Net-zero carbon

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Today’s talk

1. What does ‘net-zero’ really mean?
2. What are other countries doing?
3. Identifying mitigation pathways towards net-zero
4. Modelling mitigation
   • Global scale
   • Country scale
   • Limitations
5. Emissions budgets
6. What’s happening in New Zealand
What does “net-zero carbon” actually mean?

$\text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O} + \text{F gases (HFCs, PFCs & SF}_6\text{)}$
Peak CO₂ emissions by 2030
Cut emissions per unit of GDP by 60-65% of 2005 levels by 2030

26-28% reduction by 2025 compared to 2005 levels
(Note US withdrawal from Paris)

37% reduction by 2025 compared to 2005 levels

40% reduction by 2030

33-35% reduction by 2030 compared to 2005 levels

26-28% reduction by 2030 compared to 2005 levels

30% reduction by 2030 compared to 2005 levels

30% reduction by 2030 compared to 2005 levels

37% reduction by 2025 compared to 2005 levels

40% reduction by 2030

26-28% reduction by 2030 compared to 2005 levels
Identifying mitigation pathways towards net-zero

Need some way of understanding realistic mitigation pathways

• Which parts of the economy can reduce by how much and by when?

Mitigation opportunities differ dramatically depending on things like:

• Availability of alternative technology

• How responsive decisions are to different types of policies
Identifying mitigation pathways towards net-zero

New Zealand has a very distinct emissions profile for a developed country

• Emissions from agriculture make a big difference

• CH\textsubscript{4} doesn’t last as long in the atmosphere, but has a much more powerful warming effect

• There are fewer (major) mitigation opportunities for CH\textsubscript{4} from agriculture as opposed to many sources of CO\textsubscript{2}
Modelling mitigation: Global scale
Modelling mitigation: Country scale

Need a variety of different models that range in size, scope and complexity

- Electricity
- Energy
- Multi-sector
- Whole-of-economy

Each requires different types of assumptions
Global GHG abatement cost curve beyond business-as-usual – 2030

Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO₂e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.

Source: Global GHG Abatement Cost Curve v2.0
Modelling mitigation: Limitations

- (Some of the) limitations of modelling
  - Always uncertain
  - Data availability
  - Relationships
  - Only a model!

- Other types of information are also critical e.g. socio-cultural context, behavioural economics etc.
Emission budgets

UK five-yearly carbon budgets

- First carbon budget (2008-2012)
- 2nd carbon budget (2013 to 2017)
- 3rd carbon budget (2018 to 2022)
- 4th carbon budget (2023 to 2027)
- 5th carbon budget (2028 to 2032)

% reduction

Carbon budget level

Reduction below 1990 levels

Mt CO$_2$e
What’s happening in New Zealand?

• Zero Carbon Bill, based on UK model
• What will the target be?
  • Productivity Commission recommended split targets and split budgets
Thank you
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Sources: