BEC2060 ENERGY SCENARIOS

Navigating our flight path

RESOURCING New Zealand

New Zealand has an abundance of natural resources and we depend upon access to affordable, reliable and sustainable energy to maintain our prosperity. While dependent on it, we increasingly live in a world where energy systems are changing fast and being shaped by many factors and diverse actors. New Zealand is ranked in the world's top five developed countries for electricity produced from high levels of renewable sources. About 40% of New Zealand's total primary energy supply comes from renewable energy sources. However, heat and transport fuels remain largely fossil fuel-based resulting in 60% of primary energy supply coming from hydrocarbon fuels. The Government aims for a net-zero carbon economy by 2050. What might be the role of hydrocarbon-based fuel tomorrow?

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. Having modelled these stories, the results will help you to better understand the challenges and opportunities faced by the energy sector as we grapple with important issues such as emerging technologies, changing consumer preferences, and the shift from fossil fuels as we seek to decarbonise New Zealand's 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 of production**.

Less investment in exploration, lower reserves, less investment in infrastructure, and rising oil and gas production costs leads to significantly higher gas prices.

Process heat moves completely away from using coal with gas serving as a transitional fuel. Gas-fired power generation declines but continues to support grid reliability until investment decisions in solar, geothermal and bioenergy by generators, industrial companies, commercial businesses and small consumers can enable demand to be met in all conditions.

Businesses and communities **aggressively trial and invest in energy efficiency** and alternative fuels to play their part in reducing emissions.

New Zealand adopts a 'wait and see' mode. The **economy continues to grow**, relying on market incentives.

Energy resources are managed carefully, with effective governance and in a way that preserves the energy market.

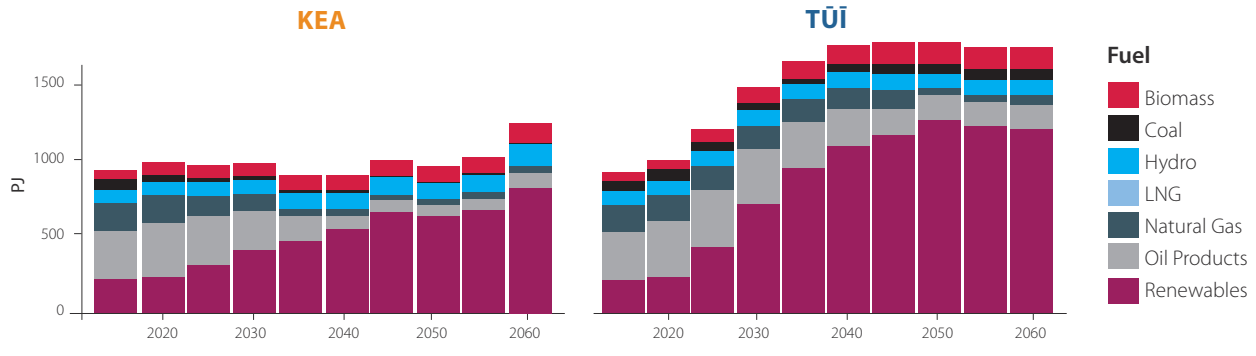
Production from fossil-fuelled heat and power generation systems (such as natural gas peaking power plants, coal-fired generation and coal-driven process heat) continues to be considered on its merits. Society doesn't value renewable energy just to reduce carbon emissions, instead prefers to support least-cost electricity and process heat production options.

Businesses and consumers **only adopt energy and carbon-efficient technologies when they become price competitive**.

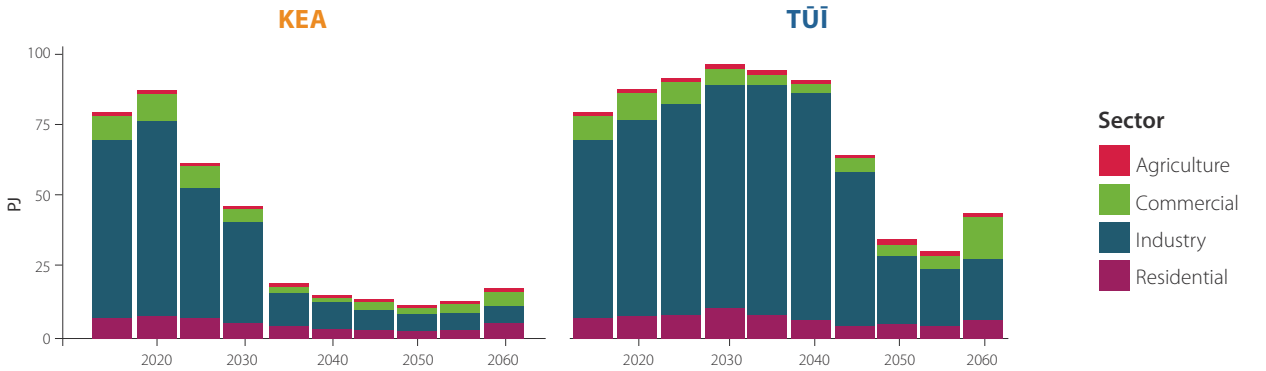
WHAT MIGHT BE THE ROLE OF HYDROCARBON-BASED FUEL TOMORROW?

Today, New Zealand's industry is heavily reliant on hydrocarbon-based fuel inputs. Over 50% of the country's total primary energy requirements are being met by oil and gas and 7% by coal.

Primary Energy Consumption by Fuel Type



Natural Gas use by Sectors



Under **Kea**, industrial used natural gas drops 50% by 2030, and 80% by 2035%. The reliance of natural gas within industries reduces from 30% to 9% by 2035 as it electrifies.

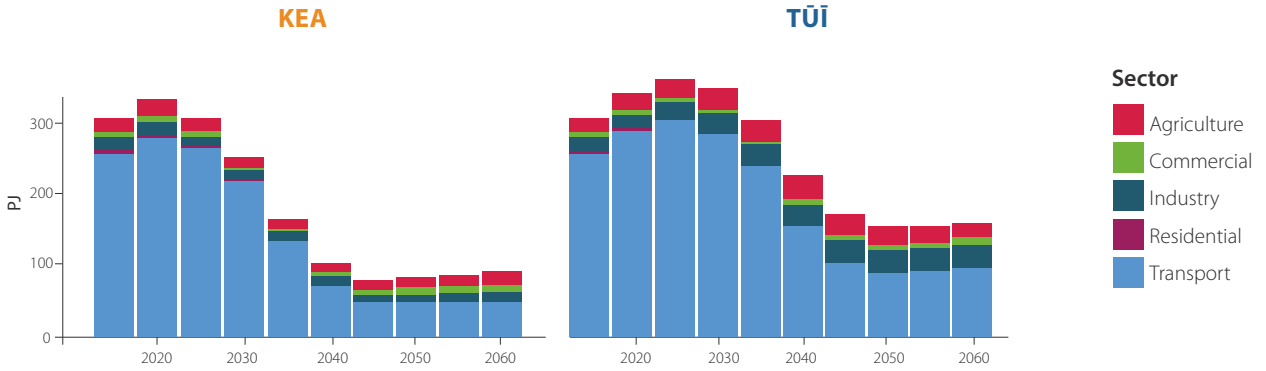
In **Tūī**, industry relies on natural gas for longer. After 2040, natural gas consumption in industry has dropped 70% by 2050.

Under **Kea**, due to the electrification of the transport sector, the use of oil in transport falls radically after 2030, reducing by 75% in 2040.

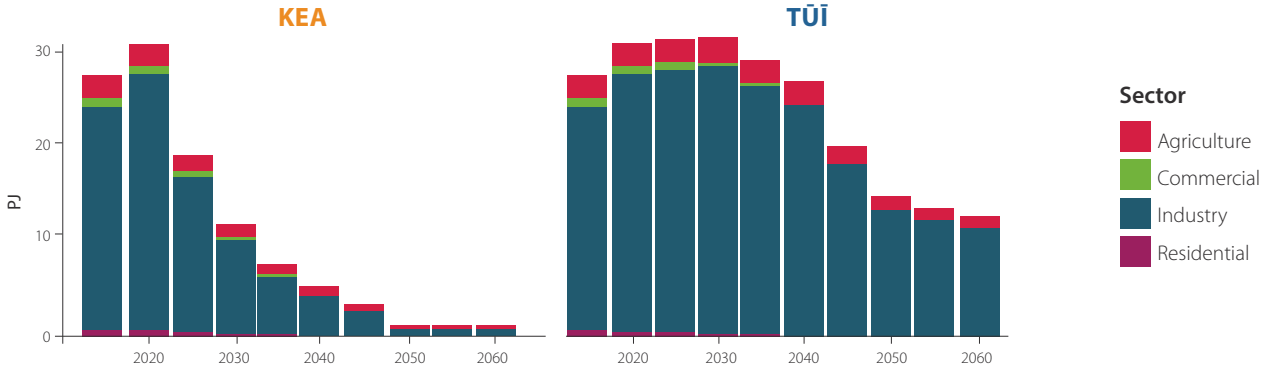
In **Tūī**, the transformation takes longer. However, transport oil consumption drops 65% by 2050.

In both scenarios, the amount of fossil fuel used in transport declines significantly. From 2045 onwards, aviation is the largest share of transport fuel consumption and contributor of carbon emissions with around 40% being domestic and international jet fuel.

Oil use by Sectors



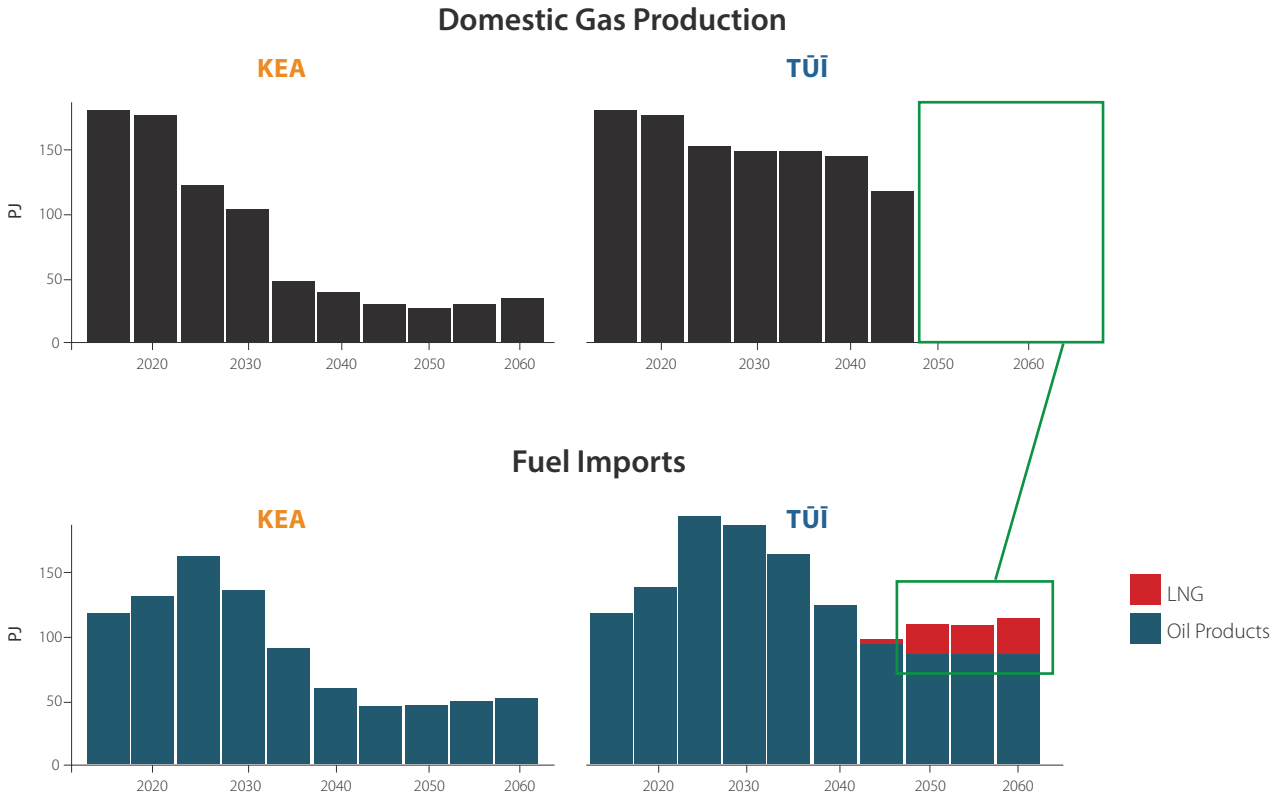
Coal use by Sectors



In **Kea**, the use of coal declines by almost 60% across all sectors, over the next 10 years. Coal consumption drops to almost zero by 2050. Coal is eliminated from the industrial sector, with some manufacturing and dairy processing plants retaining coal boilers for heat applications.

In **Kea**, New Zealand's domestic gas production will decline by almost 80% down to 40PJ by 2040. This is due to a high carbon price and lower demand driven by lower alternative technology costs. Imports of oil products sink around 20% by 2040.

In **Tūī**, production ceases in 2045 as a result of the economics of exploration and to some extent the carbon price. However, sufficient residential gas demand remains, and New Zealand starts importing liquefied natural gas (LNG).



KEY INSIGHTS

Decarbonisation is a priority in **Kea** and not in **Tūī** but in both cases the biggest opportunity to decarbonise is to leverage New Zealand's renewable electricity resources and convert as much of the transport fleet and industrial heat to electricity as possible.

Gas continues to play a role in providing security of supply, but natural gas is supplemented by LNG in **Tūī**.

The increasing role of the carbon price in decision making is one example in an energy industry that is becoming more and more interconnected. There will be a period where both electricity and fossil fuels will compete for the transport consumer's dollar.

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

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