BEC2060 ENERGY SCENARIOS

Navigating our flight path

POWERING New Zealand to a more sustainable future

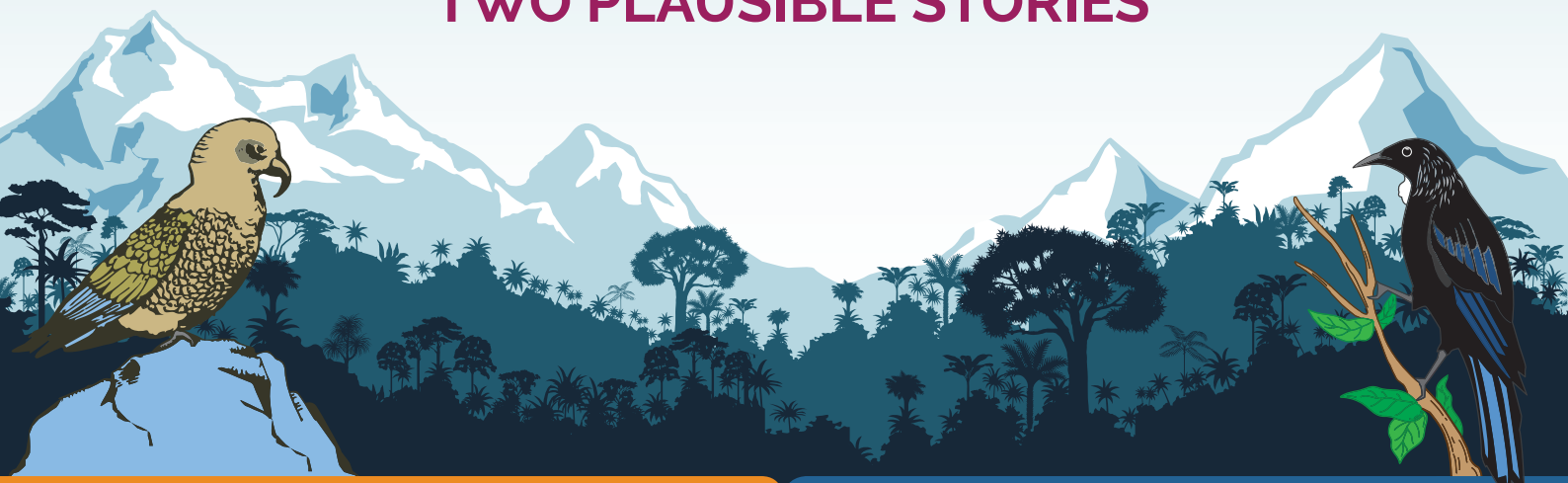
The government aims to transition New Zealand's economy to net zero carbon by 2050. Today's energy sector (incl. transport) accounts for over 40% of New Zealand's greenhouse gases, mainly in the form of CO_2. 85% of New Zealand's electricity is supplied from renewable energy sources, the 3rd highest renewable electricity share in the OECD countries. This positions us well for a low emissions future. A vibrant electricity market is opening opportunities for consumers across the electricity sector. But what role might electricity play in New Zealand's energy outlook?

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. A scenario approach has been used to explore the dynamics of the sector, and the country, to meet the decarbonisation goal. The results will help you to better understand the challenges and opportunities faced by the energy sector as they grapple with important issues such as emerging technologies, the role of electrification in enabling decarbonisation, changing consumer preferences, and the shift from fossil fuels as we transition our economy.

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.

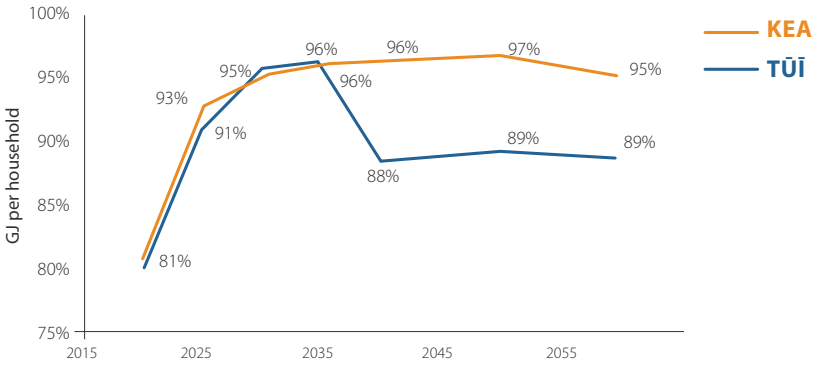
The key differences between the two stories

In response to climate change, New Zealand commences a **fast transition** away from a goods producing economy to one dominated by low energy demand and low intensity production.		New Zealand climate policy adopts a '**wait and see**' mode to stay in sync with global developments. The economy continues to grow, relying on market incentives.
Fast transition is underpinned by a **high carbon price**, subsidies for a **'just transition'**, and high R&D investment in new energy technologies.		An **incremental approach**, economic growth relies on **market-based signals**.
District plans promote a **compact city approach**, supported by more public transport, cycling and walking.		Urban development practices continue resulting in **more greenfield residential development** located further from jobs.
Lower rate of population and GDP growth, but with risks as the economy restructures.		**Faster annual population and GDP growth**, using New Zealand's traditional competitive advantage in primary sectors, but trade risks emerge.
Businesses and communities **aggressively trial and invest in energy efficiency** and alternative fuels to play their part in reducing emissions.		Businesses and consumers only **adopt energy and carbon-efficient tecnologies when they become price competitive.**

EXPLORING TOMORROWS ENERGY SYSTEM

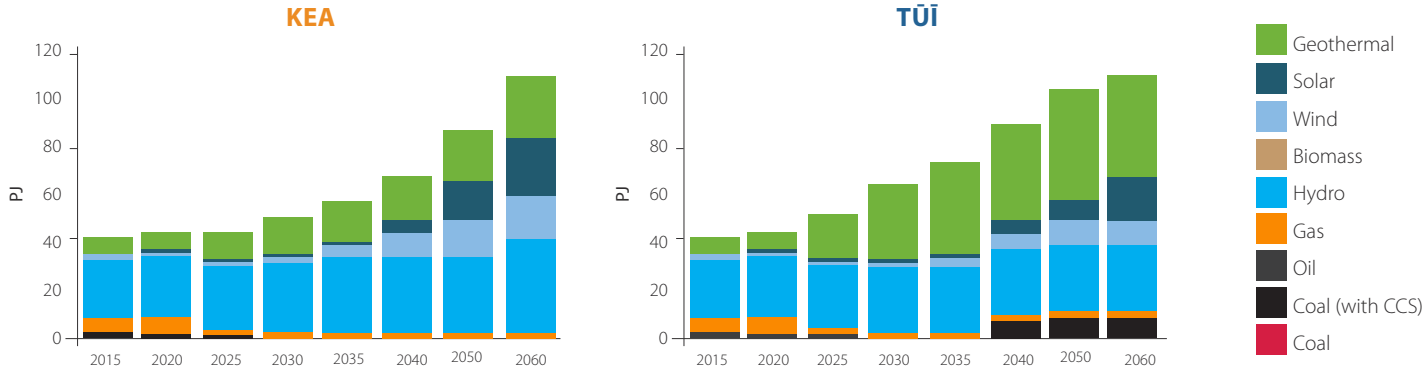
The shutdown of Huntly (coal) drives renewables to 95% by 2030 in both scenarios. Only **Kea** increases further to 97% in 2050, relying on over building of geothermal to provide seasonal flexibility. However, after the peak in 2050, the renewable proportion in **Kea** declines slightly back to 95% as a small coal and carbon capture storage (CCS) plant is used to meet growth. In **Tūī**, the renewable portion of electricity drops from a high of 96% in 2035 back to 88% in 2040 as a combination of gas, and coal with CCS is used to meet the increase in security of supply requirements. This balance between renewable and non-renewable is maintained through to 2060.

Renewables Proportion in Electricity

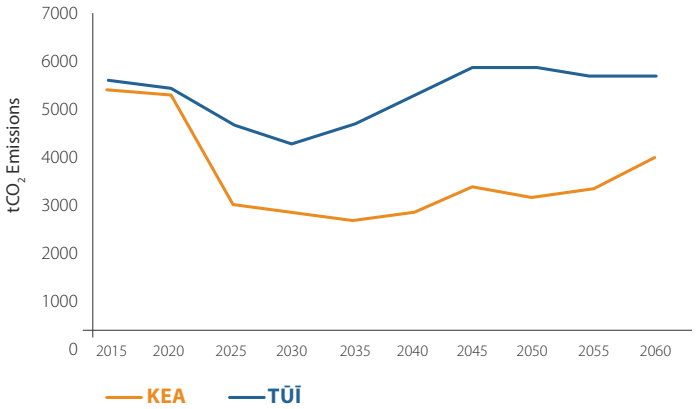


Under **Kea**, wind and geothermal become increasingly present. After 2035, solar begins to have a substantial presence, driving a need for more system flexibility. In **Tūī**, the system prefers a stronger reliance on geothermal and coal with CCS over wind and solar. Gas and coal with CCS rather than renewables overbuild, are chosen to provide security of supply.

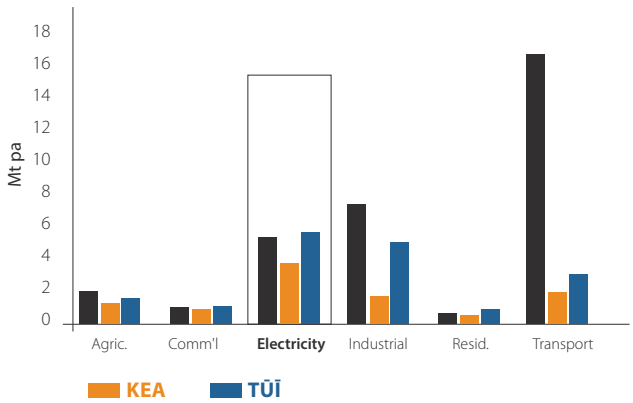
Electricity Generation by Fuel Type



Electricity Sector CO_2 Emissions 2015 - 2060

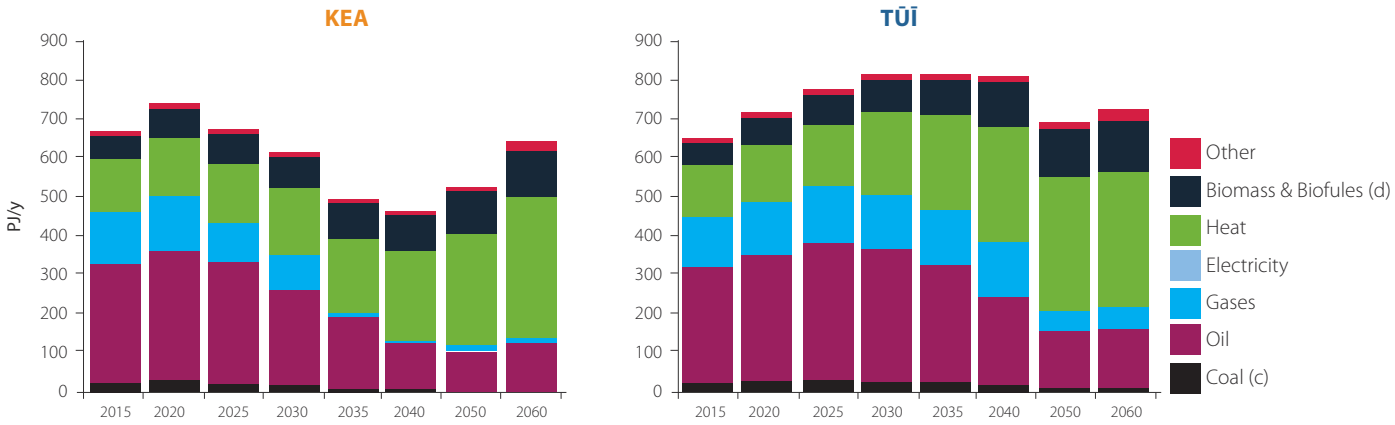


Emissions reduction by sector 2015 vs 2060 Kea and Tūī



Kea sees a significant reduction in emissions in the electricity sector due to higher renewable penetration and the closure of thermal power stations in response to the prospect of tighter climate policy and higher carbon prices. **Tūī** is slower to transition away from fossil fuels as some gas-fired power stations remain in the mix as they see more moderate future carbon prices. Rising demand for electricity and maintaining security of supply requires increasing use of CCS later in the time-period for both scenarios.

Energy Consumption by Fuel Type



In both scenarios, electricity as a renewable proportion of energy rises, illustrating the increasing importance of electricity in the decarbonisation of the economy. The main driver in the shift is the switch to electricity for transport and industrial process heating. Electricity is critical for the economic transformation.

Kea electrifies transport and maintains a growing and largely decarbonised electricity system. Under Kea, there will be more than **3m EVs** on the road in 2040. In **Tūī** there will be **2.3m EVs** on the road and a significant portion of hybrid petrol cars.

KEY INSIGHTS

The biggest opportunity to decarbonise is to leverage New Zealand's world-leading renewable electricity resources and convert much of the transport fleet and industrial heat to electricity.

The degree to which New Zealand can maintain a growing and largely decarbonised electricity system (and electrify transport) is crucial for progressing towards a net-zero carbon future

Maintaining security of supply for electricity will be amplified by the effects of climate change, as more of the supply is weather dependent. We must invest in the resilience of our electricity system to ensure the wider economic reach of electricity is not compromised by the very problem it is trying to fix.

Fugitive emissions from geothermal stick and make a full decarbonisation of the energy sector difficult. It raises the question as to whether future geothermal developments will be more or less carbon-intensive than today.

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