BEC2060 ENERGY SCENARIOS

Navigating our flight path

Carbon pricing to reduce CO_2 EMISSIONS

New Zealand's total annual gross greenhouse gas emissions are about 80 million tonnes of carbon dioxide equivalent ($MtCO_2$-e). The agriculture and energy sectors (energy, including transport, accounts for ~34 Mt pa greenhouse gas emissions) are the largest contributors to New Zealand's gross emissions.

As part of the Paris Agreement to limit the global average temperature increase between 1.5° to 2° Celsius above pre-industrial levels, the plans are to decarbonise New Zealand's economy to achieve net zero carbon emissions by 2050. Energy will play a key role in achieving this commitment. Carbon pricing is a key plank in the government's response to climate change.

The BusinessNZ Energy Council has partnered with the public and private sectors to develop two plausible and coherent stories about New Zealand's energy future. The model gives us the opportunity to see the effect of different carbon prices. Carbon prices are a key input in this model.

Having modelled these stories, the results will help you to better understand the challenges and opportunities faced by New Zealand businesses and consumers as we grapple with important issues such as carbon pricing as a major driver to influence changing consumer behaviour.

Go to **www.bec2060.org.nz** to find out more.

WORLD ENERGY COUNCIL | BusinessNZ Energy Council

TWO PLAUSIBLE STORIES

Kea:

a future where climate change is recognised by society as the most important priority. New Zealand aggressively transforms itself into a low-emissions economy, faster than its global trading partners, competitors and peers.

Tūī:

a future where climate change is recognised as one of many competing priorities. New Zealand leverages off its traditional comparative advantage to generate wealth. A 'follower' approach is taken to climate policies and solutions made possible by the actions of trading partners and competitors.

The key differences between the two stories

High uptake of technology to reduce emissions		Businesses and consumer **follow global technology** trends to reduce emissions
Consumers and businesses **favour non-fossil fuel energy sources**		Consumers and businesses favour **energy sources based on market pricing**
Government encourages a fast transition to non-fossil fuel sources		**Government doesn't push** a switch from fossil fuels, relies on incremental market-led change
Domestic **carbon price is higher** than global carbon price		Domestic **carbon price is lower** than the global carbon price
Integrated, mixed-use **land development within urban areas**, supported by a shift to active mode		**Greenfields outside cities**, supported by autonomous cars to make the long commute more comfortable
High road pricing and environmental charges to support carbon pricing for transport		**Limited road pricing** of carbon, used to fund expansion of road infrastructure to ease congestion
Mass public transport increasingly a preferred method of travel in New Zealand cities		Passenger fleet **is dominated by private car ownership**
Reduction in New Zealand pastoral agriculture to plant- base production and forestry. Emphasis on high value products, **new manufacturing producing low emissions**		**New Zealand's economy thrives** in the near-term based on its primary sector comparitve advantage.

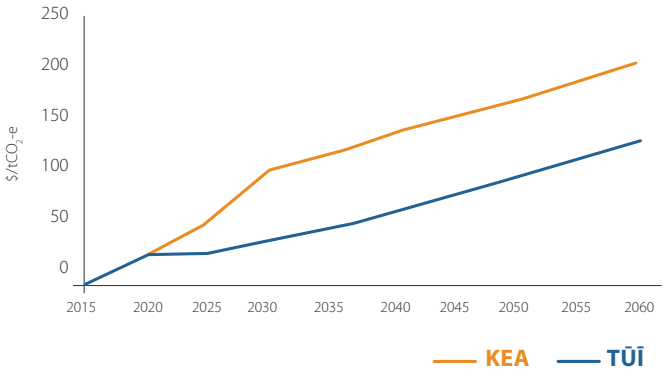
CARBON PRICING AND ENERGY SECTOR CO_2 EMISSION CURVES

Under **Kea**, the economy is mostly decarbonised by 2040. Under **Tūī** progress to decarbonise the economy is slower, with energy sector emissions 50% higher than in **Kea** by 2040.

The scenario narratives are driven by society's response to the climate change challenge. A key way the two responses are reflected in the modelling is through the carbon price.

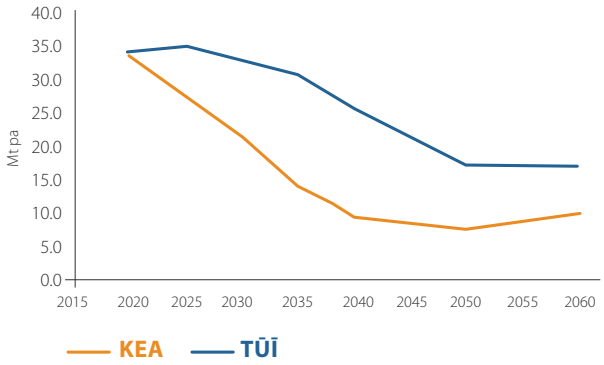
By 2030 the difference between the carbon price in **Kea** and **Tūī** is \$65/tCO_2-e with **Kea** at \$105/tCO_2-e and **Tūī** at \$40/tCO_2-e. That spread widens to \$100/tCO_2-e by 2060. The emissions outcome shown reflects the carbon price model inputs and all the behaviours refelcted in the narratives.

Carbon Prices

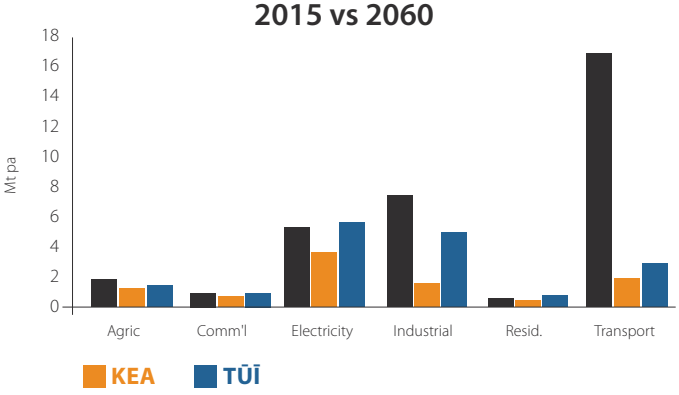


EMISSION REDUCTIONS BY SECTOR

Energy Sector CO_2 emissions



Emissions Reductions by Sector 2015 vs 2060



2020

34mt

The agriculture and energy sector account for about 34mt gross emissions.

2040

-24mt

Significant economic transformation. CO_2-e emissions **decline to around 10mt**.

-10mt

CO_2-e emissions **fall slowly to reach 24mt**.

2050

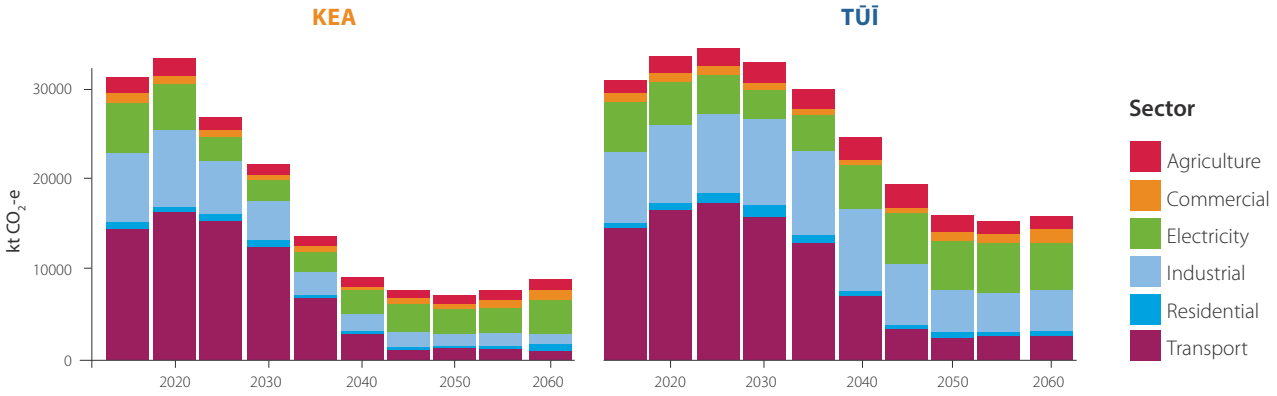
-26mt

In 2050, CO_2-e emissions **fall to 8mt** and then increase slightly before leveling off at 10mt in 2060

-17mt

CO_2-e emissions **bottom out at around 17mt.**

Emissions by Sector



A \$90/tCO_2-e difference between the two carbon price paths after 2030 (in combination with accompanying policy settings) delivers a significantly different emissions profile between the two scenarios – **Kea** and **Tūī**. In transport, the introduction of electric vehicles significantly reduces emissions for both scenarios in the long term. **Kea's** focus and prioritisation on removing emissions from New Zealand's economy can be driven from 34mt pa in 2020 to 10mt pa by 2040. However, some "sticky emissions" remain from natural gas usage in the food product and other manufacturing sectors as well as geothermal use in the electricity sector and make a full decarbonisation of the energy sector difficult. In **Tūī**, New Zealand takes more of a follower approach to addressing its CO_2-e emissions profile, CO_2-e emissions fall from 34mt pa in 2020 to 16mt pa by 2050.

KEY INSIGHTS

The model shows that pricing alone will not drive out emissions.

In both scenarios some stubborn emissions remain including from aviation (domestic and international), rail, shipping, geothermal in electricity, diesel in agriculture and industrial sectors.

In **Kea** the aggressive transition to a low emission economy comes with some costs including, potentially, low economic growth through to 2040, failure of some businesses, higher unemployment and impacts on lower income households. The payoff for this strategy is a transformed economy and restoration of economic growth in the later part of the modelled period albeit with the lowest emission profile sustainable.

Under **Tūī**, the path for economic growth in the follower scenario remains robust through to 2040 but New Zealand faces costs and harder trading conditions subsequently when the imperative to transform to a lower emissions-based economy comes into play.

Further emission reductions in either scenario are possible through compact urban development integrated with transport in New Zealand cities, which increase the use of public transport, walking and cycling, and rely less on private car travel.

Project Investors

bp, contact, EECA Te Tari Tiaki Pūngao Energy Efficiency & Conservation Authority, Firstgas, Fonterra, genesis, Mercury, Ministry of Transport Te Manatū Waka, Ministry of Business, Innovation & Employment Hīkina Whakatutuki, Ministry for the Environment Manatū Mō Te Taiao, New Zealand Steel, PEPANZ Petroleum Exploration & Production Association of New Zealand, POWERCO, Refining NZ Your Energy Hive, Todd Energy, Toyota, Transpower, vector, Z Energy

Project Partners

sapere research group, Deloitte., Paul Scherrer Institut PSI, ARUP, The University of Auckland Te Whare Wānanga o Tāmaki Makaurau New Zealand