Two-pager: Key results from economic modelling of 2050 emissions targets

The full NZIER report, prepared for the Ministry for the Environment, can be found here: http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/NZIER%20report%20-%20Economic%20impact%20analysis%20of%202050%20emissions%20targets%20-%20FINAL.pdf

NZIER was engaged to explore the economy-wide impacts of meeting different 2050 emissions targets

- We developed a dynamic Computable General Equilibrium (CGE) model that projects the economic activity and associated greenhouse gas emissions of the New Zealand economy and its 111 industries out to 2050.
- We then explore a series of scenarios that explore the economic and emissions impacts of adopting 2050 emissions targets of differing levels of ambition. These scenarios incorporate additional innovation in the agriculture, transport and energy industries, as well as additional afforestation.[1]
- The economic modelling is subject to several caveats. Projecting out 33 years and determining how firms and households will respond to very high carbon prices is challenging. These results should be seen as indicative of the direction and magnitude of economic costs, rather than precise forecasts.

We compare the results with a status quo scenario that reflects our current climate change commitments

- New Zealand's present 2050 emissions target is for a 50% reduction in emissions from 1990 levels.[2] We call this, and its implied assumptions for innovation and afforestation, our status quo scenario.
- Getting to this status quo is not cost-free. The average annual real GDP cost is $8.6 billion between 2017 and 2050, compared to a 'do nothing' baseline.

The more ambitious the emissions target, the greater the costs to firms and households

- The economy will continue to grow no matter the emissions target chosen. But it will grow slower. The more ambitious the target, the larger the decrease in economic growth.
- Average GDP growth from 2017 to 2050 drops from 2.1% in the status quo to 1.9% with a Zero Net Emissions (ZNE) target.[3]
- This equates to real GDP dropping by an average of $7.8 billion per year for a ZNE target, compared to the status quo.
- The equivalent numbers for a 75% reduction target are average GDP growth of 1.9% and an average real GDP decrease of $6.5 billion per year.

Households will be better off than they are now, but worse off than they would have been in the status quo scenario

- The more ambitious the 2050 target, the larger the cost to households.

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1 In this two-pager, we report only on the 'Wide innovation' scenario that incorporates both agricultural innovation (such as a methane vaccine) and energy innovation (such as EV update to 95% of the light vehicle fleet by 2050, and a shift to 98% renewable electricity from 2035).

2 https://gazette.govt.nz/notice/id/2011-go2067

3 This target is a 100% reduction on 1990 emissions, after taking into account net sequestration.

- Per-household RGNDI will be an average of $4,600 lower per year than in the status quo for the ZNE scenario, or $3,800 per year lower under a 75% reduction target.
- Poorer households will be proportionately worse off than richer households because they spend more of their income on emissions-intensive products.

Economic costs are lowered through additional innovation, afforestation and access to international emissions permits

- Stronger innovation leads to lower economic costs. Introducing a methane vaccine, for example, lifts agricultural productivity (and hence GDP) while reducing emissions.
- Lower afforestation increases economic costs (so higher afforestation reduces costs). If we saw 40Mt instead of 50Mt with a ZNE target, the average real GDP growth rate between 2017 and 2050 would be 1.6% instead of 1.9%.
- Access to international emissions permits reduces the amount that domestic abatement contributes to meeting a target, but also reduces the economic costs to firms and households.
- If trading is allowed with a ZNE target, and global emissions permit prices gradually rise to $150 by 2050, average real GDP growth between 2017 and 2050 would be 2.1%, compared to 1.9% when no international permits are allowed.

Export competitiveness impacts can be mitigated through extending free allocation settings

- If the rest of the world takes equivalent action to New Zealand to address climate change, the impact on New Zealand's export competitiveness will be minor.
- If it doesn't, then the free allocation of permits to emissions-intensive, trade-exposed New Zealand industries is important to mitigate the costs of meeting ambitious emissions targets.

Emissions prices will need to rise significantly

- Meeting ambitious emissions targets will require high emissions prices to incentivise firms, forestry owners and households to change their behaviour towards producing and consuming lower-emissions goods and services.
- With a ZNE scenario, the implied average emissions price will average $272 per t/CO-2e between 2020 and 2050. This compares to the status quo average of $109 per t/CO-2e.
- For a 75% reduction target, the average price is $243 per t/CO-2e.

Structural change will be necessary to meet ambitious emissions targets

- The high emissions prices required to meet ambitious emissions targets will cause the structure of the New Zealand economy to change, away from emissions-intensive production methods:
  - Dairy and meat farmers and processing industries will face substantial adjustment costs, as will the petroleum and chemical industries.
  - The forestry and wood processing industries will grow significantly as the harvested area expands.
  - Renewable electricity generation (geothermal, wind, hydro) will also expand.
  - Most services industries will face proportionately lower adjustment costs, but still suffer as the economy grows slower than it would otherwise have done.