



New Zealand Energy Scenarios TIMES-NZ 2.0

EECA and BEC Lunchtime Webinar

Agriculture, Forestry, and Fishing

NZ Energy Scenarios TIMES-NZ 2.0



Our work at EECA included creating the data structure, data inputs, modelling, and analysis of the results.



NZ Energy Scenarios TIMES-NZ 2.0

Kea



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



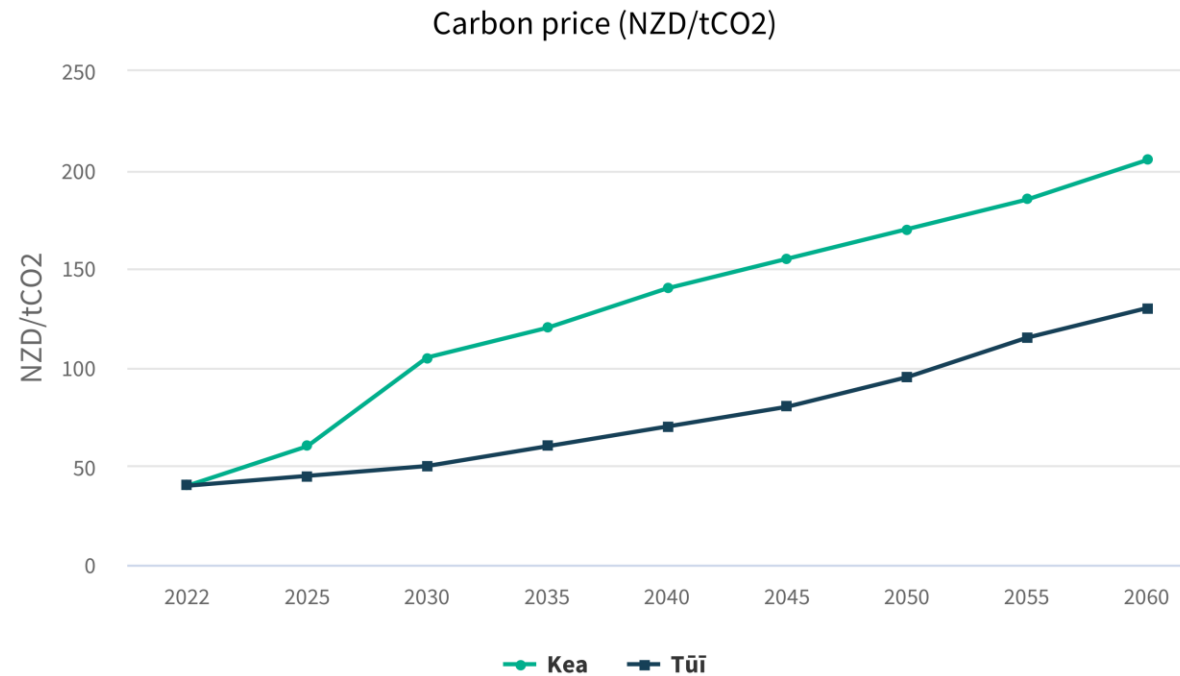
Tūī represents a scenario where climate change is an important issue to be addressed as one of many priorities, with most decisions being left up to individuals and market mechanisms.



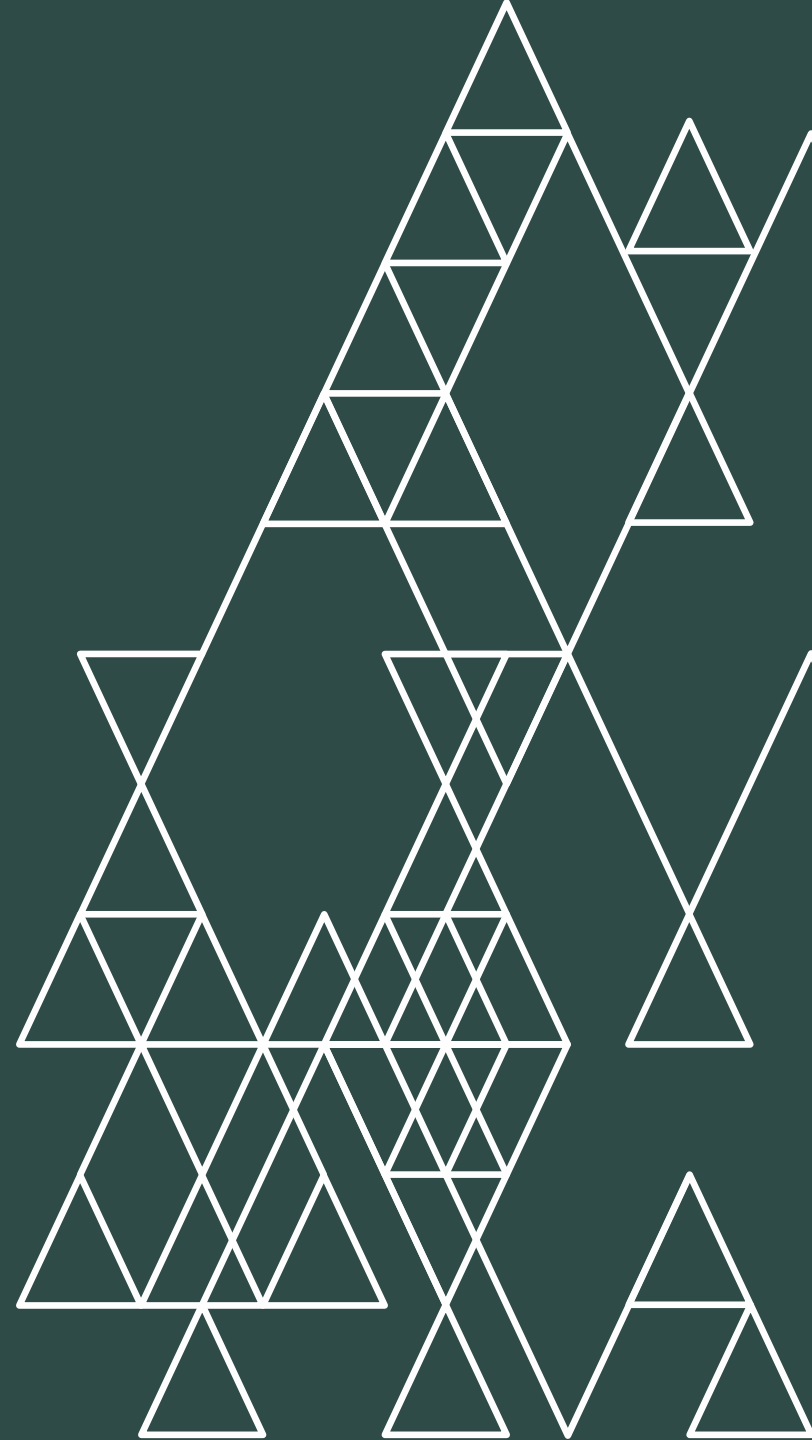
Scenario Parameters

The key model input differences between Kea and Tūi are:

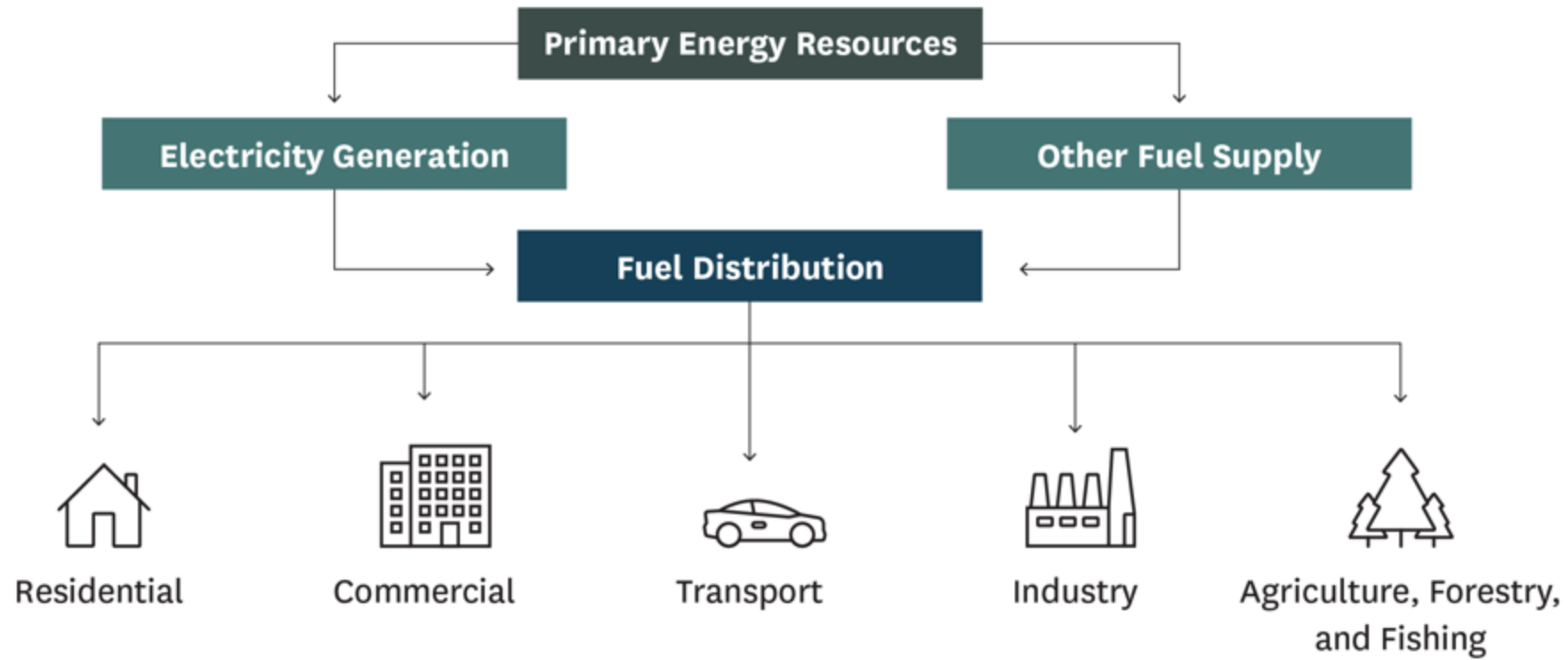
- Composite GDP
- Carbon price
- Discount rates
- Technology cost curves



TIMES-NZ Overview



TIMES-NZ 2.0 Model Structure



TIMES-NZ 2.0 Model Structure



Residential

Detached Dwellings
Joined Dwellings



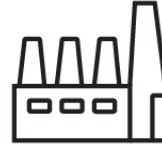
Commercial

Education
Healthcare
Office blocks
Warehouses Supermarkets
and Retail (WSR)
Other



Transport

Light road
Heavy road
Aviation
Shipping
Rail



Industry

Aluminium
Construction
Dairy Product Manufacturing
Food Processing
Iron/Steel Manufacturing
Meat Processing
Metal Product Manufacturing
Methanol Production
Mineral Production
Mining
Petroleum/Chemicals
Refining of petroleum products
Urea Production
Wood Product Manufacturing
Wood Pulp and Paper Processing



Agriculture, Forestry, and Fishing

Dairy Farming
Livestock Farming
Outdoor Horticulture & Arable
Farming
Indoor Cropping
Forestry
Fishing

EECA's Energy End Use Database (EEUD)
provides a greatly improved input dataset
for describing demand sectors.



TIMES-NZ 2.0 Model Structure

Regions and Time Representation



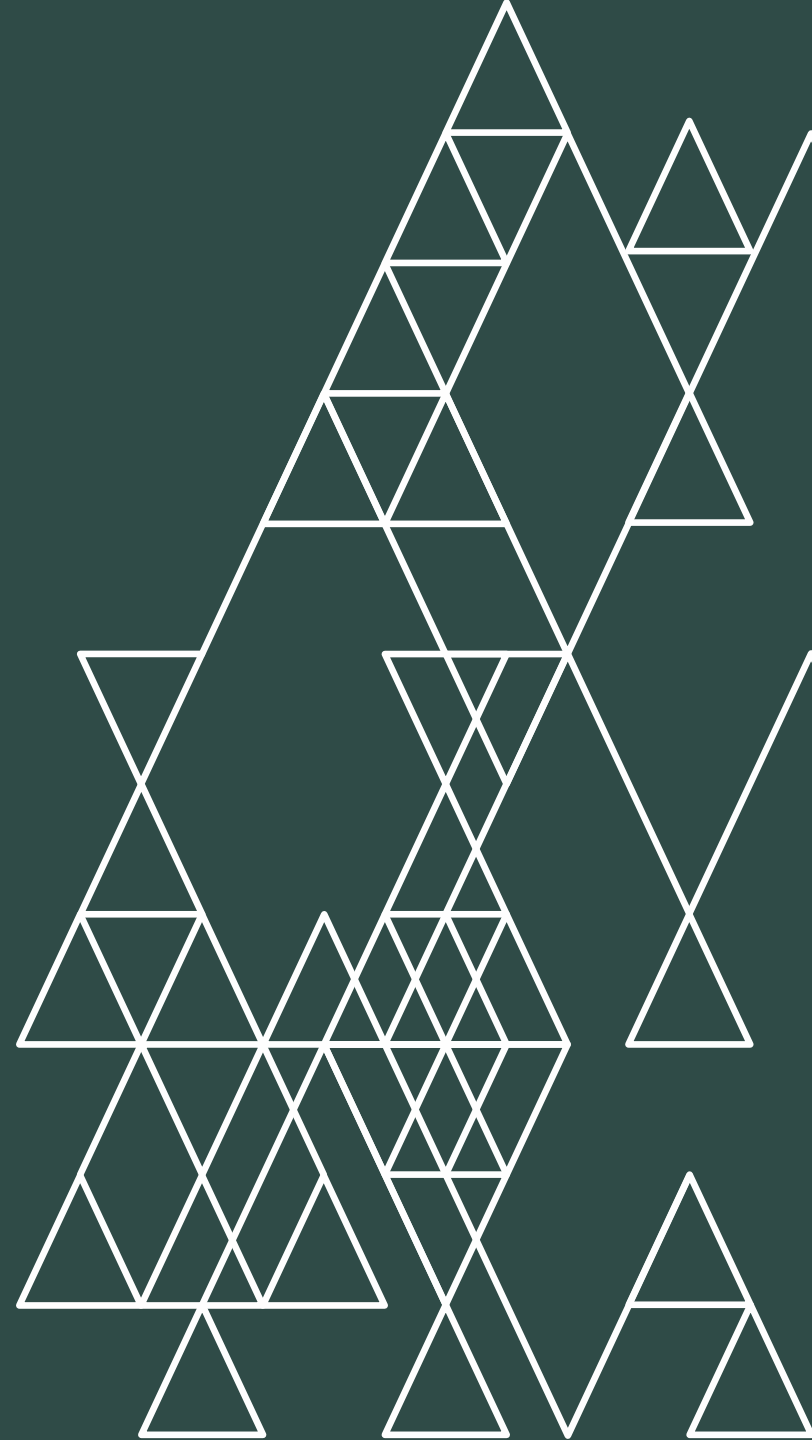
Time horizon: 2018 - 2060

Category	Values	Number of
Season	Summer Autumn Winter Spring	4
Weekday type	Weekday Weekend	2
Time of day	Day Time Peak Time Night Time	3

$4 \times 2 \times 3 = 24$ time slices per year



Assumptions



TIMES-NZ 2.0 Model Structure



Residential

Detached Dwellings
Joined Dwellings



Commercial

Education
Healthcare
Office blocks
Warehouses Supermarkets
and Retail (WSR)
Other



Transport

Light road
Heavy road
Aviation
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Rail



Industry

Aluminium
Construction
Dairy Product Manufacturing
Food Processing
Iron/Steel Manufacturing
Meat Processing
Metal Product Manufacturing
Methanol Production
Mineral Production
Mining
Petroleum/Chemicals
Refining of petroleum products
Urea Production
Wood Product Manufacturing
Wood Pulp and Paper Processing



Agriculture, Forestry, and Fishing

Dairy Farming
Livestock Farming
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EECA's Energy End Use Database (EEUD)
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Agriculture Demand Projections

Subsector	Driver
Dairy Cattle Farming	Land Use/Animal Number Projections
Livestock Farming	Land Use/Animal Number Projections
Outdoor Horticulture/Arable Farming	Land Use Projections
Indoor Cropping	Population
Forestry	Land Use Projections
Fishing	Assumed Constant



Agriculture Technology options

- Dairy shed
 - Milking Machine (Vacuum pump)
 - Transfer Pumps
 - Refrigeration
 - Water heating
 - Heat recovery
- Farm vehicles
 - Bike
 - Truck
 - Ute
- Irrigation (with/without VSD)
- Indoor cropping
 - Boiler
 - Electric
 - Hydrogen
 - Biomass
 - Natural Gas
 - Coal
 - Heat Pump



Agriculture Heavy Vehicles

- Farm Heavy vehicles
 - Tractors/Harvesters
 - Diesel
 - Electric
 - Hydrogen
- Forestry
 - Ground Based
 - Diesel
 - Electric
 - Hydrogen
 - Cable Yarding
 - Diesel
 - Electric
 - Hydrogen



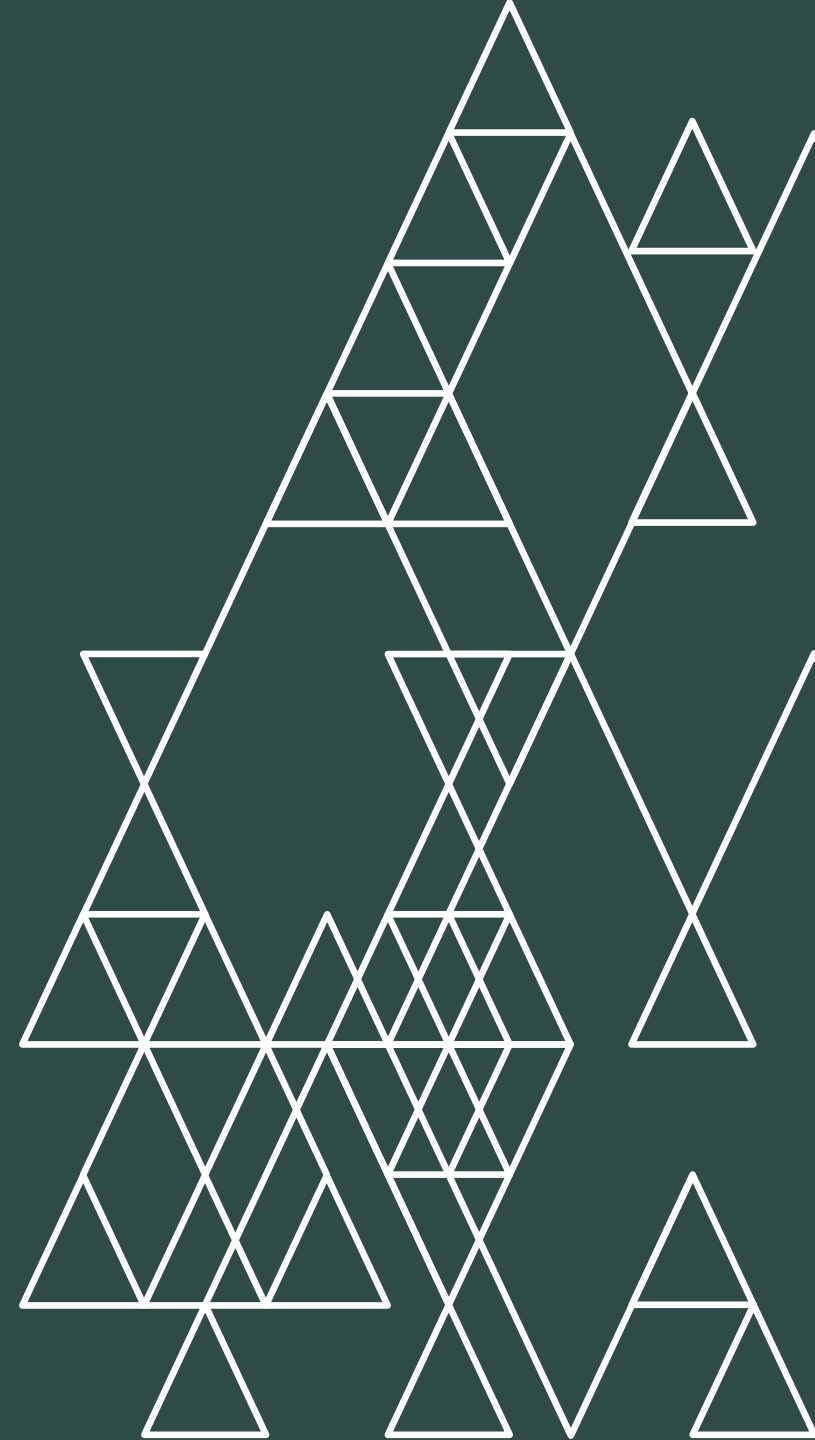
Agriculture

Load Distribution

- Irrigation
- Dairy shed
- Farm vehicles charging
- Greenhouse heating



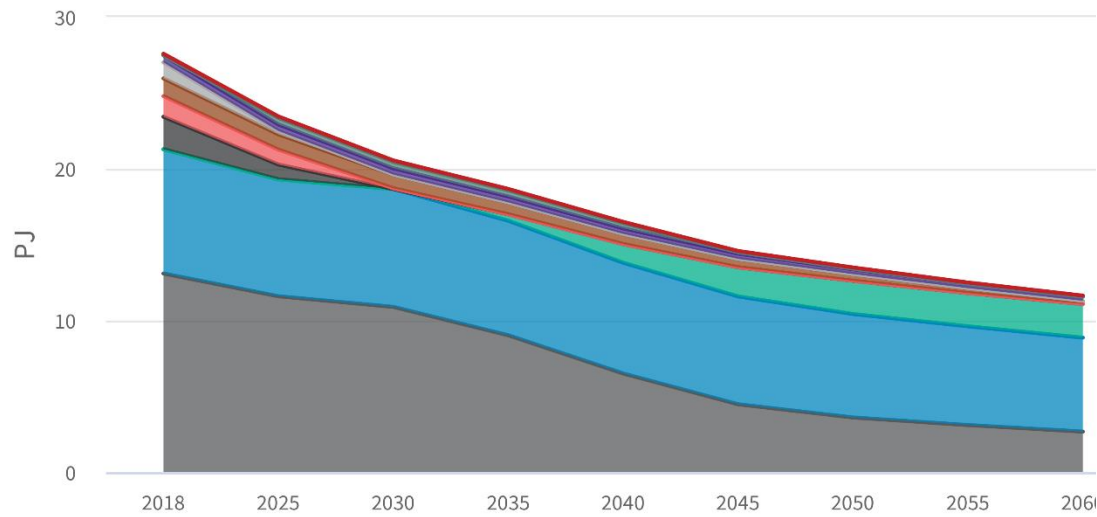
Results



Agricultural Fuels

Fuel Consumption

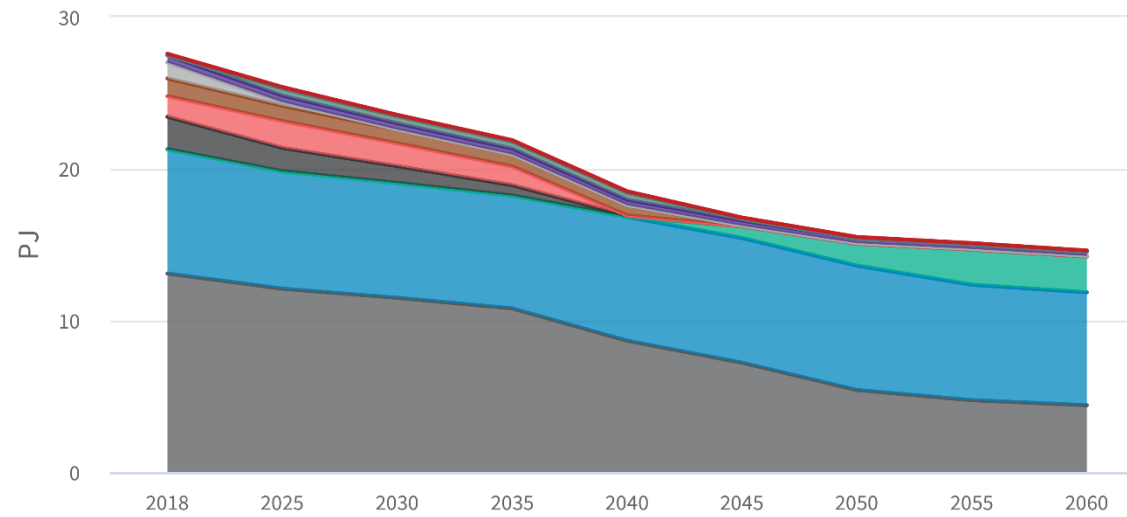
Kea Fuel Consumption



- Diesel
- Natural Gas
- Wood
- Electricity
- Fuel Oil
- LPG
- Green Hydrogen
- Petrol
- Coal
- Geothermal

TIMES-NZ 2.0, Scenario: Kea

Tui Fuel Consumption



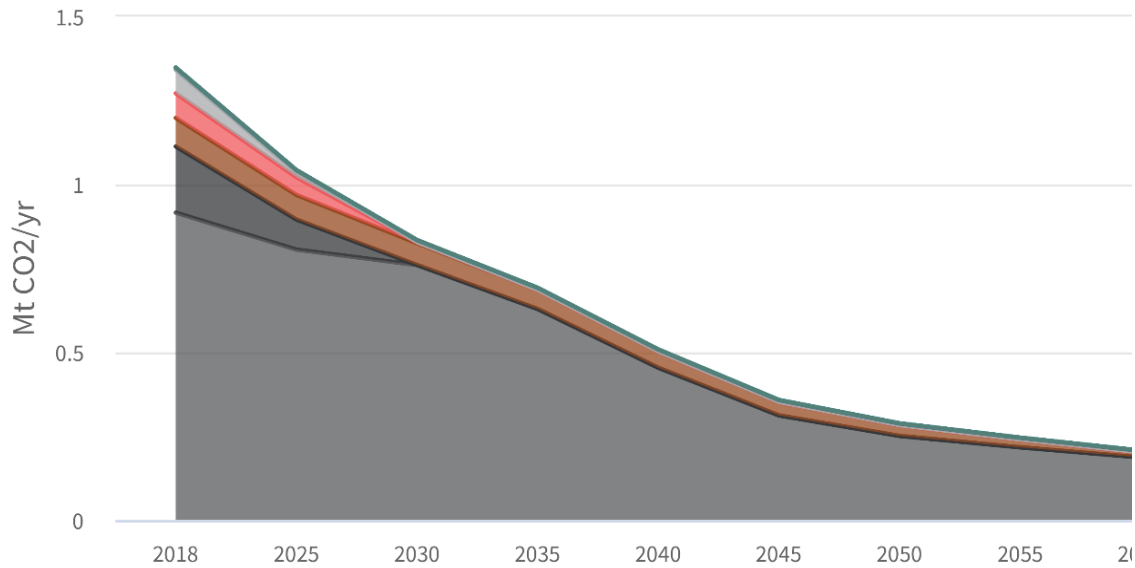
- Diesel
- Natural Gas
- Wood
- Electricity
- Fuel Oil
- LPG
- Green Hydrogen
- Petrol
- Coal
- Geothermal

TIMES-NZ 2.0, Scenario: Tui



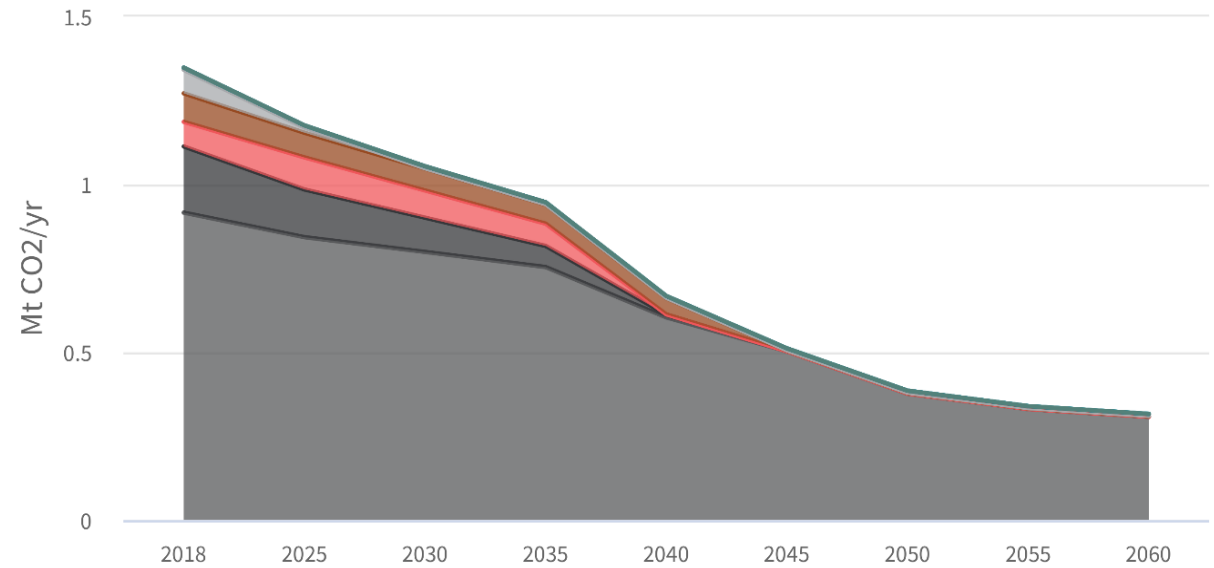
Agricultural Emissions

Kea Emissions



TIMES-NZ 2.0, Scenario: Kea

Tui Emissions



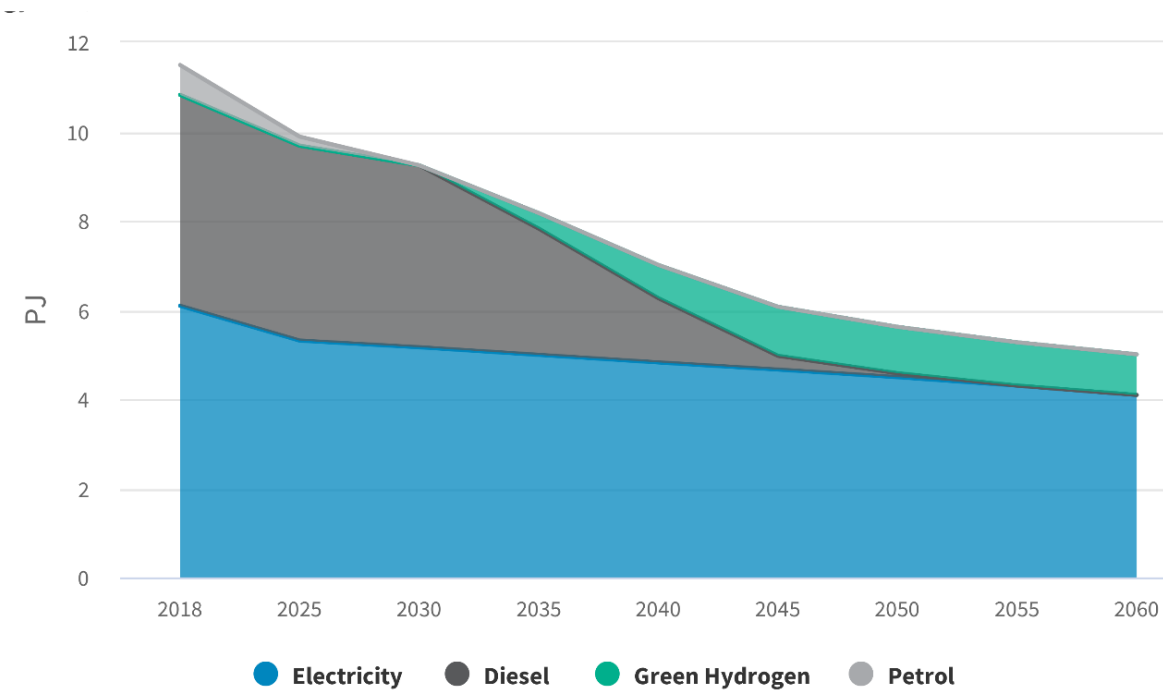
TIMES-NZ 2.0, Scenario: Tui



Dairy Farming

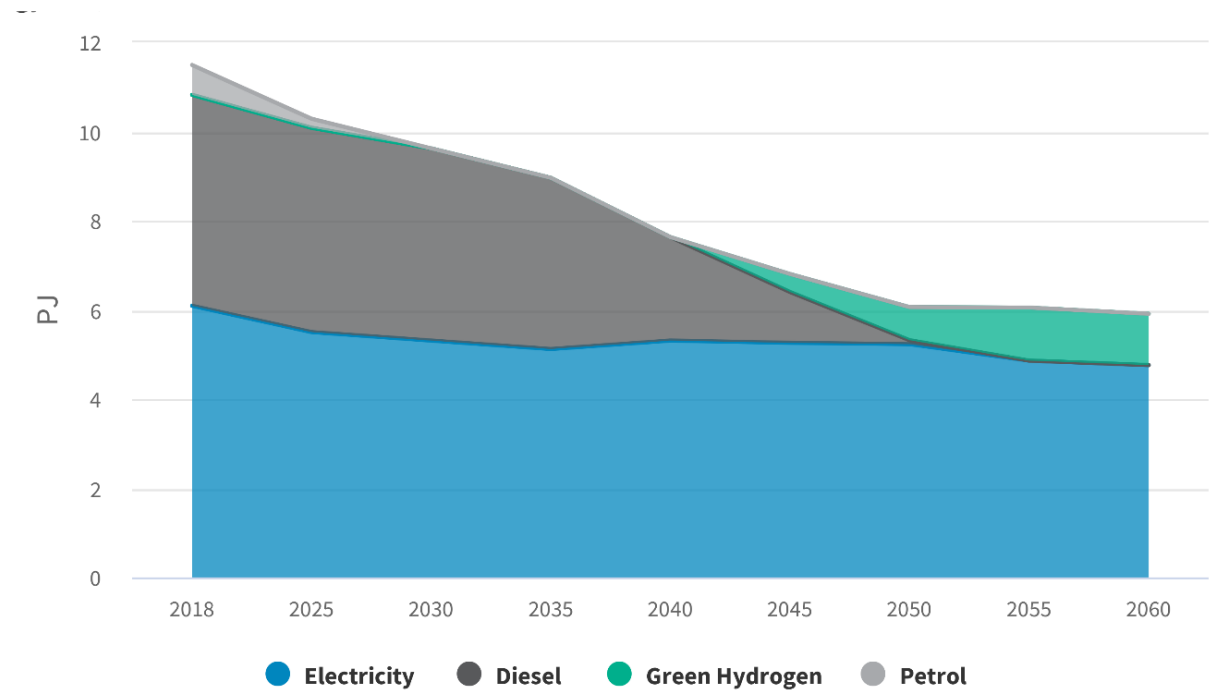
Fuel Consumption

Kea Fuel Consumption - Dairy



TIMES-NZ 2.0, Scenario: Kea

Tui Fuel Consumption - Dairy

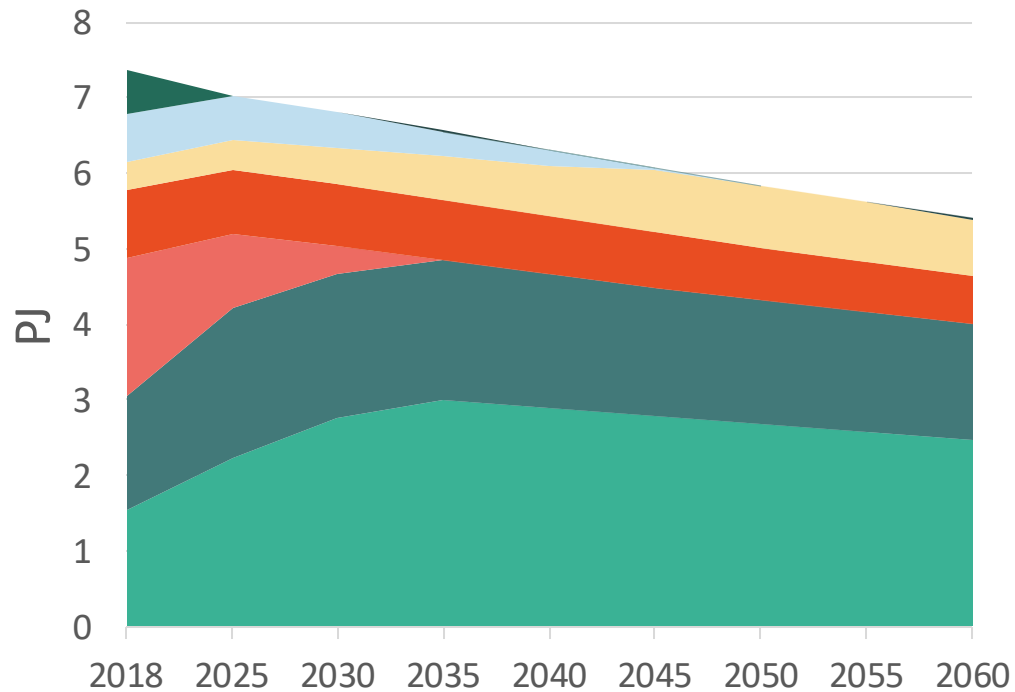


TIMES-NZ 2.0, Scenario: Tūi



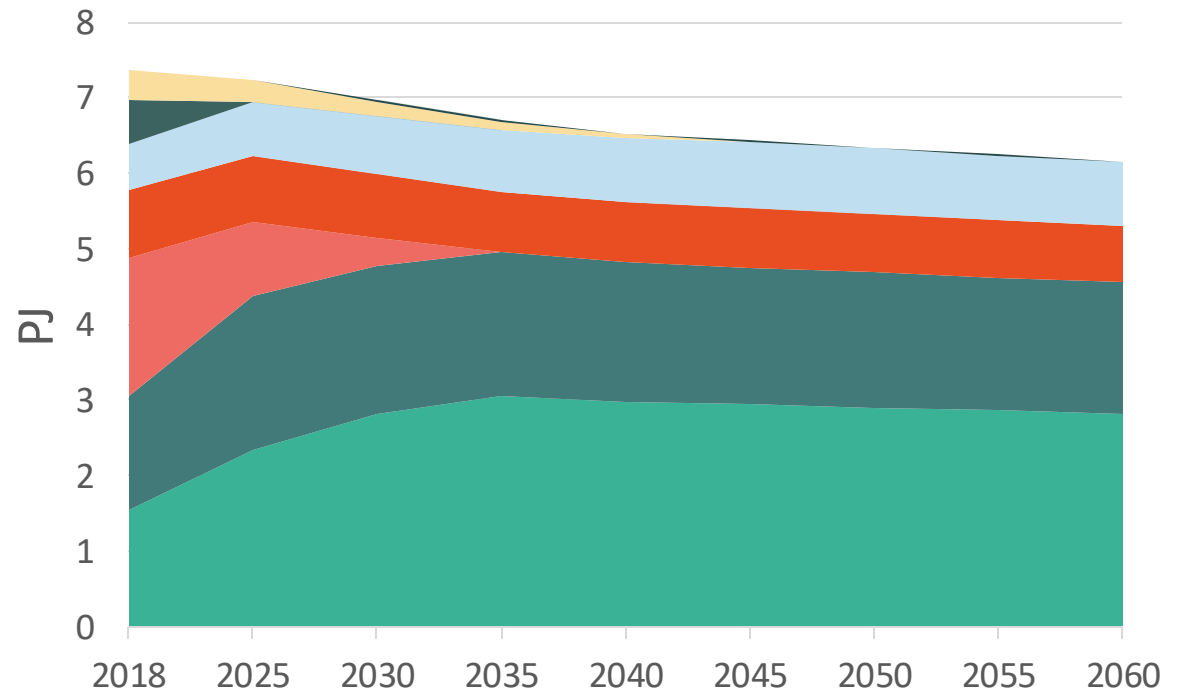
Dairy Shed Electricity

Dairy Shed Electricity - Kea



- Refrigerator
- Heat Recovery System (Heating)
- Heat Recovery System (Cooling)
- Transfer Pump
- Vacuum Pump
- Vacuum Pump with VSD
- Hot Water Cylinder

Dairy Shed Electricity - Tui

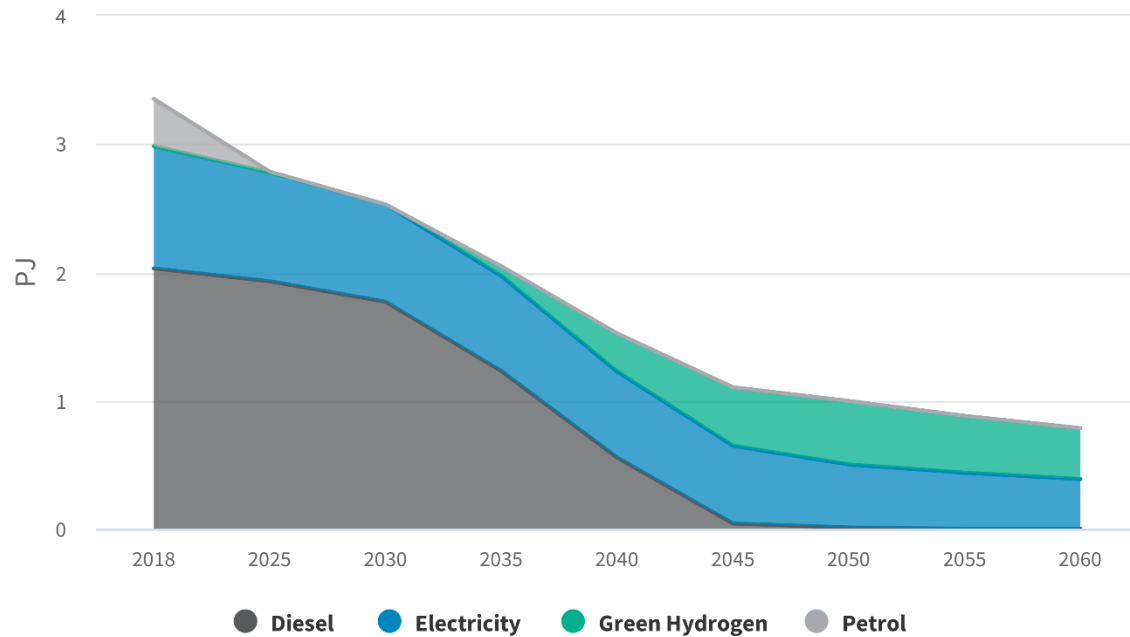


- Refrigerator
- Heat Recovery System (Heating)
- Heat Recovery System (Cooling)
- Transfer Pump
- Vacuum Pump with VSD
- Hot Water Cylinder
- Vacuum Pump



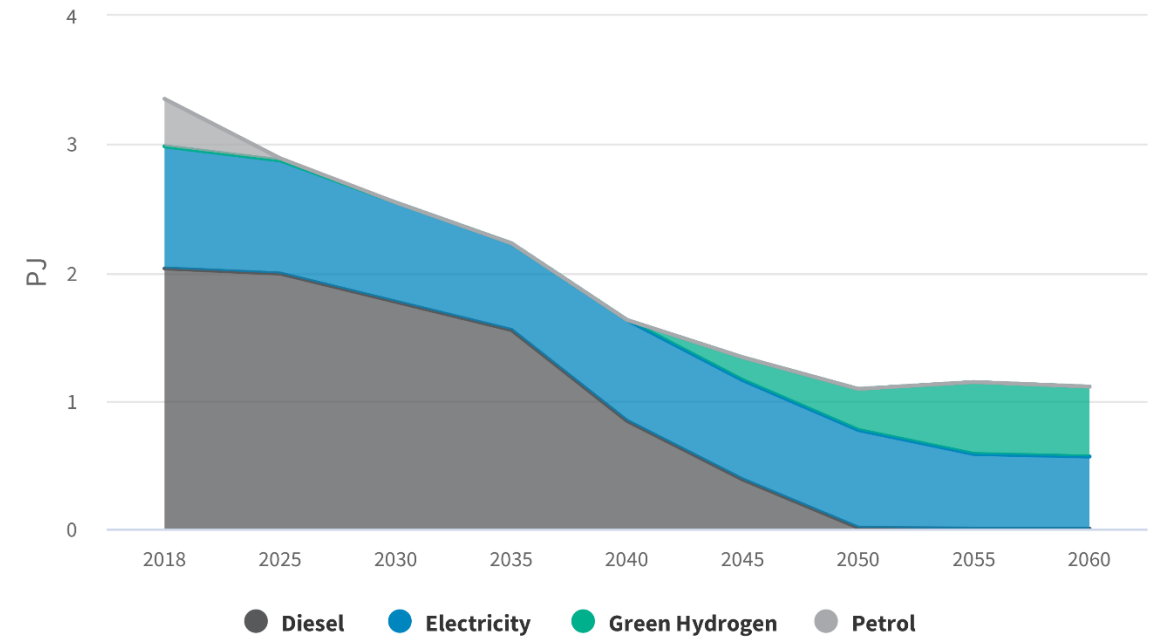
Livestock Farming

Kea Fuel Consumption - Livestock



TIMES-NZ 2.0, Scenario: Kea

Tui Fuel Consumption - Livestock



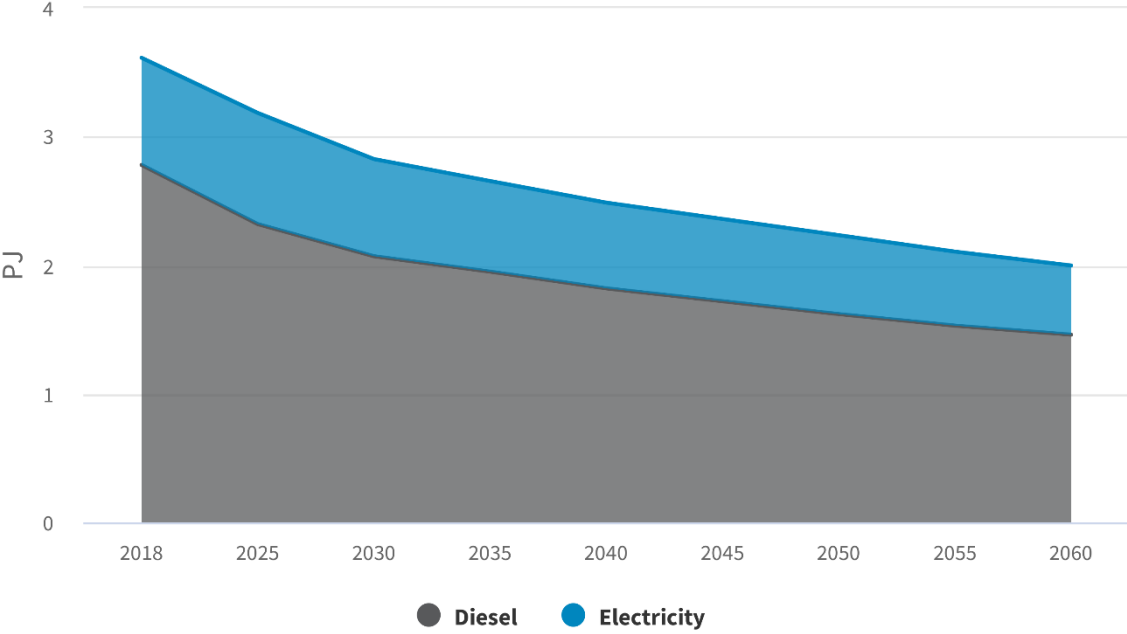
TIMES-NZ 2.0, Scenario: Tūi



Outdoor Horticulture & Arable Farming

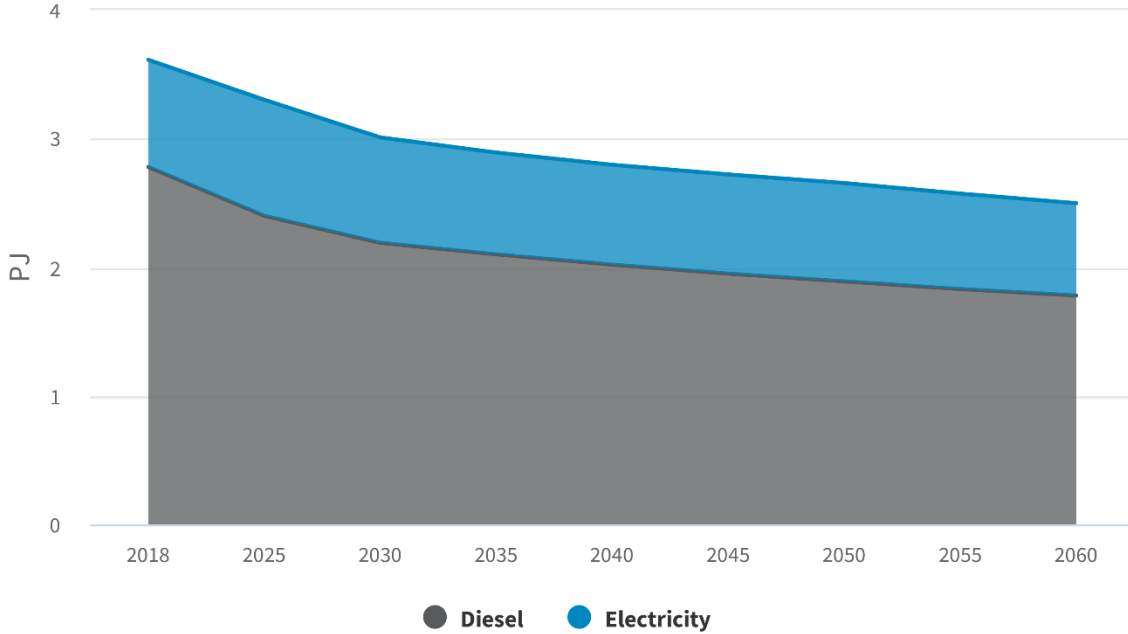


Kea Fuel Consumption – Outdoor Horticulture



TIMES-NZ 2.0, Scenario: Kea

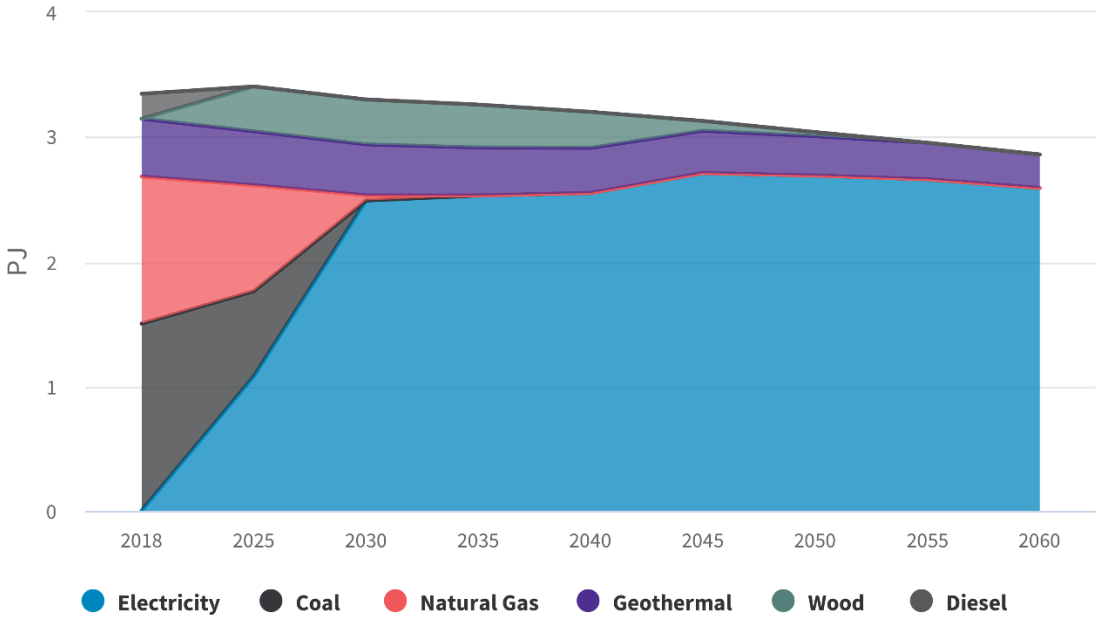
Tui Fuel Consumption – Outdoor Horticulture



TIMES-NZ 2.0, Scenario: Tūi

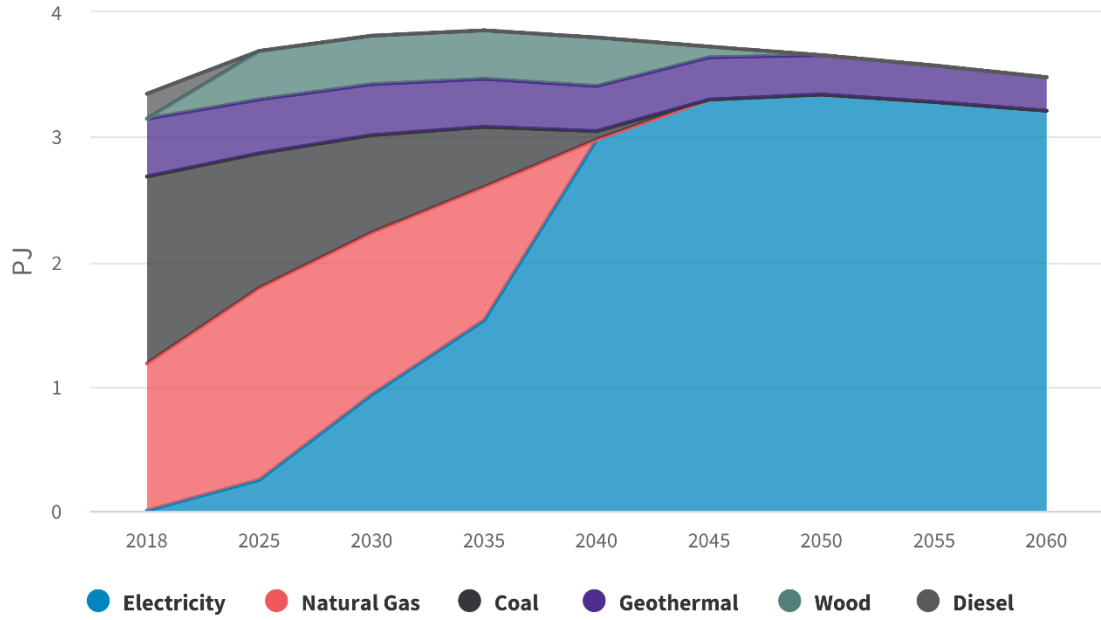
Indoor Cropping

Kea End Use Demand – Indoor Cropping



TIMES-NZ 2.0, Scenario: Kea

Tui End Use Demand – Indoor Cropping

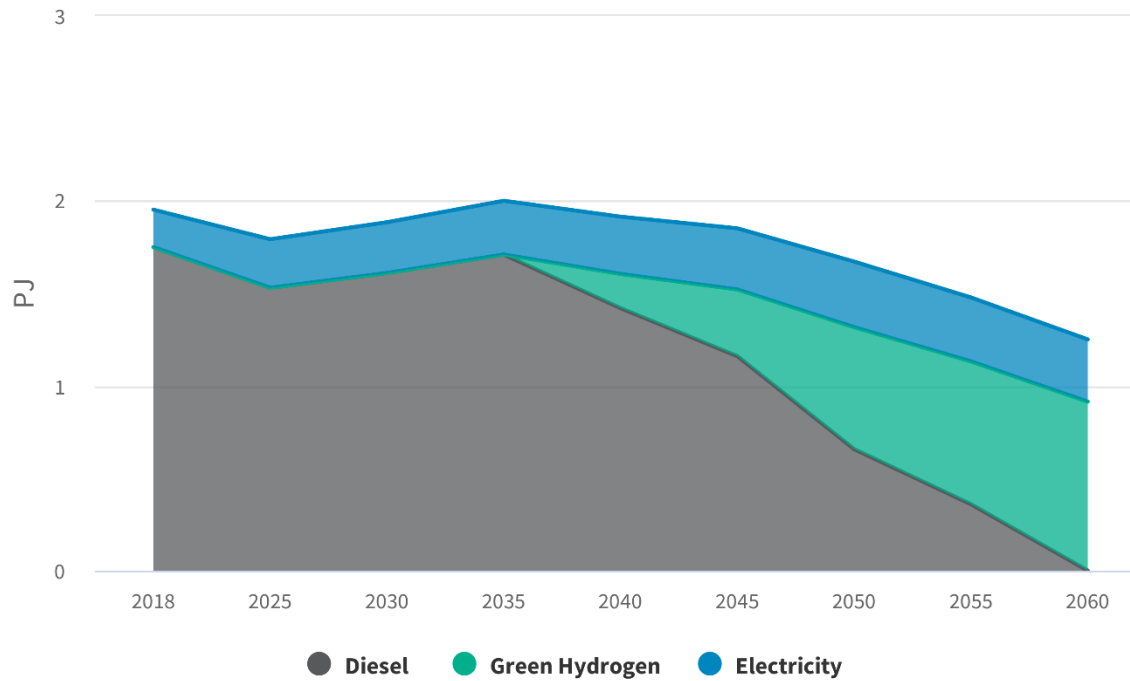


TIMES-NZ 2.0, Scenario: Tūi



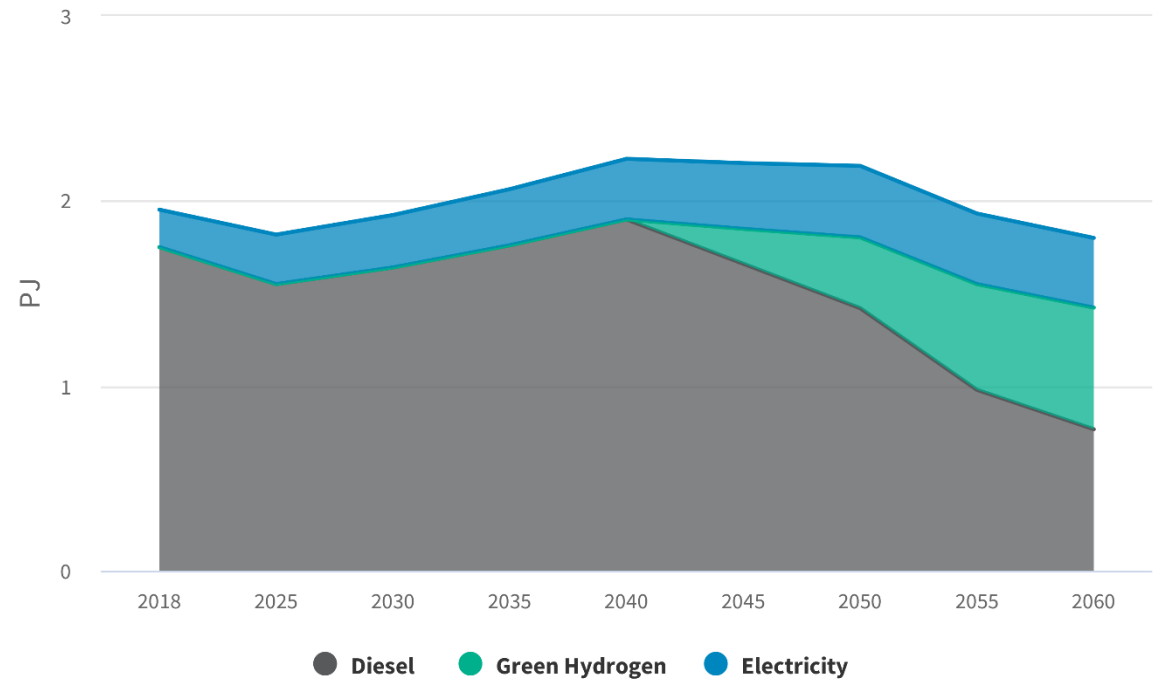
Forestry

Kea Fuel Consumption - Forestry



TIMES-NZ 2.0, Scenario: Kea

Tui Fuel Consumption - Forestry

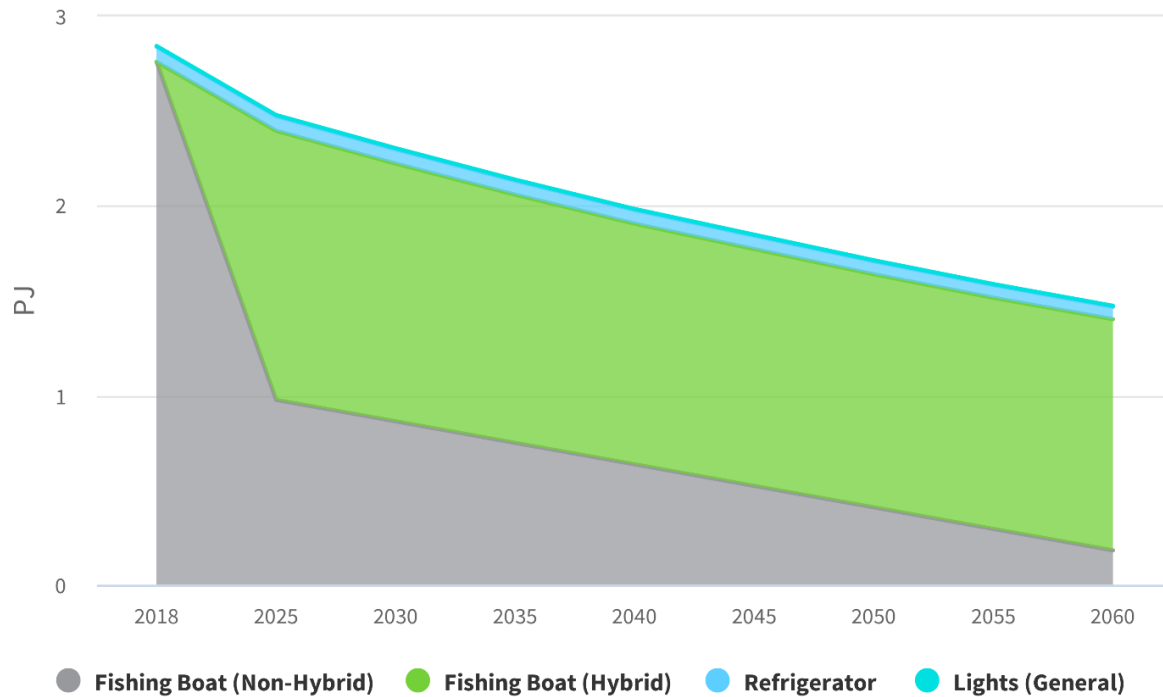


TIMES-NZ 2.0, Scenario: Tūi



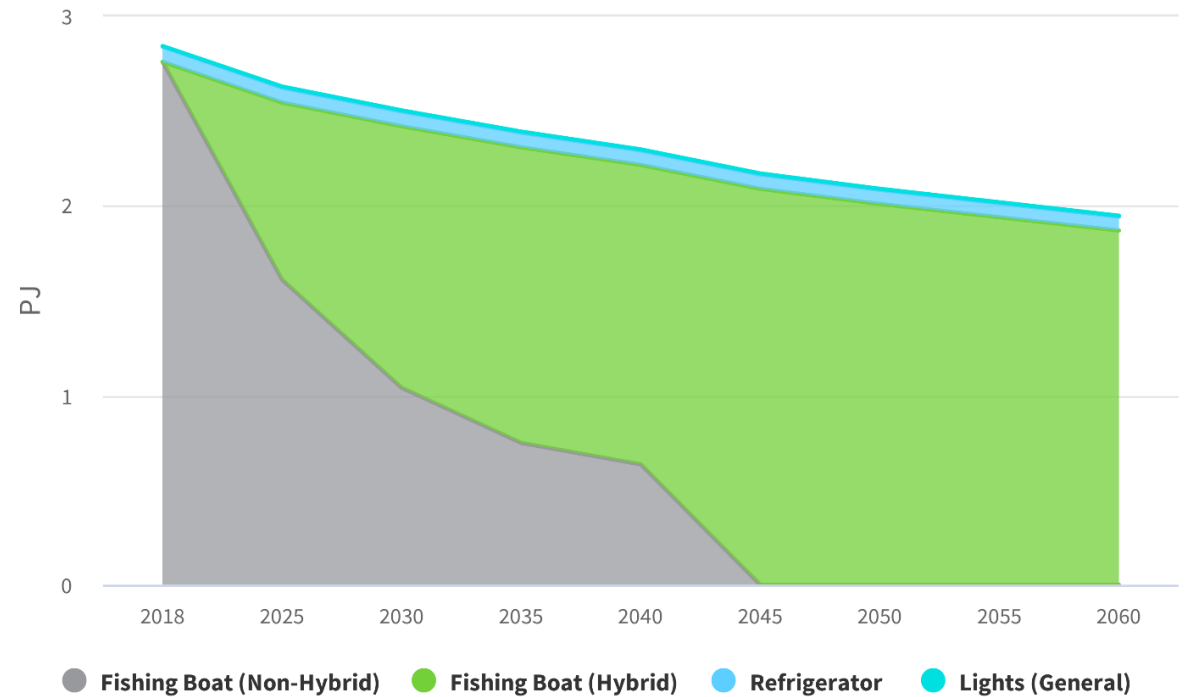
Fishing

Kea Fuel Consumption - Fishing

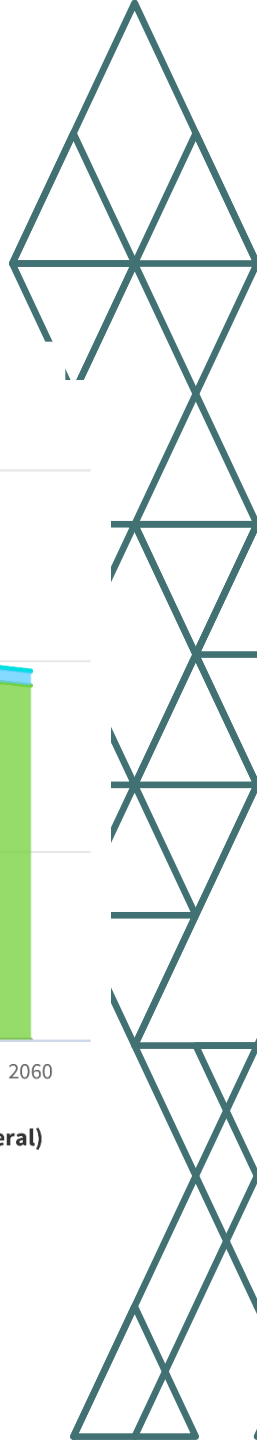


TIMES-NZ 2.0, Scenario: Kea

Tui Fuel Consumption - Fishing

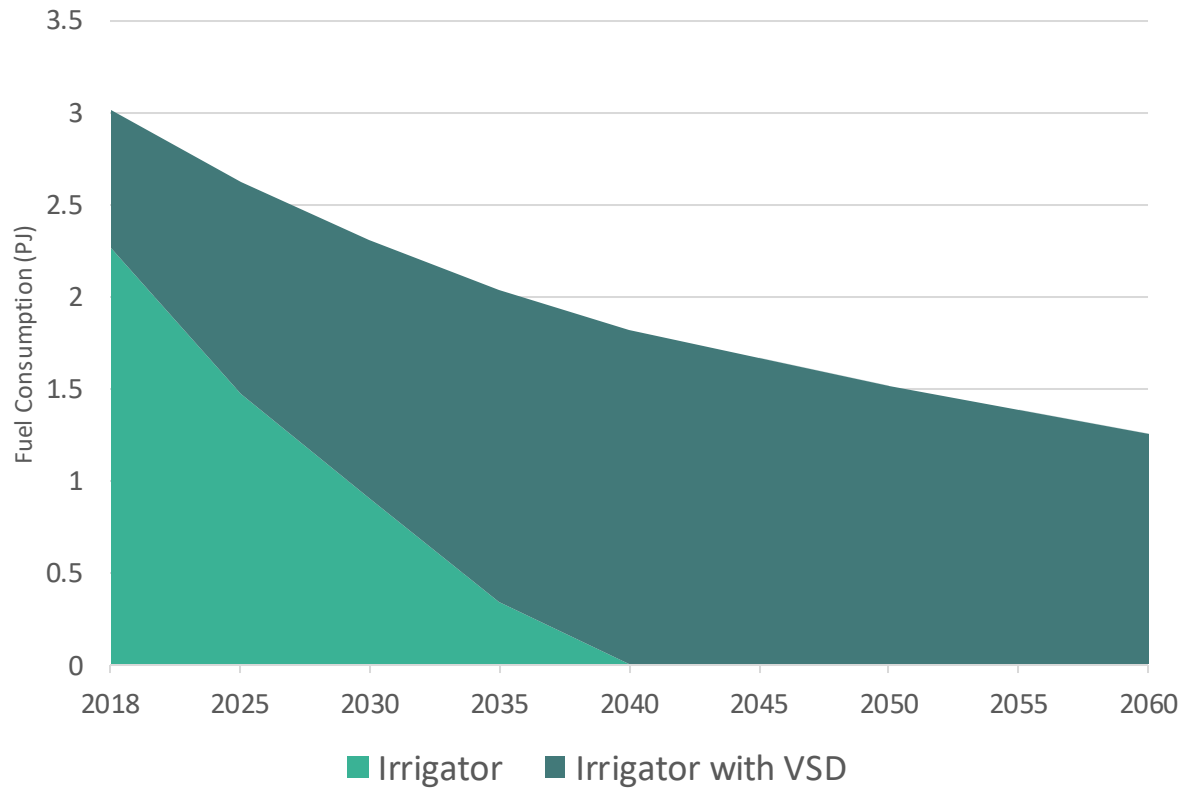


TIMES-NZ 2.0, Scenario: Tūi

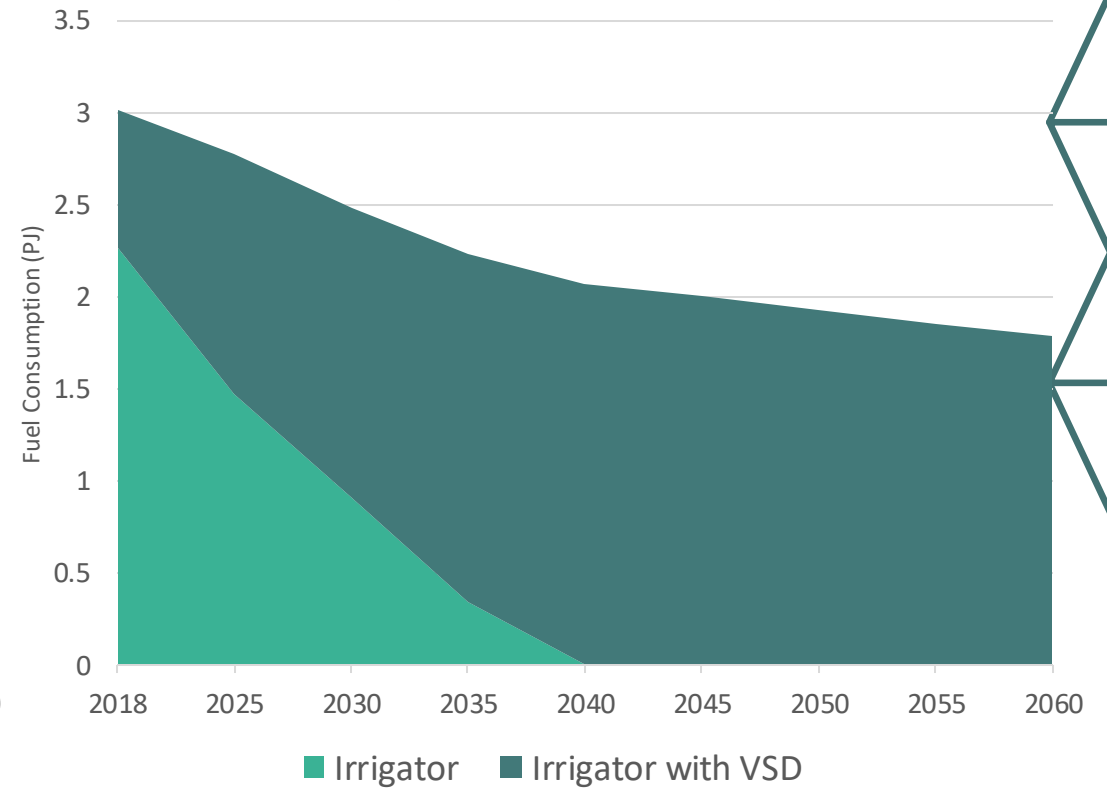


Irrigation

Kea - Irrigation Fuel Consumption

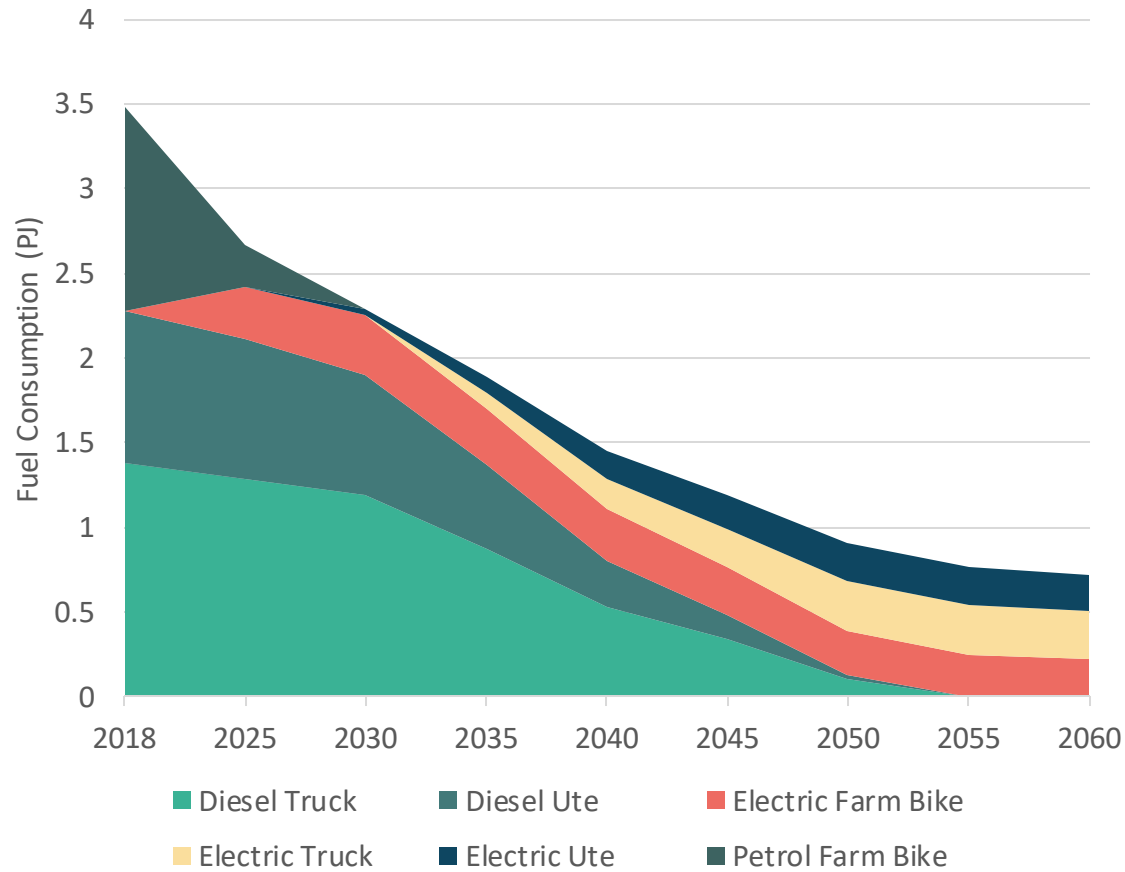


Tui - Irrigation Fuel Consumption

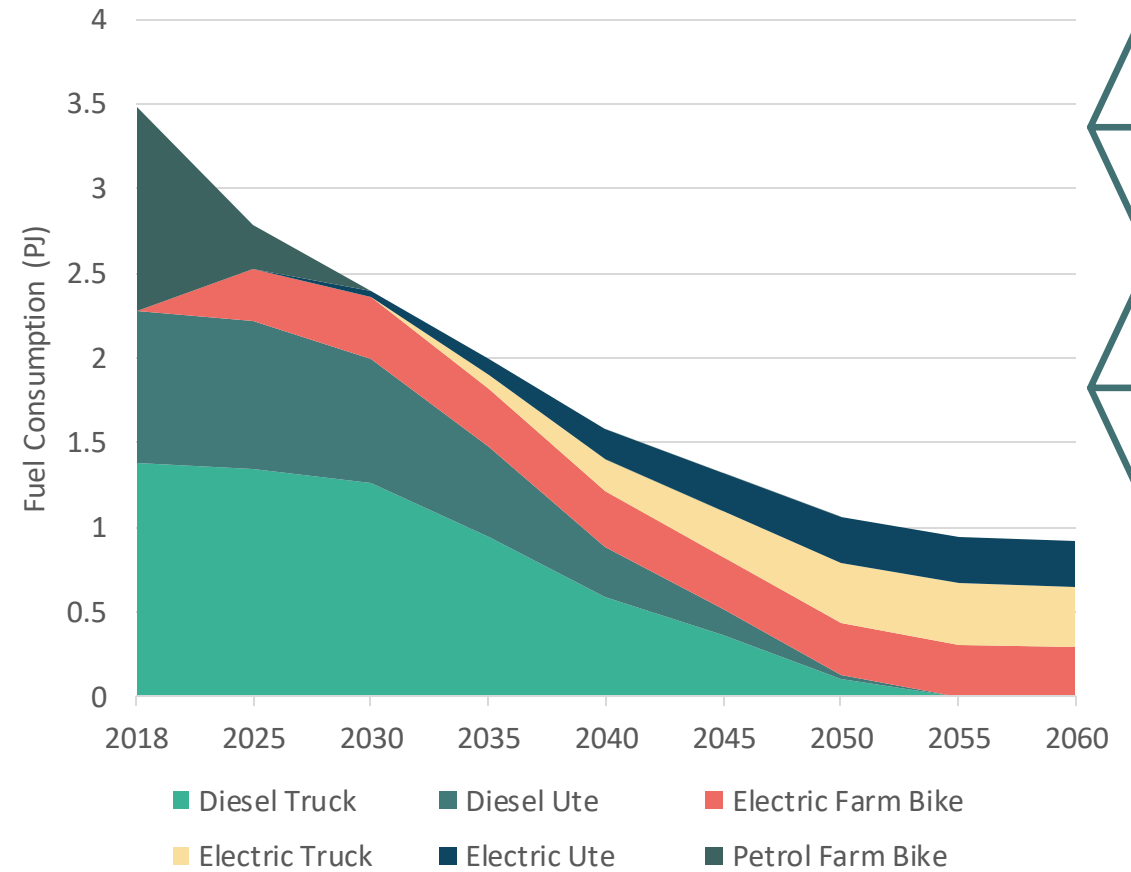


Agricultural Vehicles

Kea - Agricultural vehicles

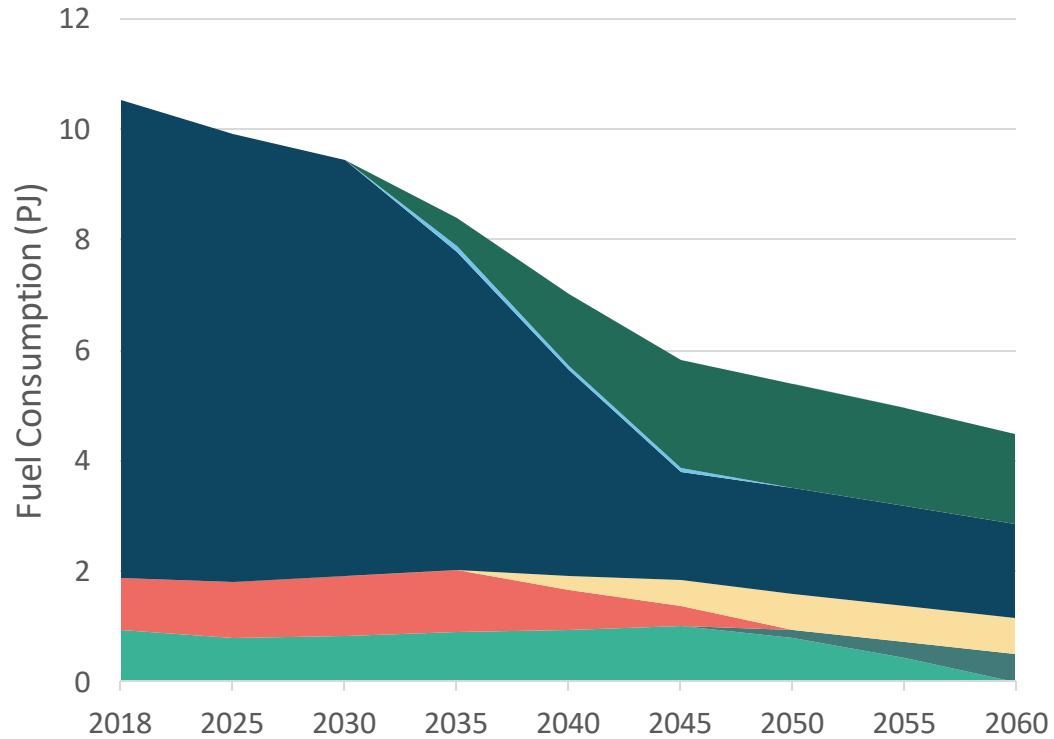


Tui - Agricultural vehicles



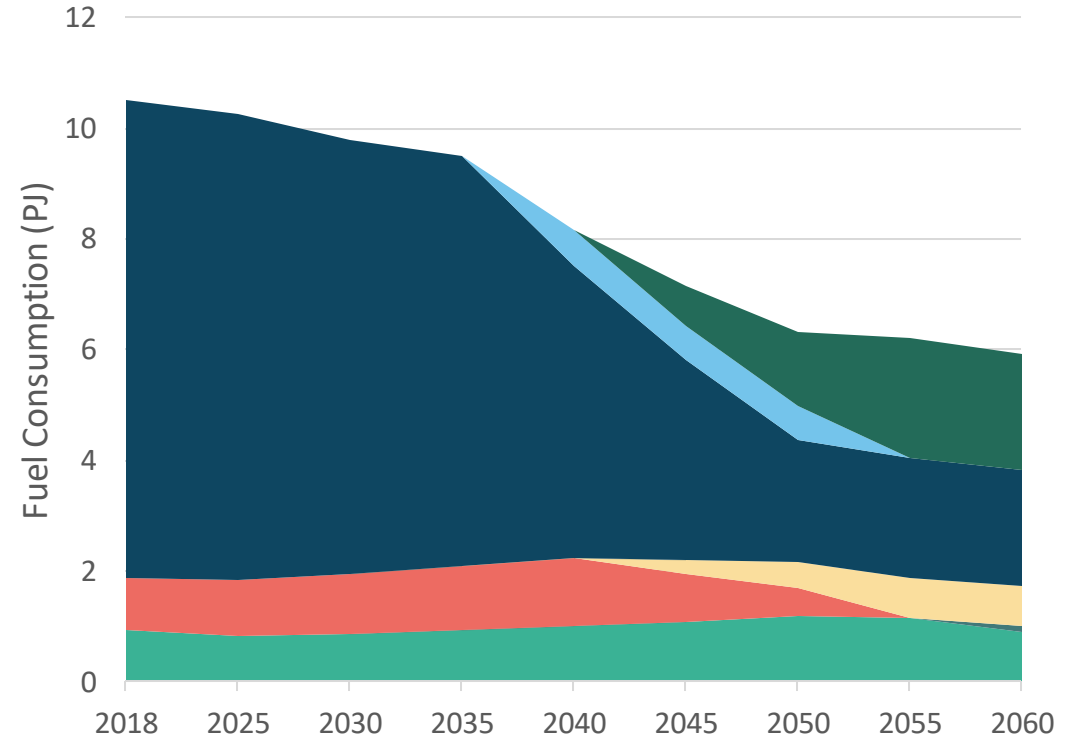
Agricultural Heavy Machinery

Kea - Heavy machinery



- Diesel Cable Yarder
- Diesel Skidder
- Diesel Tractor
- Hydrogen Cable Yarder
- Hydrogen Skidder
- Electric Tractor
- Hydrogen Tractor

Tui - Heavy machinery



- Diesel Cable Yarder
- Diesel Skidder
- Diesel Tractor
- Hydrogen Cable Yarder
- Hydrogen Skidder
- Electric Tractor
- Hydrogen Tractor



Off-Road Liquid Fuels

<https://www.eeca.govt.nz/insights/eeca-insights/off-road-liquid-fuel-insights/>

Off-road liquid fuel insights

Quantifying off-road petrol and diesel use in New Zealand

July 2021

[Read full report](#) [↗](#)

[Home](#) > [Insights](#) > [EECA Insights](#) > [Off-road liquid fuel insights](#)

Off-road fuel use is a decarbonisation opportunity

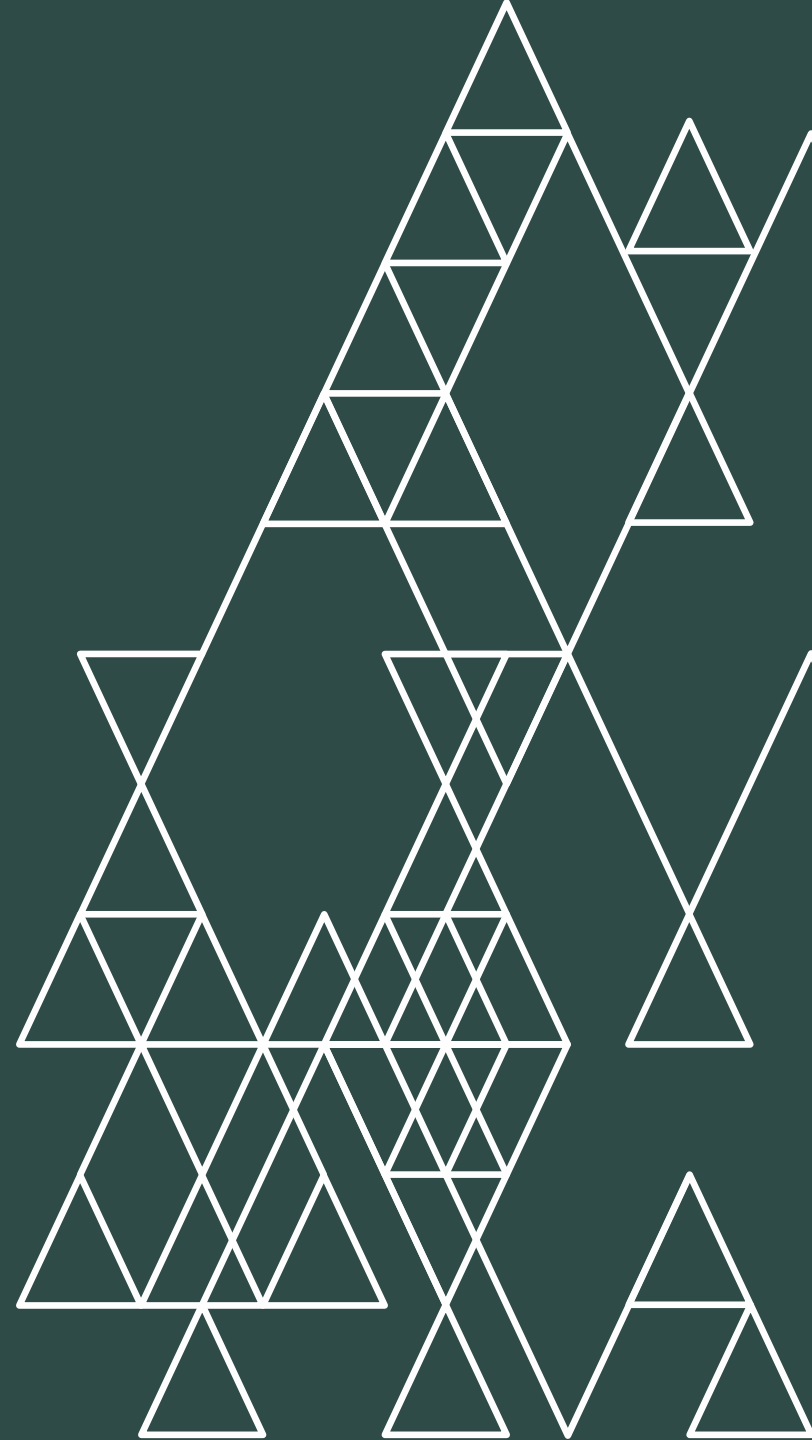
Petrol and diesel power many vehicles and machines that will never be used on a road, so remain out of sight, out of mind.

In fact, **28%** of all liquid fossil fuel sold in New Zealand is used off-road, for industrial and recreational activities, accounting for **9%** of our total energy-related greenhouse gas emissions.

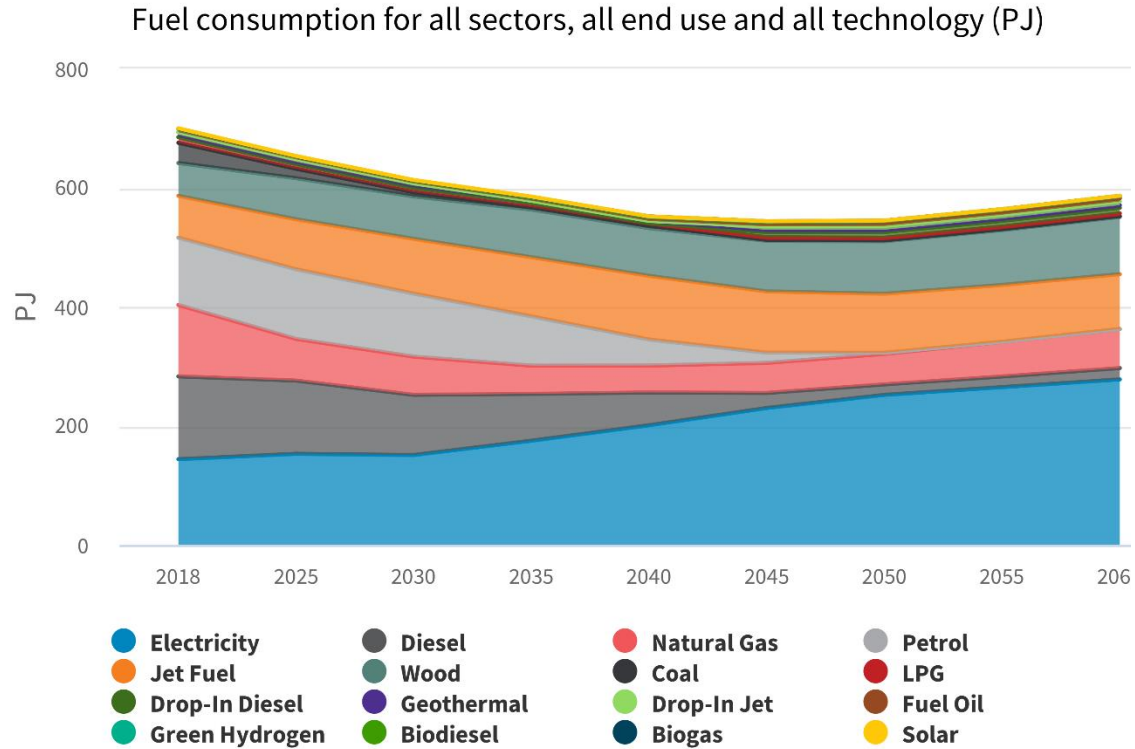
This research has given us a more detailed understanding, and challenged some assumptions about where fuel is used, and therefore where these emissions come from, which will enable better planning for decarbonisation.



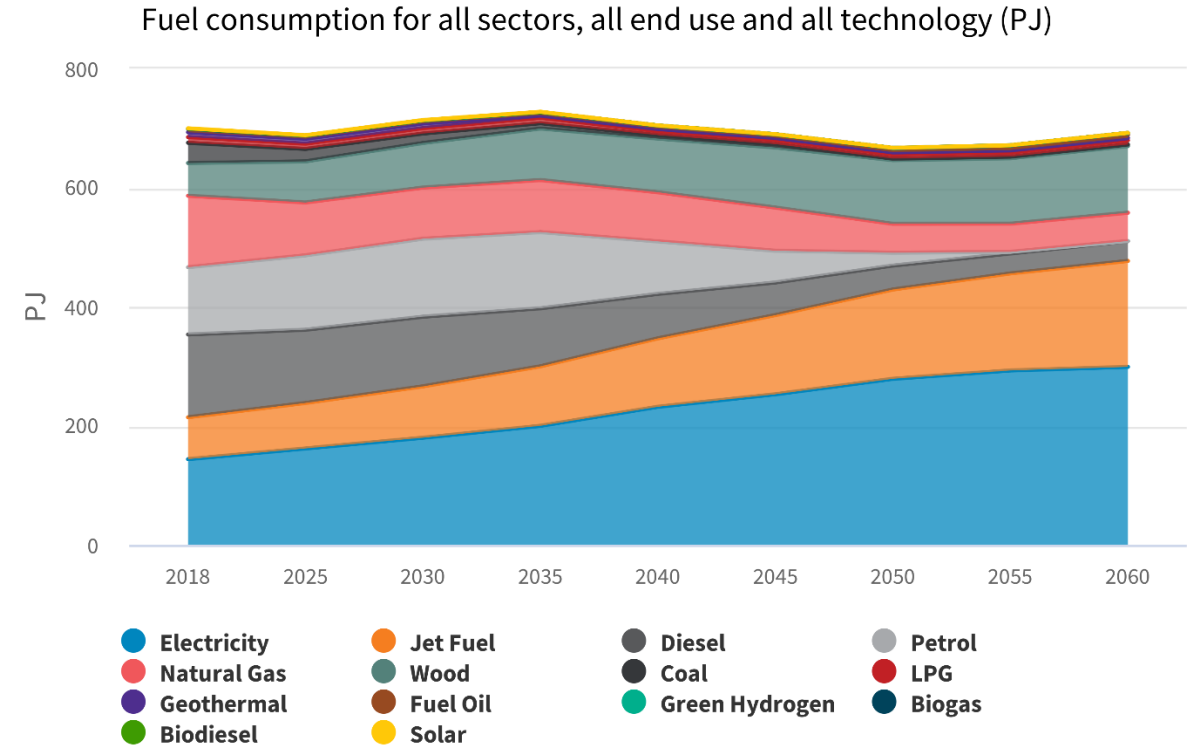
Summary of All Sectors



Fuel Consumption



TIMES-NZ 2.0, Scenario: Kea

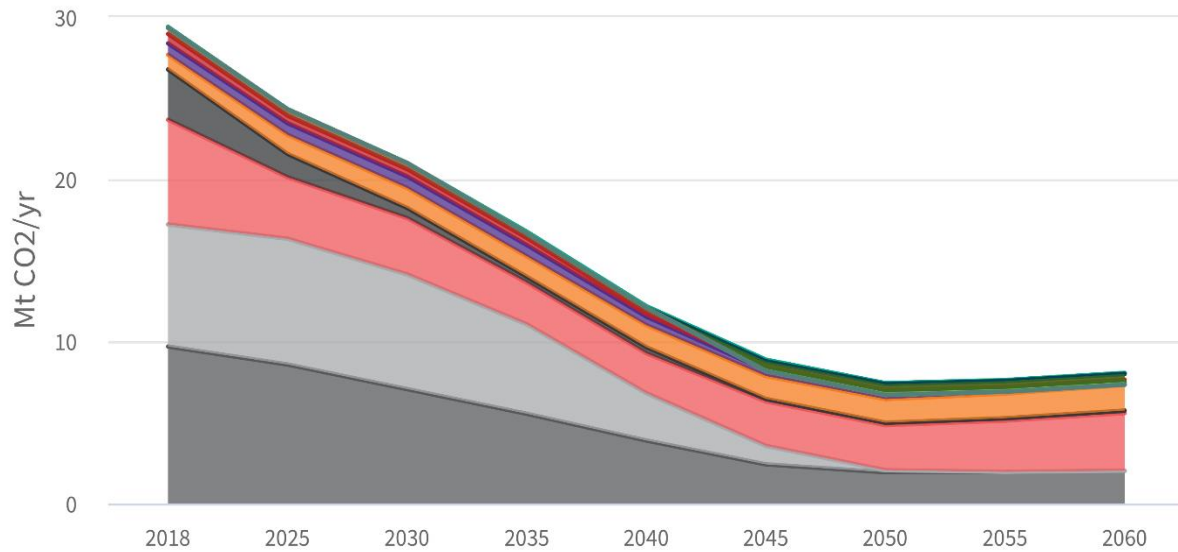


TIMES-NZ 2.0, Scenario: Tūi



Emissions

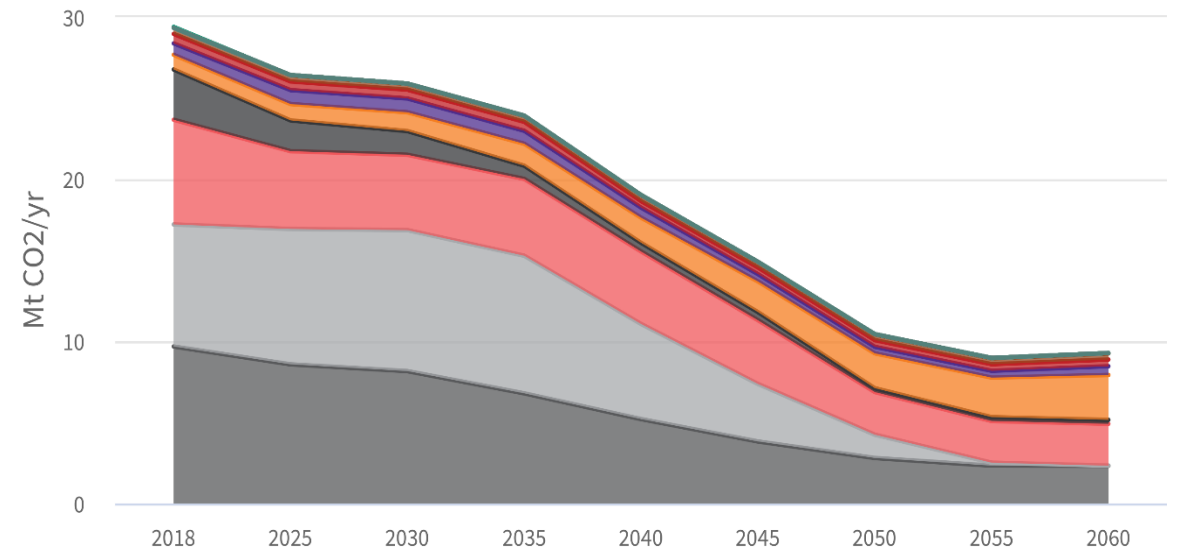
Emissions for all sectors, all end use and all technology (Mt CO₂/yr)



- Diesel
- Jet Fuel
- Waste Incineration
- Drop-In Diesel
- Solar
- Petrol
- Geothermal
- Green Hydrogen
- Drop-In Jet
- Wind
- Natural Gas
- LPG
- Biodiesel
- Electricity
- Wood
- Coal
- Fuel Oil
- Biogas
- Hydro

TIMES-NZ 2.0, Scenario: Kea

Emissions for all sectors, all end use and all technology (Mt CO₂/yr)

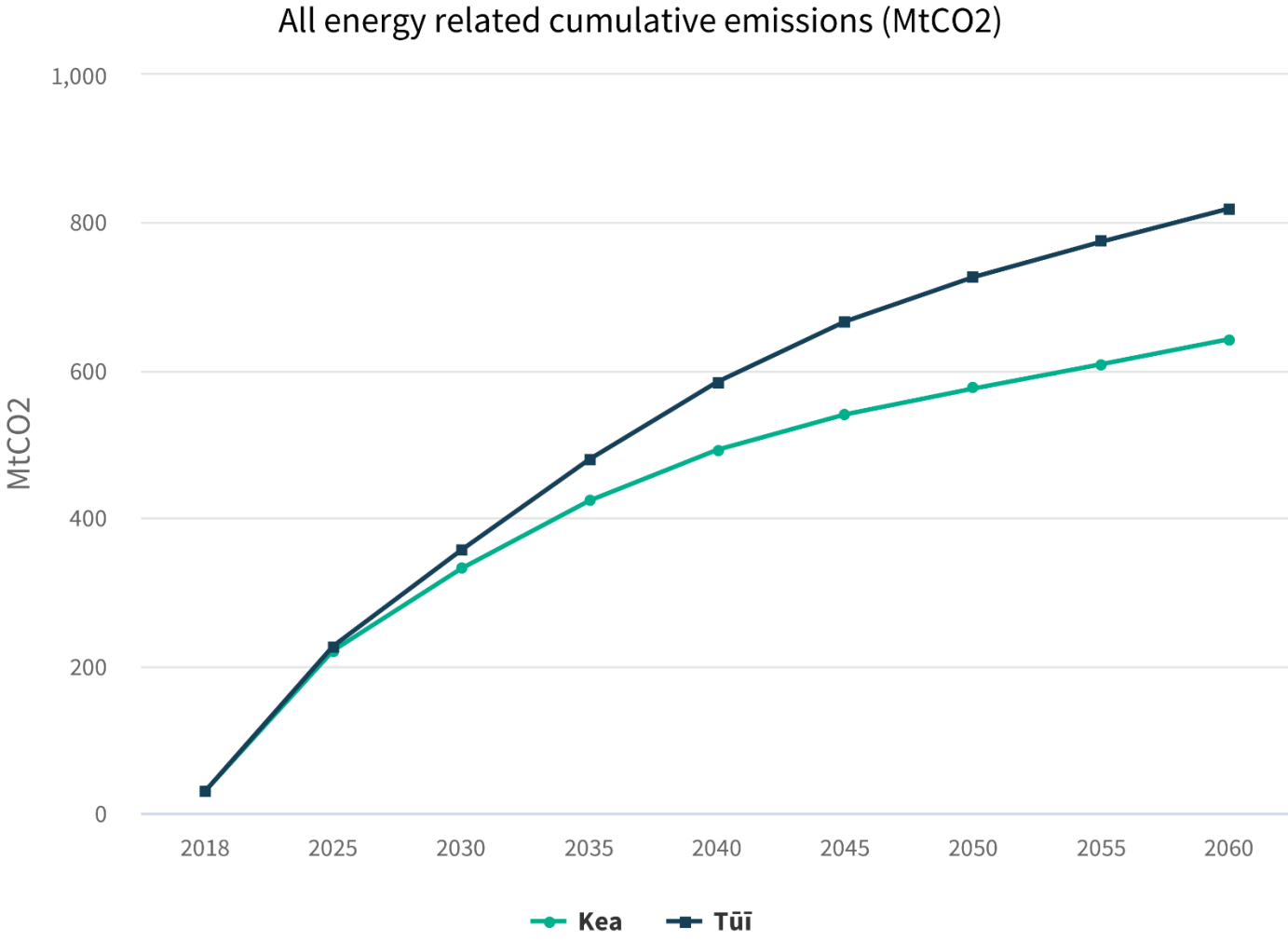


- Diesel
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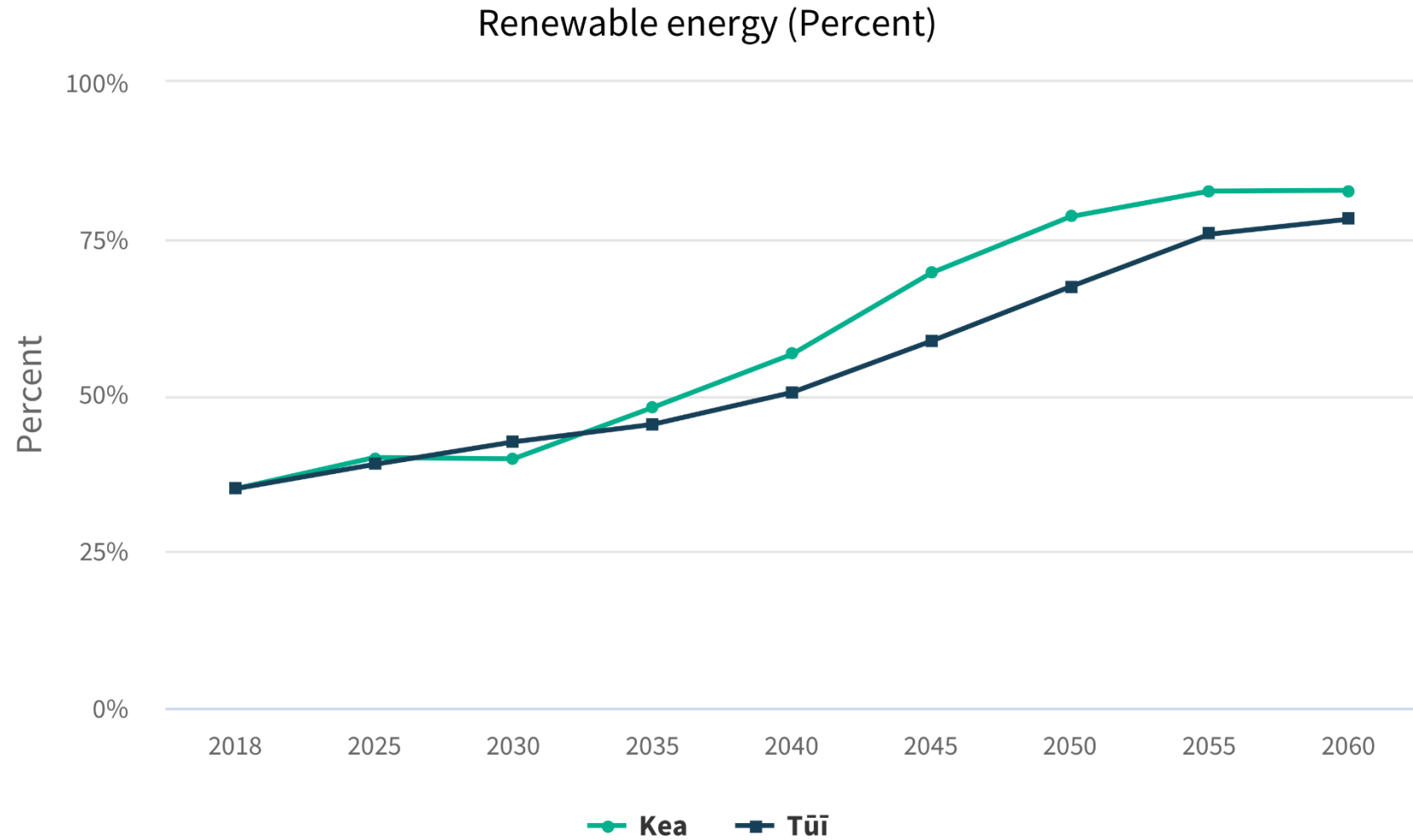
TIMES-NZ 2.0, Scenario: Tūi



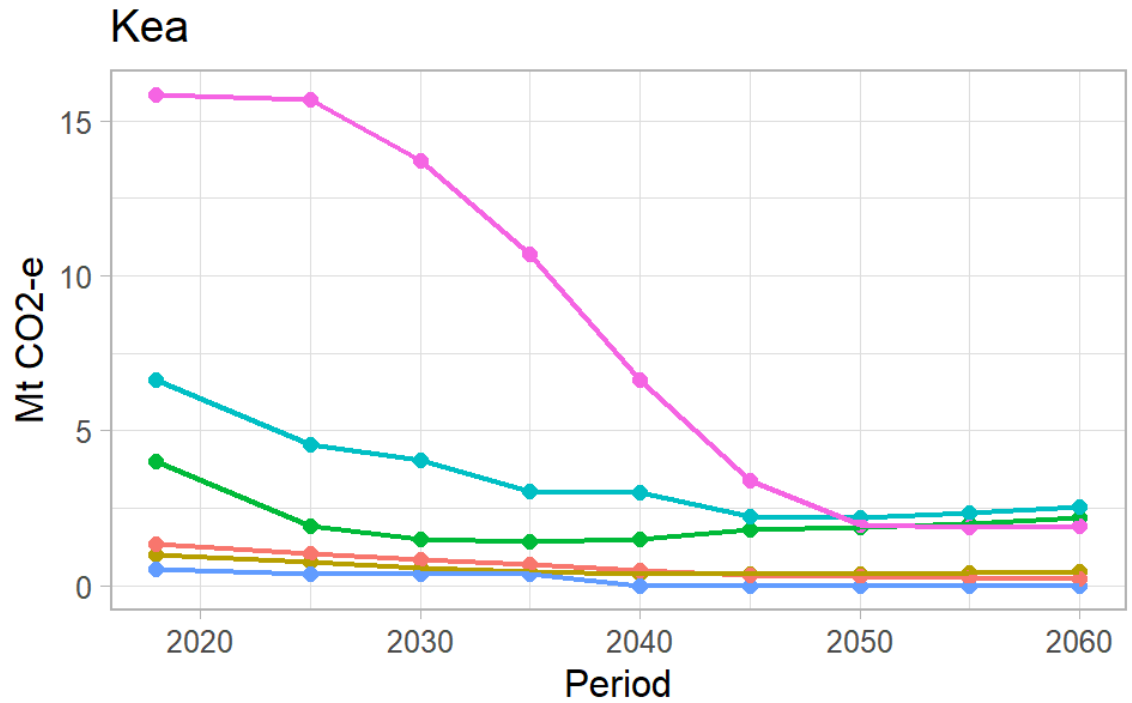
Cumulative emissions



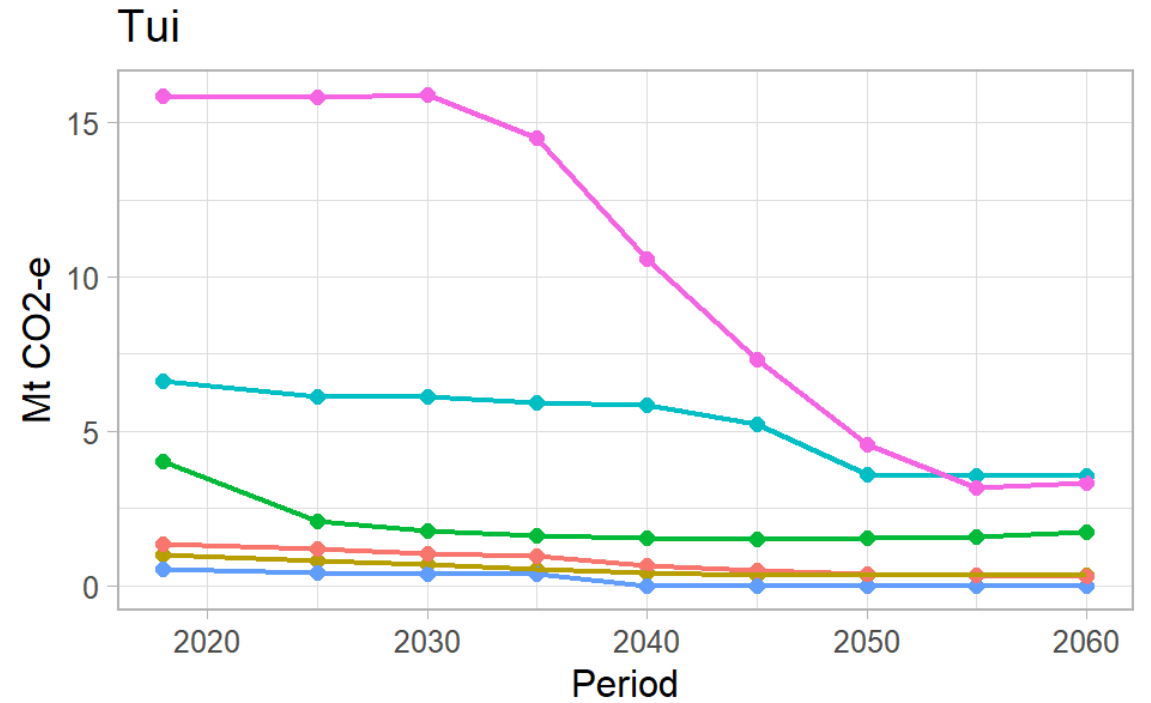
Renewable Energy



Emissions By Sector



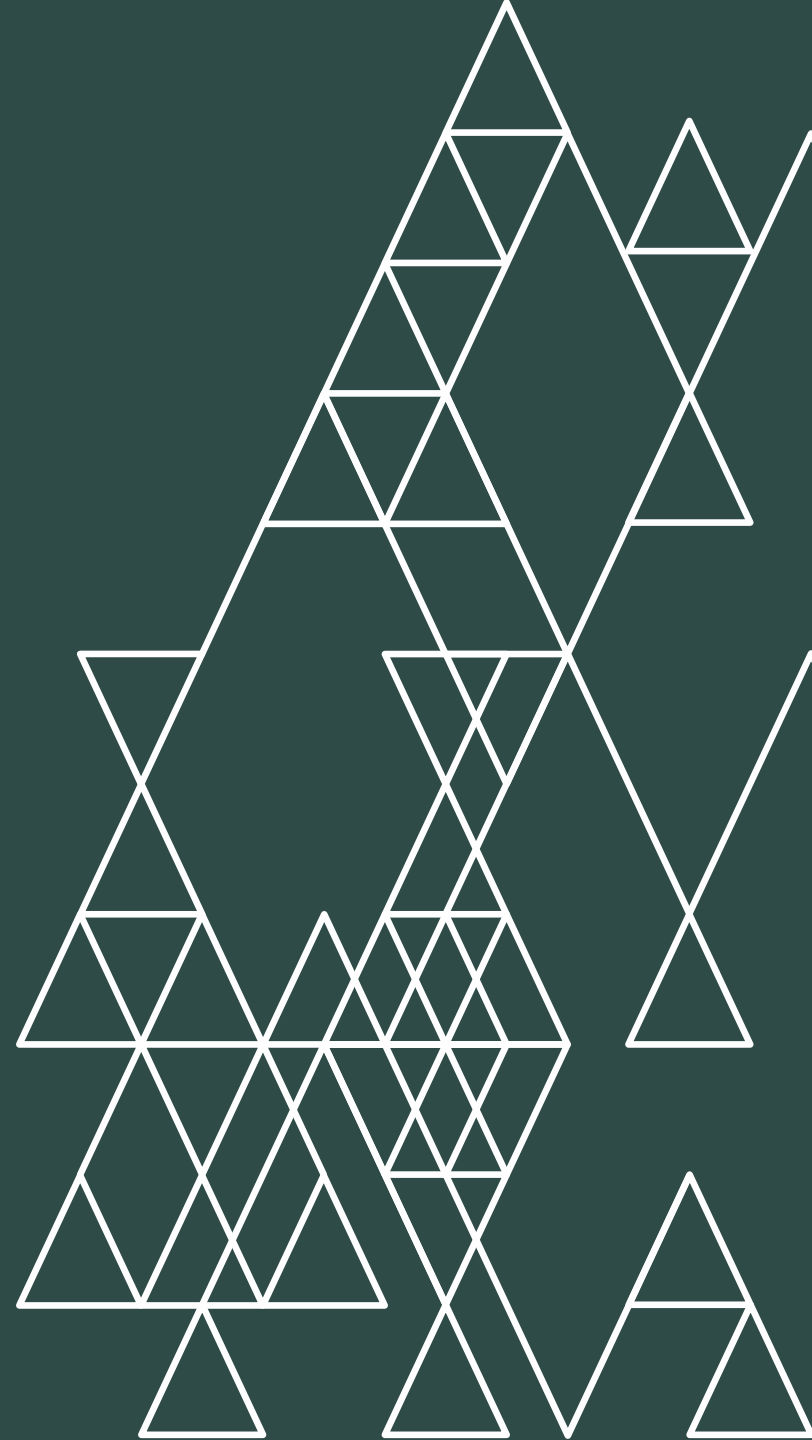
—●— Agriculture, Forestry, and Fishing —●— Electricity —●— Residential
—●— Commercial —●— Industrial —●— Transport



—●— Agriculture, Forestry, and Fishing —●— Electricity —●— Residential
—●— Commercial —●— Industrial —●— Transport



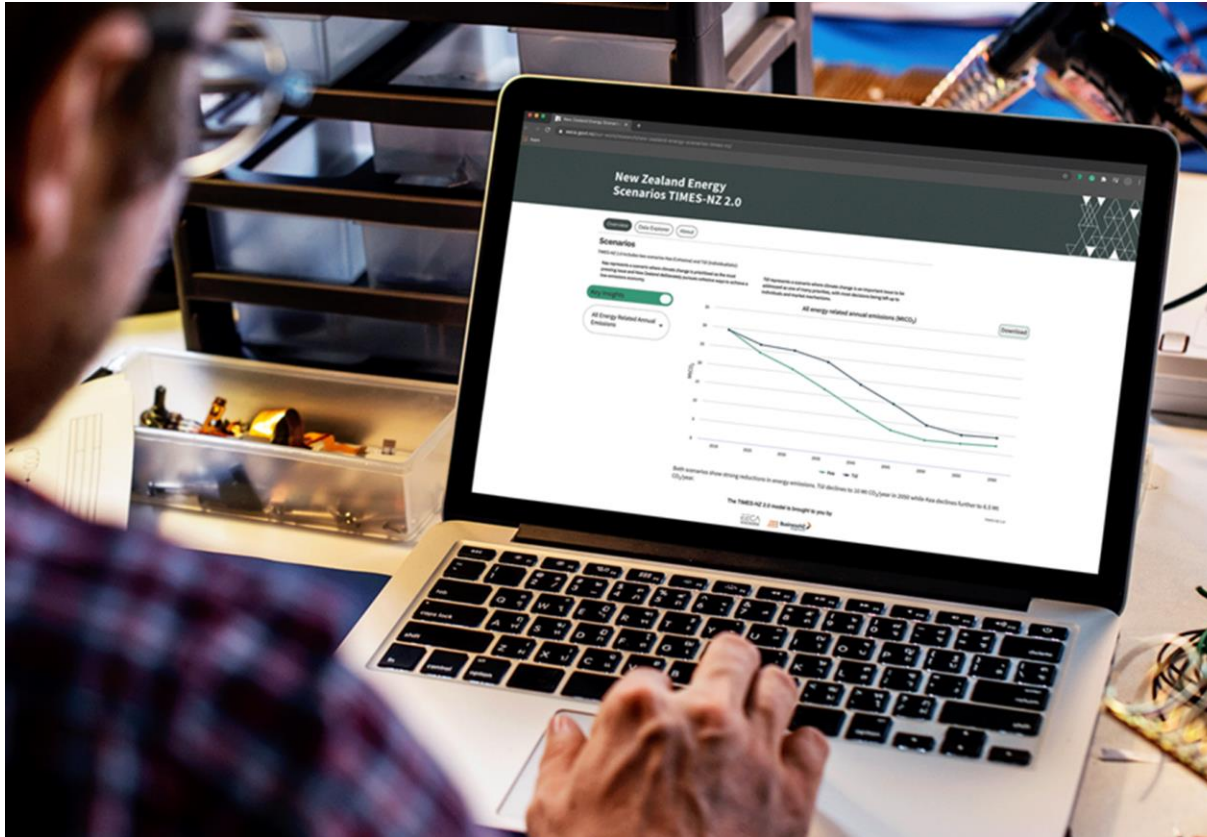
Data Visualisation



NZ Energy System Scenarios TIMES-NZ 2.0

Innovative communication

To ensure results are accessible to the community, and clearly communicated, TIMES-NZ 2.0 data have been released as an interactive visualisation app: <http://www.eeca.govt.nz/times-nz>



NZ Energy Scenarios TIMES-NZ 2.0

<https://times.bec.org.nz/>

The screenshot shows the landing page for the NZ Energy Scenarios TIMES-NZ 2.0 project. At the top left, the logos for the World Energy Council and BusinessNZ Energy Council are displayed. A navigation menu at the top right includes links for HOME, INSIGHTS, SECTORS, TOOL, DOWNLOADS, ABOUT, MEDIA, and CONTACT. The main content area features a background illustration of snow-capped mountains and a forest. The title "NEW ZEALAND ENERGY SCENARIOS" is centered in blue, with "TIMES-NZ 2.0" below it in orange. A paragraph of text explains that the EECA, BusinessNZ Energy Council, businesses, academia, and government have prepared two potential scenarios for New Zealand's energy future to 2060. Two orange buttons labeled "INSIGHTS" and "TOOL" are positioned below the text. The page is decorated with illustrations of two New Zealand birds: a colorful parrot on the left and a blue-green bird on the right. A small yellow double-arrow icon is at the bottom center.

