



# New Zealand Energy Scenarios

Navigating energy futures to 2050



Project Partners

# BEC2050 – Facing future challenges

New Zealand and the rest of the world are facing rapidly changing energy needs and an uncertain future. There are energy related headlines hitting the media every day. We need to think about navigating towards our desired future by taking the helm and making smart choices today.

So as we find ourselves in turbulent waters, how do we best chart a course towards 2050? What could the future hold for New Zealand?

As a country, we are in an enviable position with an abundance of natural resources, ease of doing business, high standard of living and a strong export sector.

The challenge we face is how to leverage these opportunities to allow businesses to thrive and the economy to grow in an environmentally responsible way. The energy sector is critical in meeting this challenge.

The challenge is amplified as we face increasing complexity and unprecedented uncertainty in the global energy sector.

In a world where new technologies foster quicker innovation and require changes in policy and investment decisions, the task of business and policy makers predicting what might happen in the future becomes harder.

There is a need for useful information that will help businesses and policy makers make informed decisions about the trade-offs around the Energy Trilemma of energy security, energy equity (access and affordability) and environmental sustainability.

The faster pace of change is fed by consumers' rapidly increasing propensity to absorb new technologies and willingness to change the relationship they have with the way energy is produced and consumed. In such an uncertain environment, our ability to predict the future beyond the next few years is seriously challenged.

Traditional forecasting or normative approaches begin to lose relevance, due to widening uncertainty as we extrapolate into the future.

The BusinessNZ Energy Council (BEC) has developed a report containing two different future energy scenarios for New Zealand – Kayak and Waka – which look forward towards 2050. This document provides a brief, stand-alone snapshot, while the full report goes into more detail.

## The WEC Approach to Scenario Development

The World Energy Council (WEC) is the principal impartial network of energy leaders and practitioners promoting an affordable, stable and environmentally sustainable energy system for all. As a UN-accredited global energy body, it represents the entire energy spectrum with more than 3,000 member organisations in nearly 100 countries.

The WEC works closely with its member committees such as the BEC, to develop and share insights from its network, bringing its global reach and tradition of independence and neutrality.

The WEC's approach to scenario development took an explorative (what might be), rather than a normative (what ought to be) approach, widening the options considered viable for the future and integrating critical uncertainties.

The WEC's scenarios are not a roadmap but credible assessments of what might happen, rather than what the WEC would like to happen in an ideal world.

The BEC report is based on the WEC's internationally respected framework. Our Kayak and Waka scenarios utilise the WEC's approach and build on the WEC's Jazz and Symphony scenarios, but reflect New Zealand's unique circumstances.





# The KAYAK Scenario

“Kayak” symbolises characteristics that are individualistic, dynamic, volatile, autonomous, independent, unconstrained, flexible and fast-moving. In this scenario New Zealanders kayak alone, we deal with situations we have in front of us, we want to go forward efficiently and quickly, but need to go with the flow.

At the heart of this scenario – markets more than government intervention, drive supply chain decisions and innovation, with business and consumers making informed decisions in their own interests based on price and quality (including environmental quality).

Consumers and suppliers determine outcomes through market forces, while government focuses on establishing strong competitive frameworks relying on the pursuit of least cost energy supply.

A global deal on climate change is agreed but international commitments on reducing emissions are weak.

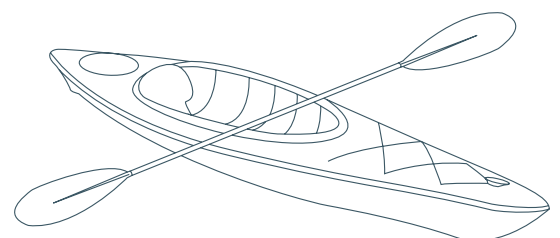
Free trade and higher global economic growth drive export expansion in primary sectors, services and high-tech manufacturing. Environment and natural resources remain critical to social and economic development. New Zealand leverages off its “clean and green” image and economic opportunities result in a vibrant domestic economy and higher net immigration, mainly urban. But higher density cities, pressure on water resources and weather risks increasingly give rise to capacity and resource constraints.

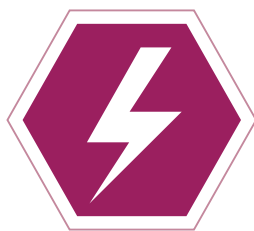
Energy sources compete on price, quality and supply. There is no support for low-carbon technologies apart from a modest carbon price.

In a Kayak future, New Zealand enjoys cheaper energy and better energy equity. This reflects relatively low carbon prices and a reliance on markets which drive energy supply towards least-cost solutions.

Markets and technology improvements deliver more affordable energy over time.

Economic growth is effectively borrowed from younger generations as a failure to mitigate carbon emissions will mean they face higher costs and economic volatility post 2050 as we focus on adaptation.





## Renewables in energy

### Kayak Trilemma performance

Environmental sustainability



Energy Security

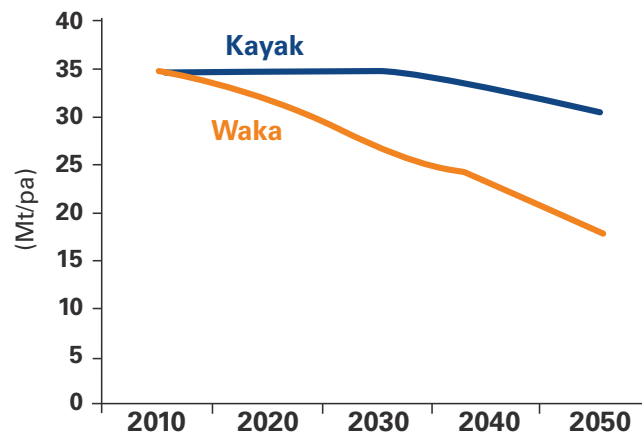


Energy equity

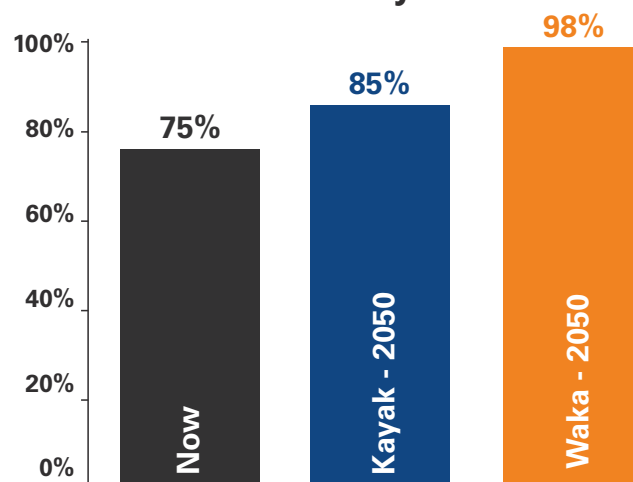


New Zealand has an enviable position regarding renewables, especially in the electricity sector. This makes further significant reductions in energy sector emissions challenging, even with a high carbon price.

### Carbon Emissions



### Electricity



\*2013 data

Energy Intensity  
(change per annum)

-1.7%

Carbon Intensity  
(kg CO<sub>2</sub> per dollar GDP)

0.18

Carbon Intensity  
(kg CO<sub>2</sub> per dollar GDP)

0.07

Energy Intensity  
(change per annum)

-1.7%

Energy Self  
sufficiency

94%

Investment Spend  
on Electricity  
Generation

\$15.4b

NOW

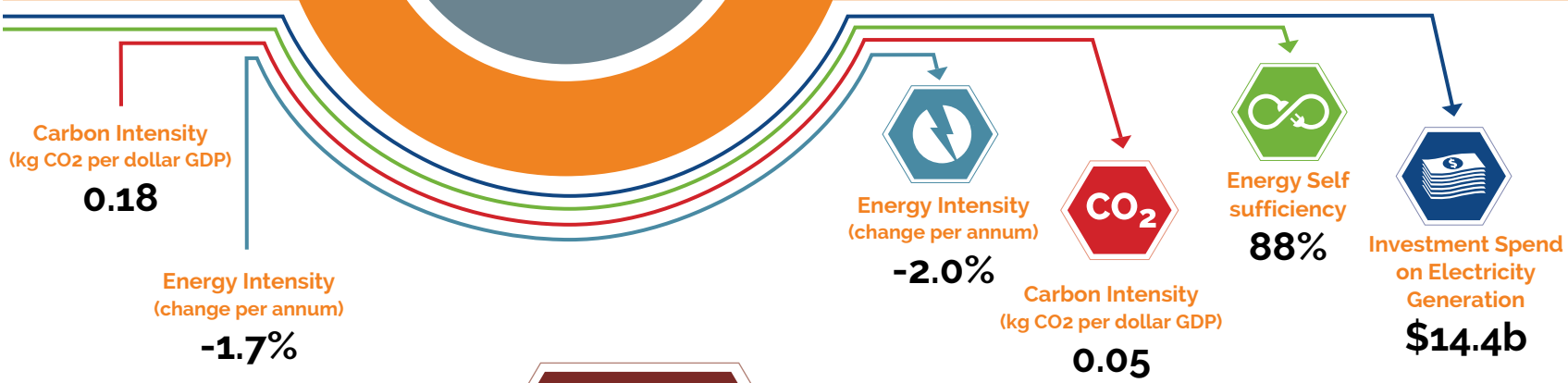
The energy sector is highly interconnected - the ability of the transport sector to

KAYAK

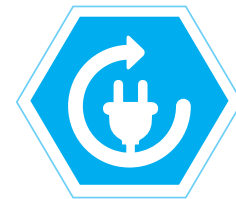
2050

de-carbonise will depend on the interplay of oil, electricity, carbon prices and better cost.

# WAKA

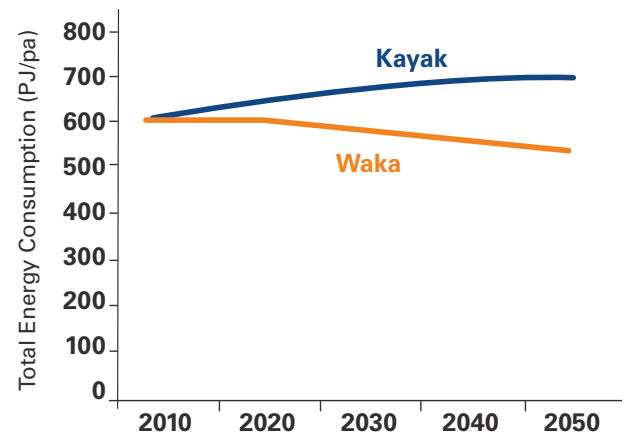


Transformative change is possible. However, there is no single underlying driver of a transformational uptake of new technologies.



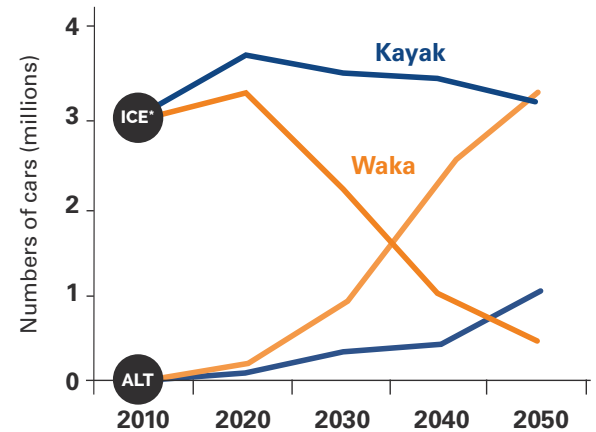
## Waka Trilemma performance

## Total energy consumption



## Transport

Alternative Light Vehicles



\*Internal Combustion Engine

Environmental sustainability



Energy Security



Energy equity



# The WAKA Scenario

“Waka” symbolises characteristics that are for the collective greater good, interdependence, integration, co-ordination, stewardship, custodianship, harmony. We’re on a long-term Waka journey, with a goal in mind. In this scenario we work together as a team, using the great natural resources we have in New Zealand.

At the heart of this scenario – due to heightened environmental awareness, business and consumers rely more on government to make decisions in the national interest, particularly to meet the country’s environmental commitments.

A comprehensive global deal on climate change is agreed based on strong emissions reduction commitments.

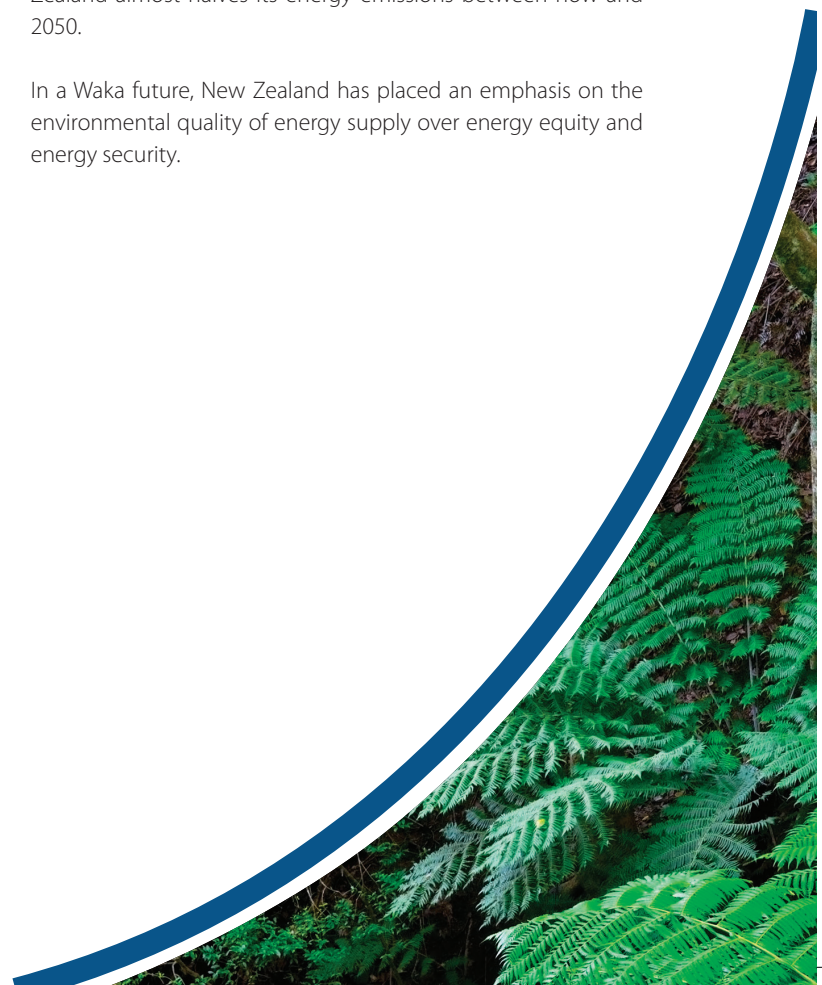
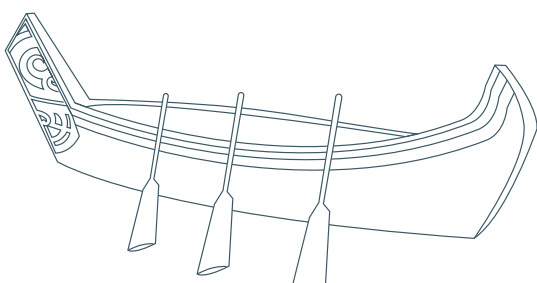
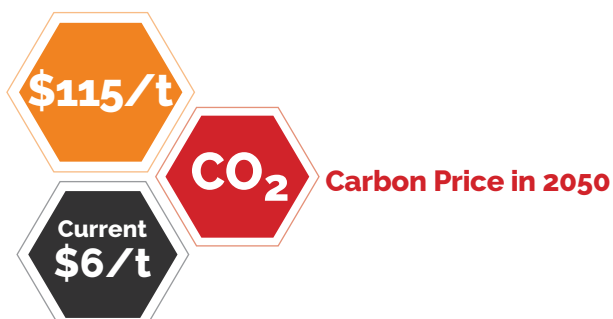
There are lower overall global rates of economic growth and governments around the world adopt more nationalistic policy positions .

New Zealand’s exports are less attractive due to lower levels of wealth in our key export markets. The tyranny of distance, where high carbon prices add to freight costs for our exports places pressure on our energy intensive industrial sector. Trade is focused on our trading partners with the lowest barriers.

New Zealand’s “clean green” image still draws immigrants but increasingly other countries catch up, offering more sustainable forms of living in a high carbon price world.

Development and adoption of technology within global energy markets is supported by government initiatives. Technology change is greatest in transport through the use of alternative vehicles, public transport and ride and car sharing. The electricity sector approaches near 100% renewable. As a result, New Zealand almost halves its energy emissions between now and 2050.

In a Waka future, New Zealand has placed an emphasis on the environmental quality of energy supply over energy equity and energy security.



# What the scenarios mean for New Zealanders

New Zealand's future will be driven by many things which are at present uncertain. How we respond to the most critical of these will define our future.

## Behind the scenarios

In developing its scenarios, the BEC sought to base its understanding of the future on the core drivers of New Zealand's future. This includes developing a range of "critical uncertainties" that are relevant to New Zealand.

In conjunction with a wide cross-section of individuals and organisations with an interest in the energy sector, the BEC narrowed down its list of critical uncertainties to 19. The critical uncertainties varied from external forces – such as global stability – to the domestic economy – such as population growth – to energy specific critical uncertainties – such as international fuel markets – to others such as urban sustainability, energy affordability, and the allocation of natural resources especially water. Some of these are factors we have some control over, but at this point it is not clear what path we will choose.

The Kayak and Waka scenarios represent two plausible combinations of these 19 critical uncertainties. Developed over the course of the year, the active involvement of the project participants and the use of a robust and internationally recognised modelling approach ensured rigorous testing of the work and a highly credible set of results. We recognise that our scenarios are by no means the only plausible views of our future but they set out two very distinct futures, each of which tells a coherent story about how things might unfold.

## Using the scenarios

The Kayak and Waka scenarios will enable business, consumers and policymakers to consider how their decisions will be affected by each of the futures. Further, people will make their own assessments of the likelihood of each scenario. By helping people to think hard about choices and trade-offs, decision-making will become more resilient in the face of an uncertain future.

The aim of the Kayak and Waka scenarios is to help business and policy makers make educated decisions that will, in turn, impact on New Zealand's energy future.

The scenarios can be applied at all levels including long-term policy development, industry decision-making, and energy research and education. Organisations may also want to use them for planning purposes and training programmes, or to do "deep-dives" to extend their strategic planning analysis.

The BEC aims to optimise the reach of the Kayak and Waka scenarios, working with industry, sector and government partners to help them use the scenarios to navigate towards the future.

By working together with government, business and university partners, BEC2050 can help to:

- develop a platform for ongoing projects and researching energy options for New Zealand's future
- create a positive policy and investment climate that promotes new technology and innovation, as well as supporting energy sector developments.

The BEC2050 report is not the end, it is just the beginning.

It's time to explore the future scenarios of Kayak and Waka.





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