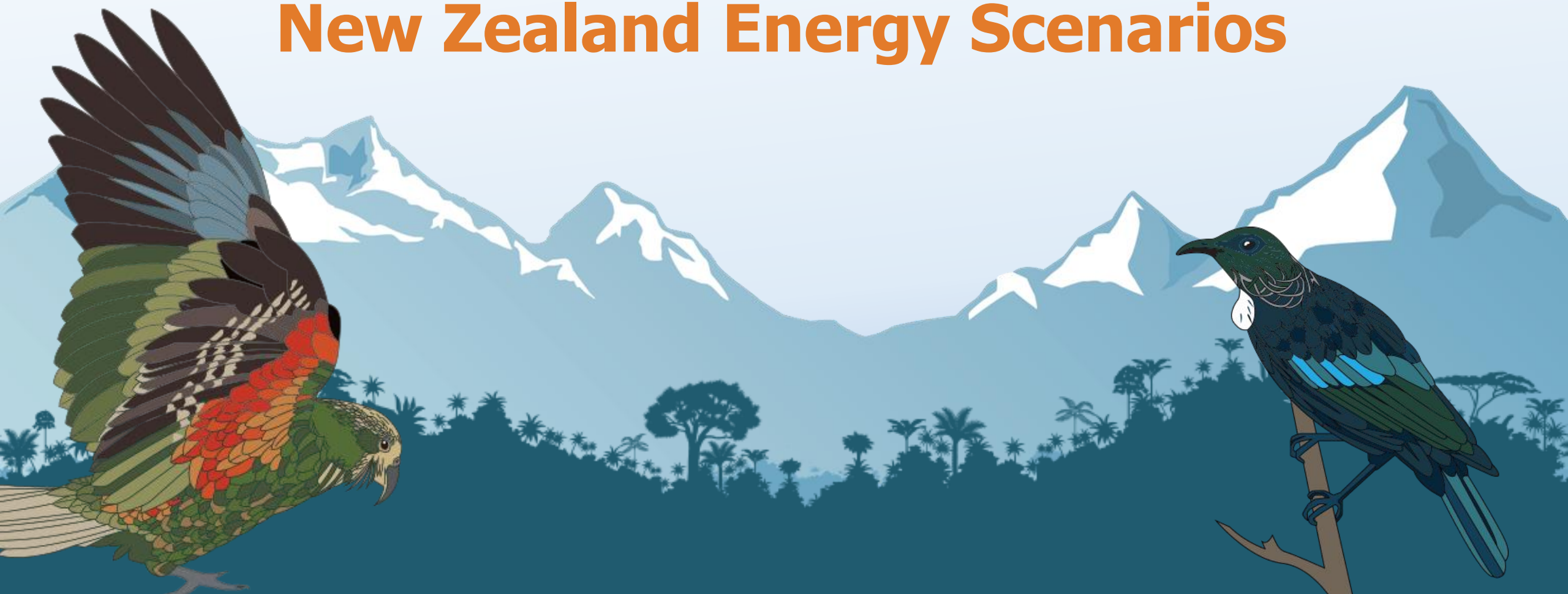
WORLD ENERGY COUNCIL | BusinessNZ Energy Council

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

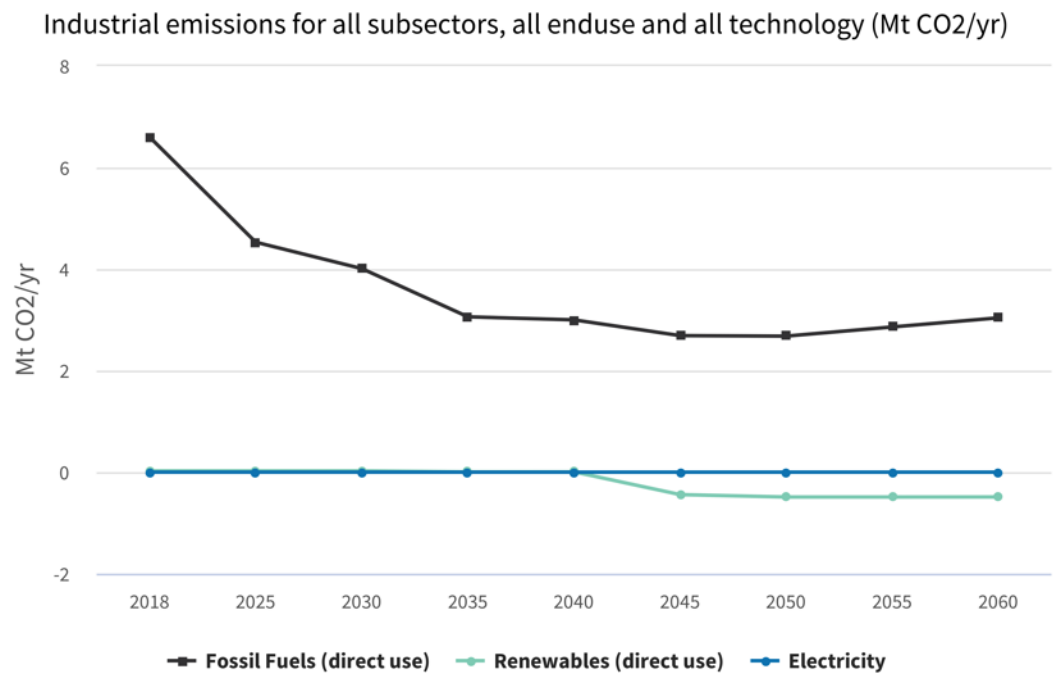
TIMES-NZ Scenarios

Industrial

Industrial

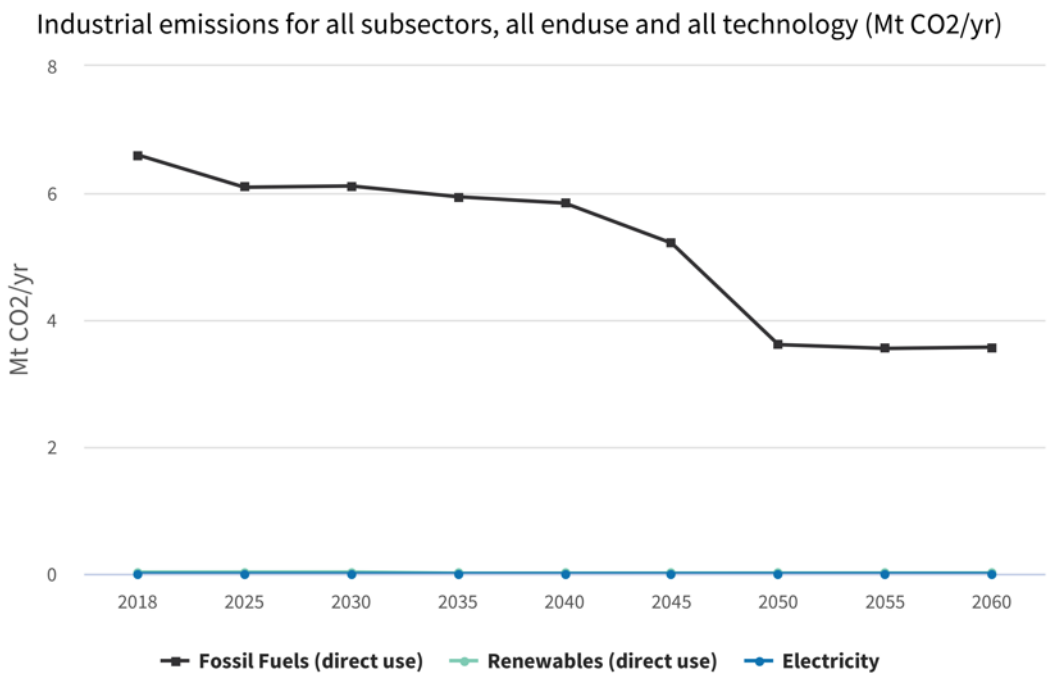
How much industrial decarbonisation does the model show?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tūī

Industry - How much industrial decarbonisation does the model show?

Industrial emissions roughly halve in the scenario timeframe, dropping from 6.6 Mt CO2-e to between 2.68 and 3.61 Mt CO2-e in 2050.

In Kea, emissions mostly reduce between now and 2040 then level off. Some negative emissions are created due to biodiesel production.

In Tūī, emissions remain relatively unchanged until 2040, then decline.

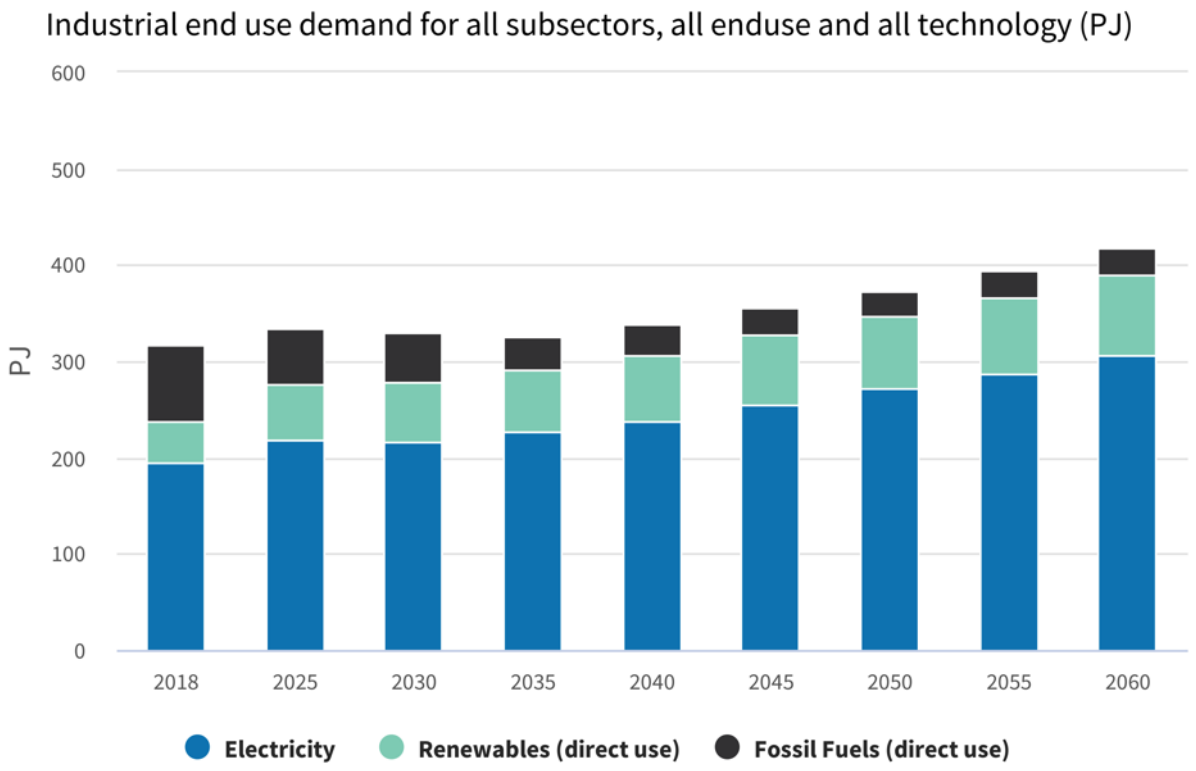
Faster decarbonisation is driven by the higher carbon prices assumed in Kea.

Residual emissions are from hard-to-abate sectors like steel making.

Industrial

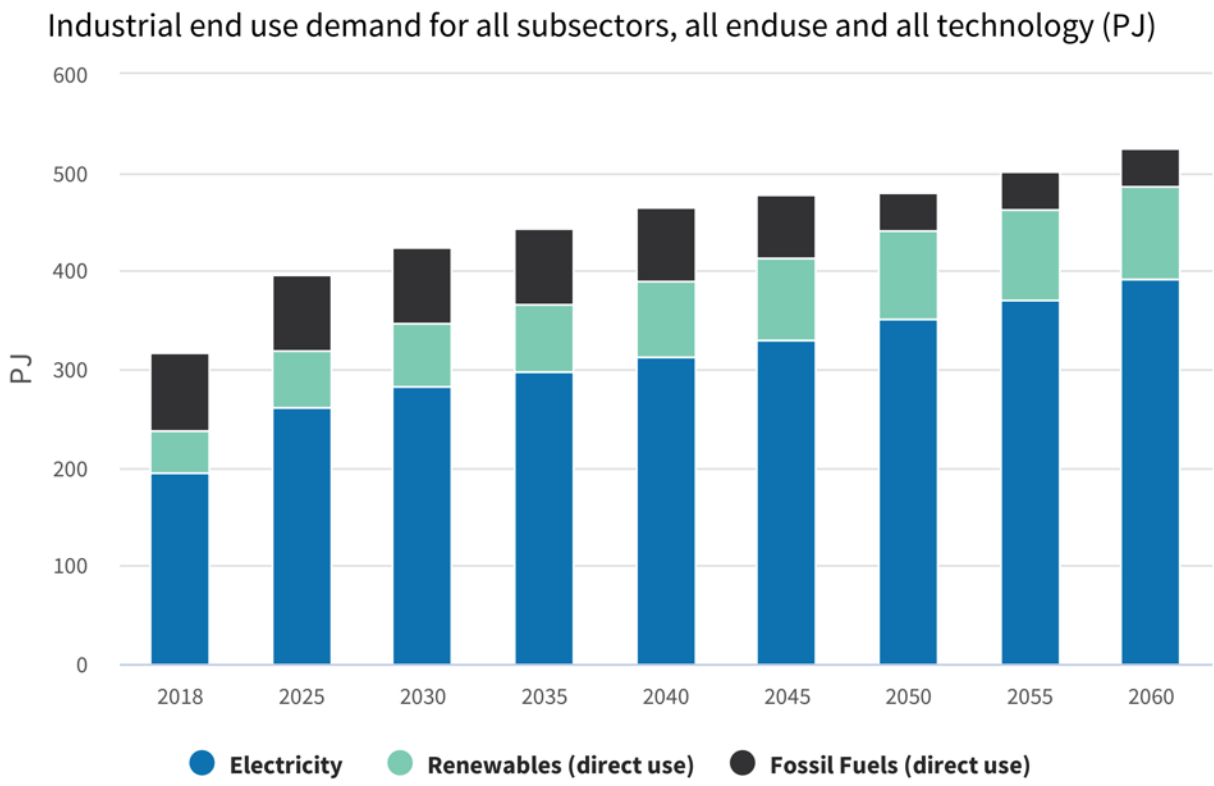
What might industrial demand look like?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tūī

Industrial - What might industrial demand look like?

The total industrial end-use demand looks quite different in our two scenarios.

Total demand is held below 400PJ until 2050 in Kea. Fossil fuel use drops to 31.5 PJ in 2040, half of its current demand.

Demand for renewable energy sources grows gradually. There is greater growth in Tūī, with industrial energy demand jumping to 396 PJ by the first milestone year, 2025, and continuing to increase until 2045.

Future industrial end-use demand is generally driven by national or sector-specific GDP projections, taking into consideration any capacity constraints. Kea assumes a low-growth period over the next 10 years with a transition period from 2030 to 2040 followed by higher growth. In contrast, Tūī assumes higher growth between now and 2030, followed by a 10-year transition period and then lower growth.

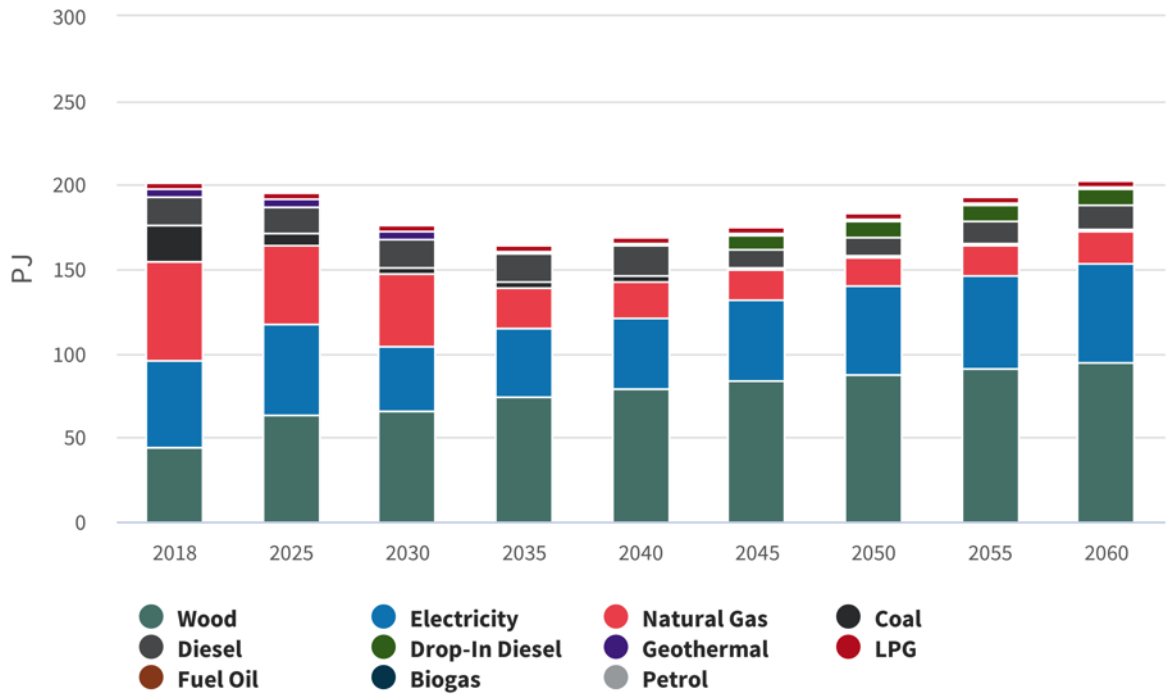
During the low-growth periods wood product manufacturing is assumed to outperform other sectors as timber and associated products become an important domestic and global economy. On the other hand, metal product manufacturing is assumed to under-perform as industry moves away from emissions-heavy energy consumption.

The model results show the industrial sector requiring a mix of fuels including some fossil feedstocks. A number of sectors move away from fossil fuels altogether. However, hard to abate sectors like steelmaking do not yet have economic alternatives available in the model, and so remain on fossil fuels.

Industrial

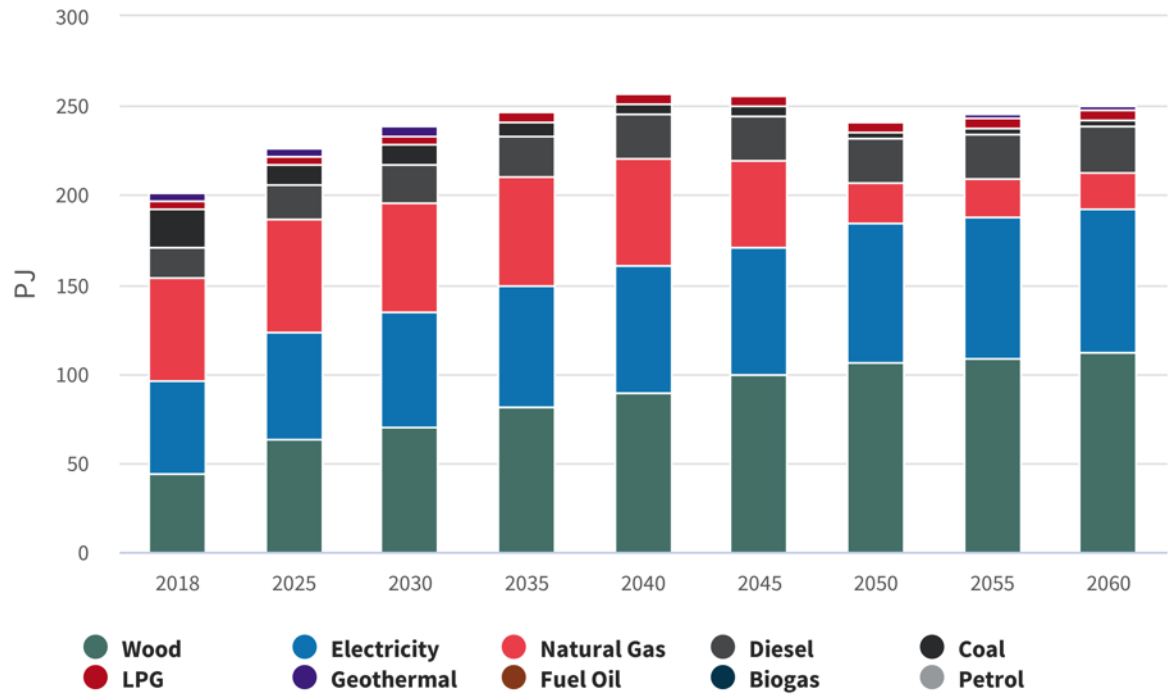
What fuels might industry use?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tūī

Industrial- What fuels might industry use?

Overall fuel consumption decreases in Kea until 2035, dropping from 202PJ to 165PJ as industry switches to more fuel-efficient options. Drop-in diesel is used from 2045 onwards as it becomes an economically viable option. In Tūī, higher natural gas and coal consumption continue as important feedstocks for industry.

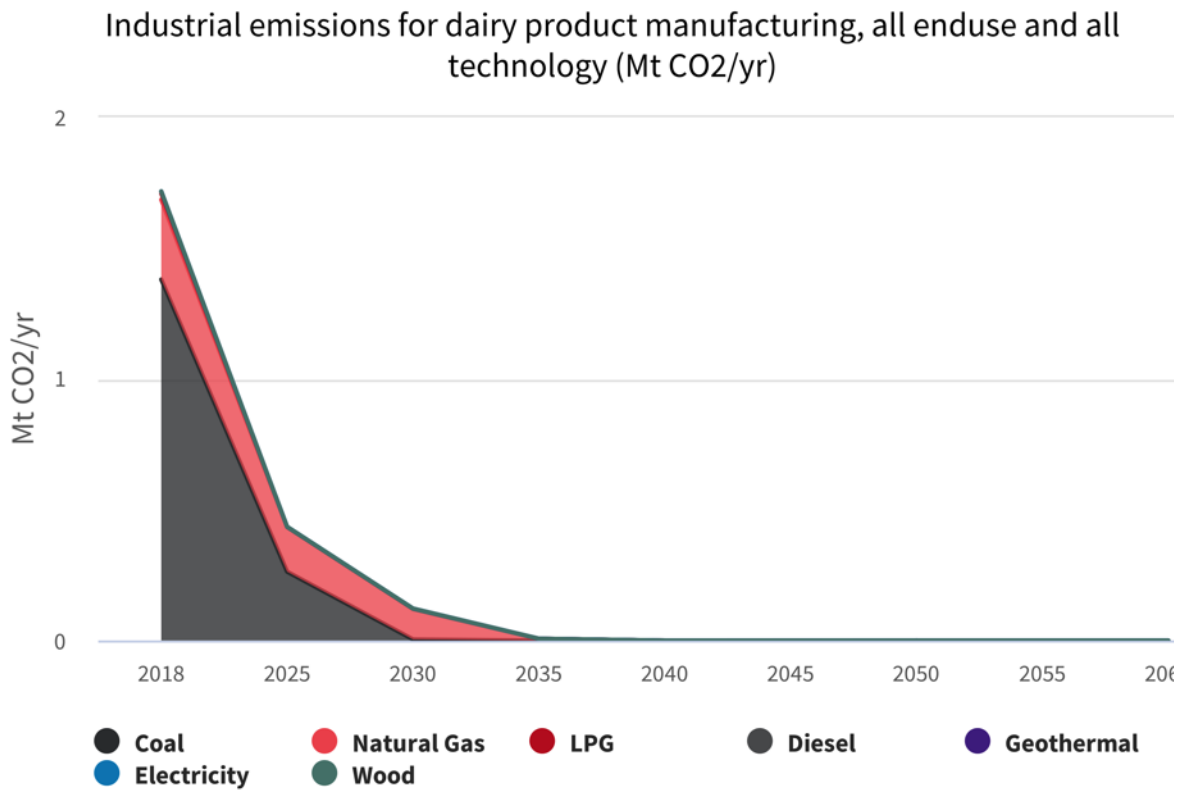
Natural gas consumption falls in both scenarios, from 57 PJ to 16 PJ (Kea) and 22 PJ (Tūī) by 2050. This is largely driven by the loss of methanol production in New Zealand in 2032 in Kea and 2047 in Tūī, due to increasing carbon prices and dwindling access to gas supply. Under Kea, the use of natural gas for methanol and dairy product manufacturing would end by 2035, while in Tūī gas use continues until 2045 for methanol production, and 2050 for dairy product manufacture. Gas would also be removed from refining under Kea but would continue in Tūī.

Coal consumption is reduced from providing 20 PJ currently down to 1.6-2.5 PJ in 2050. Coal is removed from dairy product manufacturing, other food processing and wood product manufacture by 2030 in Kea, and 2040 in Tūī.

Industrial

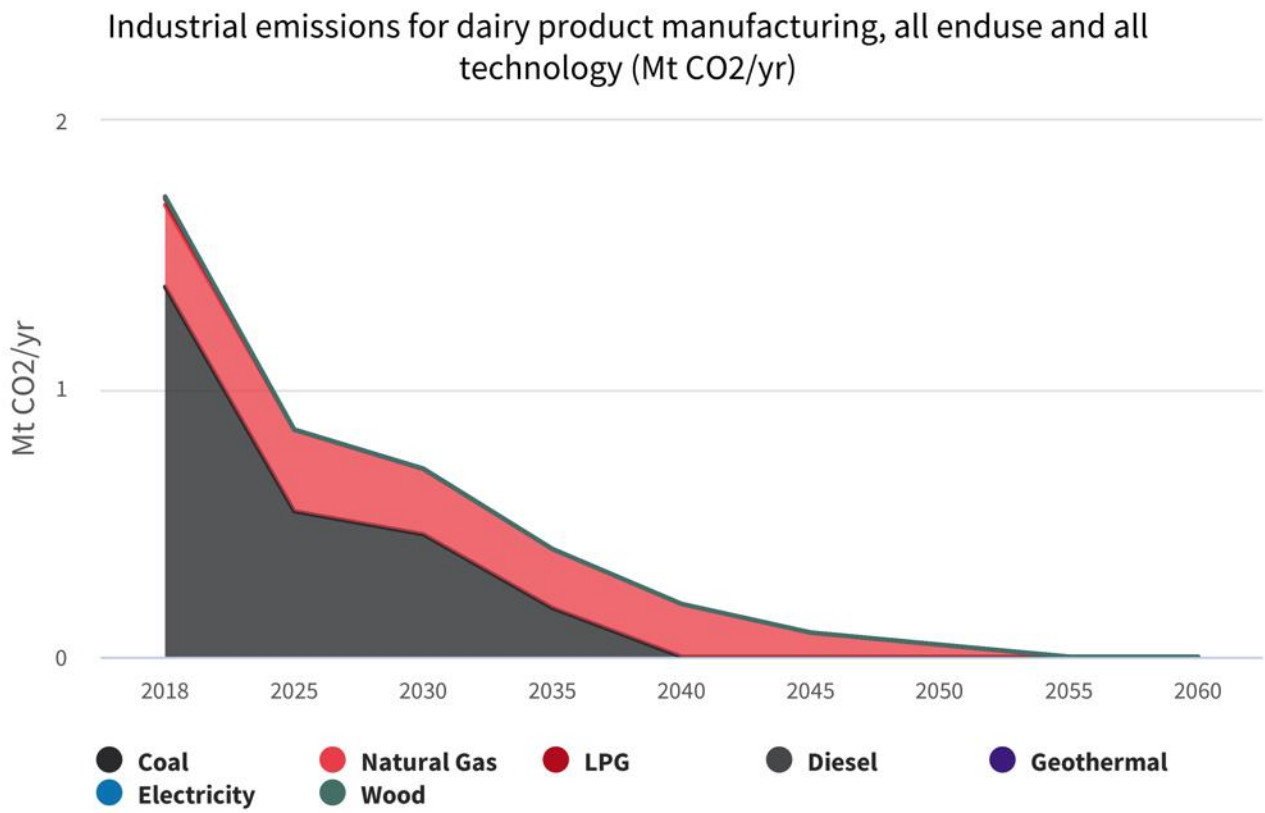
What sectors might fully decarbonise?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tūī

Industrial - What sectors might fully decarbonise?

Emissions reductions are largely due to the removal of coal and reduction of gas use by the sector.

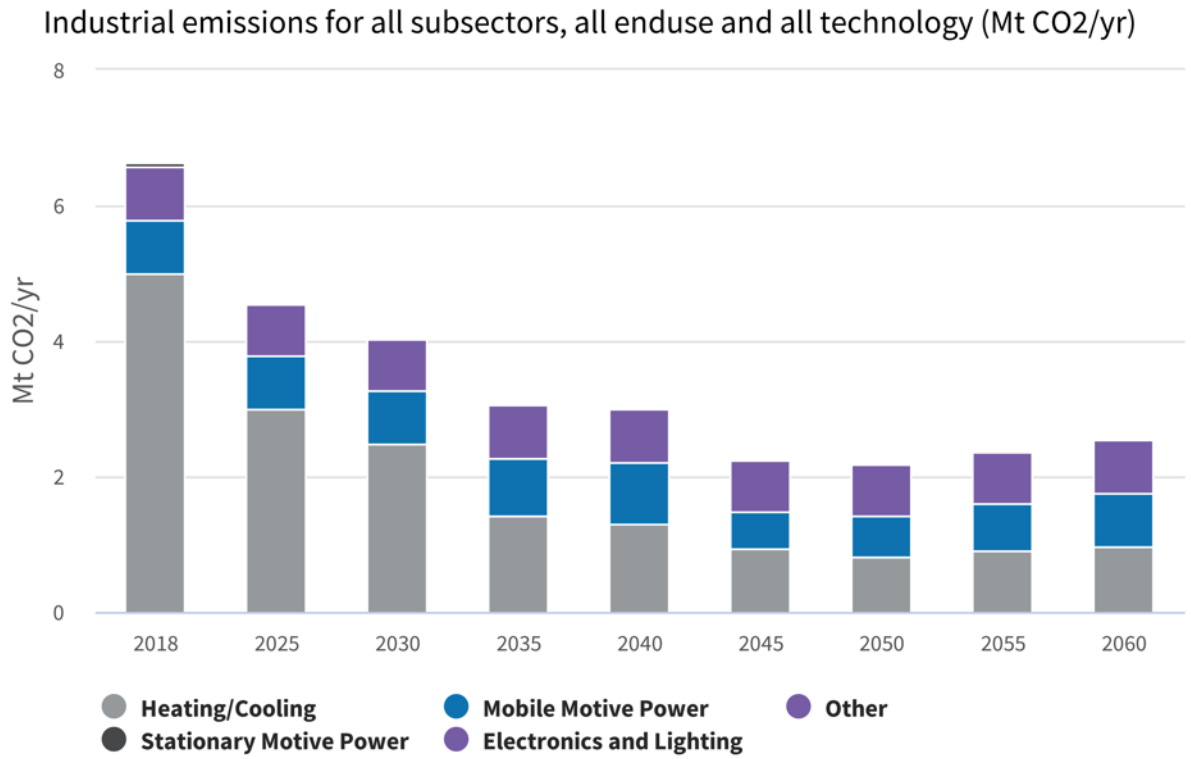
A gradual growth in construction and mining emissions is offset by significant emissions reductions associated with the manufacture of dairy products driven by a significant reduction in the use of coal.

As natural gas and coal are removed from dairy product manufacturing, emissions from this subsector drop from 1.7 Mt CO2-e today, to zero in 2035 in Kea, and zero in 2055 under in Tūī. However, emissions for some subsectors including construction, mining and wood product manufacturing are expected to rise. This is mainly due to a lack of low emissions technologies modelled in these sectors so far.

Industrial

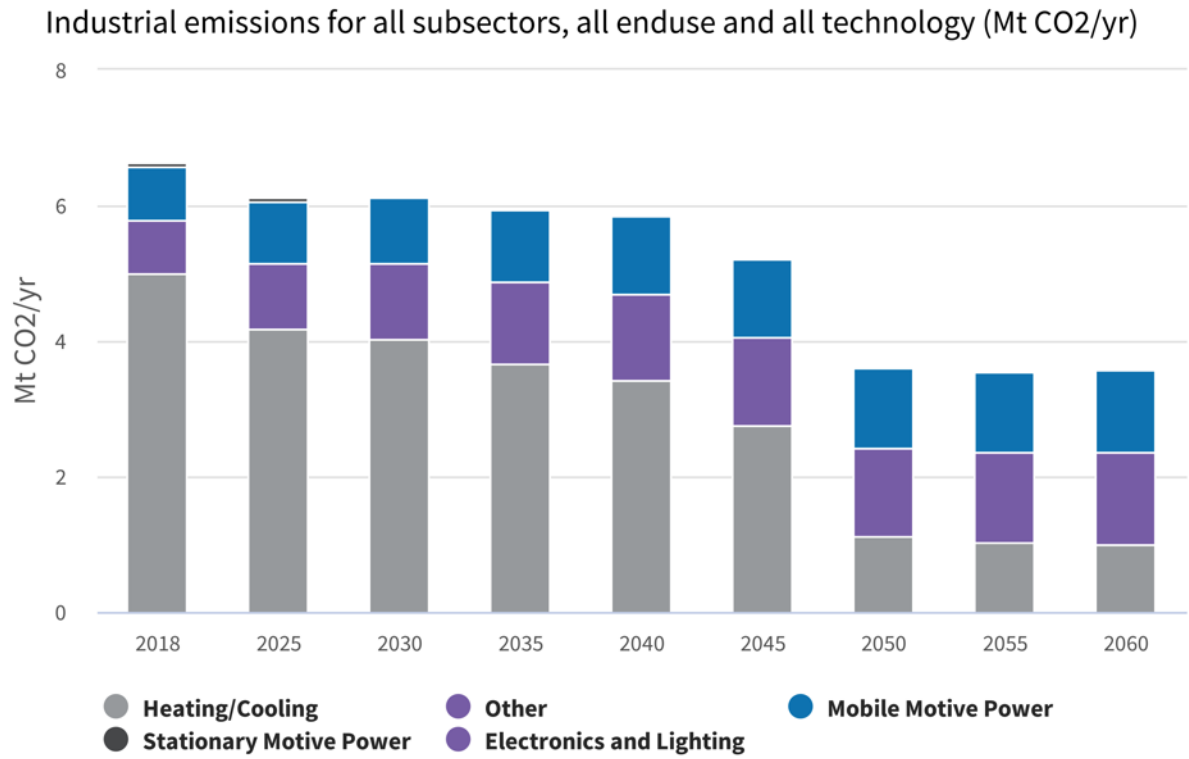
Which technologies decarbonise more readily?

Kea



TIMES-NZ 2.0, Scenario: Kea

Tūī



TIMES-NZ 2.0, Scenario: Tūī

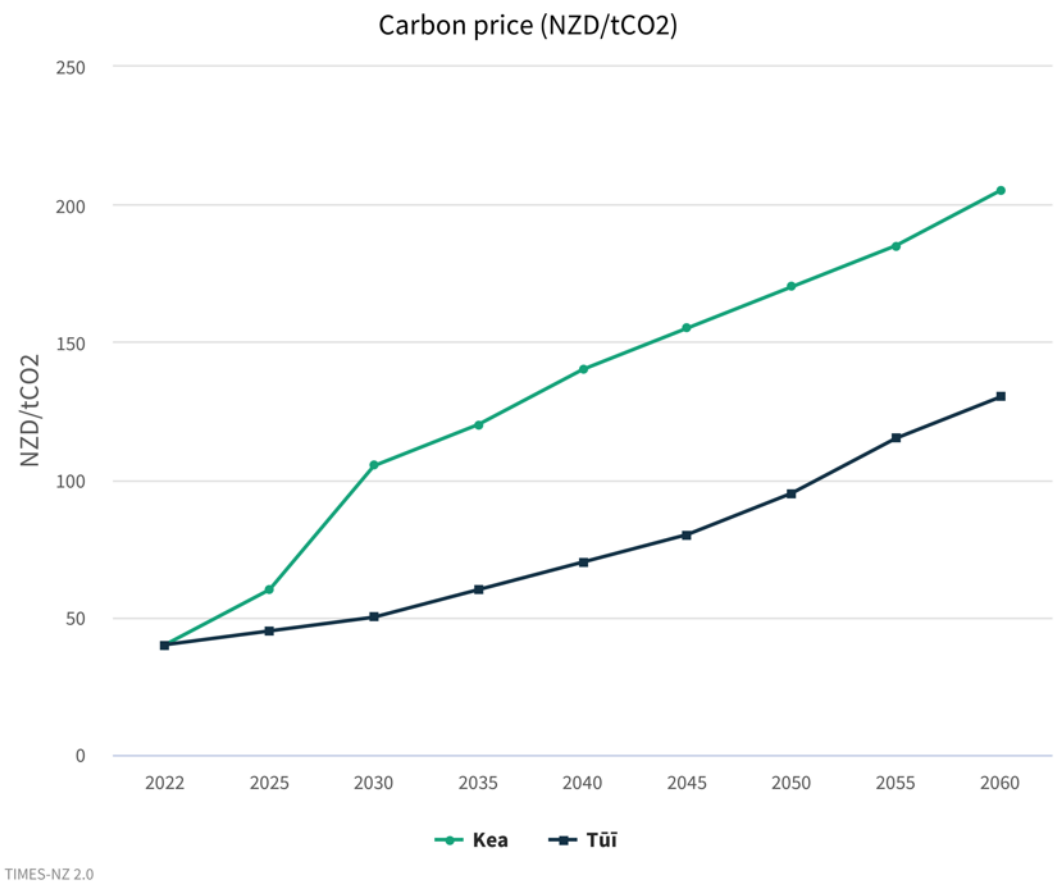
Industrial- Which technologies decarbonise more readily?

The largest reductions in industrial sector are from heating and cooling systems. In Kea, heating and cooling drops from producing 5 Mt CO2-e to 0.8 Mt CO2-e in 2050. Similarly, heating and cooling technology emissions drop to 1 Mt CO2-e in Tūī.

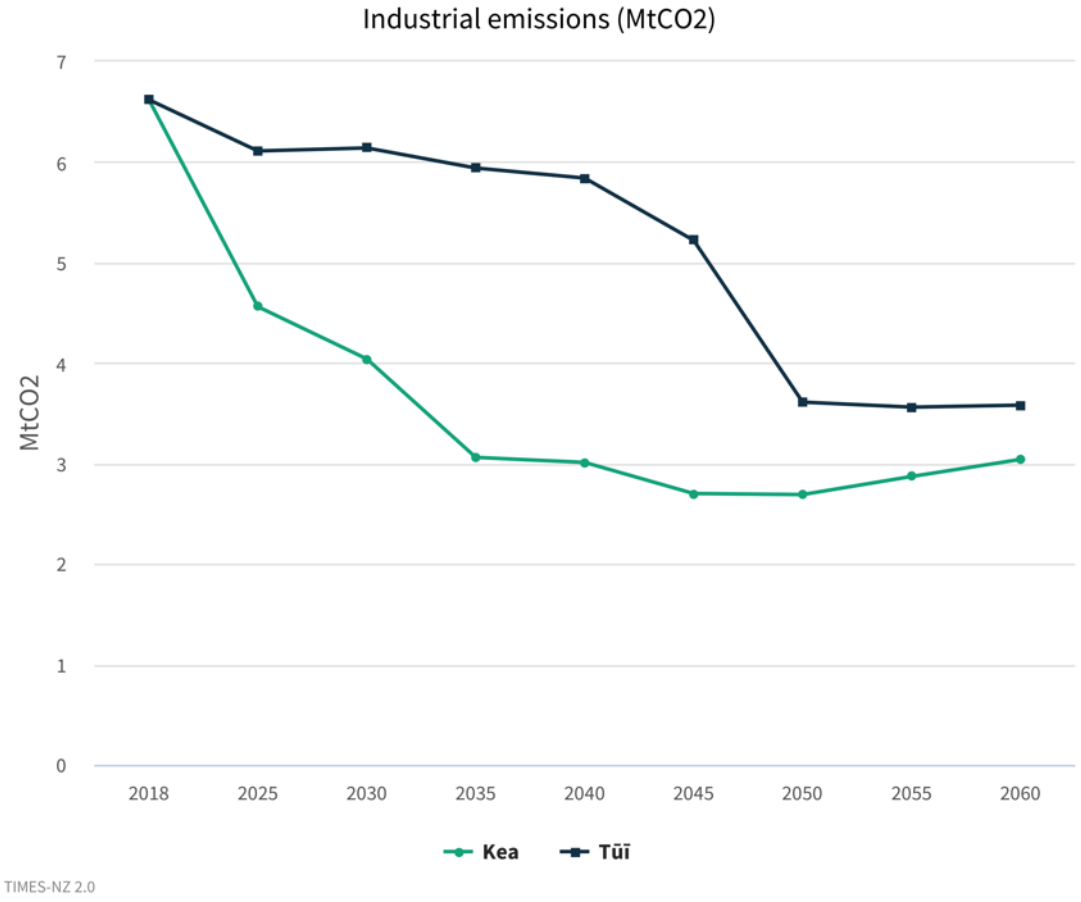
This is largely driven by reduced emissions from boilers as industry selects lower emission fuel sources.

Industrial

What are the trade-offs and choices?



TIMES-NZ 2.0



TIMES-NZ 2.0

Industrial - What are the trade-offs and choices?

In Kea, GDP growth slows, building again from 2050 onwards. The carbon price increases above the $100 mark by 2030 but industrial emissions reductions are achieved much earlier halving from 6 Mt CO2-e to 3 Mt CO2-e by 2035.

In Tūī, the carbon price remains lower for longer, not surpassing the $100 mark until after 2050. However, industrial emissions don't drop as far or as fast; between 2040 and 2050 emissions reduce from 5.8 Mt CO2-e to 3.6 Mt CO2-e.
GDP growth remains consistent until it is overtaken by Kea in 2050.

In the industrial sector a faster reduction of emissions is related to earlier closure of local industries, including methanol, aluminium, and refining.

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