

Biofuels Options

24 October 2017

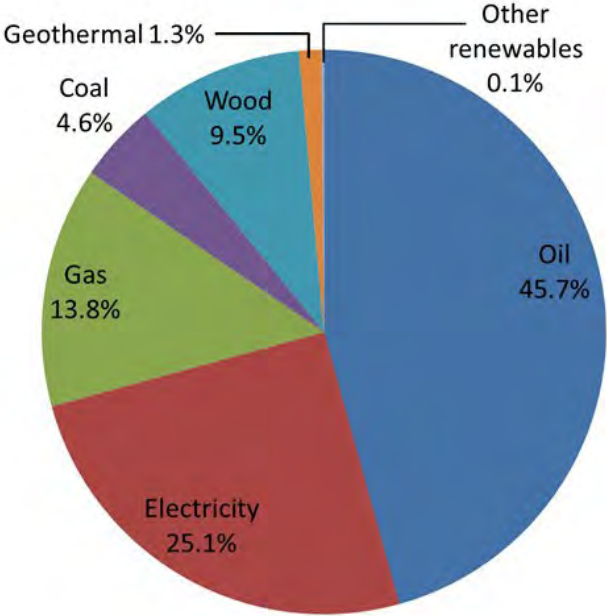
Paul Bennett, Ferran de Miguel Mercader and Ian Suckling



Why Biofuels in New Zealand?

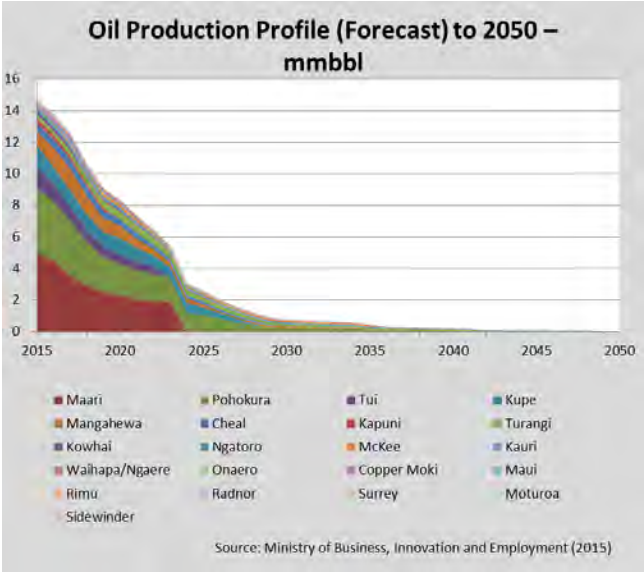
NZ Energy Security

Consumer energy - 2016

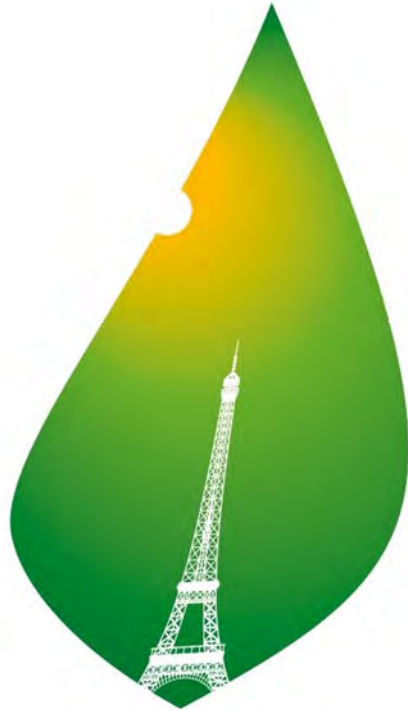


Source: MBIE

NZ Oil production only 24% total and in decline



NZ Greenhouse gas commitments



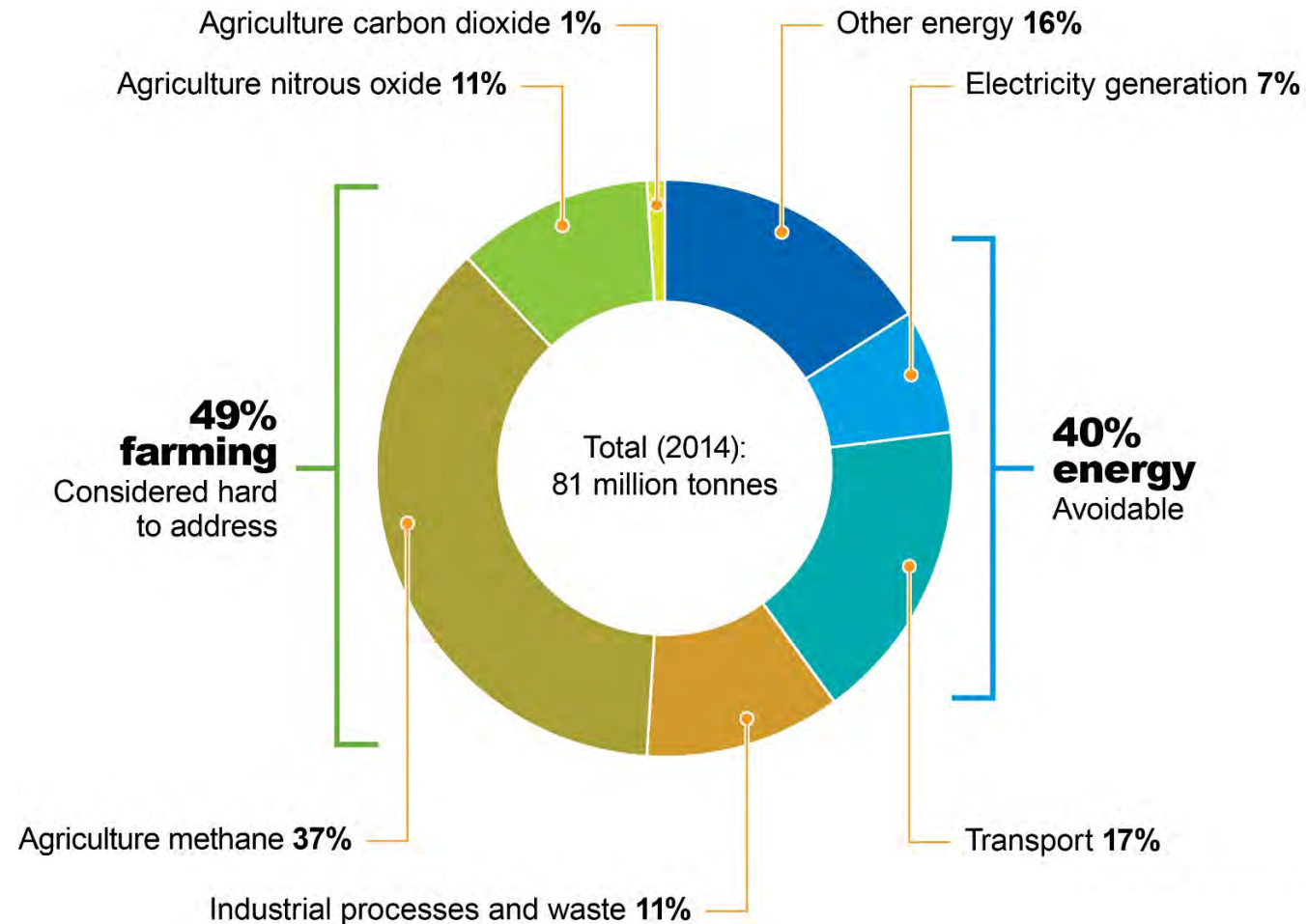
COP21 • CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

- 5% below 1990 levels by 2020
- 30% below 2005 levels by 2030
- Long-term target 50% below 1990 levels by 2050

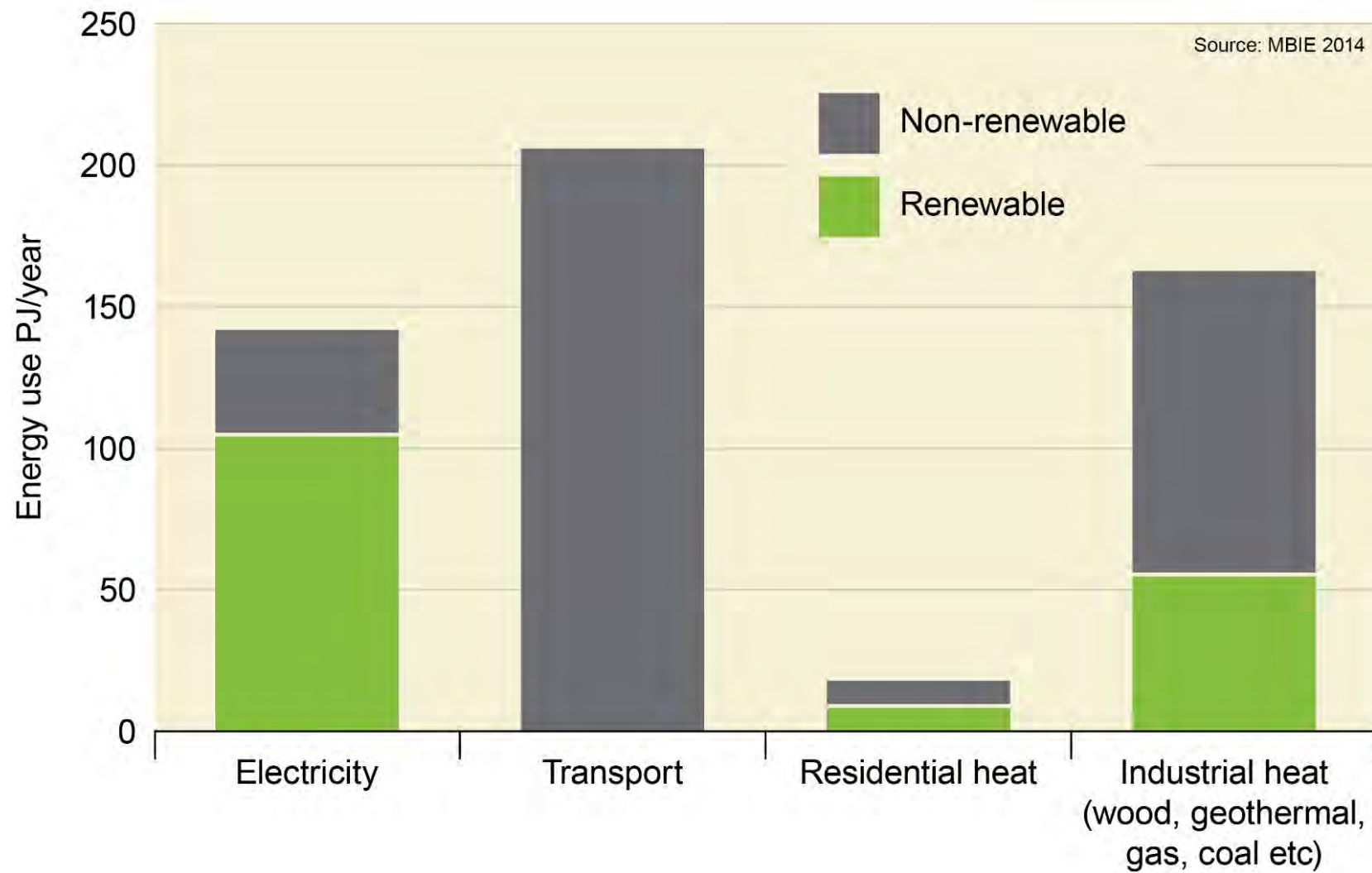
- Actual total emissions +21.3% over 1990 levels

NZ GHG emissions

Where's the 30% reduction going to come from?



Consumer energy



NZ Targets, Policies and Incentives

- Ethanol is exempt from National land transport fund 59.5 cents
- Emissions trading scheme (ETS) at \$18/t CO₂-e (adds about 2.6 c/l to fuel price. International fuels exempt from ETS)
- Only current targets (NZEECS)
 - Electric vehicles to make up 2% of the vehicle fleet by the end of 2021
 - Decrease in industrial emissions intensity by at least 1% per annum on average between 2017 and 2022

International Fuels - *not included in NZ targets*



ICAO/Corsair
carbon neutral growth from 2020

As of 23 August 2017, 72 States, representing 87.7% of international aviation activity, intend to voluntarily participate in the global scheme from its outset.



IMO low Sulphur
marine fuels

From 2020 global cap in Marine Fuels of 0.5% sulphur (currently 3.5%).
(Biofuels a cost effective way to achieve this)

NZ biofuels activity

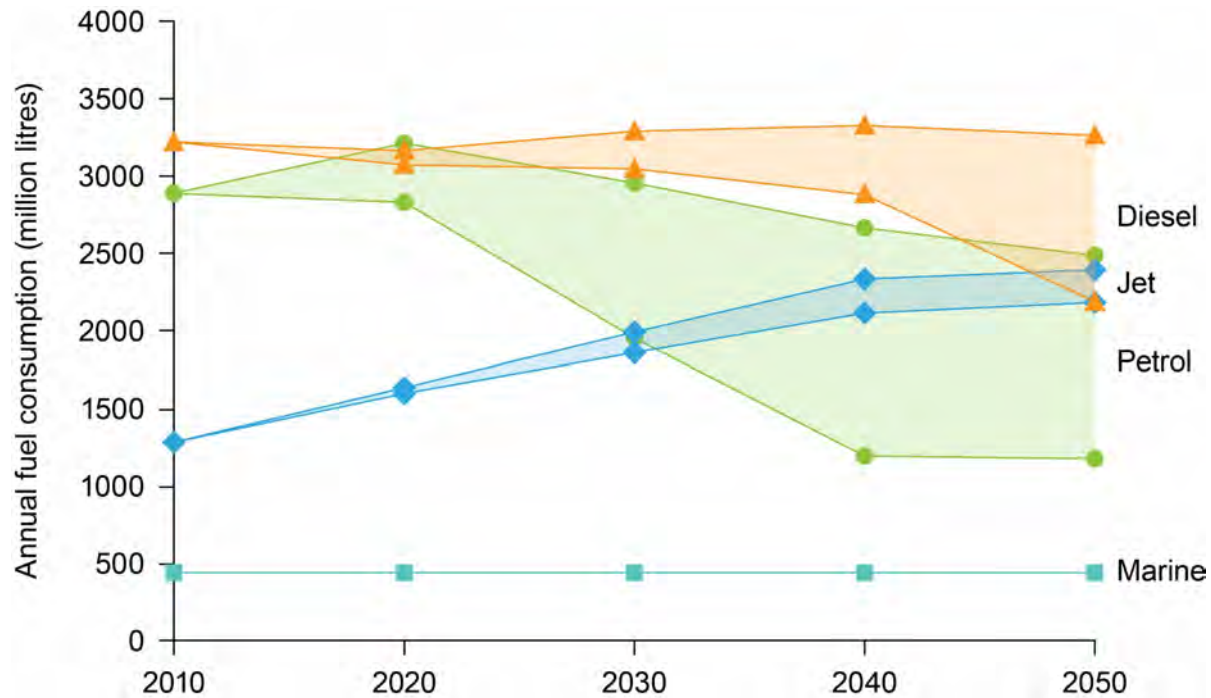
Current production

- Fonterra producing bioethanol from whey (4.5 million L).
- Green Fuels producing biodiesel from used cooking oil (0.6 million L).
- Gull retails a premium grade petrol containing 10% bioethanol and a diesel containing 5% biodiesel.

Development Initiative

- Z Energy commissioning a 20 million L/yr biodiesel plant at Wiri.
- Air New Zealand and Virgin Australia RFI for the supply of biojet fuel.
- KiwiRail tender for supply of bio-marine fuel for their Interislander ferries.

Business NZ Energy Council fuel demand scenarios



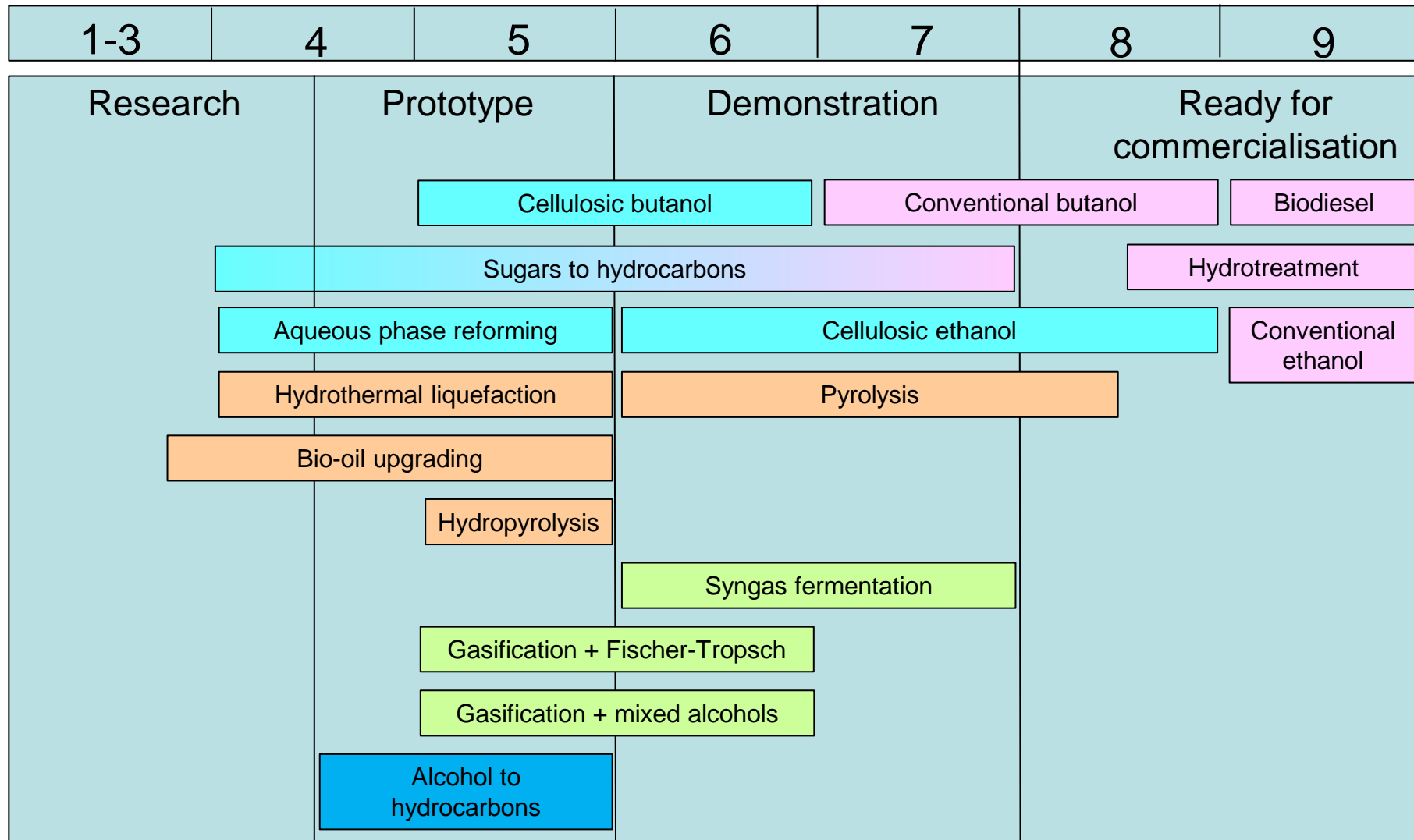
Large EV penetration in Waka, but mainly affects petrol volumes.

Still 5 billion litres of diesel-like fuels required in 2050.

Kayak: Want to go forward, efficiently and quickly, but need to go with the flow

Waka: Long-term journey with goal in mind, use of natural resources

Technology readiness level



Options for diesel biofuels

- **Conventional biodiesel** eg Z Energy Wiri plant.
 - Blend limited to 7 %vol
 - Food vs fuel
 - Can be implemented now

- **Hydrotreated natural oils**
 - Drop-in fuels
 - Food vs fuel
 - Can be implemented now
 - Large scale

- **Pyrolysis/gasification**
 - Drop-in fuels
 - Flexible feedstock inc wood
 - Range of scales
 - Technology needs further development



NZ Biofuels Roadmap

www.scionresearch.com