

Marginal land and lignocellulosics

New Zealand's natural advantage for future transport fuel needs

Trevor Stuthridge, GM Sustainable Design - Scion





Scion Goal:

Increase the profitability
of New Zealand's forest industries



Scion Goal:

Optimise the value of marginal land



Scion Goal:

Accelerate growth of the
bioeconomy

Biofuels innovation





Addressing drivers

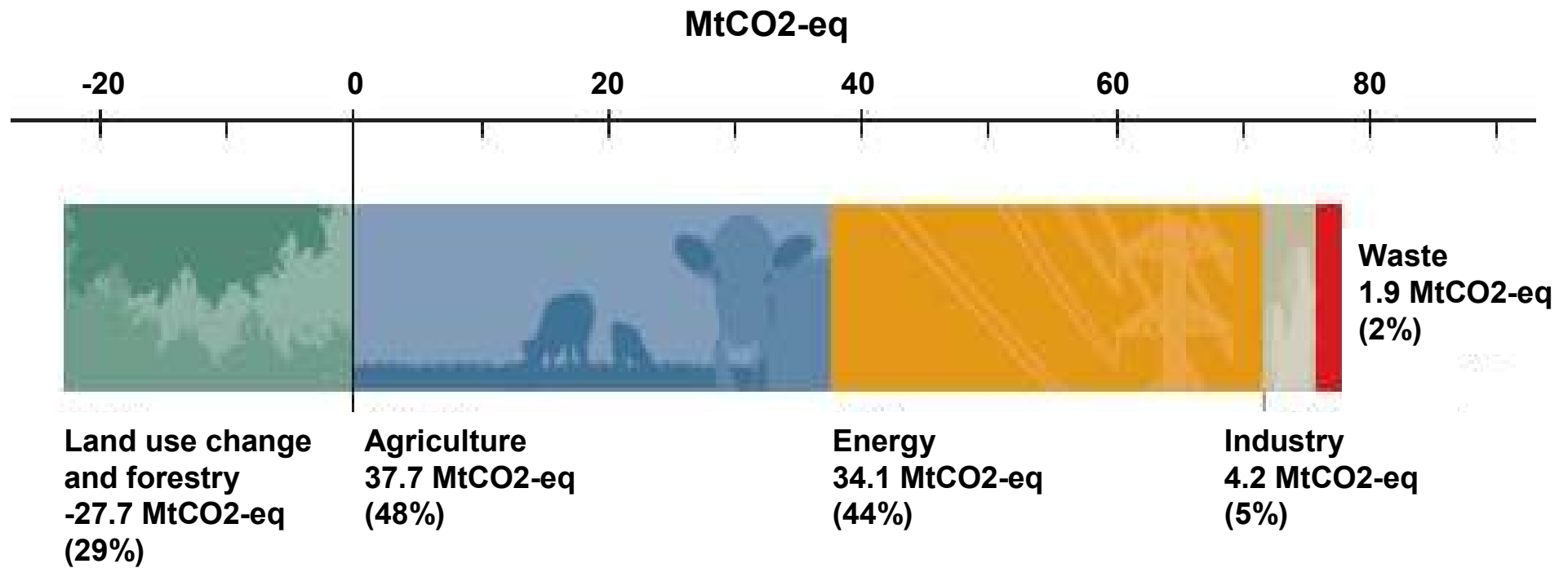


- Plantation forest
 - 7% land mass (1.8M ha)
 - 500 plantation trees per person
 - Productivity 40-50x natural forests
 - Harvested 18-28 years
 - 0.0009% global forest cover per year
- Plantation composition (%)

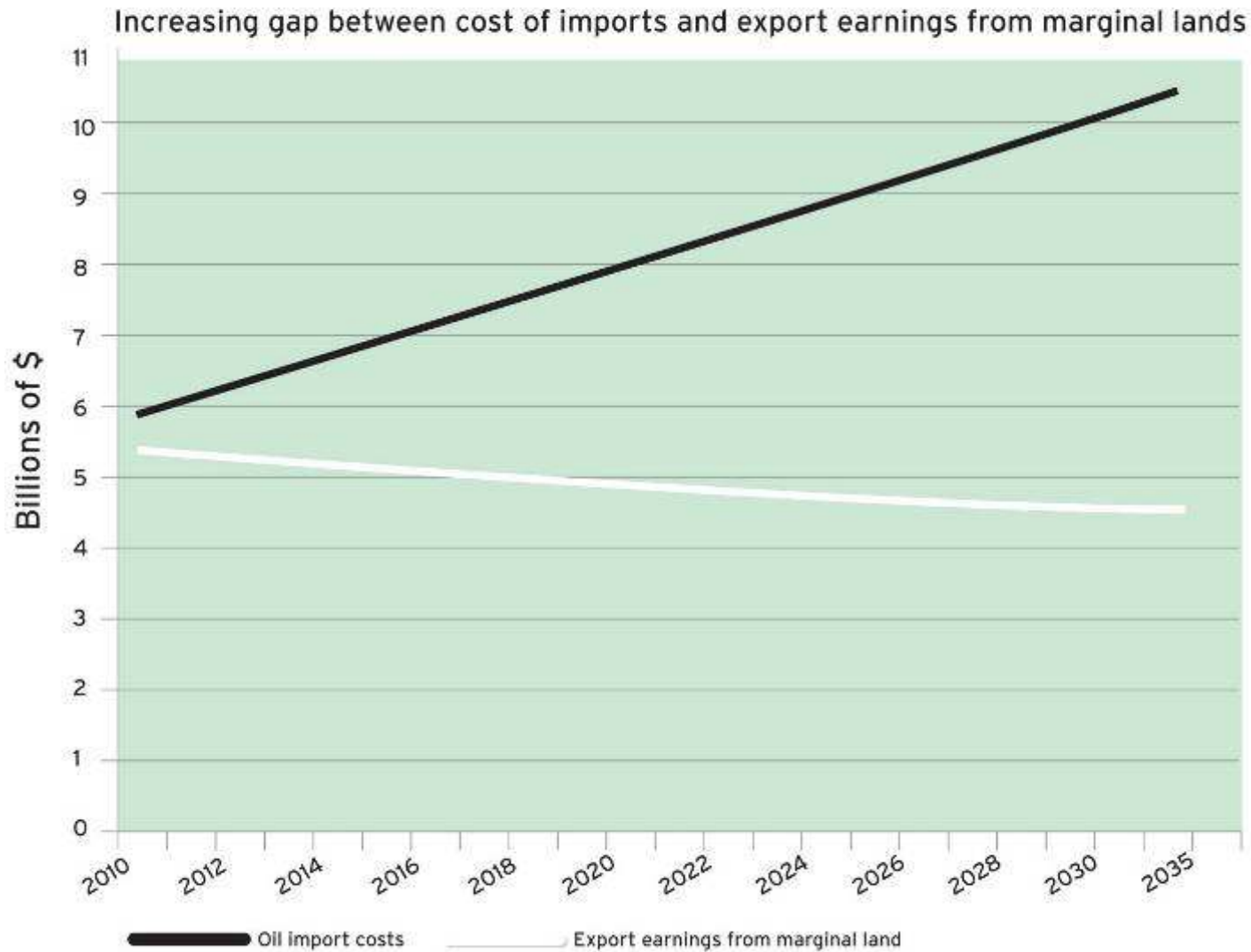
<i>Pinus radiata</i>	89.0
Douglas fir	6.4
Eucalyptus spp.	1.8
others	2.8
- Protected natural forest
 - 24% land mass (6.5M ha)
- Forestry sector contributes
 - 4% NZ GDP
 - 8% export earnings (\$3.2B 2008-9)

Sector Profile

New Zealand's total greenhouse gas emissions by sector: 2006

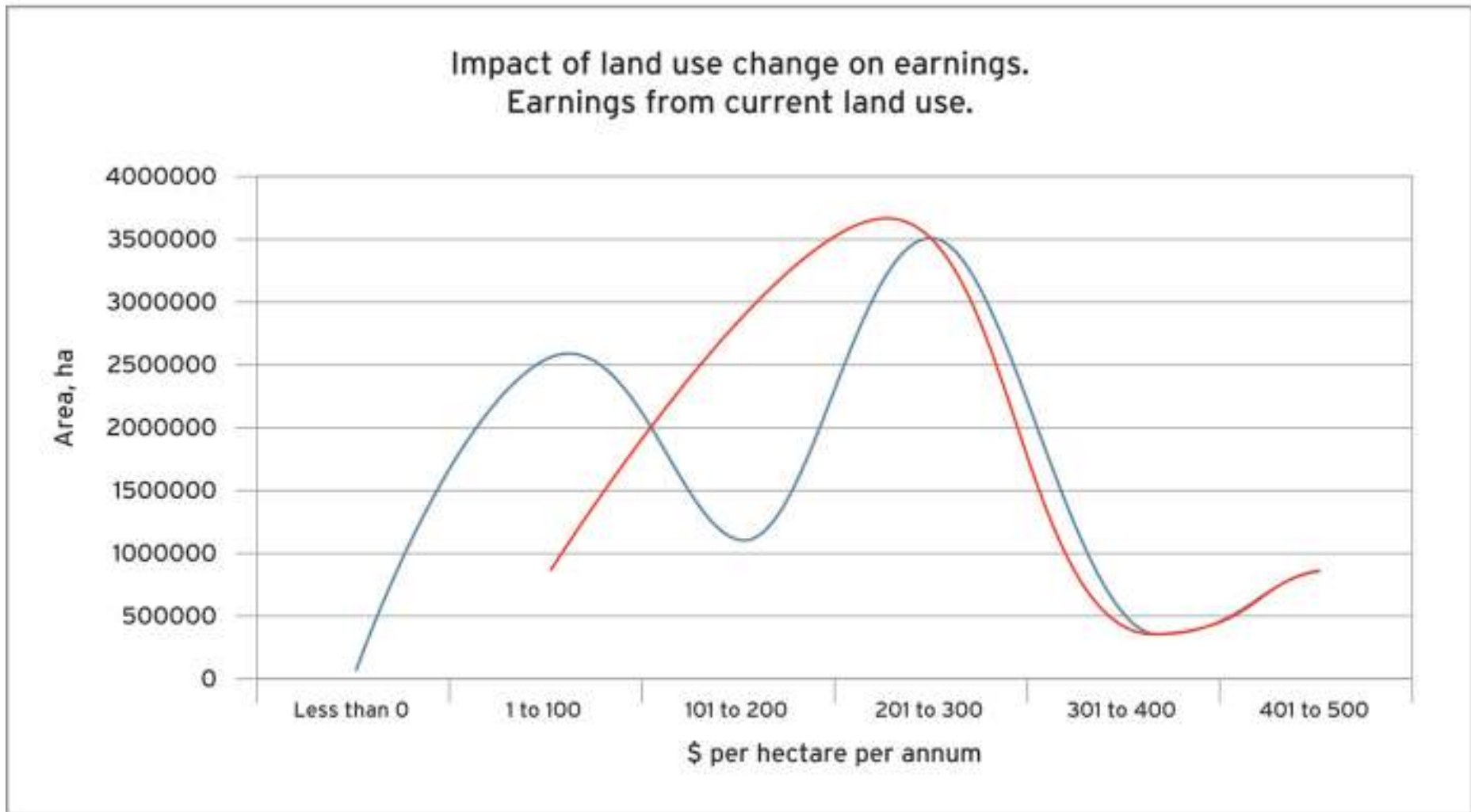


Marginal land returns are declining in real terms. Cost of oil imports are increasing.

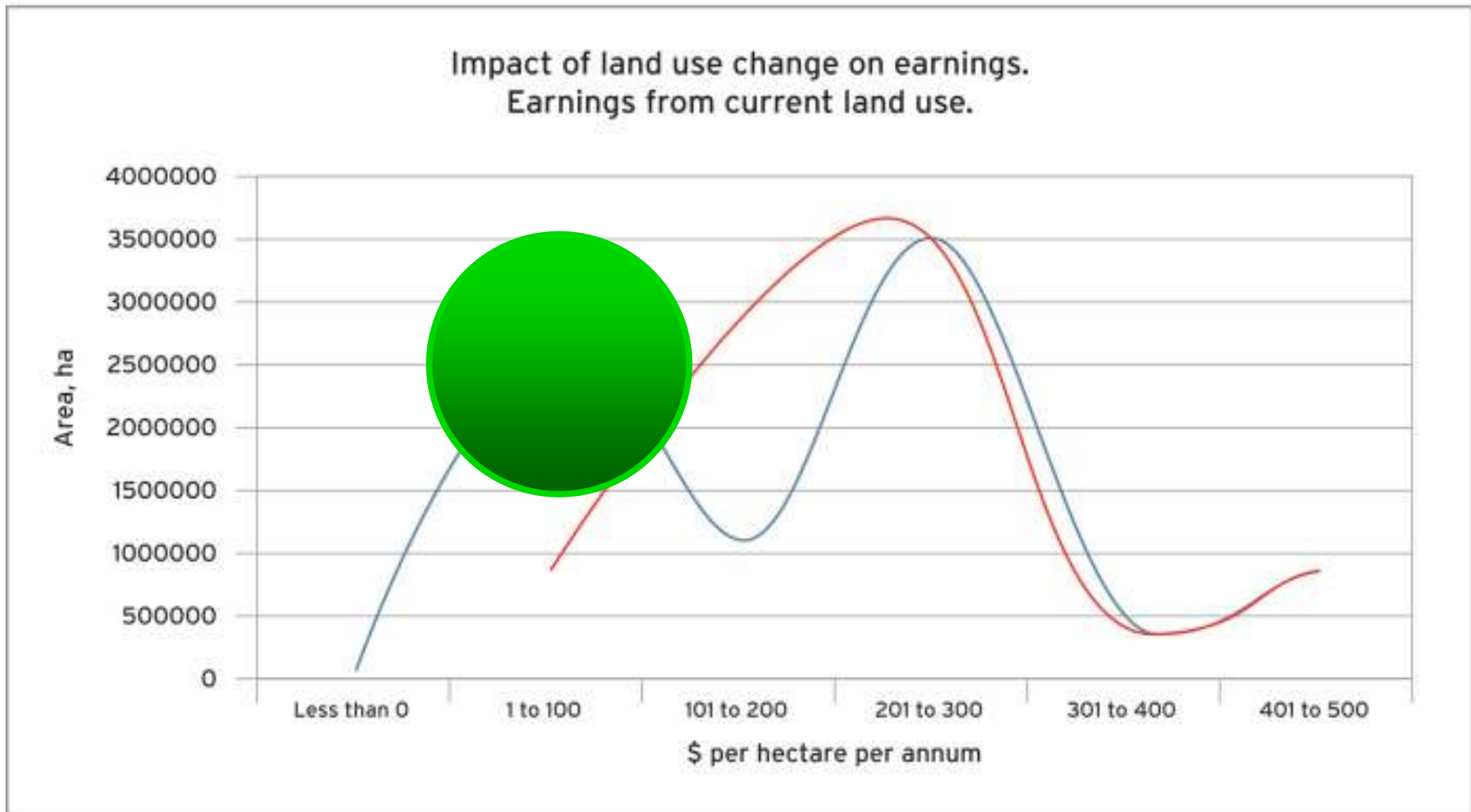


Reference - Data from World World Bank Price Trends 2009 and Statistics New Zealand

Marginal land – Nominal economic definition



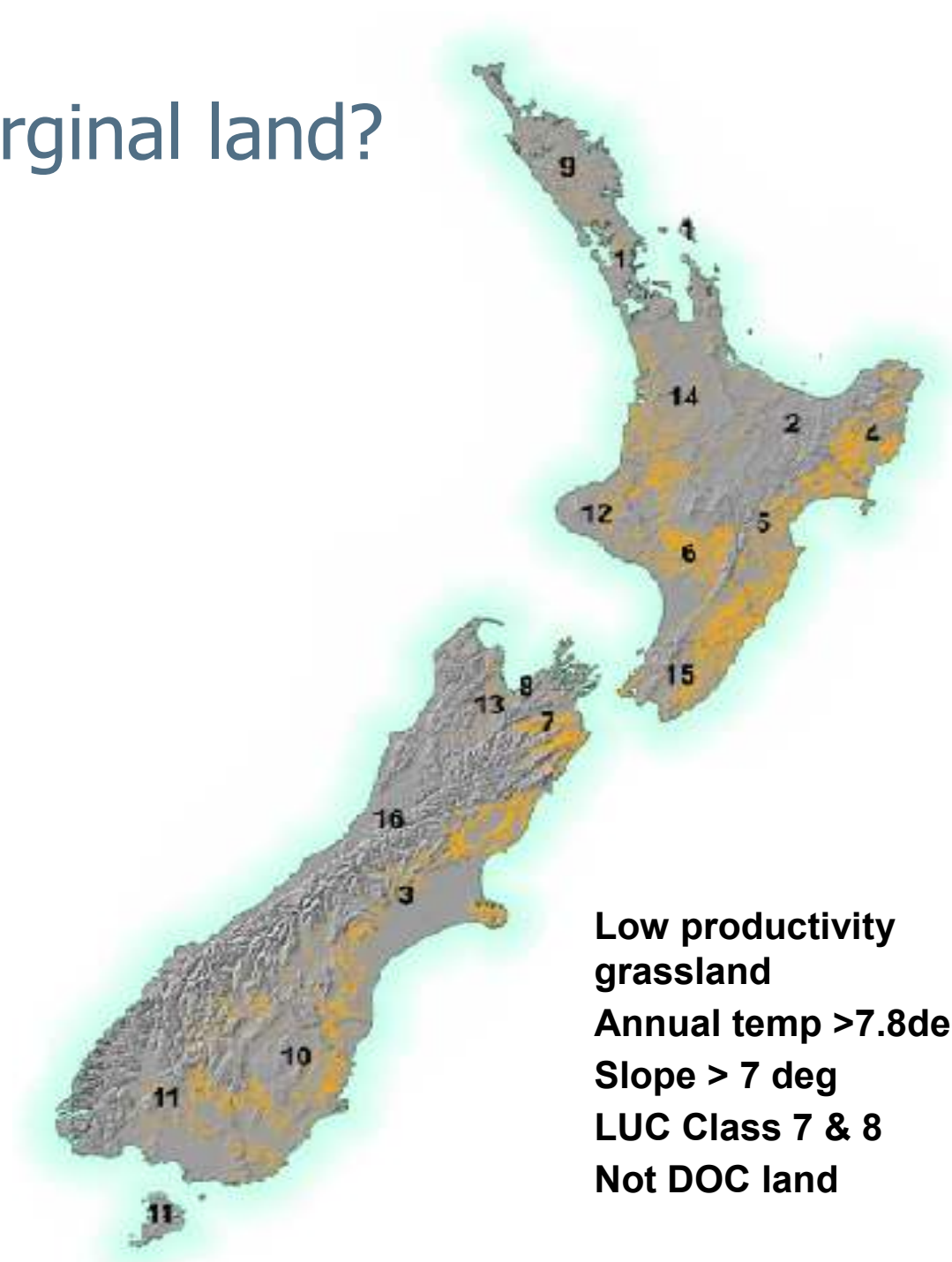
Marginal land – Nominal economic definition





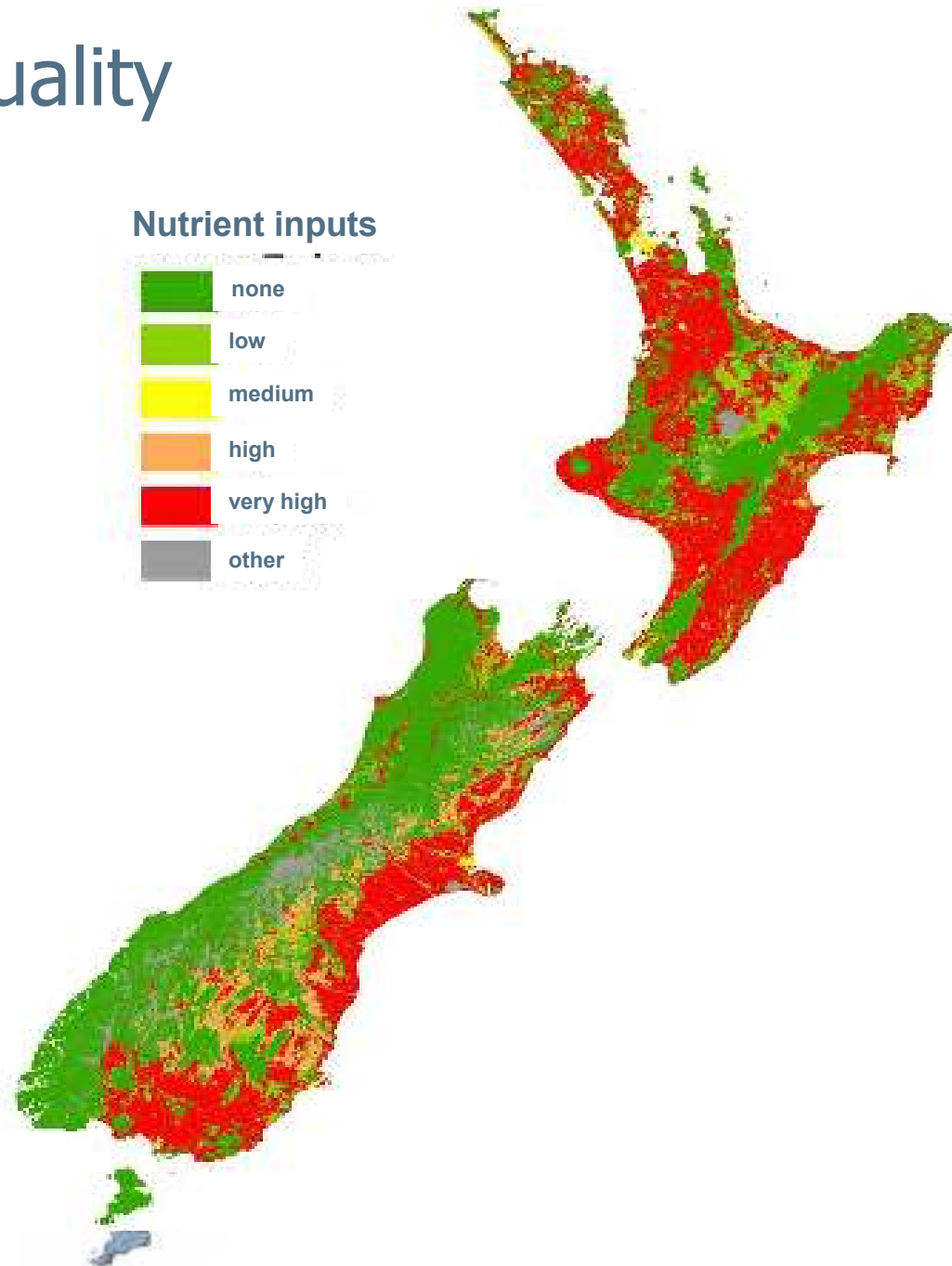
Targeting resource

Where is the marginal land?

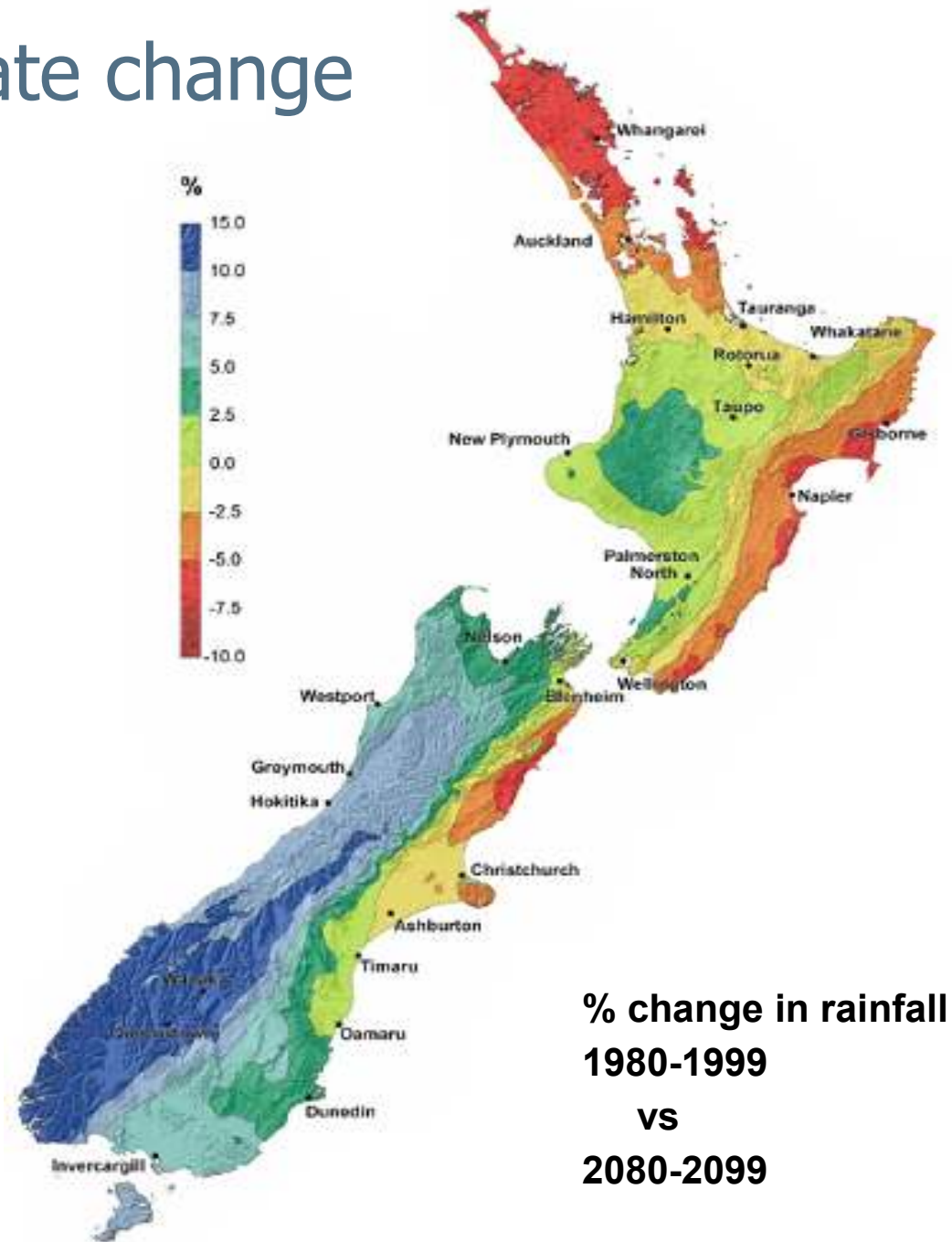


**Low productivity
grassland
Annual temp >7.8deg
Slope > 7 deg
LUC Class 7 & 8
Not DOC land**

Addressing soil quality

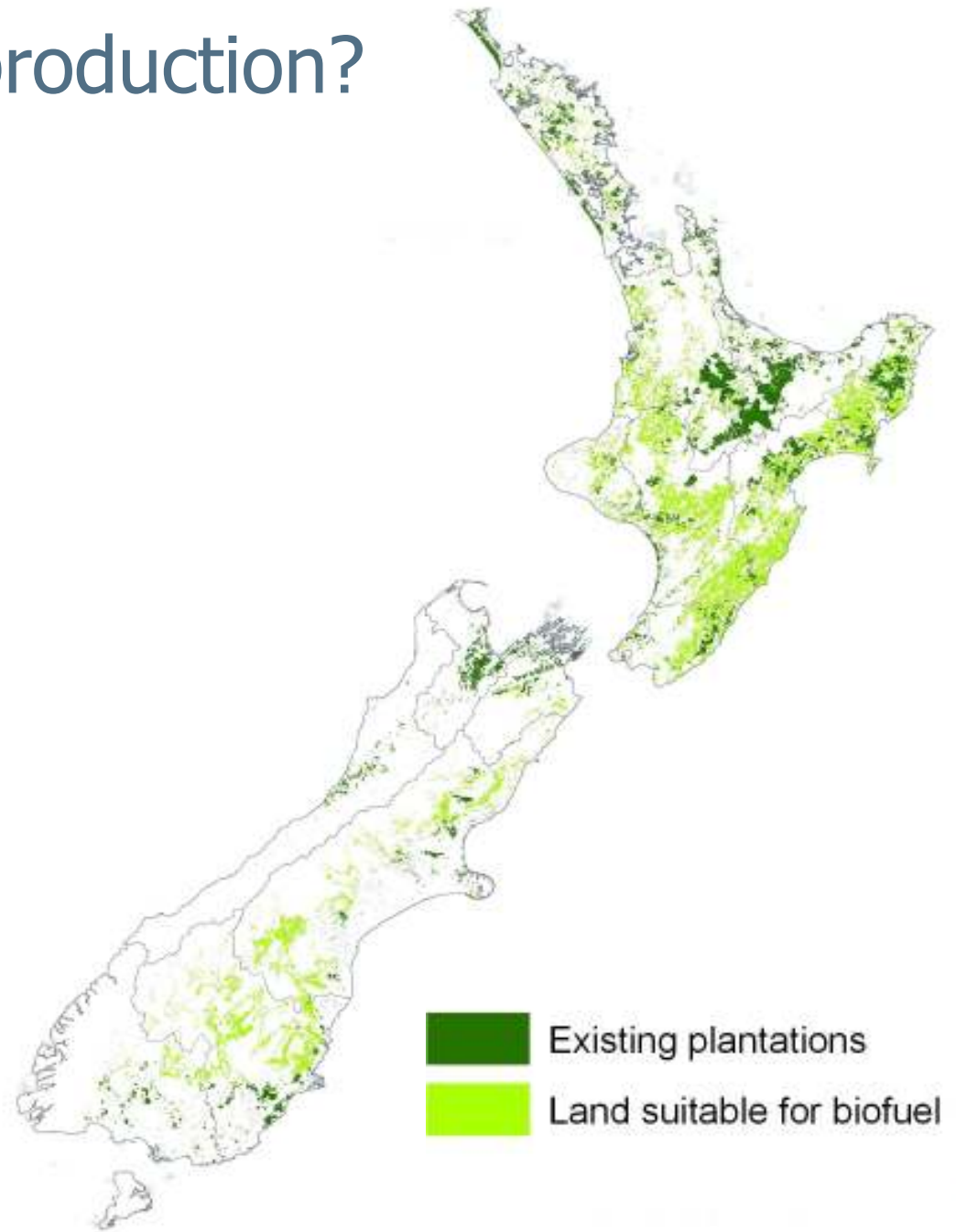


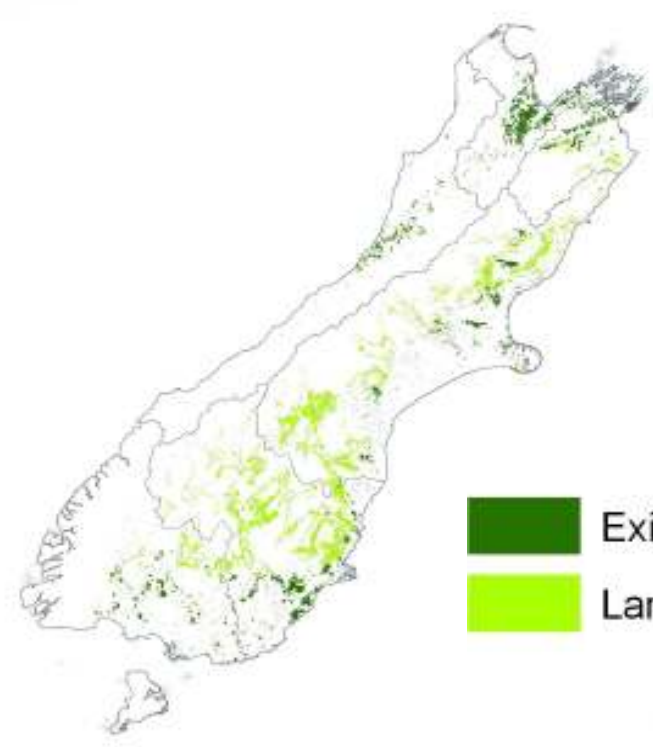
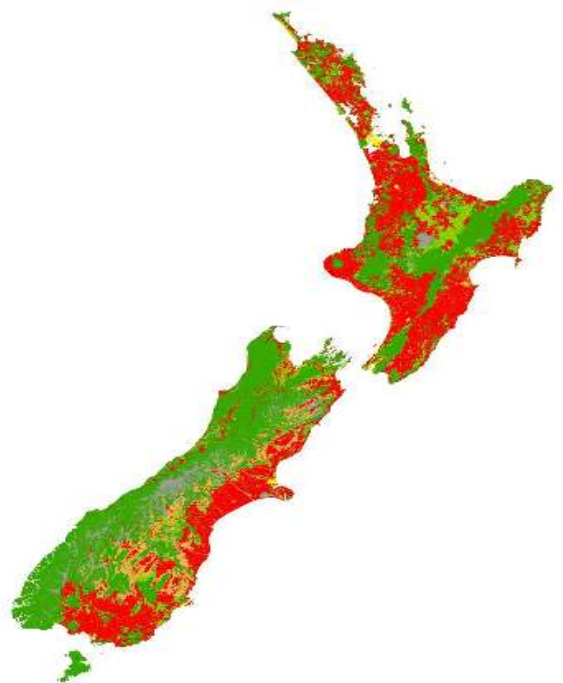
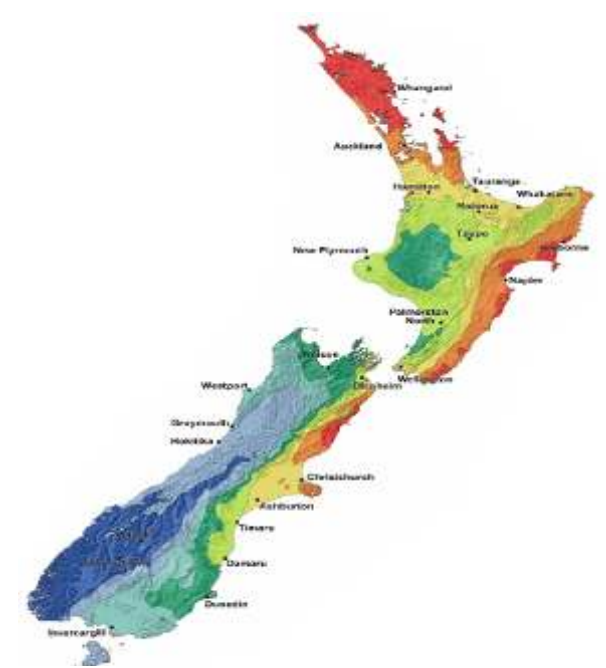
Anticipating climate change



**% change in rainfall
1980-1999
vs
2080-2099**

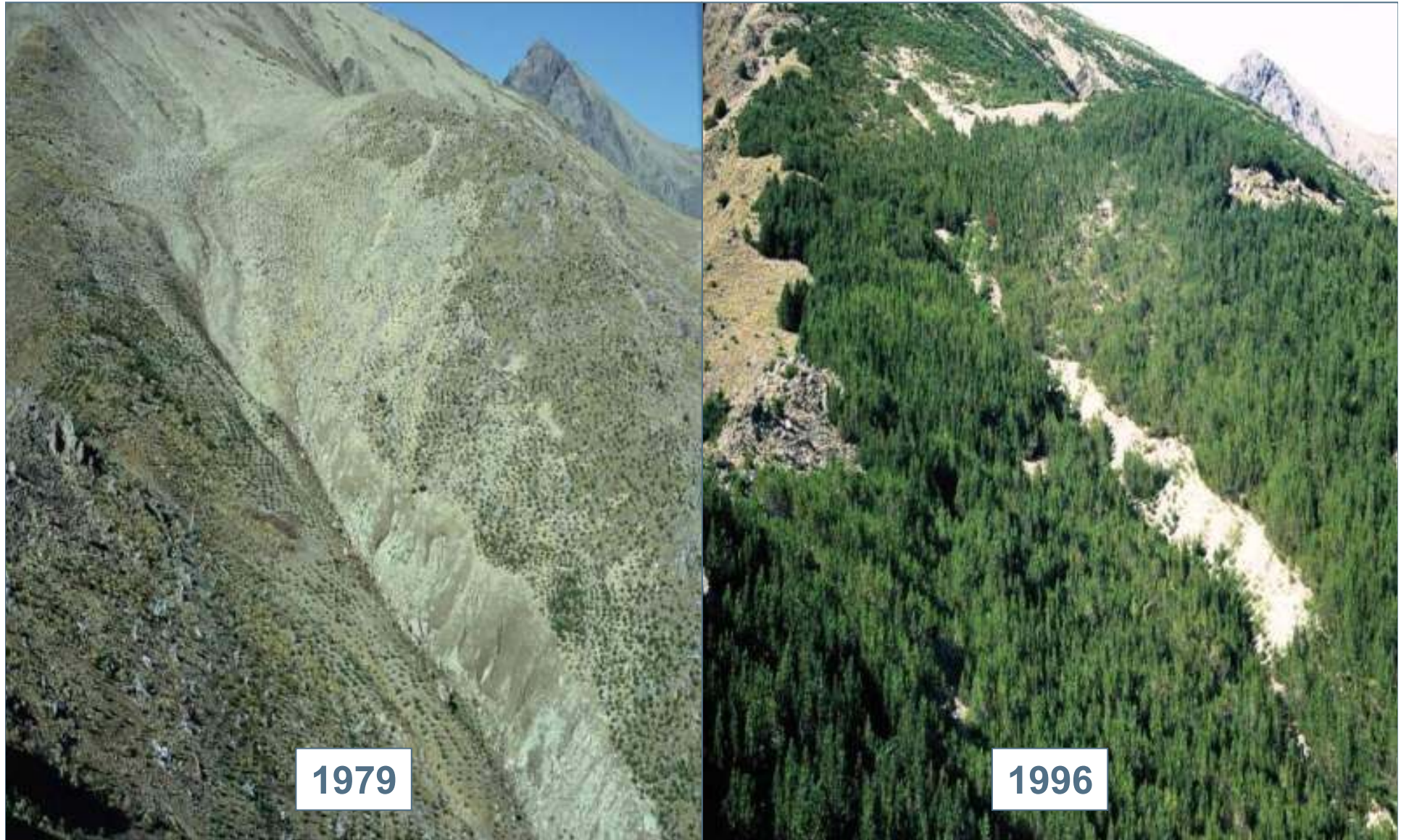
Future biomass production?





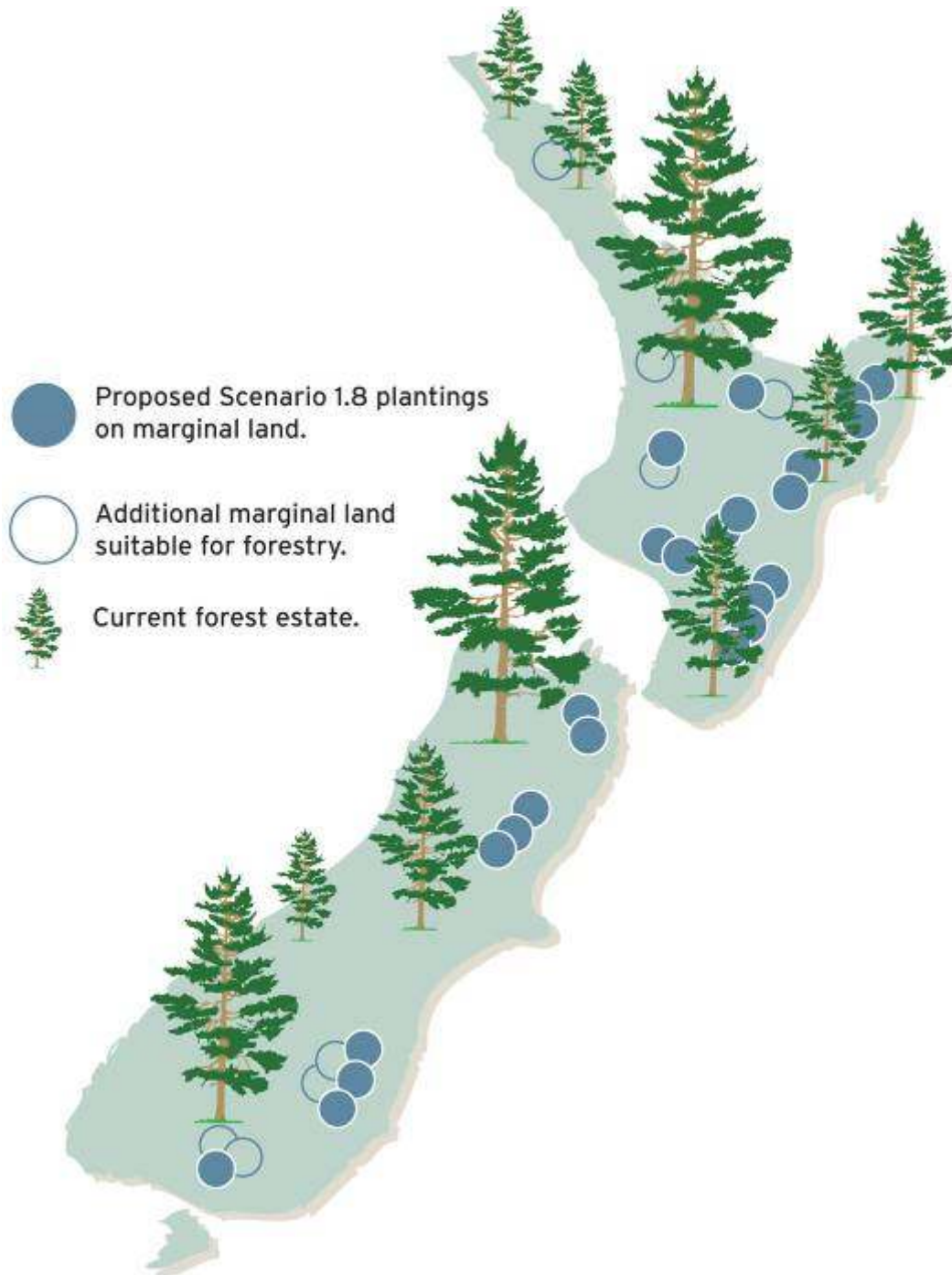
Existing plantations
Land suitable for biofuel

Biomass opportunities

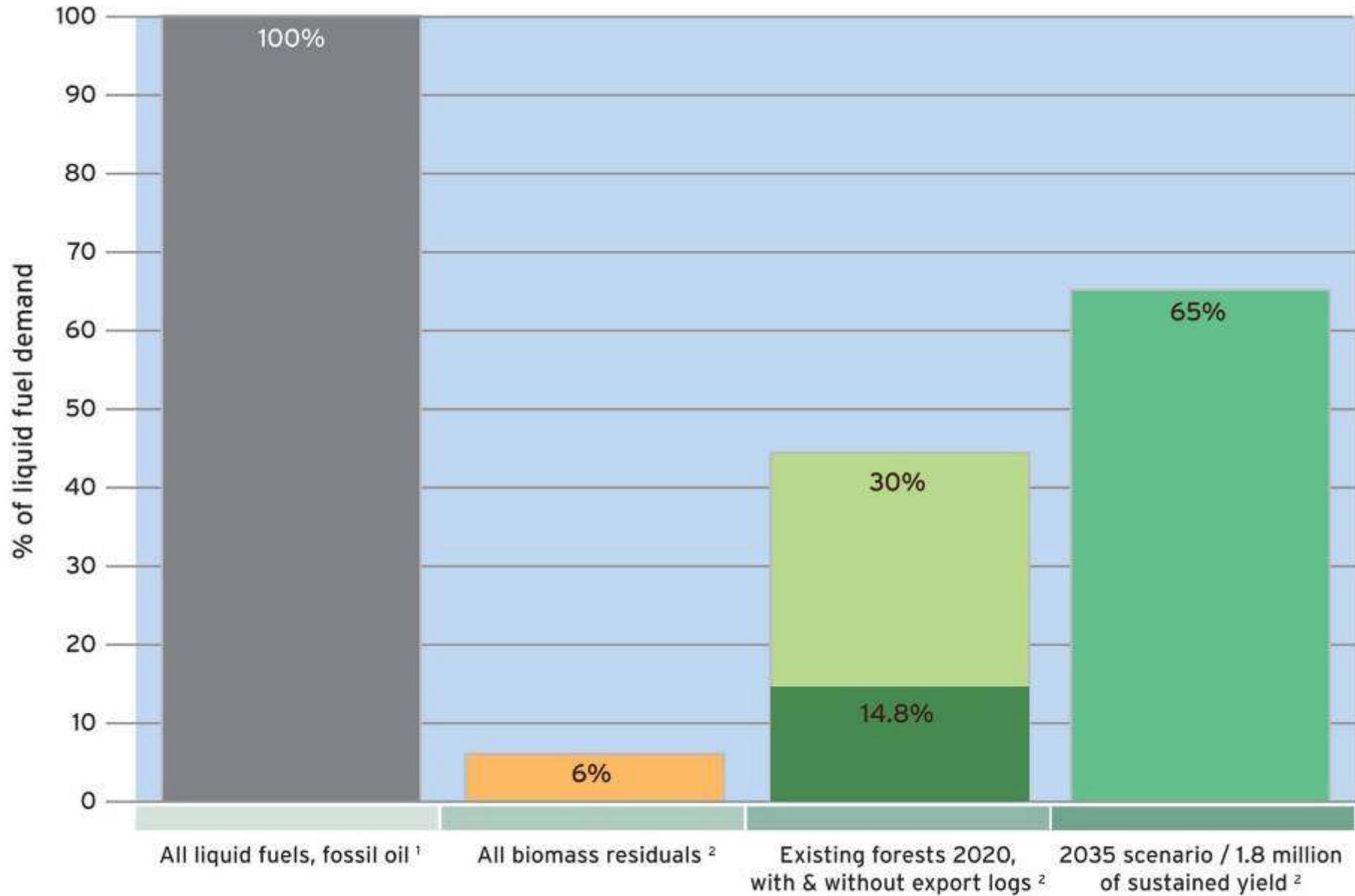




Growing synergies

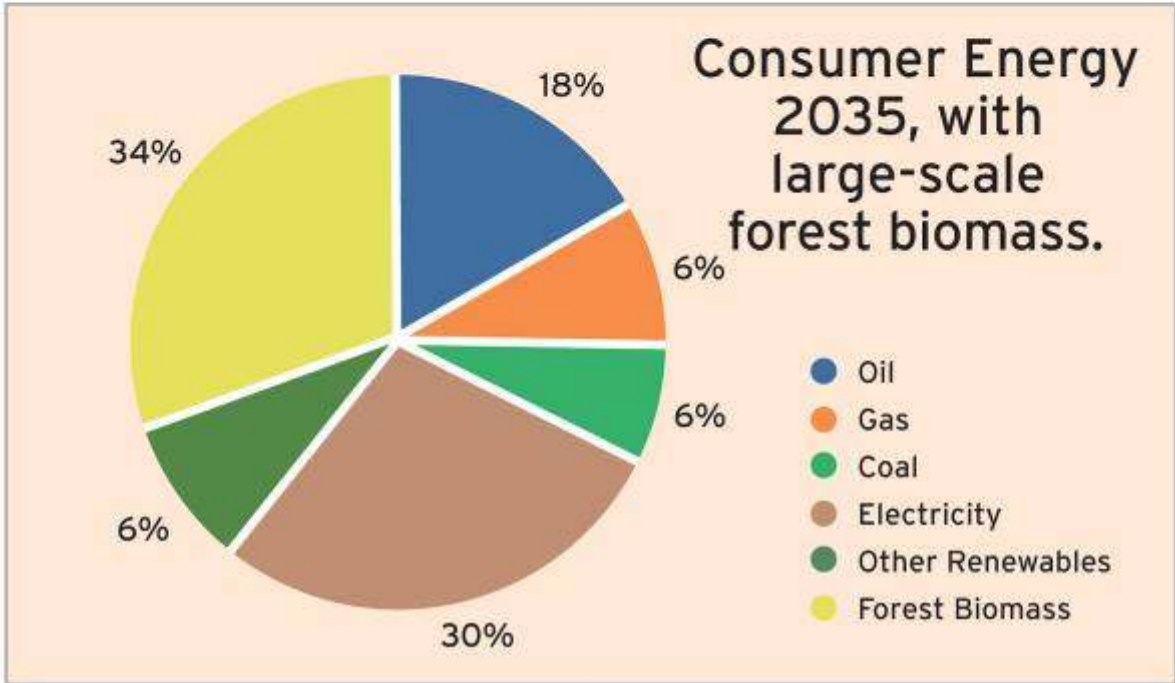
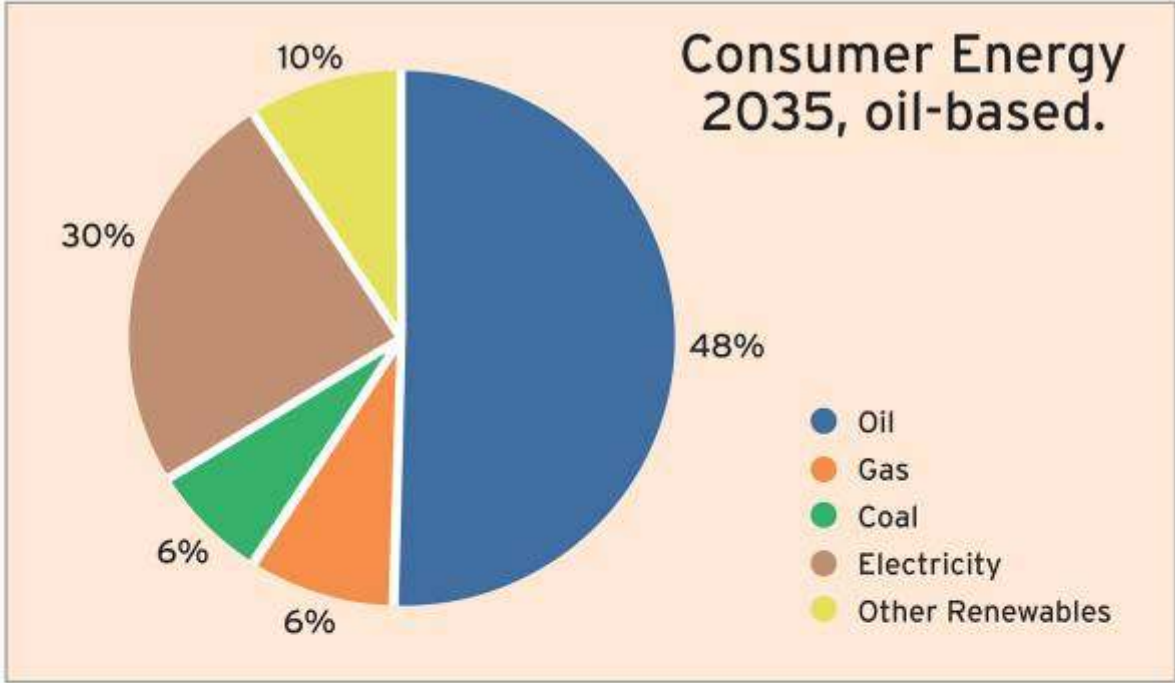


Liquid fuel demand versus potential biomass supplies.

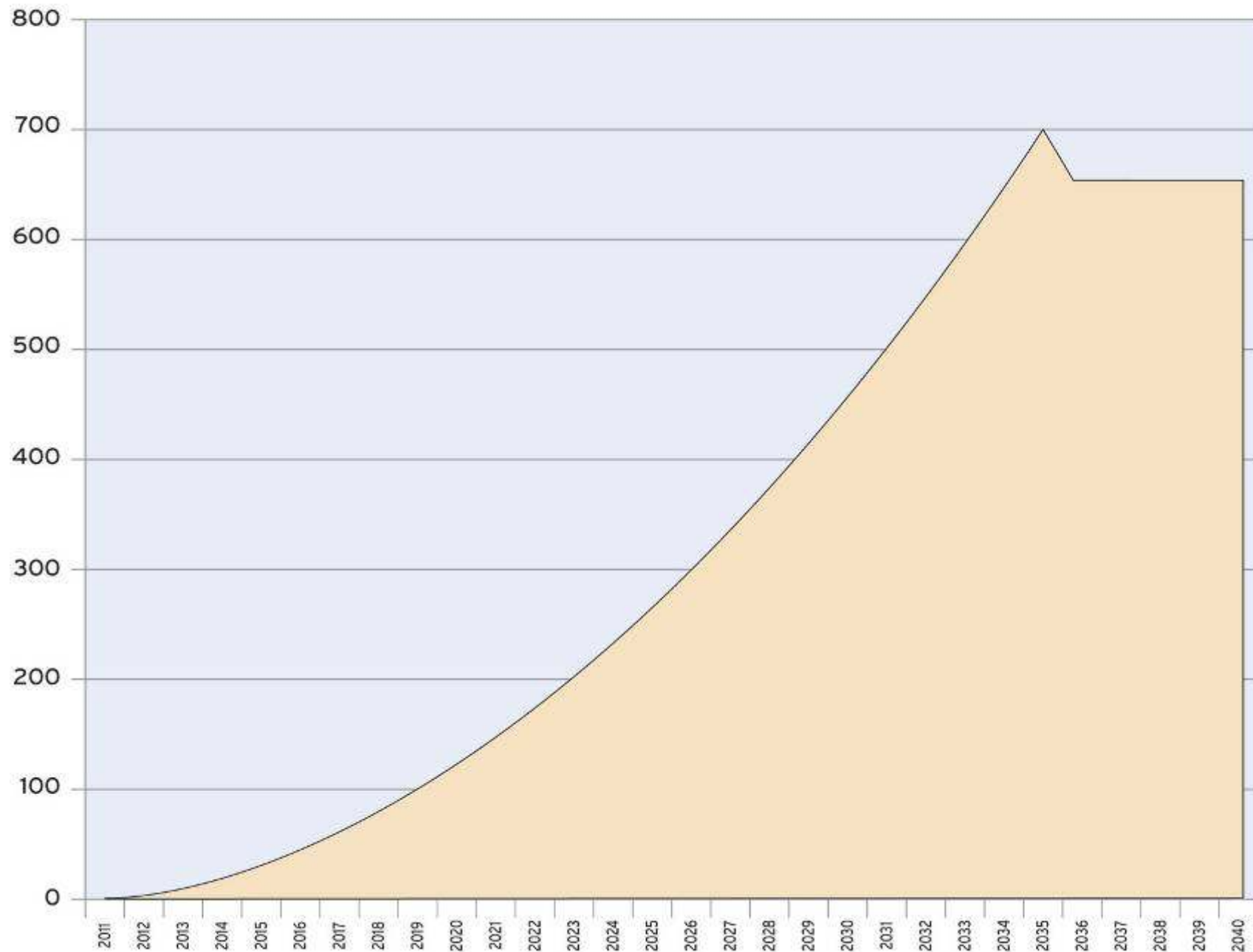


Reference - ¹ Ministry of Economic Development, New Zealand's Energy Outlook 2009

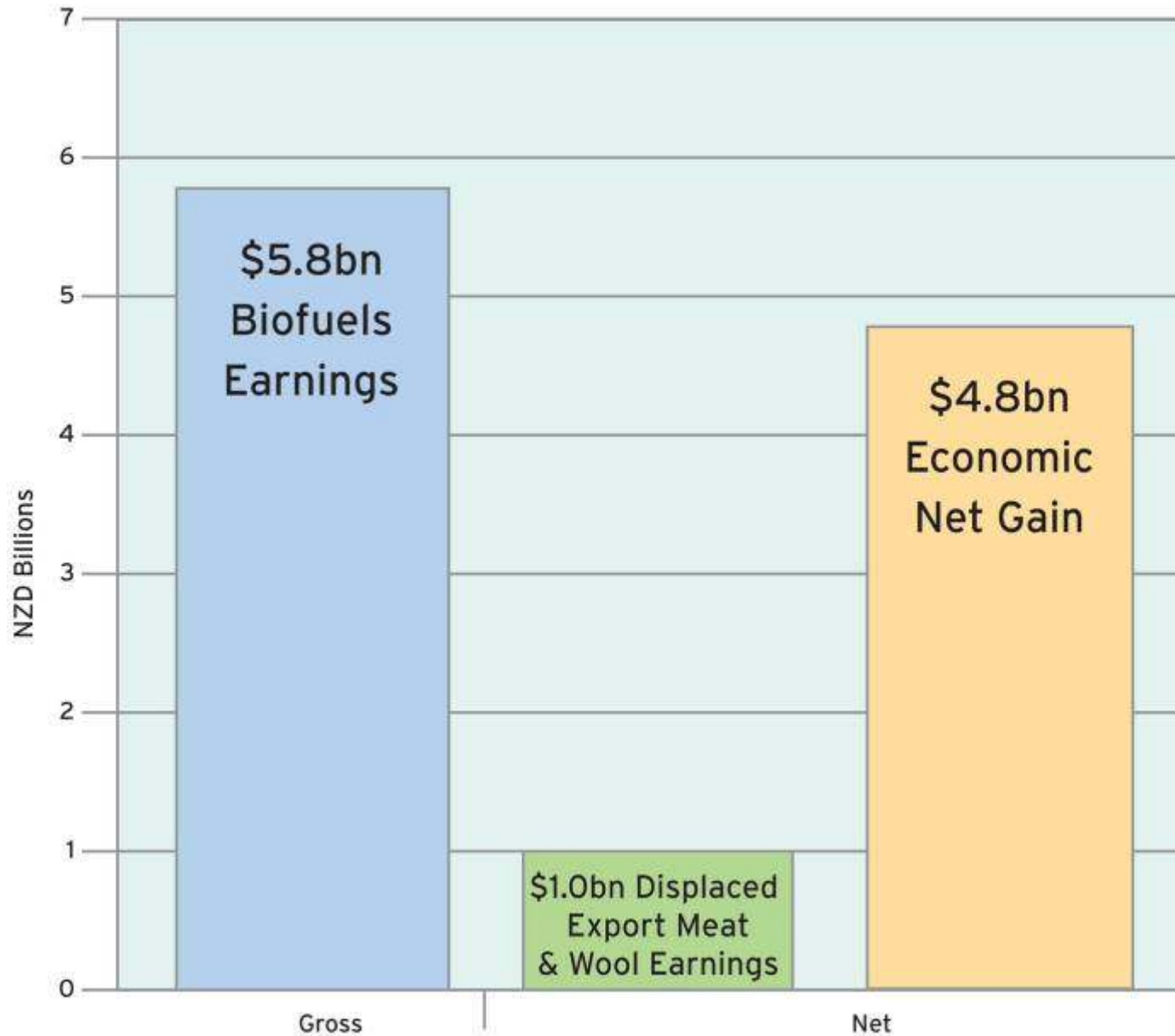
² Scion Bioenergy Options Studies



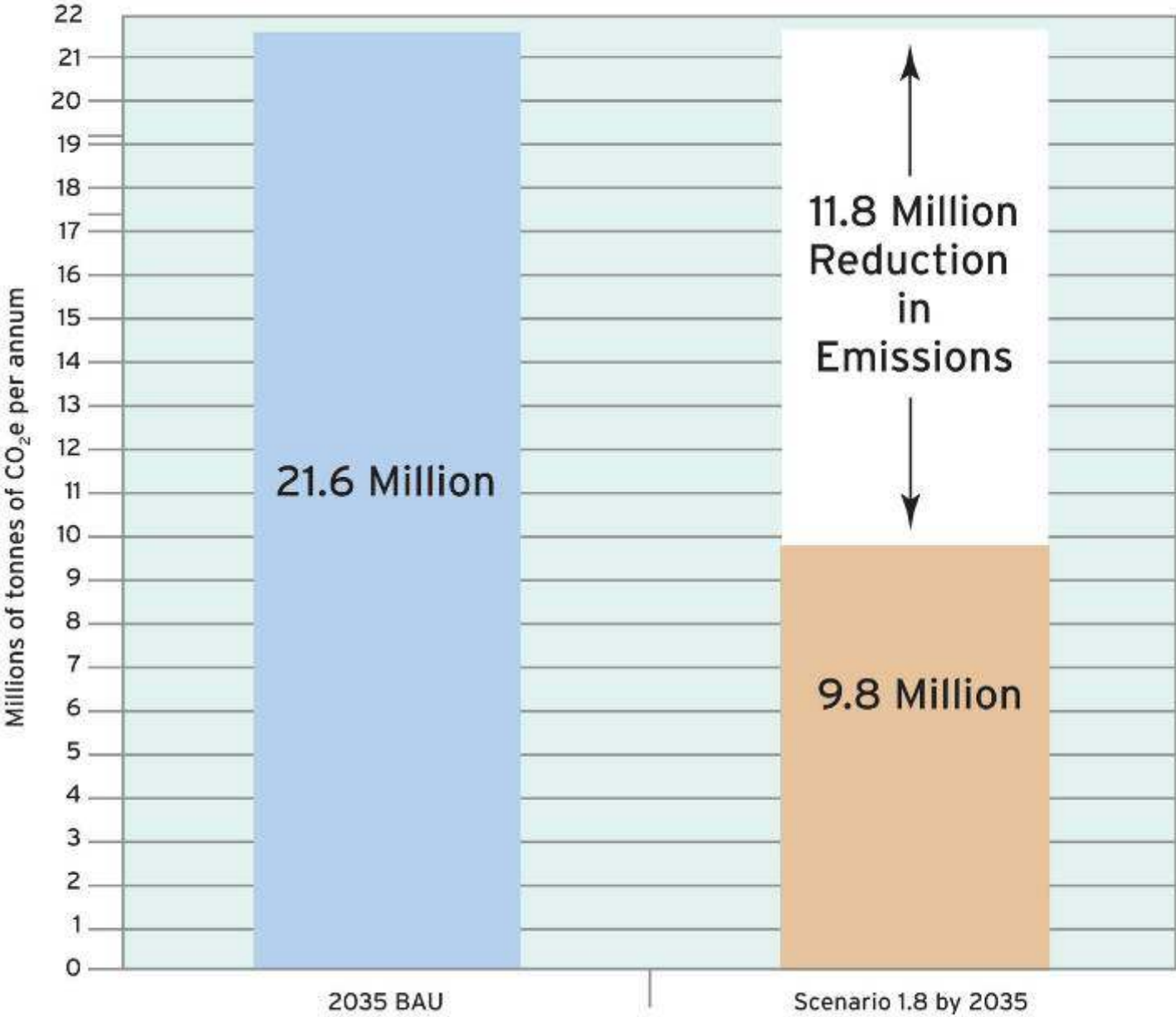
CO₂e Millions of tonnes, per annum.



Biofuel production improves terms of trade.



Transport GHG Emissions Profile.



Reference - Ministry of Economic Development, New Zealand's Energy Outlook 2009.



Creating
opportunity

Fit for purpose feedstocks



- *in planta* customisation
- new silvicultural models
- densification technologies (e.g. torrefaction)

Integrated processing technologies



- focus on core strengths
 - ▶ pre-treatment
 - ▶ co-product development
- bolt-on technologies from other (international) providers
- virtual scale-up

Future-proofing biofuels production



- water recycling
- waste utilisation
- environmental risk assessment

Beyond the technologies



- energy modelling
- systems and life cycle analysis
- macroeconomic models

Exploiting partnerships



- avoid reinvention
- multi-tiered
 - ▶ plant biotechnology
 - ▶ process development
 - ▶ co-products
 - ▶ systems analysis
- national and international
 - ▶ research
 - ▶ technology transfer

Diversification



Security



Protection



Brand





SCION 

Next generation
biomaterials

trevor.stuthridge@scionresearch.com