

Modelling New Zealand's transition to net-zero emissions

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IAEE Asia-Oceania Conference 2020

13 February 2020



Inquiry into New Zealand's transition to a low-emissions economy

In 2017 the NZ Government asked the Productivity Commission to inquire into: How can NZ transition to a low-emissions economy, while at the same time continuing to grow incomes and wellbeing?



The inquiry process





The final report in August 2018 had five parts:

1: Setting the scene

Introduces the inquiry and describes context for NZ's low-emissions transition (eg, key emitting sources and trends, and NZ's emission targets)

2: Low-emissions pathways

Identifies possible future pathways (from modelling commissioned for the inquiry) and examines the needed major economic and social transitions

3: Policies and institutions

Focuses on cross-cutting policies and institutions pervasive across the economy (eg, laws, emissions pricing, innovation, a just transition)

4: Emissions sources and opportunities

Analyses mitigation opportunities in land use, transport, electricity, heat and industrial processes, waste and the built environment

5: Achieving a low-emissions

economy

Focuses on the immediate actions that Government should take to achieve a successful transition



Main findings





STABLE AND CREDIBLE CLIMATE POLICY AND INSTITUTIONS







The four key policy and institutional pillars are:

1. EMISSIONS TRADING SCHEME

2. LEGISLATION AND INSTITUTIONS

3. COMPLEMENTARY REGULATIONS AND POLICIES 4. INVESTMENT AND INNOVATION





Four pillars

Emissions pricing

- Reform the structure of the NZ ETS, (eg, through setting yearly caps) and increase its coverage to include N₂O from agriculture
- Price biogenic CH₄ (either in a dual-cap NZ ETS or a CH₄ quota system)

Laws & institutions

- New climate legislation, with separate longterm targets and emissions budgets for short- and long-lived gases
- An independent Climate Change Commission to advise government

Regulation & policies

- Use prices (eg, feebate scheme for transport and increase the level of the waste disposal levy)
- But other supportive regulation will be needed eg, in electricity distribution, process heat, transport and waste

Innovation & investment

- Substantially increase funding for innovation into clean technologies and agricultural emissions mitigation
- Promote low-emissions investments (eg, by mandatory financial disclosure of climate risks)



Modelling pathways to low emissions







: vivideconomics



Motu Economic and Public Policy Research



NZ's challenge to get to net-zero emissions





Why undertake modelling?

- Modelling can throw light on:
 - complex systems in order to solve complicated problems
 - whether an emissions target is feasible
 - measures to achieve an emissions target at least cost
 - alternative pathways depending on available technologies
 - quantitative estimates of key variables
 - the opportunities, choices and risks that may lie ahead



The modelling explored 3 scenarios ...

- ...about technology and the ability to reduce GHG emissions
- 1. The Policy Driven scenario
 - Technological change is slow
 - So need to rely on high emissions prices to drive behaviour change ...
 - to stop doing emissions-intensive things; & start doing low-emissions things (largely using existing technologies)



The 2nd scenario is Disruptive Decarbonisation

 Rapid technological change that disrupts current economic structures







The 3rd scenario is Stabilising Decarbonisation

 Rapid technological changes that "preserve" existing industries by reducing their emissions





3 scenarios and 2 targets give us 6 pathways that the modelling describes



	Scenario	Net emissions target in 2050	Pathway
1.	Policy Driven	25 MtCO ₂ e	PD-25
2.	Policy Driven	Net zero	PD-0
3.	Destructive Decarbonisation	25 MtCO ₂ e	DD-25
4.	Destructive Decarbonisation	Net zero	DD-0
5.	Stabilising Decarbonisation	25 MtCO ₂ e	SD-25
6.	Stabilising Decarbonisation	Net zero	SD-0

Insight 1: both targets look feasible





Insight 2: Emissions prices climb steadily from current levels ...





Emissions prices are mainly in the range expected in other developed countries



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Insight 3: Transformational technology number one is...



Insight 4: Extensive (but not radical) land-use change is required







Forestry is not a 'get-out-of-jail-free' card



- Forestry credits principally accrue when we <u>add</u> land area under forestry
- If NZ stops planting new trees
- ...its sequestration from tree growth will eventually stop, and net emissions will jump right back up to gross emissions
- So how do we achieve our net zero emissions after 2050?

Insight 5: Transformational technology number two is ...



EVs are coming anyway but will they come fast enough?



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The pace of change needs to be rapid

Proportion of light passenger vehicles entering NZ which are EVs



Insight 6: Electricity is key, and capacity KEY ZEALAND will need to expand a lot



Insight 6: Electricity is key, and capacity will need to expand a lot

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Current geothermal

- Decline in fossil generation, but some remaining for seasonal and 'dry-year' duties
- Significant growth in new renewables to meet demand growth (and displace 'baseload' fossil generation)



Summarising the insights from the modelling ...



- Achieving net zero by 2050 is possible but, without help from technology, will require very high emissions prices
- Expansion of forestry is a low-cost measure, but poses a challenge post-2050
- Dairy output does not change much, but sheep & beef sees a significant decline
- Expanding the light vehicle EV fleet and clean electricity generation also important (but don't aim for zero- emissions electricity)



www.productivity.govt.nz/lowemissions

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