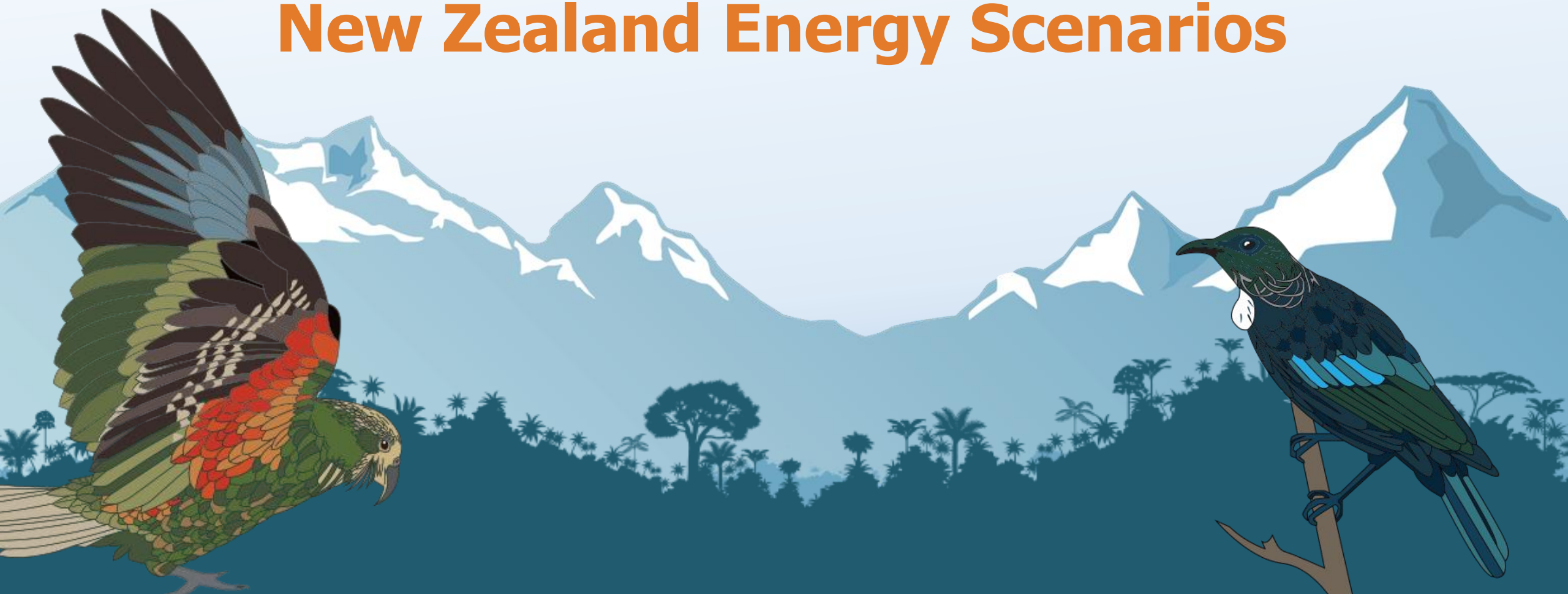
WORLD ENERGY COUNCIL | BusinessNZ Energy Council

New Zealand Energy Scenarios



TIMES-NZ Scenarios

Introduction

How do you tell the story of the future?

What if most Kiwis chose to see climate change as the most important problem to solve?

What would happen if they invested now in new technologies and led the world in decarbonising the economy?

How would New Zealand's energy sector evolve?

What are the choices and trade-offs?

TIMES-NZ Scenarios

Kea and Tūī

Kea (cohesive)

Kea represents a scenario where climate change is prioritised as the most pressing issue and New Zealand deliberately pursues cohesive ways to achieve a low-emissions economy

Tūī (individualistic)

Tūī represents a scenario where climate change is an important issue to be addressed as one of many priorities, with most decisions being left up to individuals and market mechanisms

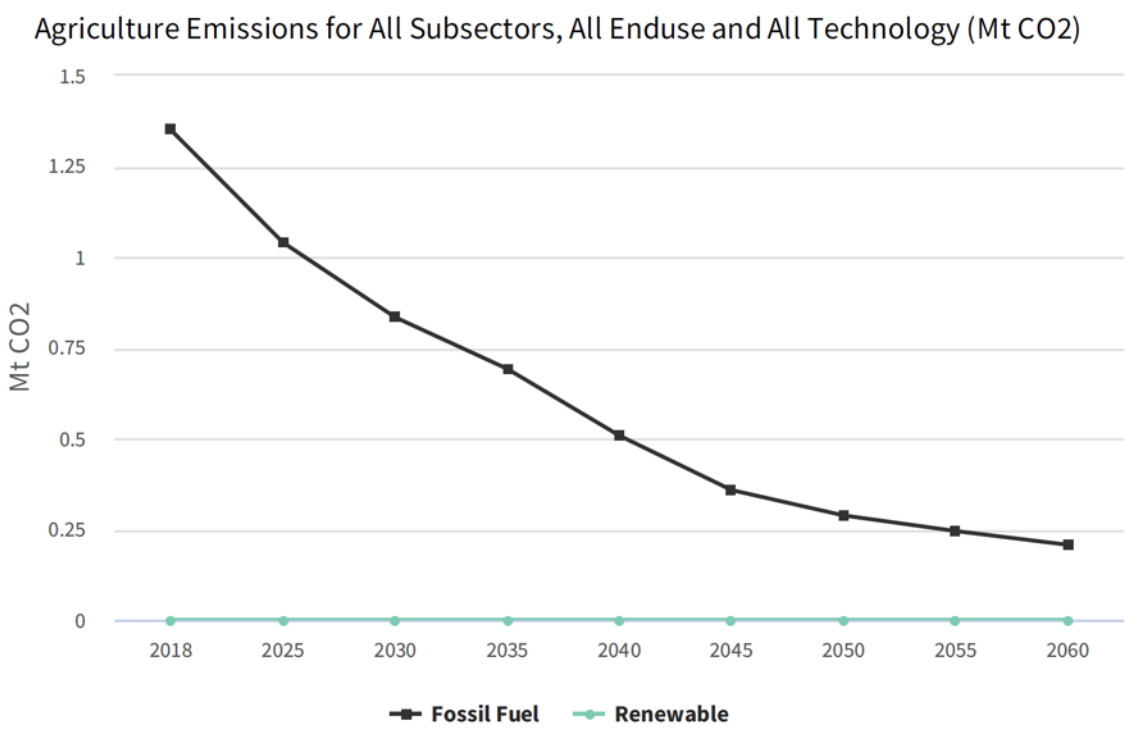
TIMES-NZ Scenarios

Agriculture

Agriculture

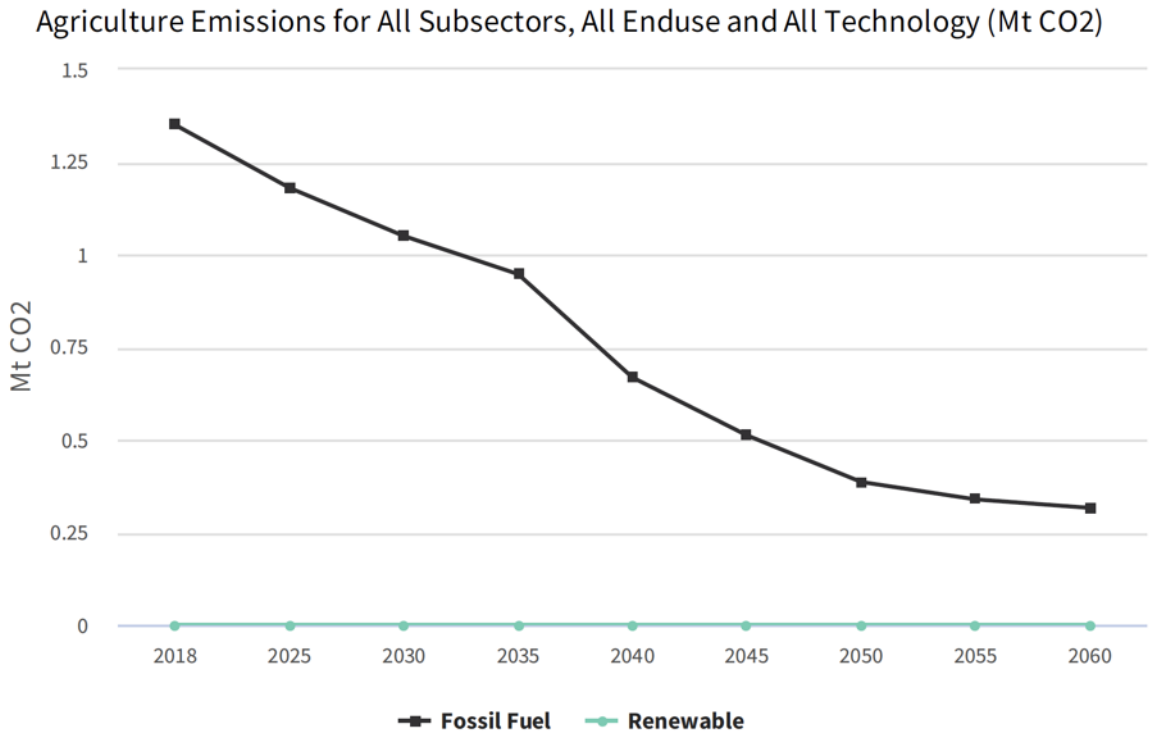
How close to zero emissions does the model get?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tui

Agriculture energy emissions - How close to zero emissions does the model get?

Zero energy emissions are not modelled as being reached in this sector by 2050. Both Kea and Tūī have emissions settling around the same mark – Kea at 0.207 and Tūī at 0.316 Mt CO2-e respectively (around 25% or current levels).

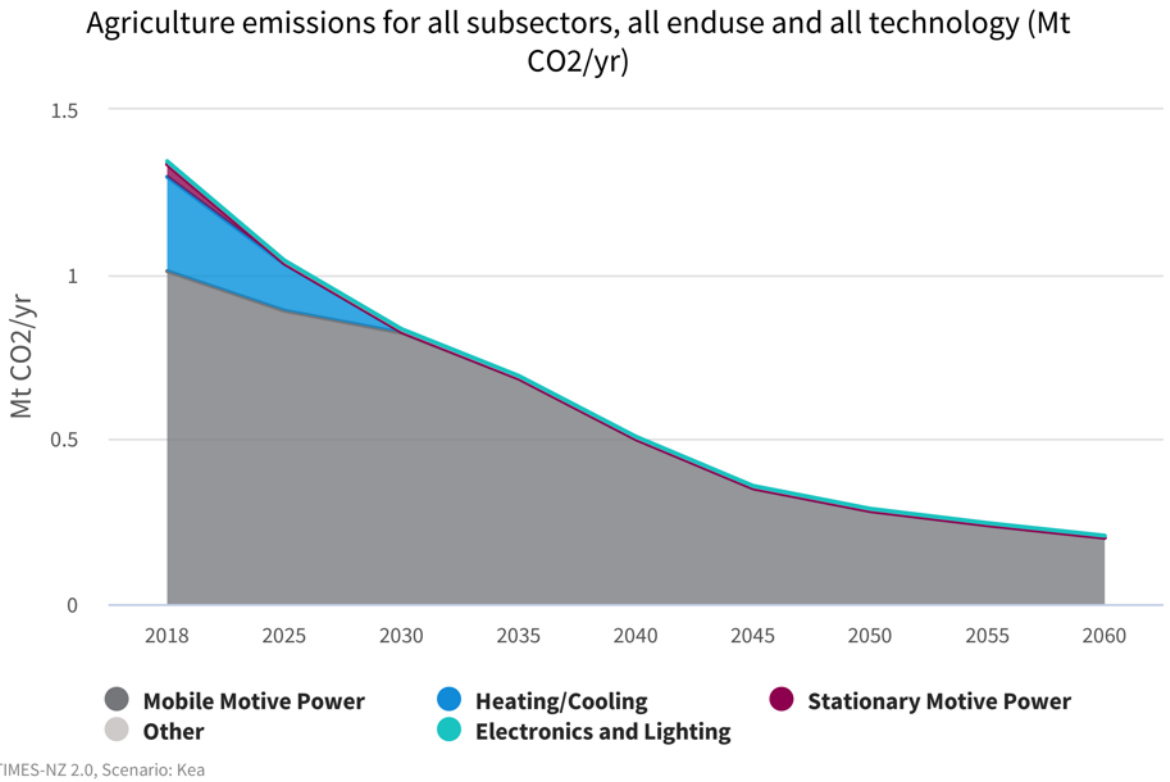
Kea shows a sharper drop in emissions.

This sector can be significantly decarbonised. Technological development in heavy equipment and farm vehicles could further assist the sector to full decarbonisation.

Agriculture

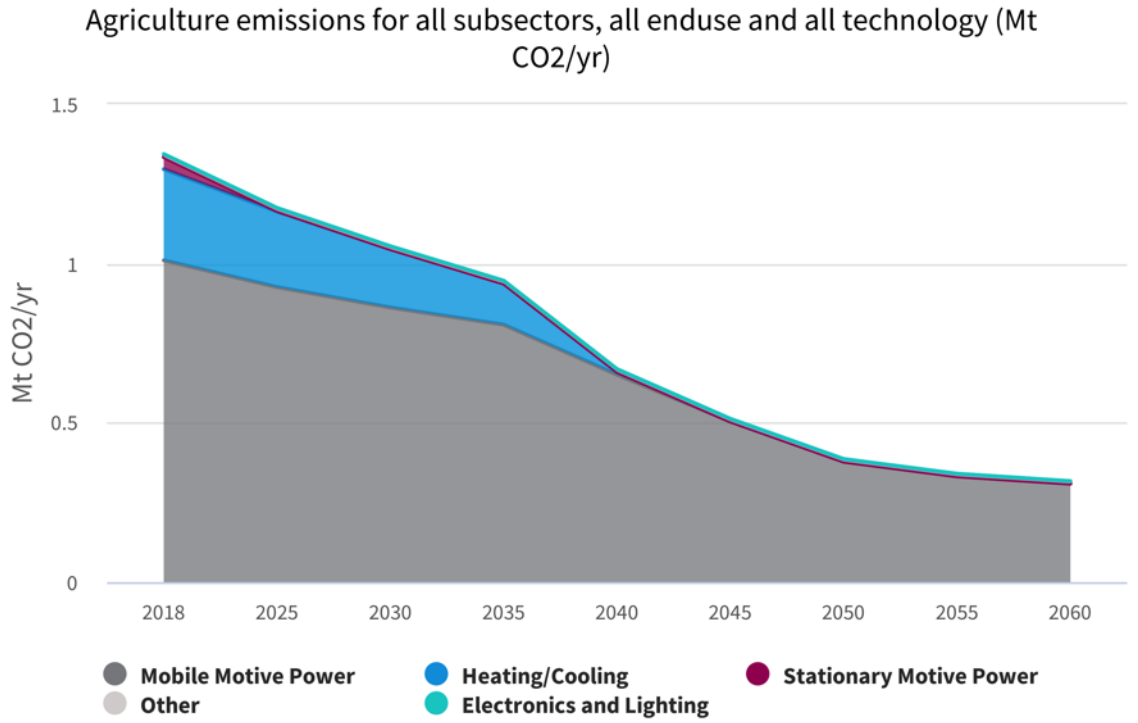
What technologies might contribute to emission reductions?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tūī

Agriculture - What technologies might contribute to emission reductions?

Faster technological development under Kea is responsible for the quicker elimination of some emissions sources – notably boilers (light blue) and forestry equipment (teal and dark green).

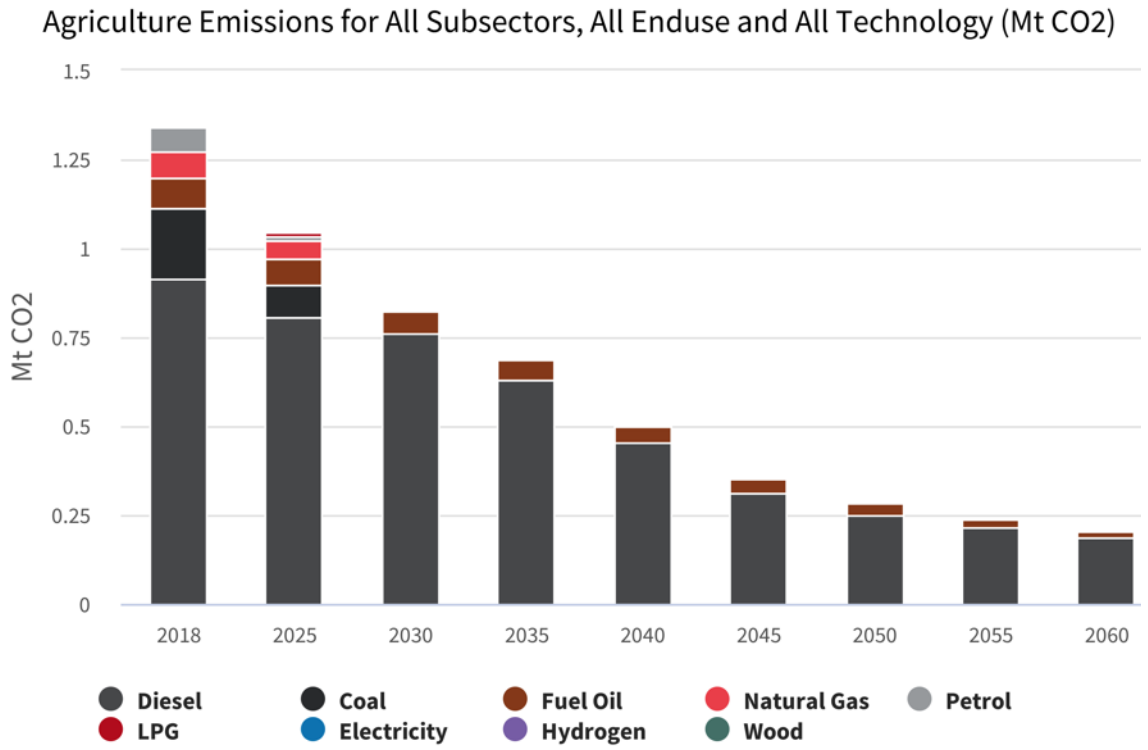
Overall emissions are lower in Kea than Tūī. The difference is .109 Mt CO2-e difference by 2050 – as outlined on the previous slide – roughly a third less. Note that all these numbers are small in the scheme of things.

The theme between Kea and Tūī is that a lack of zero carbon technology for heavy machinery and fishing vessels stands in the way of reaching a zero energy emissions agricultural sector. The faster emissions-reducing tech can be developed, the faster this sector can make a significant contribution. As noted in subsequent slides, hydrogen has the potential to play a useful role here.

Agriculture

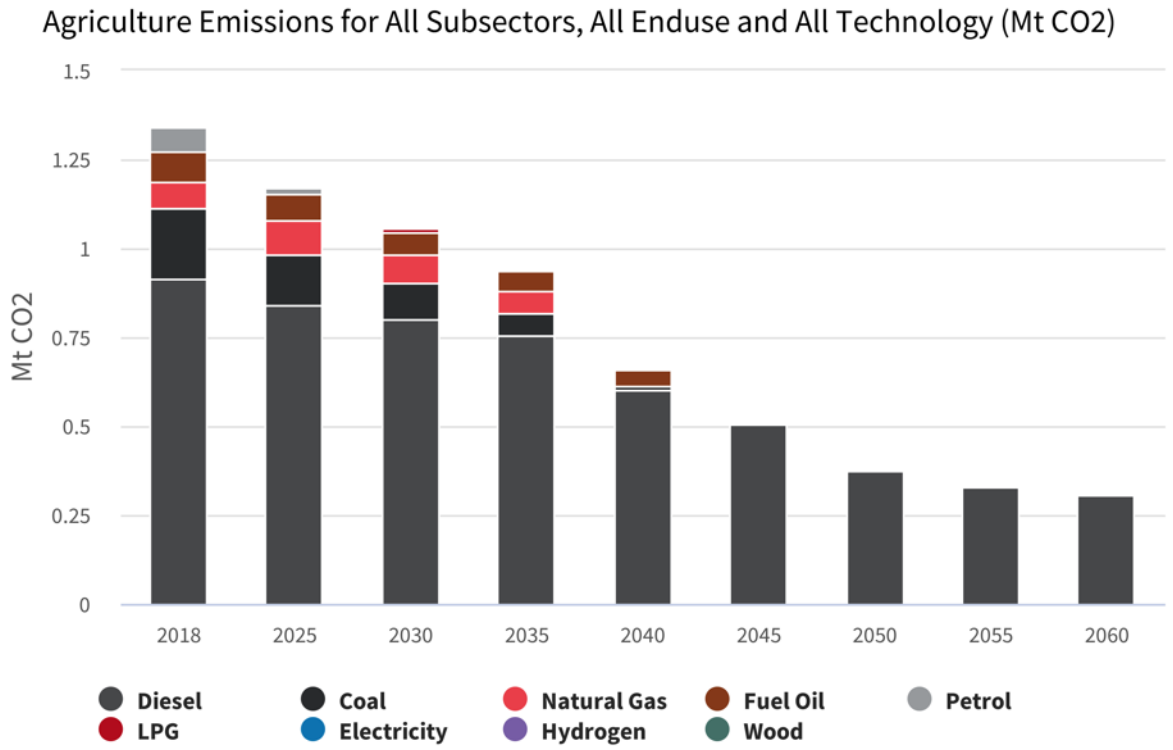
Where might we see emissions sticking around for longer?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tui

Agriculture - Where might we see emissions sticking around for longer?

Diesel is the main source of carbon emissions in both Kea and Tūī. This is from a variety of sources, including heavy trucks and farming vehicles (tractors and the like).

Full decarbonisation in this sector will be reliant on technological development in order to give businesses opportunity. This also includes forestry.

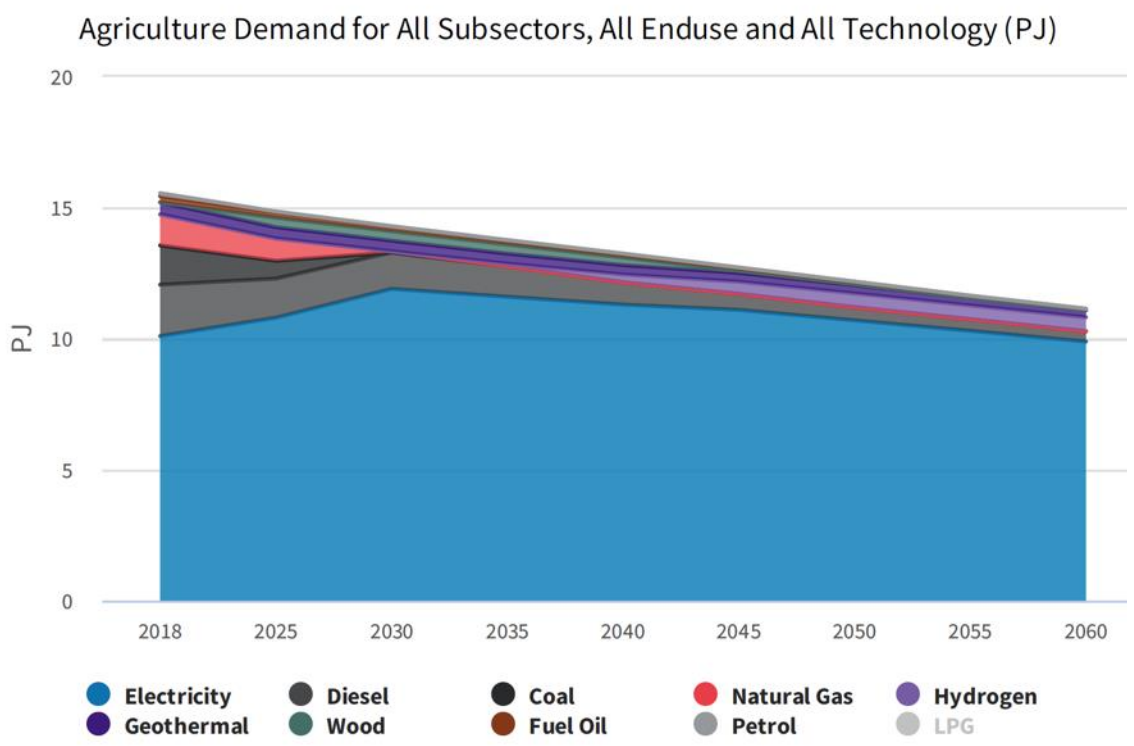
It is also worth noting that liquid biofuels in these charts are shown as diesel as they are usually combined with an existing fuel.

Coal is the second most prominent source in the starting point, but is eliminated by 2030 under Kea, and 2040 under Tūī. This is largely as a result of coal boilers being phased out and transitioning to wood as a fuel. Indoor cropping transitioning away from coal/natural gas/diesel to electricity/wood/geothermal also plays a role.

Agriculture

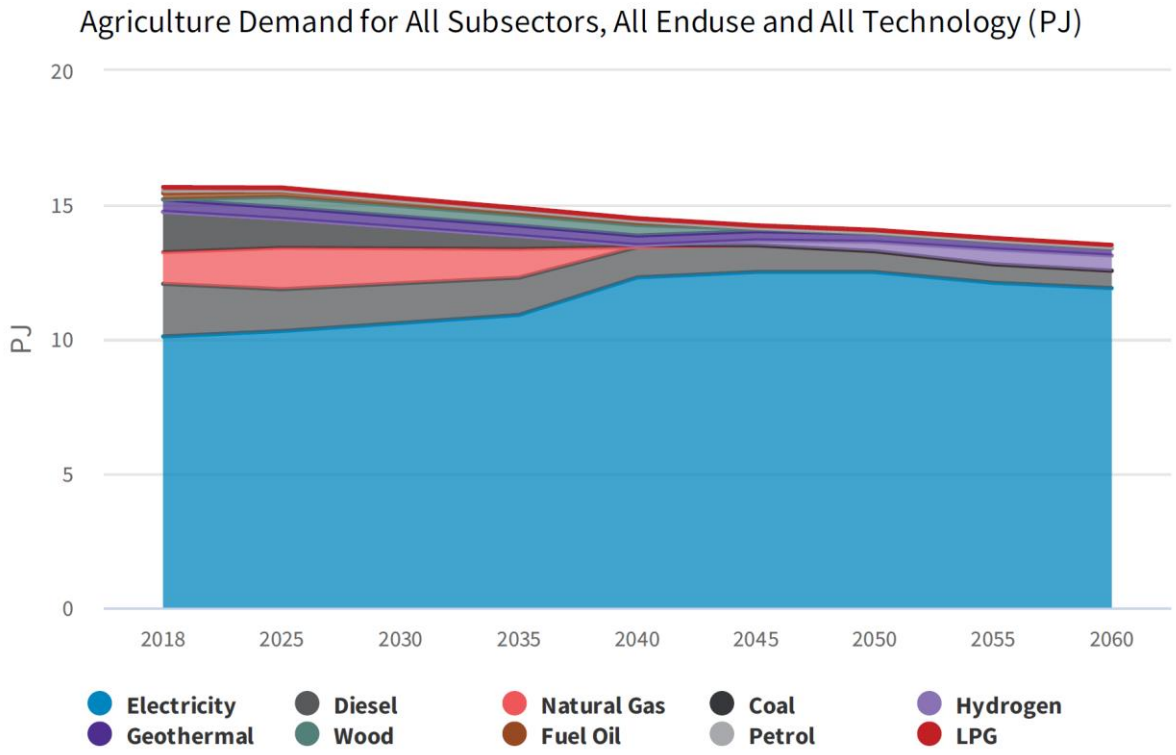
How much energy demand might we see?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tui

Agriculture - How much energy demand might we see?

Total demand under Kea in 2050 is around 12 PJ, and 14 PJ under Tūī. Tūī shows little shift in demand over the course of time.

Demand is largely met by increasing electrification. Diesel continues to play a role, albeit a smaller one, with hydrogen having an increasing, although still limited role in both scenarios.

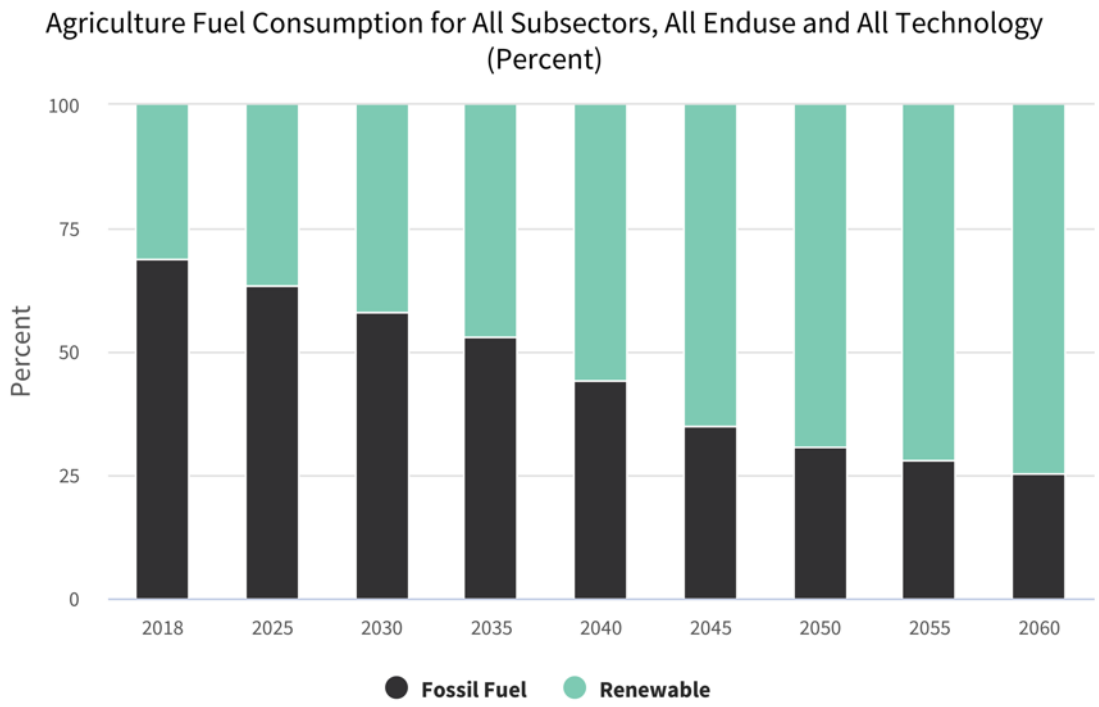
Demand for natural gas and coal extends beyond 2030 in Tūī. This is not the same in Kea, due to faster overall technological development and adoption due to the higher carbon price.

There is a slow decline in overall agricultural activity in the input assumptions.

Agriculture

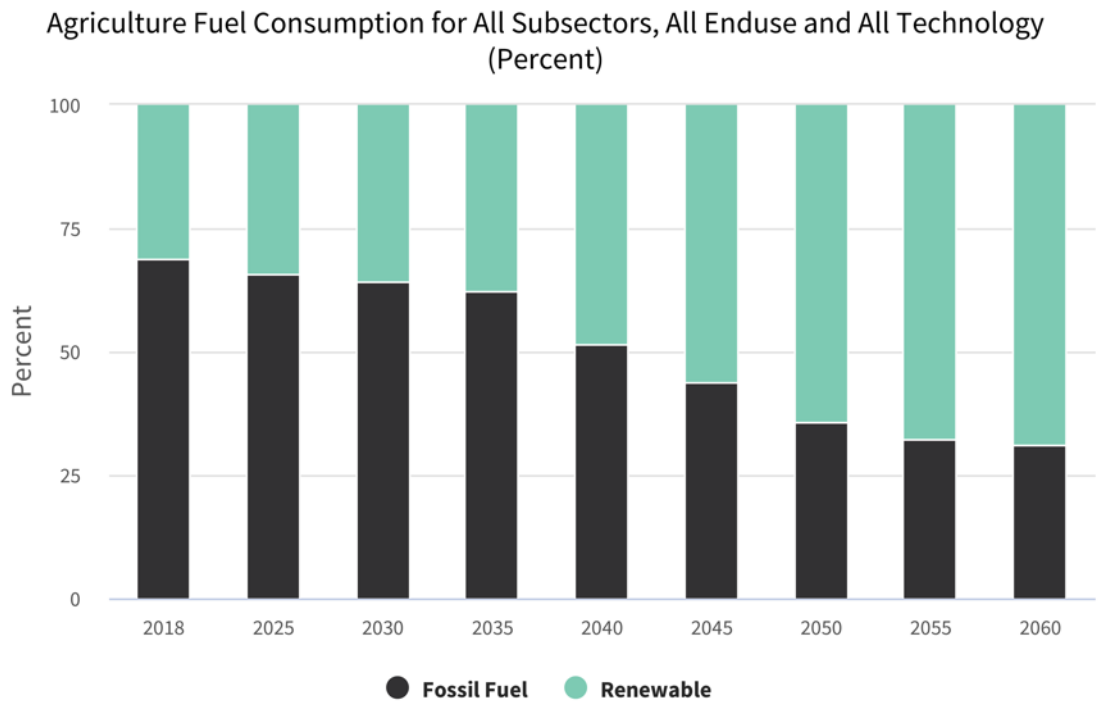
What does the model say about agricultural energy sources?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tui

Agriculture - What does the model say about the energy sources?

Neither Kea or Tūī show full consumption of renewable energy. This is largely due to the role of diesel, which ensures the presence of at least some reliance on fossil fuels.

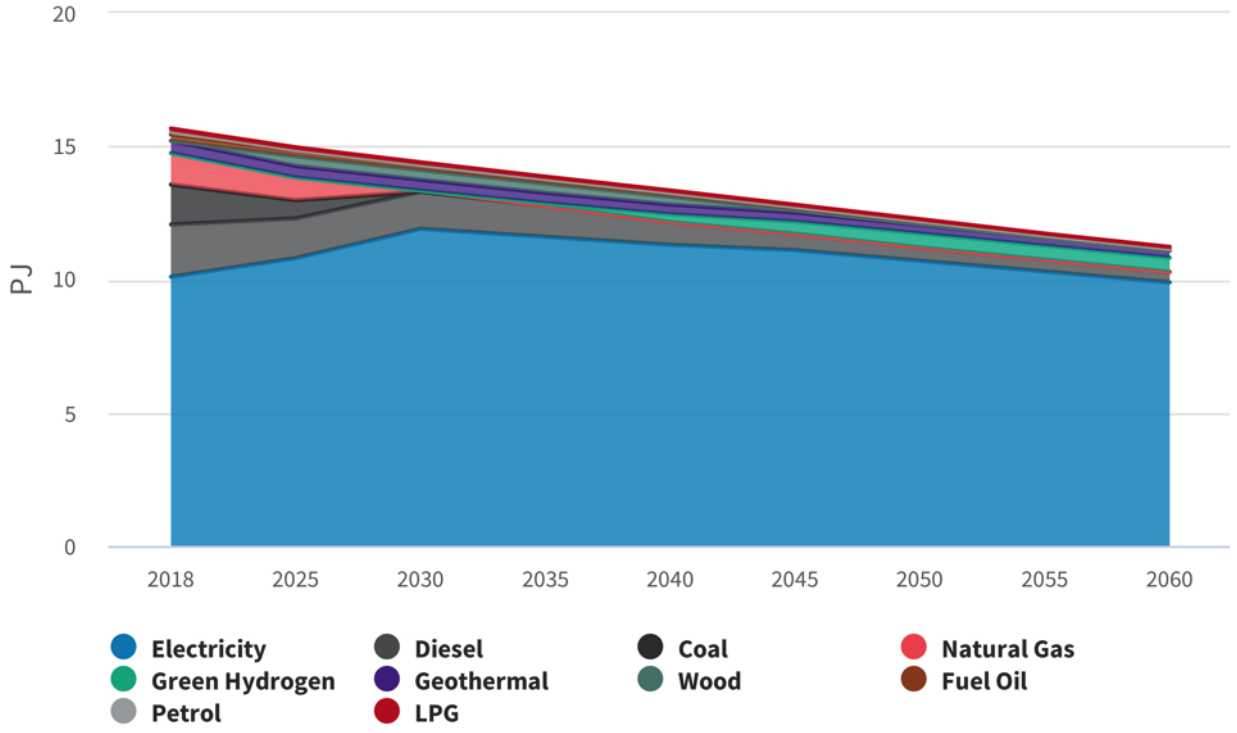
Demand for renewable energy increases as a percentage of overall demand in both Kea and Tūī, although this process takes longer under the more conservative Tūī. A lack of available renewable heavy machinery technology will be responsible for longer reliance on fossil fuels.

Agriculture

What fuels might we be consuming?

Kea

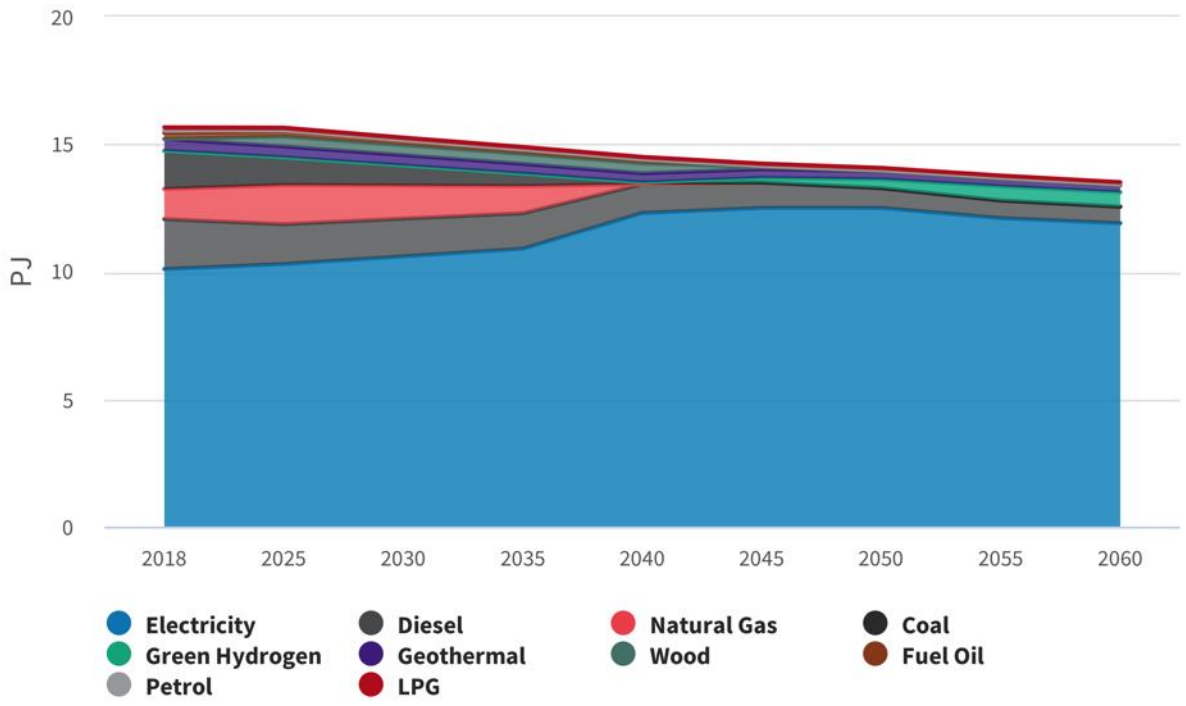
Agriculture end use demand for all subsectors, all enduse and all technology (PJ)



TIMES-NZ 2.0, Scenario: Kea

Tūī

Agriculture end use demand for all subsectors, all enduse and all technology (PJ)



TIMES-NZ 2.0, Scenario: Tūī

Agriculture - What fuels might we be consuming?

Diesel and electricity continue to be the main sources of fuel for the agricultural sector. There is not a substantial difference in the percentage consumption of these fuels between Kea and Tūī at either the 2030 or 2050 intervals.

Under Kea in 2030, diesel makes up 53%, with electricity at 38%. These numbers shift to 27% and 51% respectively by 2050.

Under Tūī in 2030, diesel makes up 49%, with electricity at 32%. These numbers shift to 35% and 53% respectively by 2050.

Hydrogen technology in tractors, skidders, trucks and other heavy vehicles are largely responsible for this shift, in addition to a broad transition away from natural gas, LPG and coal. The development of hydrogen tech in this sector will be crucial to seeing increased reductions in emissions. It is difficult to power such vehicles using electricity due to prohibitive battery weight.

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