Some context

• In 2016, New Zealand signed the Paris Agreement - agreed to reduce greenhouse gas emissions by 30% below 2005 levels by 2030.

• In 2018, Government proposed and consulted on Zero Carbon Bill suggesting:
  ➢ options for New Zealand to transition to a net zero emissions economy
  ➢ an independent Climate Change Commission - the ICCC, also independent, is the precursor to the Commission.
Who is the ICCC?

- David Prentice - Chair
- Lisa Tumahai - Deputy Chair
- Jan Wright
- Keith Turner
- Harry Clark
- Suzi Kerr
ICCC’s challenge: the questions

1. Planning for the transition to 100% renewable electricity by 2035.

2. How surrender obligations could best be arranged if agricultural methane and nitrous oxide emissions enter into the NZETS.
Planning for the transition to 100% renewable electricity by 2035
The electricity system in 2035 – three scenarios

1. What happens in a business as usual future?

Current market conditions and policies continue relatively unchanged along their current path.

2. What happens if New Zealand targets 100% renewable electricity?

3. What happens if New Zealand targets ambitious electrification of transport and process heat?

The electricity system is leveraged to deliver emissions reductions via fuel switching in transport and process heat.
Electricity generation in 2017

- 82% renewable
- About 4.7 million tonnes of greenhouse gas emissions, mostly CO$_2$
- About 5% of New Zealand’s total greenhouse gas emissions.
Results - Generation

Chart shows the generation mix in 2035

The average amount of renewable electricity for BAU is 93% by 2035

This is largely because wind, solar and geothermal are the cheapest sources of new electricity supply

Generation from natural gas declines by ~50-60% in business as usual and ambitious electrification.

Generation in 2035 by electricity produced (GWh)
Greenhouse gas emissions

From electricity under the business as usual to 2035

At 93% renewable, the emissions from electricity generation are about 3Mt – 40% reduction on todays levels

Made up of 1.4Mt from geothermal and 1.6Mt from gas generation.
Moving to 100% renewable electricity

Greenhouse gas emissions from electricity - steps to 100% by 2035

To achieve 100% renewability required significant investment in overbuild of wind and solar.

Going from 99% to 100% only save around 0.4Mt – there is still around 1.6Mt emissions from geothermal.
Moving to 100% renewable electricity

Going from 99% to 100% only saves around 0.4Mt of emissions but pushes retail electricity prices up –14% for residential, 29% for commercial, and 39% for industrial.

The emissions abatement cost of getting the last 1% of renewable electricity is prohibitively expensive in terms of marginal emissions abatement cost at a cost of over $1200/t CO$_2$e.

Other options to achieve 100% renewability are also expensive although pumped hydro has some potential.
Ambitious Electrification – Input assumptions

• 50% of the vehicle fleet in 2035 is electric – 2.2 million vehicles

• Currently 13,000 electric vehicles

• Replace about 30% of fossil-fuelled process heat with electricity by 2035.
Capacity shows what gets built between 2019-2035

Ambitious electrification requires approx 5,500 MW of new generation over the next 15 years – approx. 50% increase on current level

Additional 850 MW is assumed to come from solar installed on the roof-tops as the price of solar continues to decrease

Batteries (up to 850MW) are installed to manage demand on a daily basis

Need for additional capacity to manage an increasing proportion of intermittent generation.
Marginal cost of electricity in 2019 is around $79/MWh. Under BAU, the marginal cost falls slightly to $78/MWh because of the lower costs of renewable generation and batteries.

Under ambitious electrification, the marginal cost is $87/MWh – only slightly higher despite much more generation being built.

Total marginal costs are far greater under 100% renewable electricity, due to the prohibitively expensive costs of overbuild required to get to 100%.
Net Emissions reductions in 2035

(a) Electricity system emissions

(b) Avoided heat & transport emissions

Net impact (a) + (b)
In conclusion

• Renewable electricity percentage will increase regardless – New Zealand is currently on track to achieve 93% renewable electricity

• Extremely expensive to get to 100% renewable electricity

• Better to focus on electrifying transport and process heat for emission reductions – about 6 Mt CO2e of GHG emissions could be saved using electricity to encourage fuel switching in transport and process heat.
How surrender obligations could best be arranged if agricultural methane and nitrous oxide emissions enter into the NZ ETS
What we have considered

• Driving change:

  *NZ ETS & other pricing policies, regulatory limits & mandated Good Management Practice.*

• Supporting change:

  *Farm Environment Plans, GHG calculation methods, extension & training, dedicated Agricultural Emissions Fund, support for rural professionals.*
Preparing sector to reduce on-farm emissions

- Farmers need to know what their on-farm emissions are in order to plan how to reduce them.
- Some farmers are already reducing on-farm emissions as part of maintaining and improving viable and profitable farming businesses.
- Integrating emissions management into farm environment plans will help to further enable this.
Regulating Emissions – (a) Pricing

- Considered a range of ways to regulate emissions
- A well-designed emissions pricing policy will be more cost effective at delivering emission reductions than rules-based options
- To be most effective, the accountability for livestock emissions should ultimately be at the farm level as this provides farmers with full flexibility to respond
- For emissions from fertiliser, the added level of complexity at farm level is not justified and can be priced through the NZ ETS at the processor level.
Regulating Emissions – (a) Pricing (cont.)

- Any farm-level pricing policy should minimise red tape and complexity.
- Simplest way to price emissions is a levy/rebate scheme - more familiar, simpler and pragmatic for farmers than a trading scheme.
- Key issue is the appropriateness of putting the full cost burden on the 20,000-30,000 mostly small and medium-sized family farming businesses.
- Government’s policy of 95% free allocation will lessen the cost burden of reductions, while encouraging behaviour change.
Regulating Emissions – (b) Transition

- Establish farm-level greenhouse gas measurement and reporting by using systems that work with farmers’ existing processes
- Farm level is the ultimate goal - but can’t be implemented in the short-term.
Regulating Emissions – (b) Transition (cont.)

- In short term, pricing emissions modestly through the NZ ETS at processor-level will create price signal and so provide planning certainty for farmers and the wider sector.

- Processor-level pricing will be needed only for about 3-5 years while on-farm systems are established.
Encouraging the sector to transition

- Pricing agricultural emissions is a significant change
- Government should direct the levy monies back to support the sector through a new, dedicated Fund to:
  - Develop a GHG module for Farm Environment Plans and also Good Management Practices for emissions
  - Extension & training
  - Research & development.
In conclusion

• Emissions management needs to be part of on-farm management. Farm Environment Plans are crucial.

• Pricing is the most cost effective tool for reducing emissions:
  ➢ At the farm level through a levy/rebate for livestock (short term through processors via the ETS)
  ➢ At the processor level via the ETS for nitrogen fertiliser

• Recommending a dedicated fund to encourage the significant required to reduce on-farm emissions.
Plausible pathways – what’s ahead?

• ICCC – hands over reports to Government on 30 April
• ICCC – continues the groundwork for the Climate Commission
• Zero Carbon Bill expected to be introduced to Parliament in May – the legislative framework
• MfE consultation on the ICCC’s agriculture recommendations – expected mid 2019
• Climate Change Response Amendment Bill expected late 2019 – the tools and policies.
Thank You