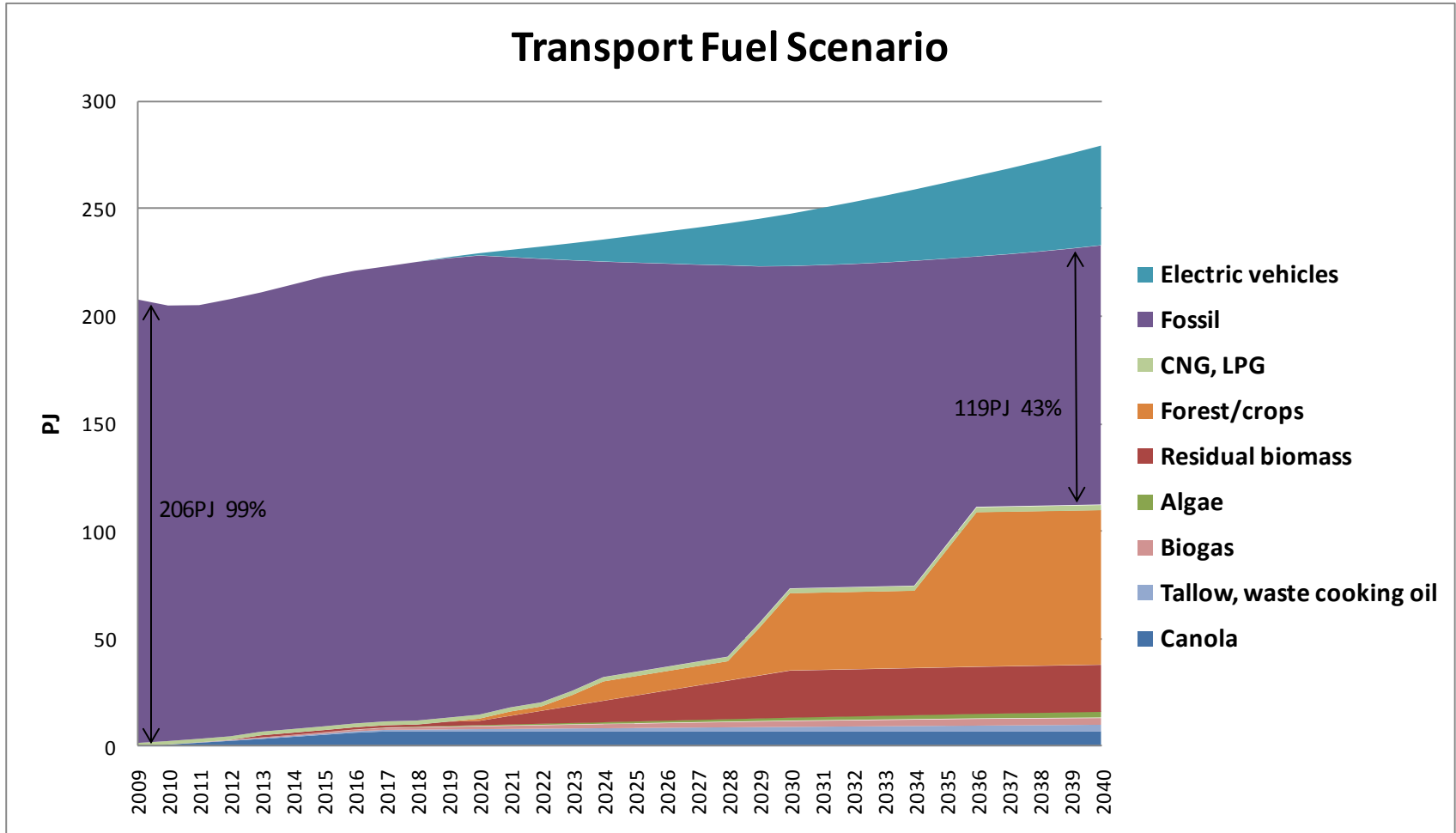
Already nearly fully committed under current conditions, but with appropriate drivers could be moved to higher value uses, and be replaced by lower value forest residues.



## Economic challenges

- Need to attract large investors to substantially expand planting
- Investors need to be convinced the market is here to stay
- Research required to identify maximum energy/ha/annum
- Optimisation of supply chain \$/km

# The transport biofuel challenge



# Bioenergy – the future options

Bioenergy is now established in New Zealand.

Supplying around 8.5PJ of heat, (8.5% consumer energy) plus modest but growing volumes of bioethanol, biodiesel, biogas

## Our strategic options span:

### Current growth path

Continuing incremental growth to (say):

- 35PJ of heat, plus
- Marginal quantities of liquid biofuels, biogas (9.5% consumer energy)



Major volume growth opportunities through

- Liquid biofuels
- Export

### High growth strategy

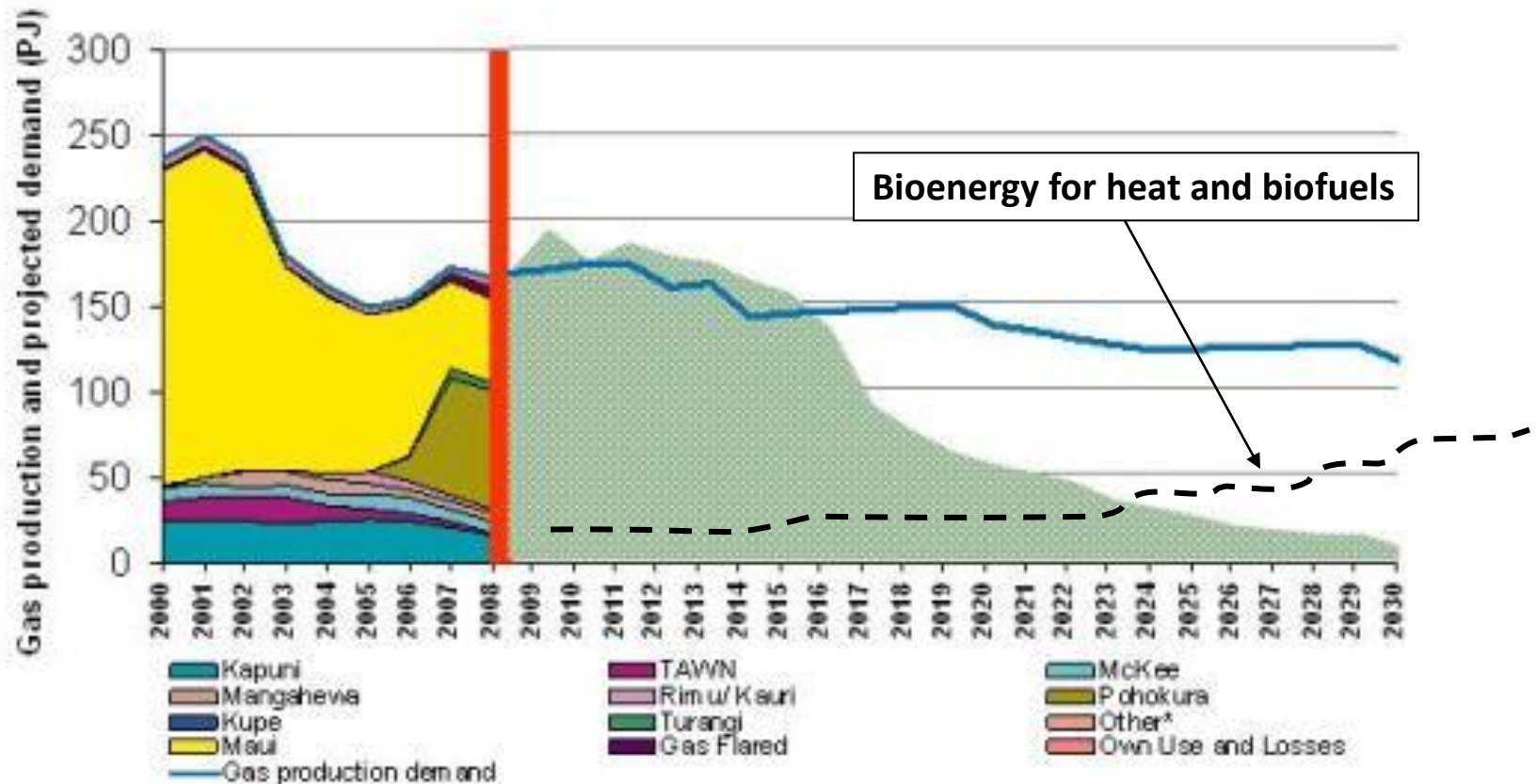
Extracting additional value from biomass by supplying more than 25% of New Zealand's projected energy needs, including 30% of total transport fuels (by 2040)

# A growth scenario

- Continuing expansion of:
  - Heat use & gas production from wood, biodiesel from tallow and oil
- Introduction of:
  - Diesel from algae
  - Bio-oil from forest residues and black liquor
- Chip or pellet export
  - Securing European climate change subsidies
  - Researching Asian/other demand
- Volume transport fuels production from lignocellulose (biodiesel or bioethanol - indicative numbers):
  - Up to 6-plants, regionally based producing >1.6 billion litres pa
  - >50PJ's of transport energy (in addition to heat)
  - CO2 emission reductions - 3.5m tonnes pa
  - 600,000 hectares of land (mix of crops and forest)
  - \$6 billion in investment by 2040

# Bioenergy in context

New Zealand's historical and projected gas production



\*Others includes Kaimiro, Ngatoro and Radnor

# Current situation analysis

- The growth strategy is a big ask
  - Requires interest and involvement of forest owners
  - Landowners need to see the value proposition
  - While challenging, this is achievable
- Investors require confidence
  - Currently limited corporate investor interest in value extraction
- Development of fibre energy feedstock market
  - Wood processors and foresters
  - Landowners
- Extension of BAU for current technologies
- Longer term big step requires
  - A community of interest and Government support
  - Demonstration ie: Solid Energy
  - Development of wood-to-energy technologies science capability

# Phased development

## PLANNING PHASE: to 2015

- Extend current initiatives
- Continue research, but directed also to crops and biodiesel, including feedstock supply chain
- Establish business case for liquid biofuels
- Secure Government and investor support

## ESTABLISHMENT PHASE: 2015 to 2020

- Extensive planting of fuel crops and new energy forests
- First liquid bio-fuel plants committed
- Attract investors

## CONSOLIDATION PHASE: 2020 to 2040

- Progressive:
  - Fuel crop harvest increases
  - Introduction of regionally located liquid biofuel production plants
  - Reduction in CO2 emissions

# A New Zealand bioenergy strategy will

- Provide additional revenue streams for forest and other land owners
- Increase business resilience and wealth obtainable from diversified land use
- Use bioenergy as a leader into the wealth potential of the wider bio-economy
- Increase the utilisation of residue for production of energy so that waste is eliminated
- Reduce imported transport fuels
- Position NZ to transition to a lower carbon economy
- Increase employment,
- Reduce environmental impacts to air, soil and water
- Enhance the quality of New Zealand's 'Green Image'

# What will make it happen?

- The bioenergy sector is established and ready to go
- A reviewed and enhanced forest strategy that includes the drivers for bioenergy development.
- Undertake:
  - Research to address forest residue supply chain optimisation
  - Demonstration of achievable revenues from forestry and land use
- Extend science capabilities for wood-to-energy conversion technologies
- Attract international investors
- Implement policies that encourage investors:
  - Accelerated depreciation
  - ETS
- Government aspirational leadership reinforced by demonstration:
  - Wood fuel in schools,
  - Biodiesel in Government vehicles,
  - National & regional procurement policies.