

Biofuels in New Zealand What , When & How?

**Prepared for the New Zealand Society for
Sustainability Engineering and Science**

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Hale & Twomey

Hale & Twomey

- Energy consultants with background in the commercial sector (petroleum industry)
- Specialise in liquid fuels - both petroleum and biofuels
- Produced advisory reports for the Government when biofuel policy being developed
- Commercial rather than scientific focus

First this: a bright future

Biofuel Crops Double As Greenhouse-Gas Reducers

BIOFUEL: MAJOR NET ENERGY GAIN
FROM SWITCHGRASS-BASED ETHANOL

Transport fuels from New Zealand biomass a reality

Petrol from pines could run
nation's car fleet, Scion says

World first wild algae bio-
diesel test drive

Then this: a disaster

Biofuel production is 'criminal path' leading to global food crisis - UN expert

Biofuel mania ends days of cheap food

World Food Price Crisis - Biofuel Perversion Threatens Billions

Biofuel revolution will drive up food prices



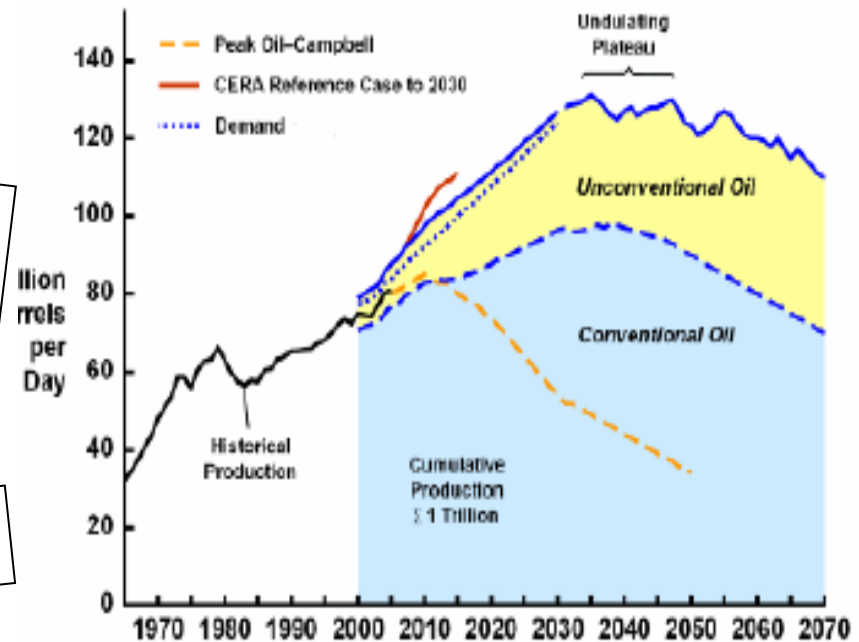
Meanwhile: why it's important

Steep decline in oil production brings risk of war and unrest, says new study

World oil supplies are set to run out faster than expected, warn scientists

Threat of petrol at \$3 a litre

Undulating Plateau versus Peak Oil



Source: Cambridge Energy Research Associates.

NZSSES Presentation

In a few years biofuels have moved from being hailed as a saviour to wean us off fossil fuels to being accused of the primary cause of rising food prices.

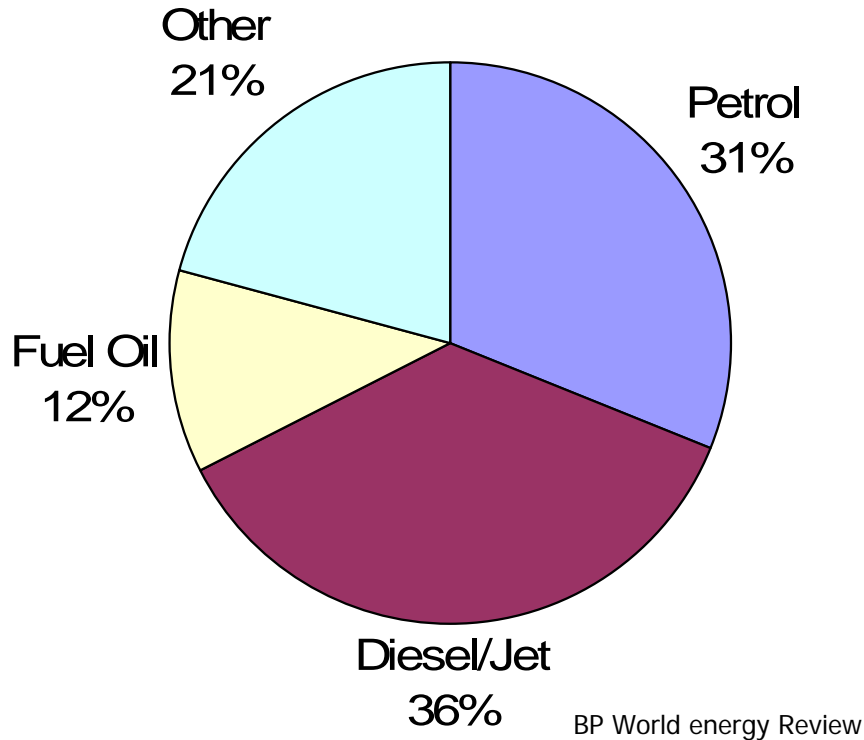
We will look at the following questions:

- Is there a middle ground?
- Is New Zealand on a sustainable path with its biofuel policies?
- What are the options moving forward?

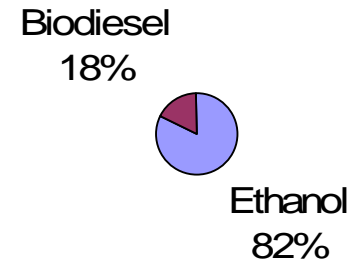
Outline

- Worldwide biofuel trends & economic drivers
- New Zealand biofuels policy development
- Demand limitations in use of biofuels
- Supply – what biofuels are available?
- Response (to date) of the petroleum marketers
- Impact of sustainability debate
- Future options

Global situation



Crude oil use split



Biofuels less than 2% of transport fuels market

However:

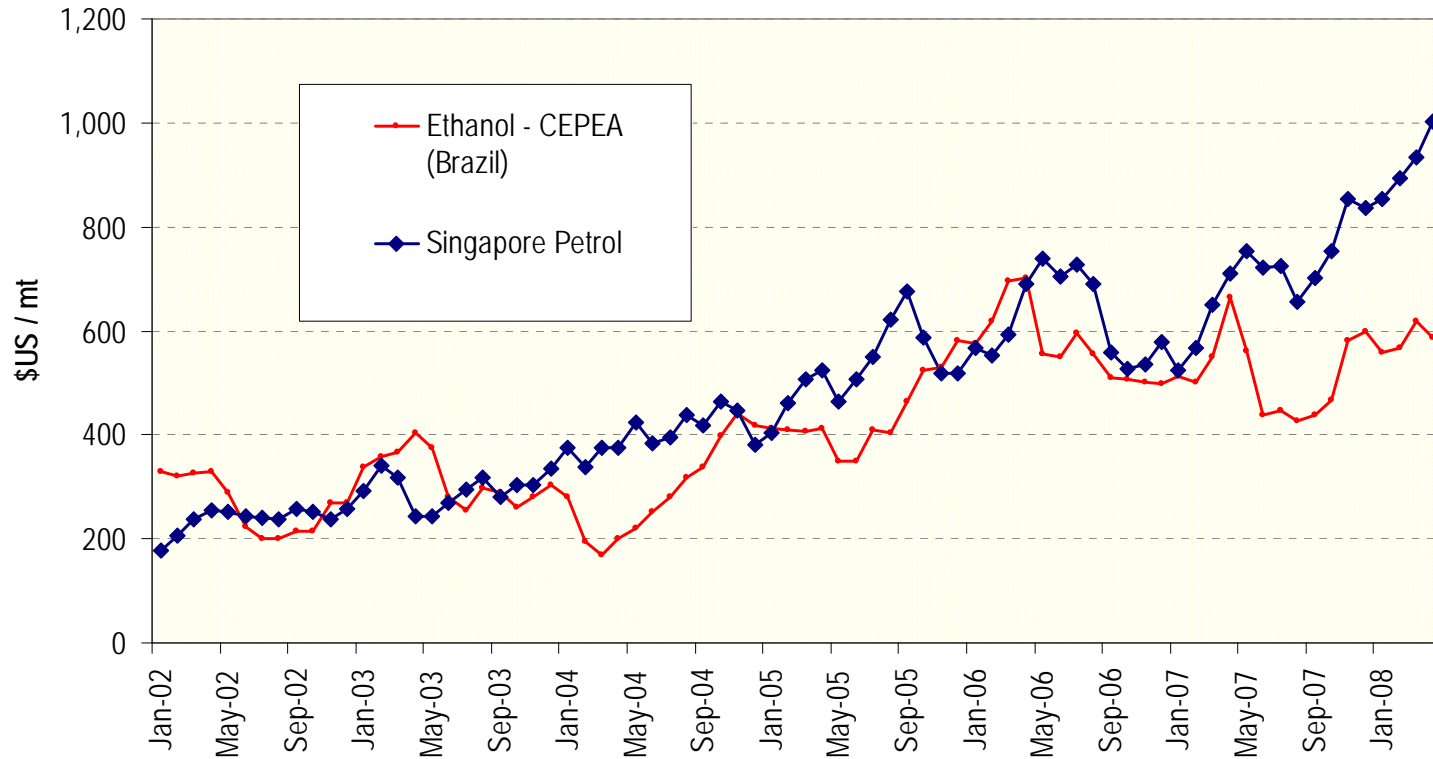
- growing rapidly +30% in 2007
- dominated by ethanol

Global situation - targets

- Approximately 40 countries with policies encouraging biofuels
- Many countries have significant incentives/subsidies to encourage biofuels (esp. Europe and the US)
- Many incentives initially agricultural based

Europe targets	5.5% of all transport fuels by 2010	10% of all transport fuels by 2020
US targets – set with volume of biofuel	~5% of transport fuels by 2012	~20% of transport fuels by 2022

Ethanol and petrol prices



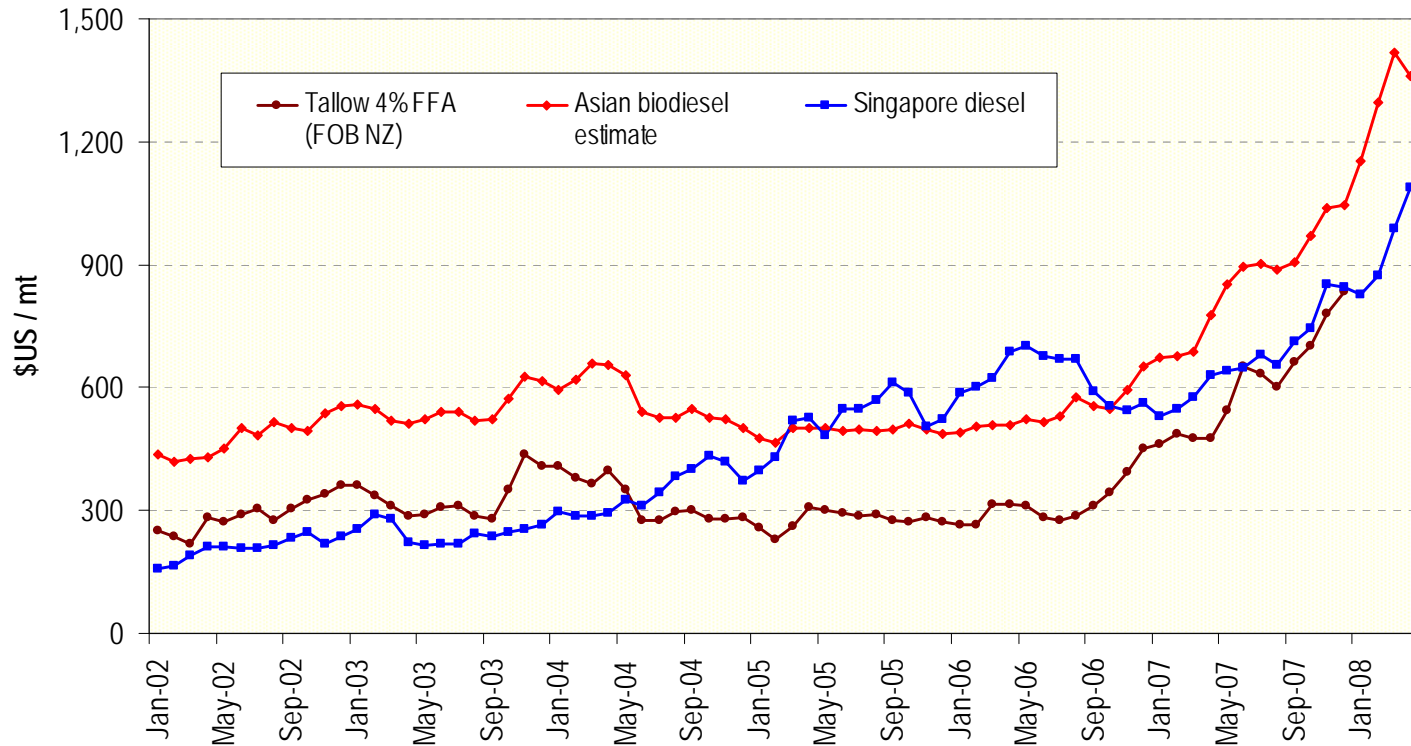
Source: H&T, CEPEA

While trend looks similar main influence on ethanol still sugar market

Introduction of US EPACT in 2006 kept ethanol prices high in 2006

Price level at which ethanol economic to use without incentive (2007/8)

Biodiesel, feedstock and diesel prices



Source: MPOB, JACOBSON, H&T

Substantial increase in price in 2007 higher than justified by diesel prices

Food demand more inelastic than energy – growing rapidly

Unless subsidised, biodiesel manufacture currently not economic

Policy interventions

Policy interventions can result in market distortion

- Unintended consequences
- Vegetable oils moved around the world
- Subsidies where they are not required – a wealth transfer to growers and/or processors
- Prices rise more than they need to

In some markets there is a move away from subsidies to mandatory targets

NZ Biofuels Policy Development

- EECA led initial voluntary push for biofuels
- Quality and price addressed
- Trials but no market introduction
- Government assessed compulsory options
- Decided to use compulsory obligation – leave the market to decide what and how

Year	2008	2009	2010	2011	2012
Percentage	0.53%	1.06%	1.67%	3.35%*	3.40%*

* Increased from level proposed following consultation process

Policy – Key points

- Obligation level is energy based – in volume terms 3.4% is close to 5% petrol and diesel
- 2011/2012 level means both ethanol and biodiesel required to meet obligation
- Between 210 and 320 mln litres of biofuels required depending on mix (ethanol/biodiesel)
- Biofuel Bill includes clause which considers sustainability impact

Biofuel Bill: Biofuel definition

"...biofuels meeting specified environmental standards or specifications (for example, specifications providing that qualifying biofuels must be produced from biomass grown without causing undue environmental harm and without unduly impinging on food production):"

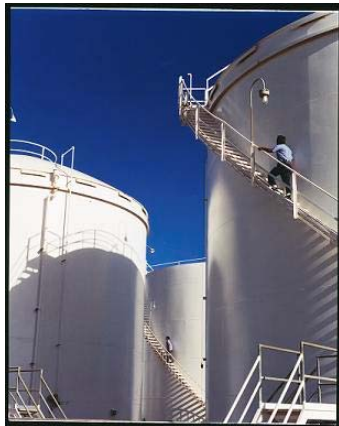
Demand limitations



Vehicle fleet – cars (petrol)

- Many cars can take 10% maximum ethanol
- However substantial part of New Zealand fleet is advised not to use over 3% - too conservative?
- To increase ethanol use significantly need flex-fuel vehicles that can take up to 85% ethanol

Demand limitations



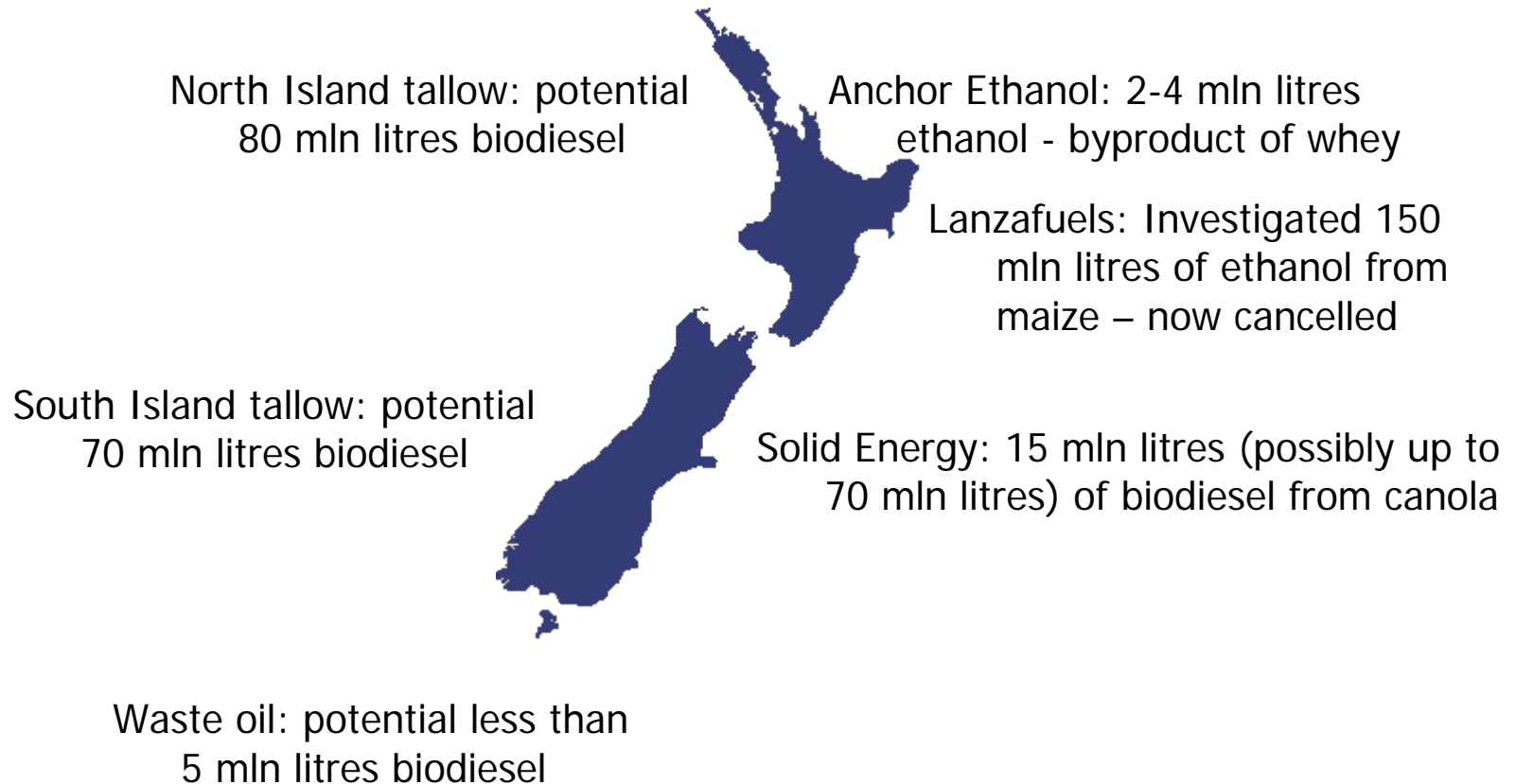
Vehicle fleet -diesel

- Most heavy vehicle manufactures only recommend up to 5% biodiesel
- However many successful trials and actual use at higher blend % (up to 100%)

A lot of distribution infrastructure investment required before biofuels can be rolled out

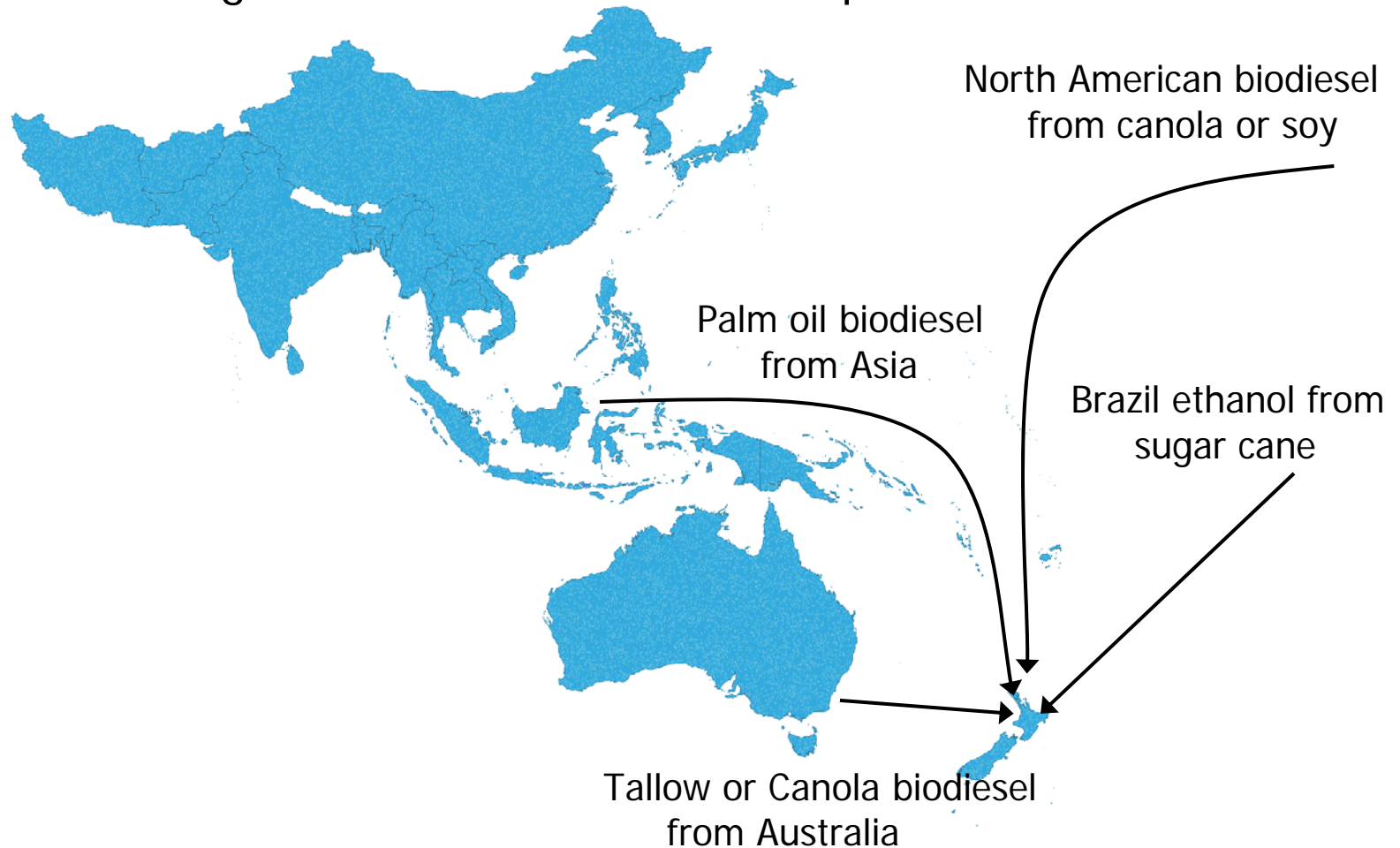
Supply – what's available?

Covers 1st generation biofuels for 2008-2012 period



Supply – what's available?

Possible 1st generation biofuels – not comprehensive



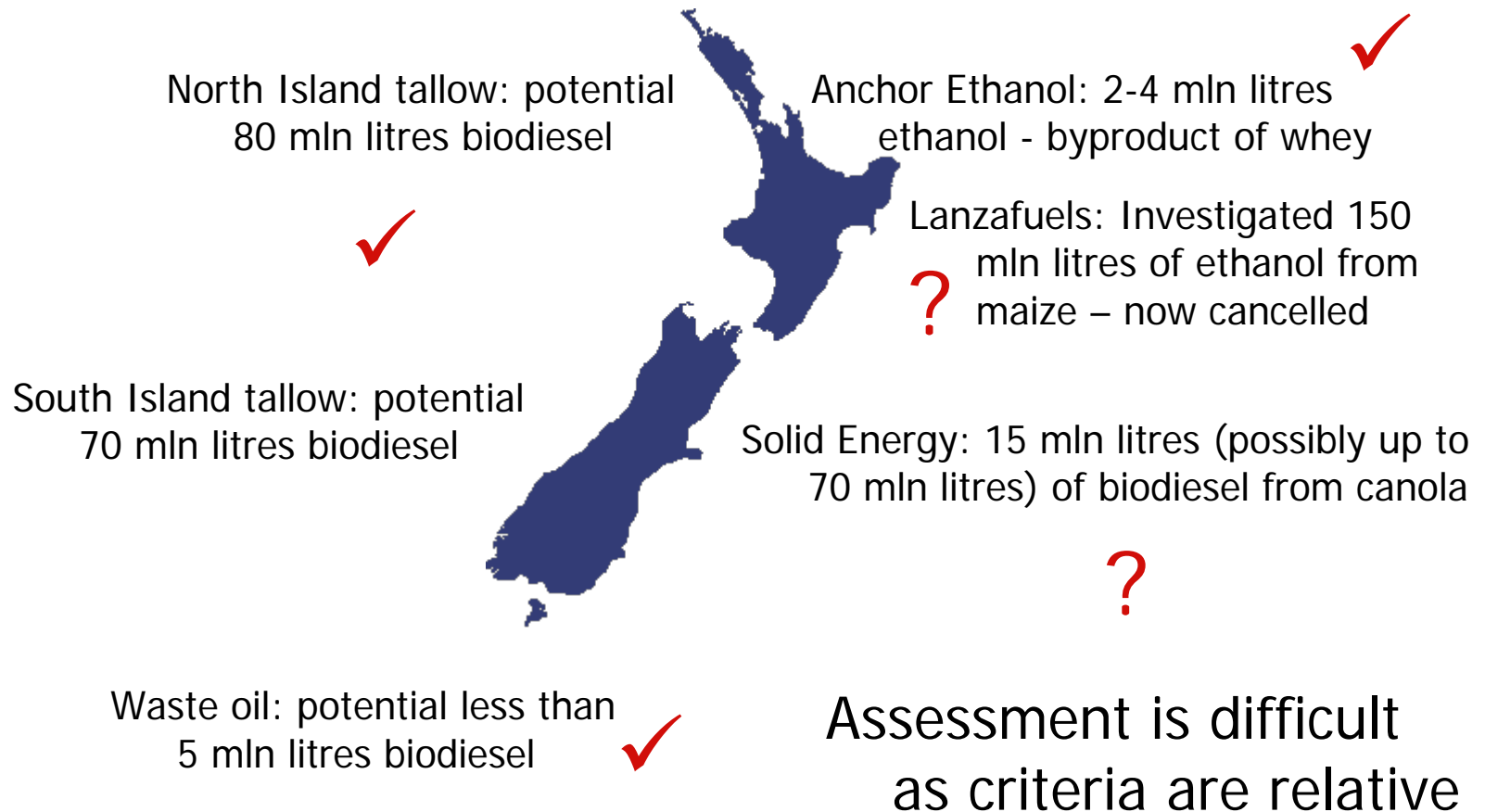
Sustainability Framework

UK Sustainability Reporting

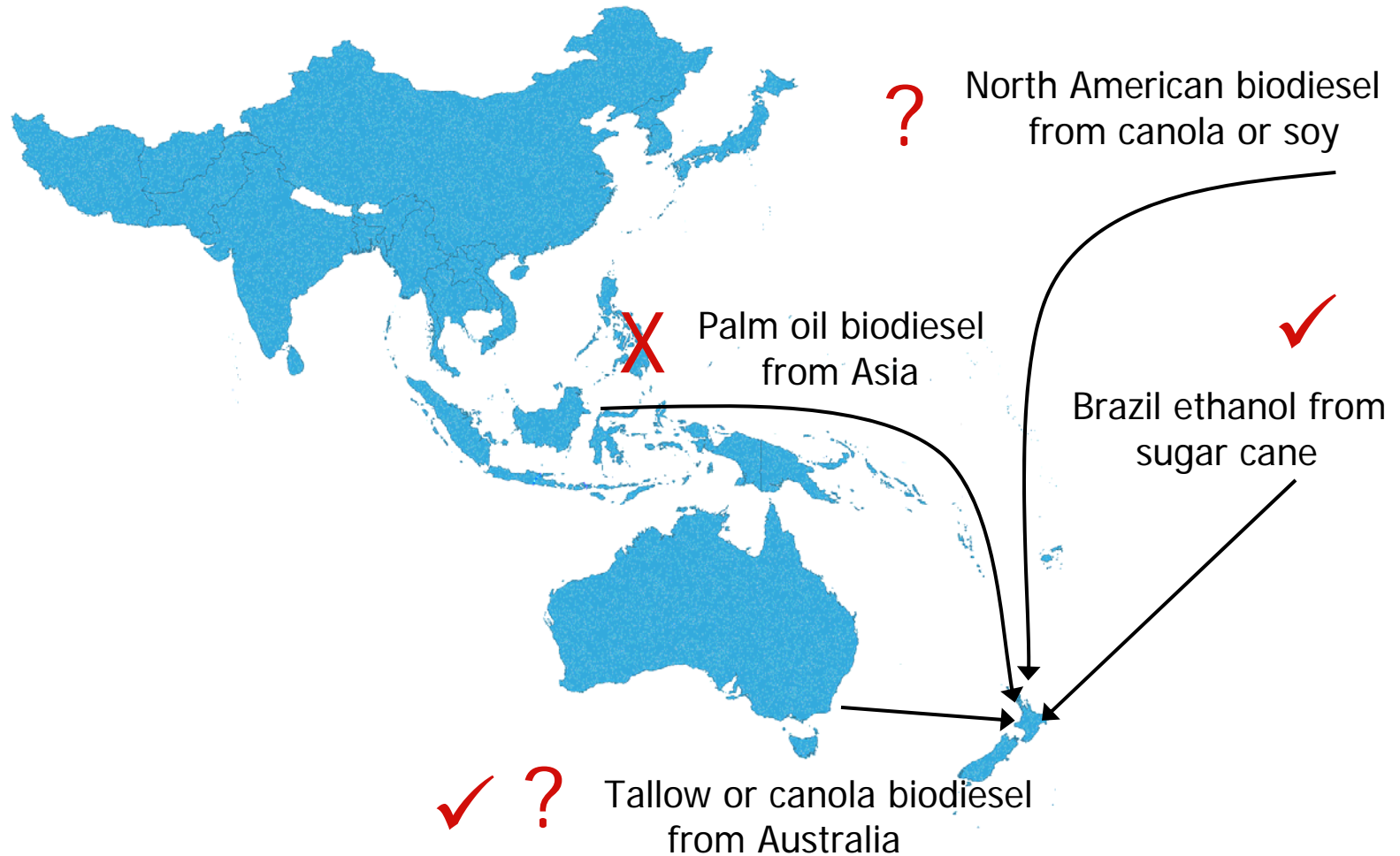
- Environmental
 - Conservation of carbon stocks
 - Conservation of biodiversity
 - Sustainable use of water resources
 - Maintenance of soil fertility
 - Good agricultural practice
 - Waste Management
- Social
 - Working conditions/labour and human rights practices
 - Land rights issues

NZ: without causing undue environmental harm and without unduly impinging on food production

How might different biofuels rate on sustainability using proposed criteria?



How might different biofuels rate on sustainability using proposed criteria?



Supply – Assumptions in Biofuels Bill

Covered in the environmental section of the preamble

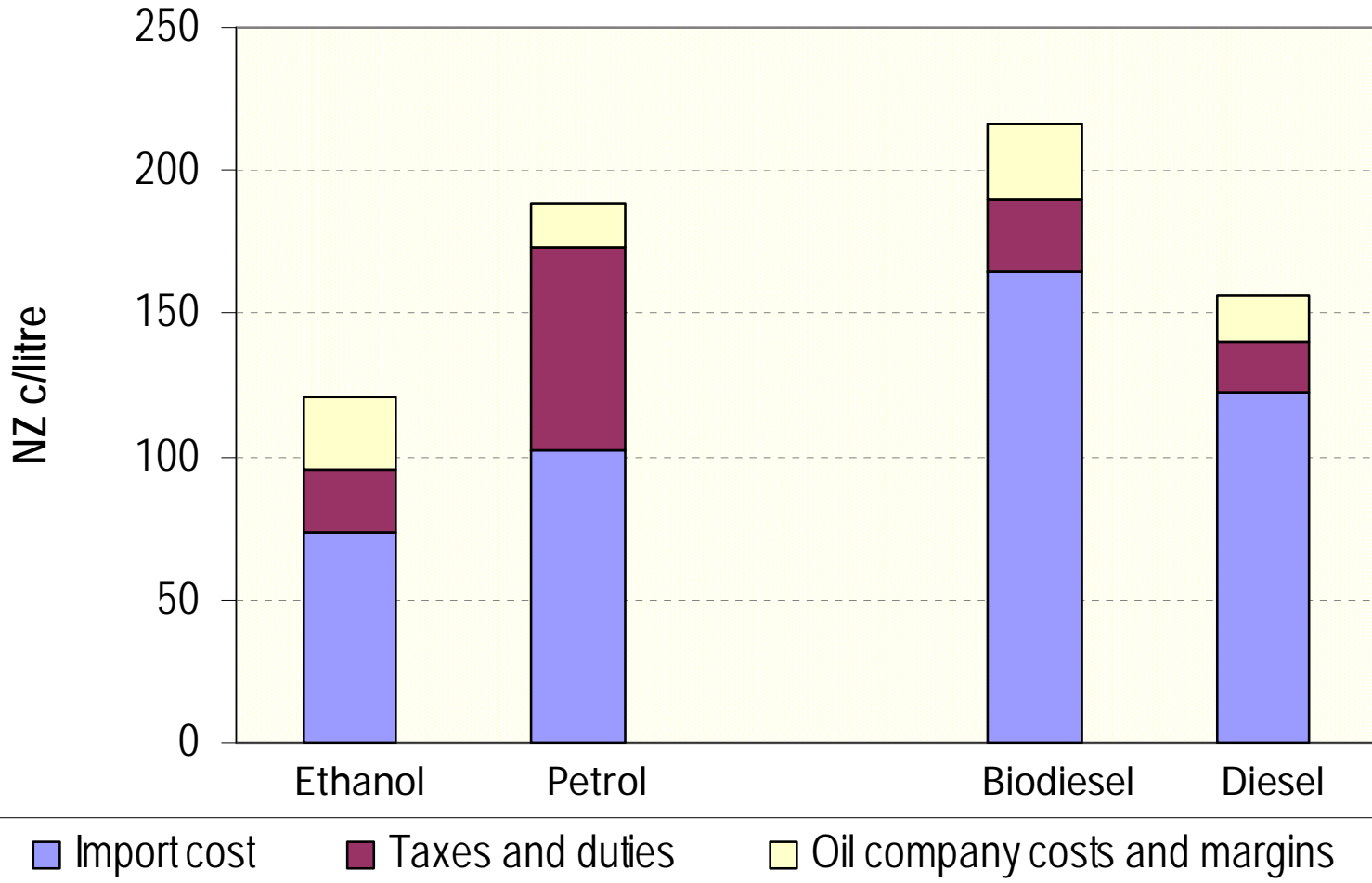
Biofuel	Volume (mln litres)	Proportion of 2012 target
Biodiesel from NZ sources (largely tallow)	~ 143	67%
Ethanol from whey (NZ)	~ 3	1%
Ethanol from domestic maize	~102	32%

Supply – Current expectations

Based on possible scenario in oil company submission to the select committee considering biofuel bill

Biofuel	Volume (mln litres)	Proportion of 2012 target	Comparison
Biodiesel from NZ sources (canola/tallow?)	34	16%	67%
Ethanol from whey (NZ)	3	1%	1%
Ethanol from domestic maize	0	0%	32%
Imported Ethanol (Brazil – sugar cane)	265	83%	0%

Current retail price estimates



Source: H&T Fuel Price Monitor

Summary of oil company response

- Gull successful E10 premium petrol roll out
- BP's says biofuels yes but targets should ramp up more slowly to avoid forcing them to sell E10 regular
- Other marketers also appear to be targeting ethanol for initial roll out
- Although many local biodiesel plant announced major commitments still to be made. Concerns regarding:
 - Subsidised imports (splash and dash)
 - Economics
 - Difficulty getting offtake agreements
 - Quality concerns from majors

Policy debate – Biofuel Bill

- Focus on sustainability clause
- Some submissions suggest Bill should be shelved (e.g. Parliamentary Commissioner for Environment)
- Some suggest sustainability issue solved by banning imports
- Will be some redrafting but how might it be done:
 - Pick winners ?
 - Ban certain biofuels?
 - How to manage unintended consequences?
- Will the target or timetable change?

Summary of my view on the policy

- Valid argument for slowing rate of target increase
- However in general target level:
 - Ensures infrastructure investment which enables biofuels to compete with fossil fuels
 - Not too high given only supply likely to be first generation (not market distorting as in Europe and the US)
- If biofuels sustainable (including economic) then volumes can expand rapidly
- Mandatory targets better than incentives/subsidies (should ethanol have a tax break?)
- Need to define sustainability criteria carefully
- In summary a reasonable middle ground

The future

The next step is producing liquid fuel that can directly substitute existing fuels (no quality issues) from a sustainable feedstock that meets sustainability criteria

Future Feedstocks

- Ligno-cellulosic biomass
- Switchgrass
- Jatropha
- Algae
- Solid waste

Future Process Conversions

- using Fischer-Tropsch
- Enzymatic/microbial conversion
- Biobutanol
- Thermo-chemical liquefaction