Ināia tonu nei: a low emissions future for Aotearoa

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EPOC Winter Workshop 2021

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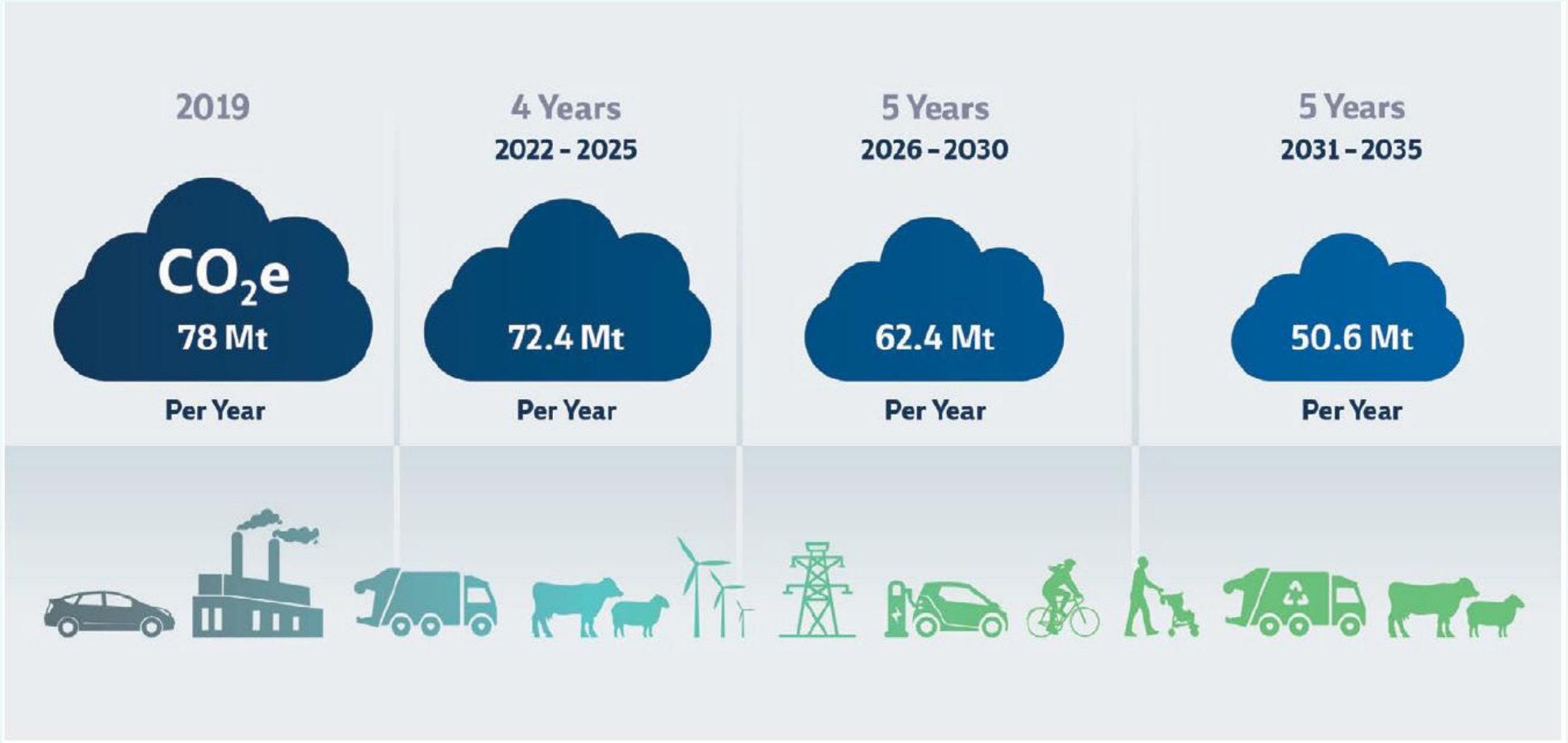
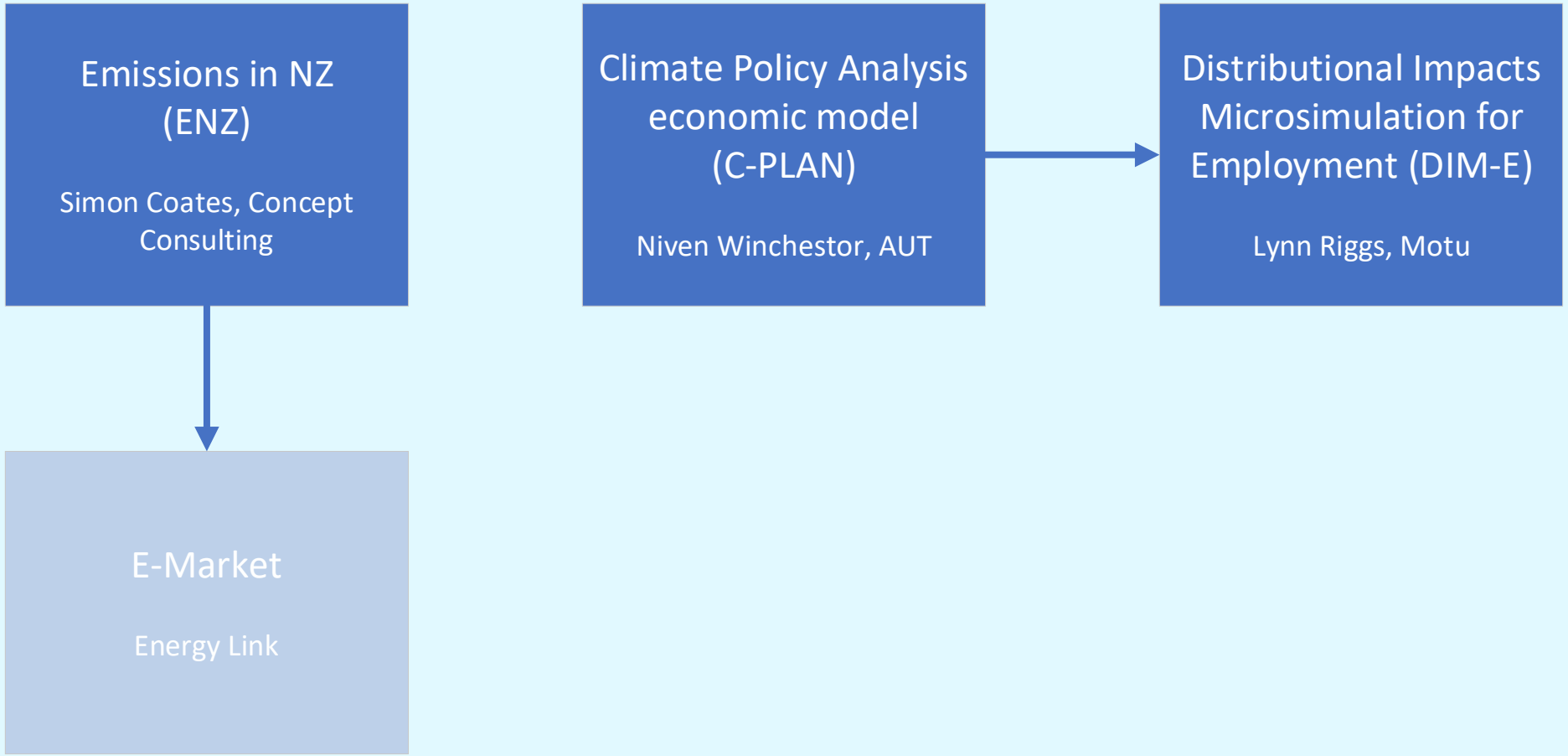
Emissions budgets



Emissions budgets 2022 - 2035 (AR5) annual average emissions

Our modelling ecosystem



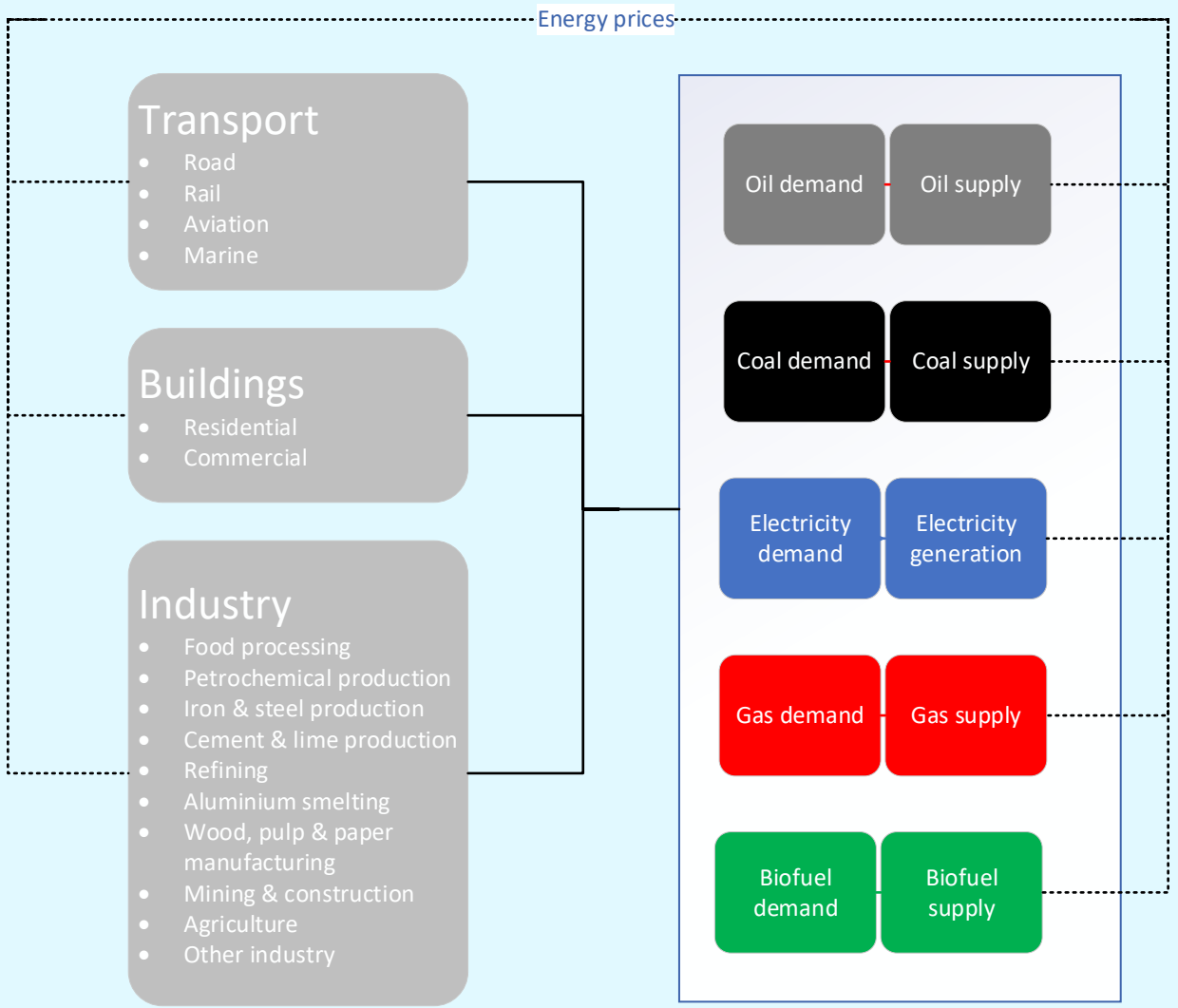
Emissions in NZ model (ENZ)

- Used to set emission budgets
- Bottom-up techno-economic model of all emitting sectors of the economy
  - Industry, Transport, Energy supply, Buildings, Agriculture, Forestry, Waste
- Rich set of technology and behaviour mitigation options for reducing emissions
- Key sector linkages
- Captures key sector dynamics

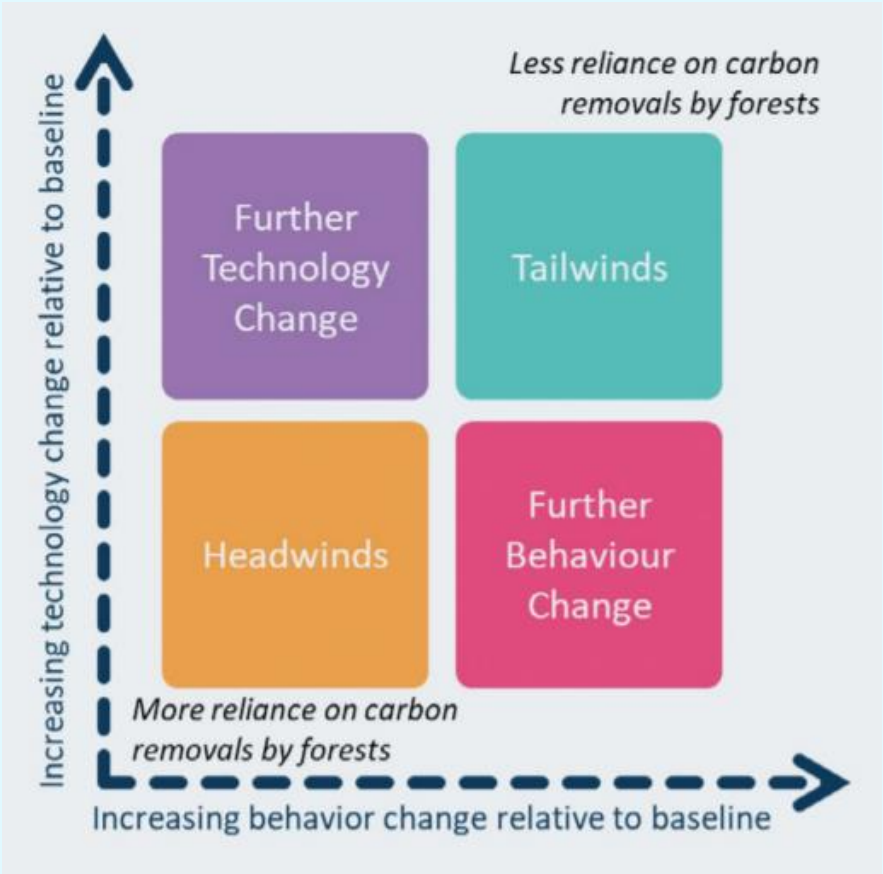
Emissions in NZ model (ENZ)

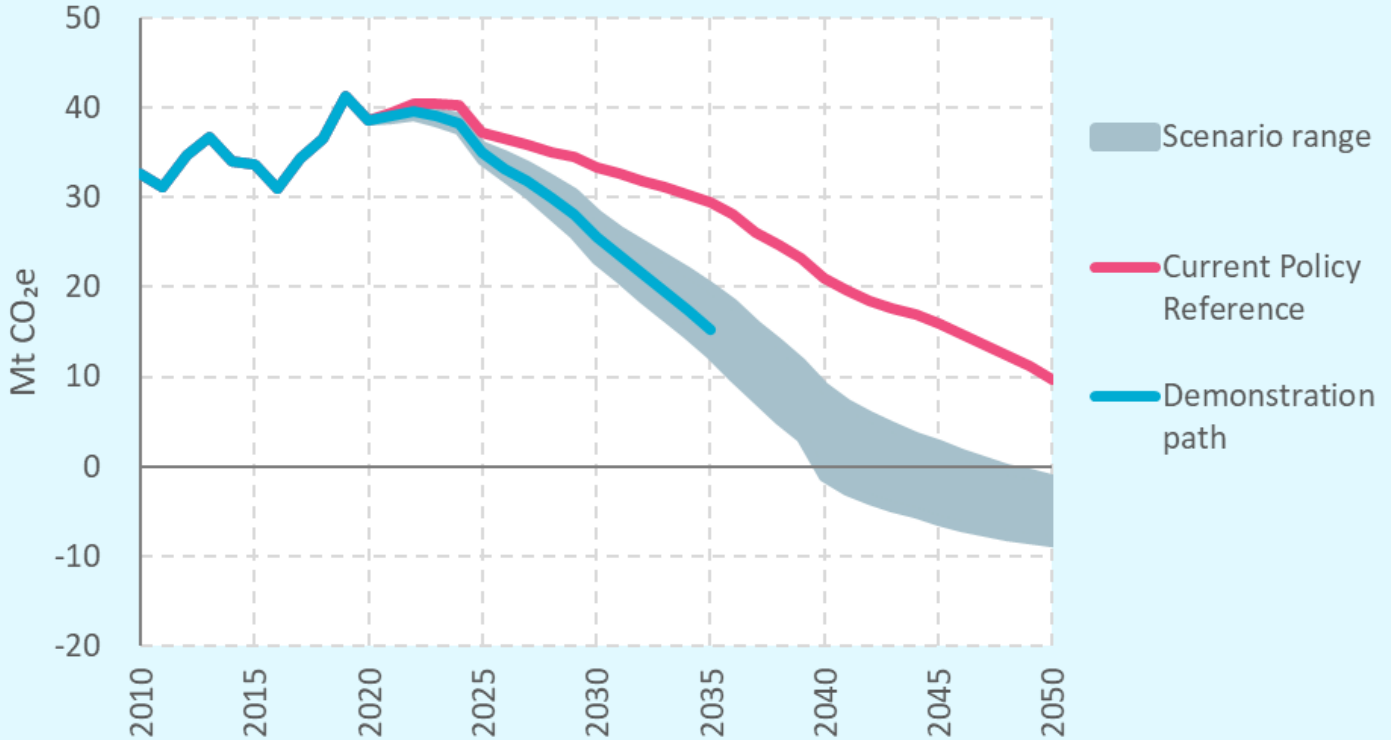
Key inputs:

- Emissions value
- Population
- GDP
- Coal, Oil, LNG, biomass price



Reference, Scenarios and Pathway

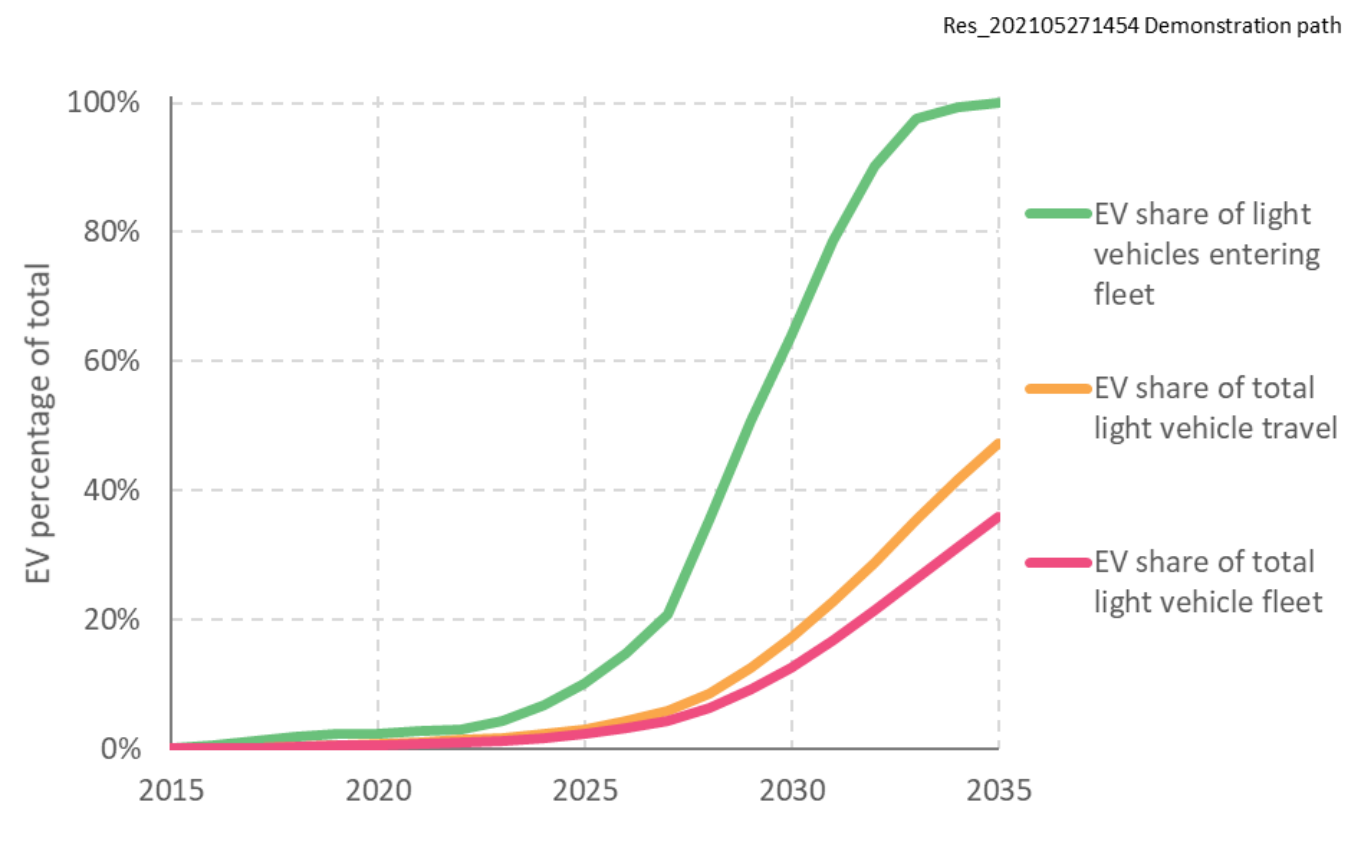




Net long-lived emissions (MtCO2e)

Electrification – Road Transport

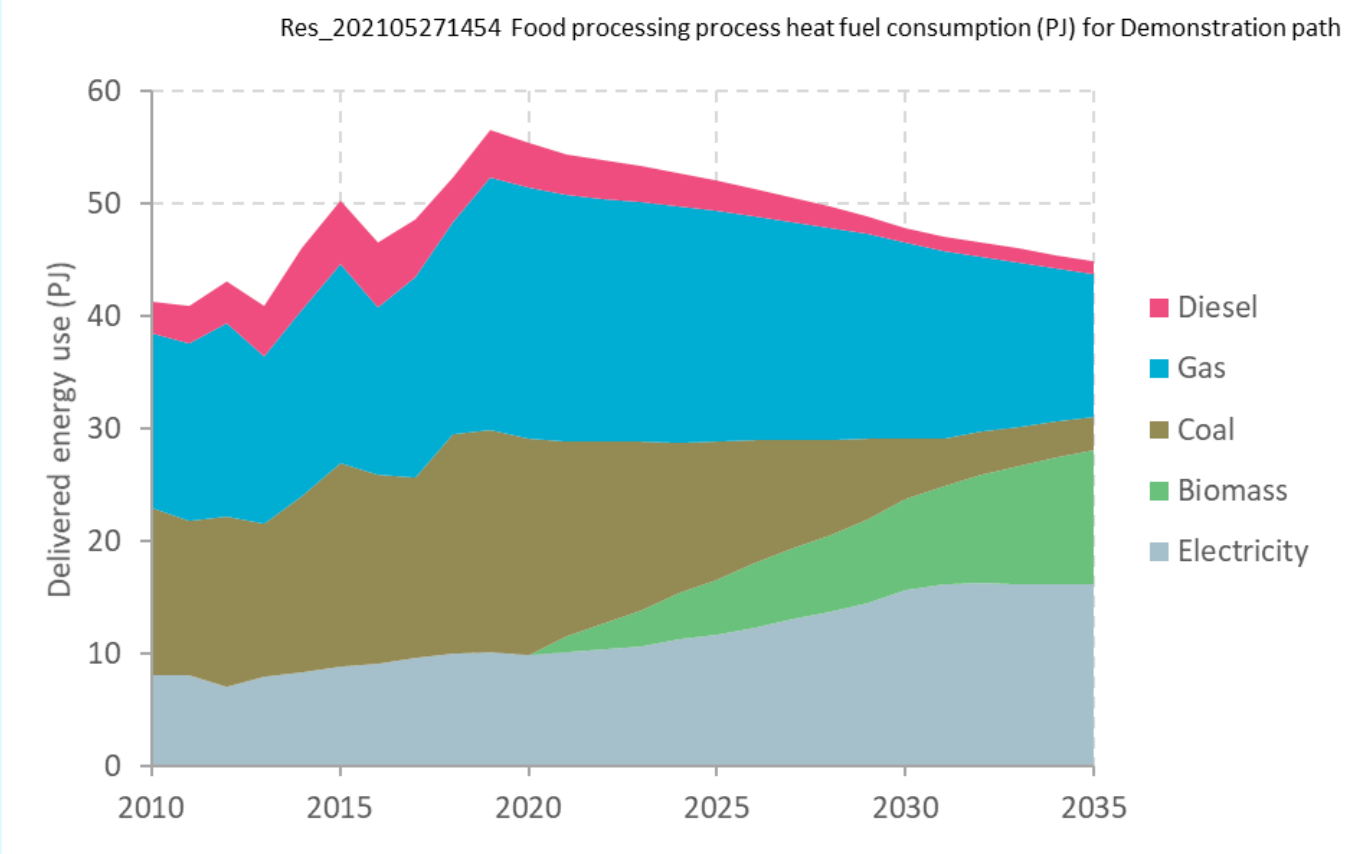
- Fleet model
  - Light passenger & commercial vehicles
  - Medium and heavy trucks
  - Buses
- Vehicle selection based on total cost of ownership
- Rate constraints applied



EV uptake for light vehicles

Electrification – Process heat

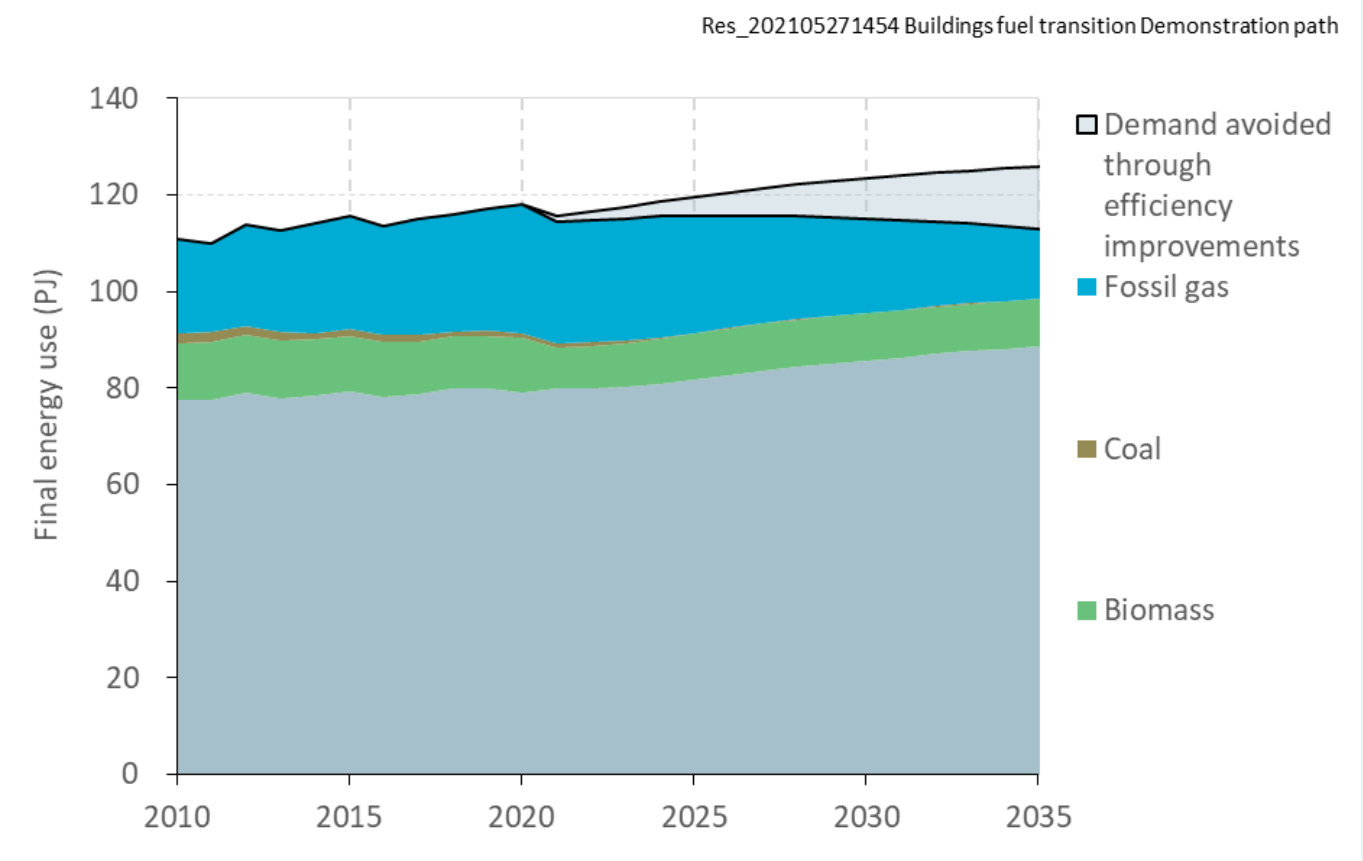
- Regional process heat demand linked to agricultural production
- Fuel switching to biomass to supply limits
- Electrify residual load



Food processing fuel consumption (PJ)

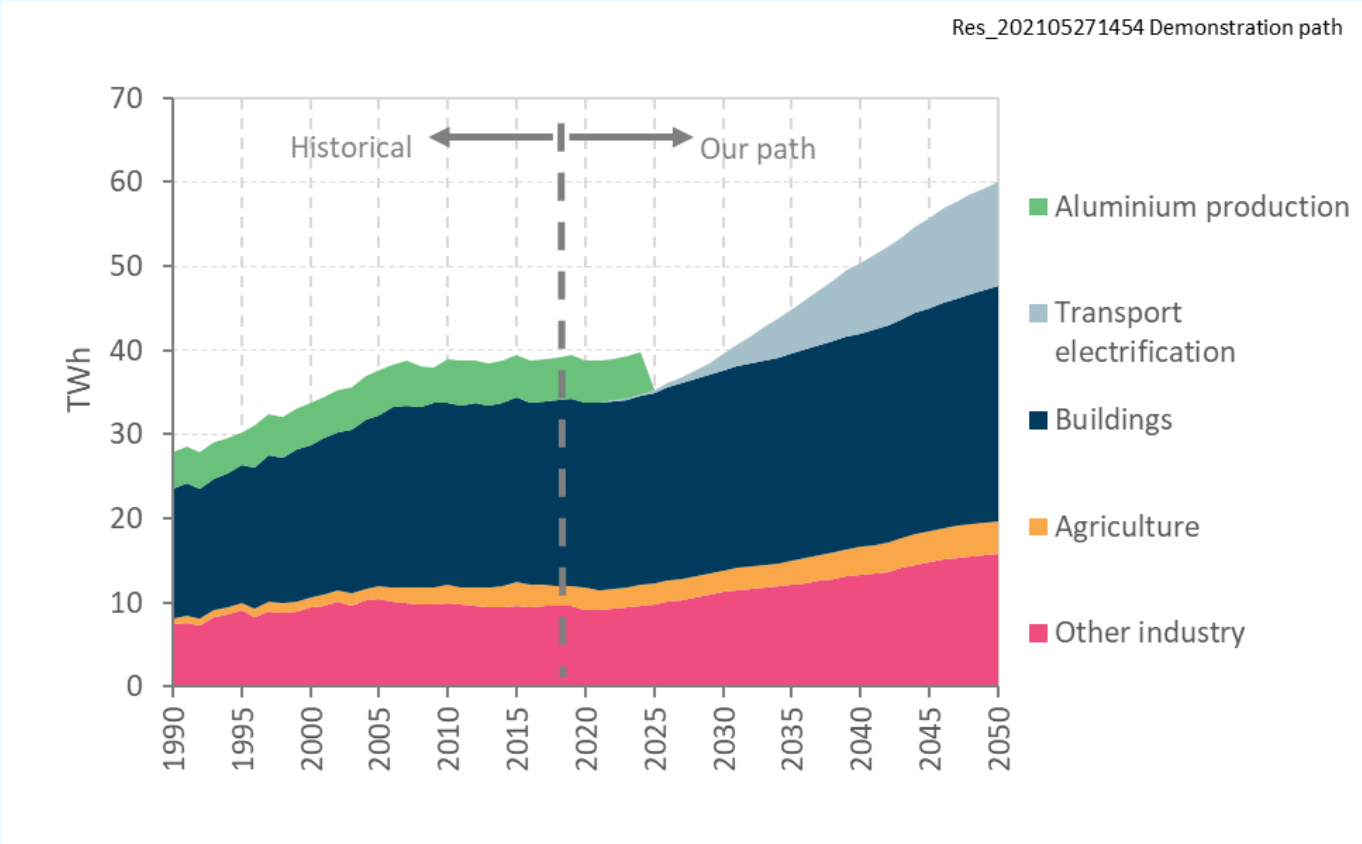
Electrification – building heating

- Building stock model
- Gas or electric heating selection based on relative costs



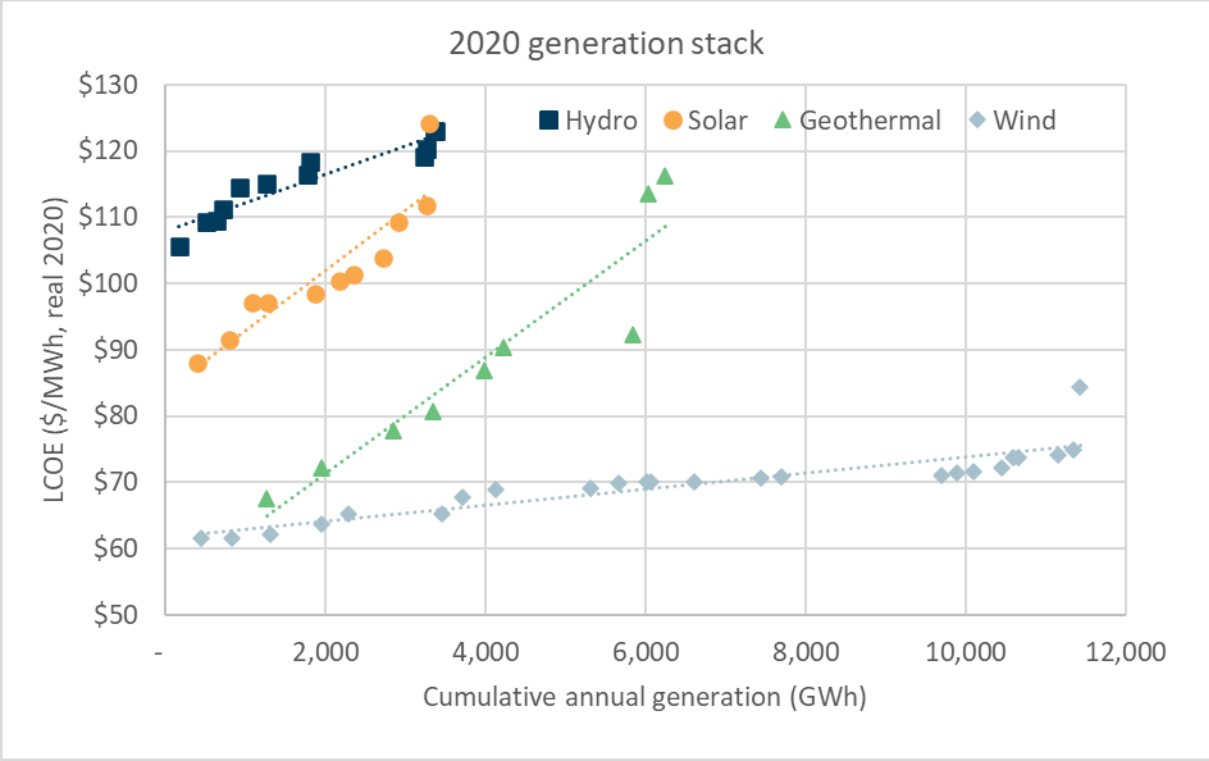
Fuel consumption in residential, commercial and public buildings (PJ)

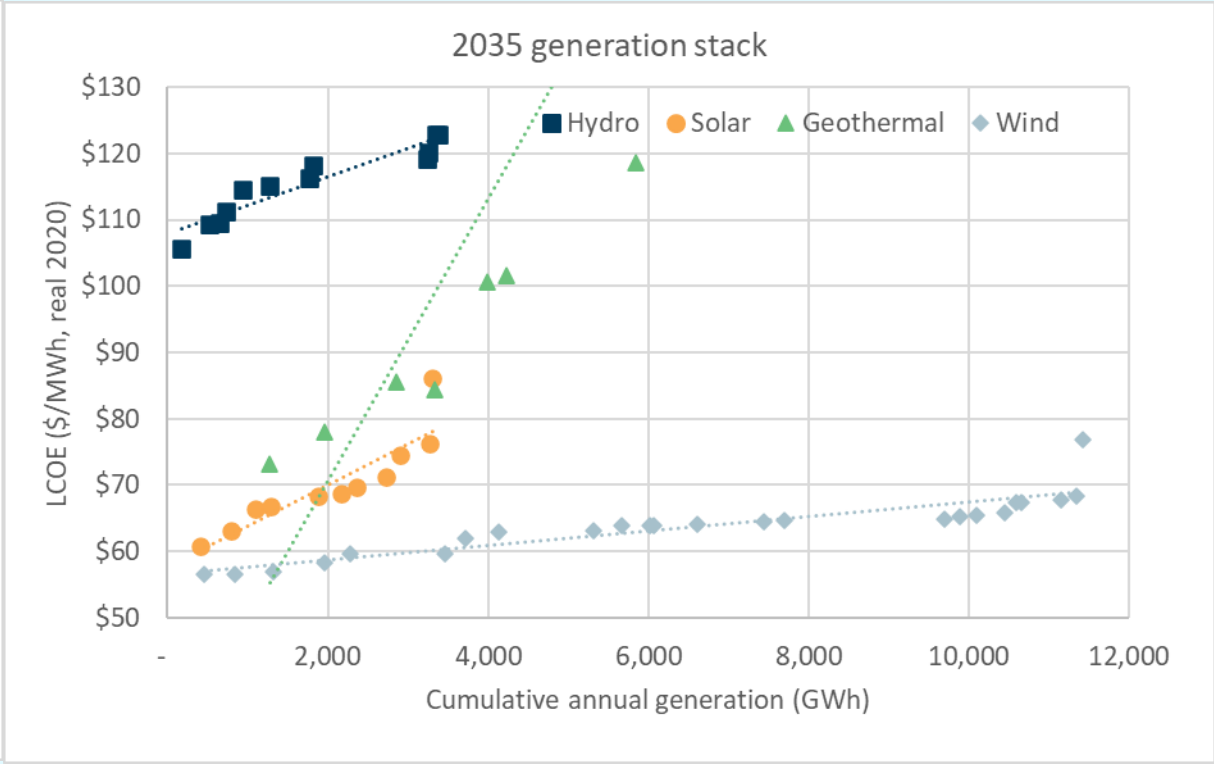
Electricity demand



Electricity demand growth for the Demonstration Pathway (TWh)

Generation assessment





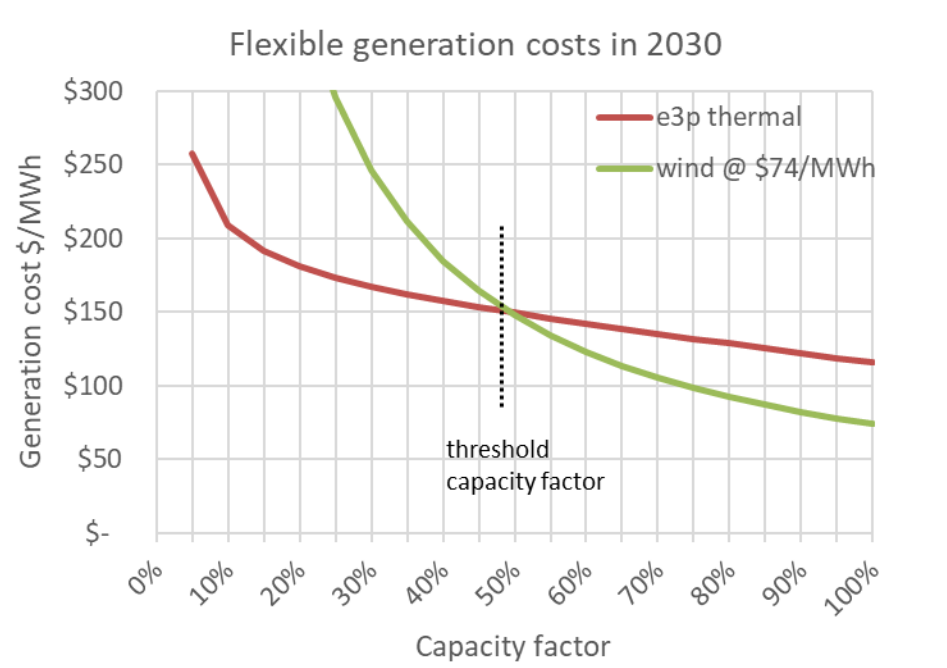
Generation operation and expansion

Baseload demand
= **37-60TWh**

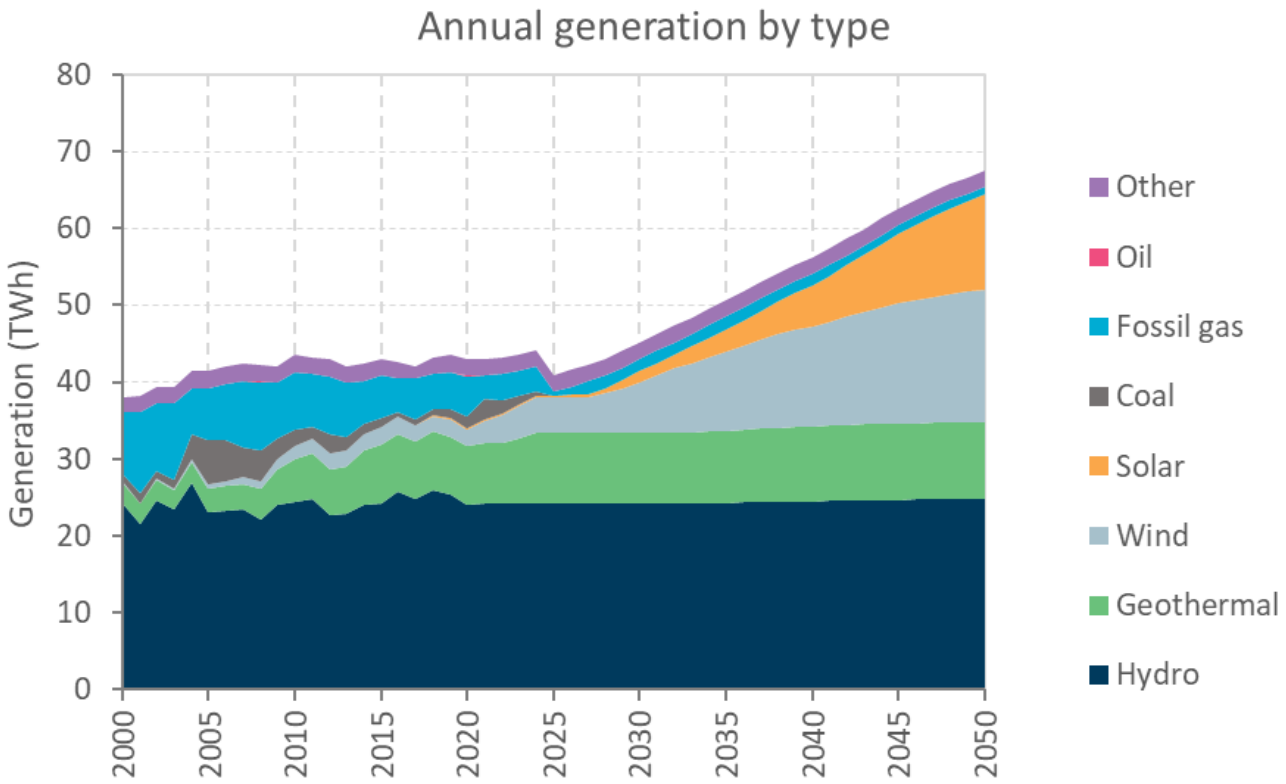
Baseload supply:
- Renewables
- Firmed with hydro

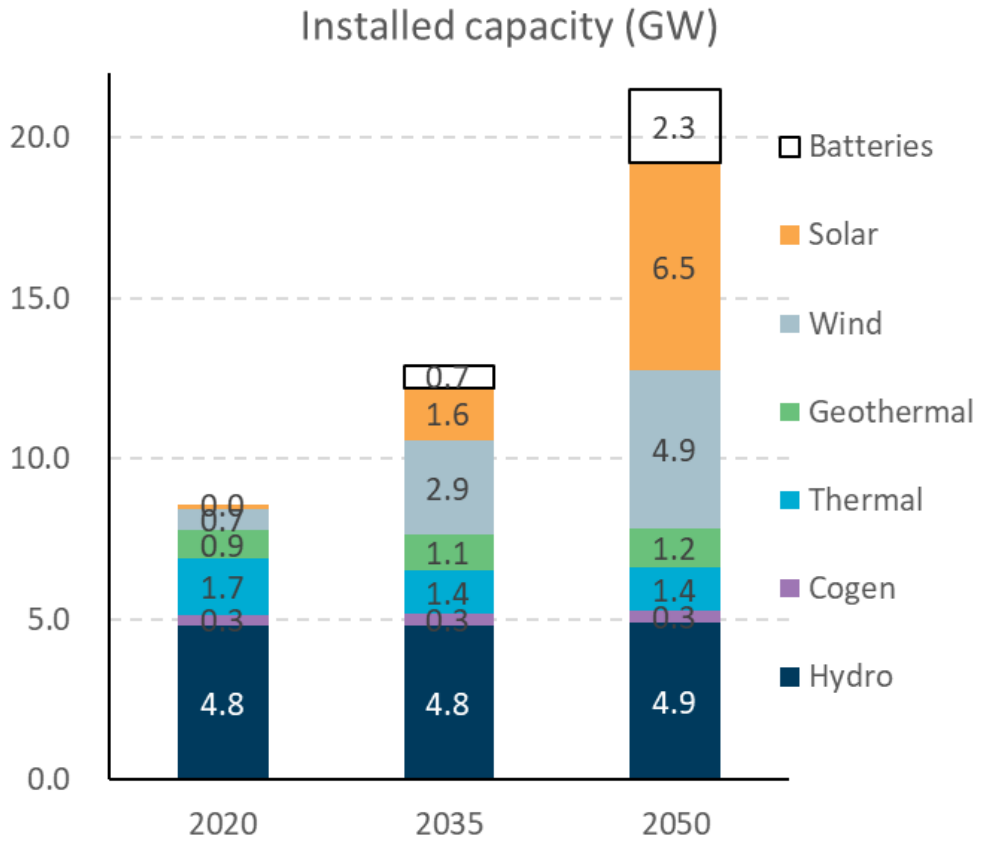
Flexible demand **~ 6TWh**
- hydro variability
- seasonal variability

Flexible supply
- Thermals
- Renewable overbuild

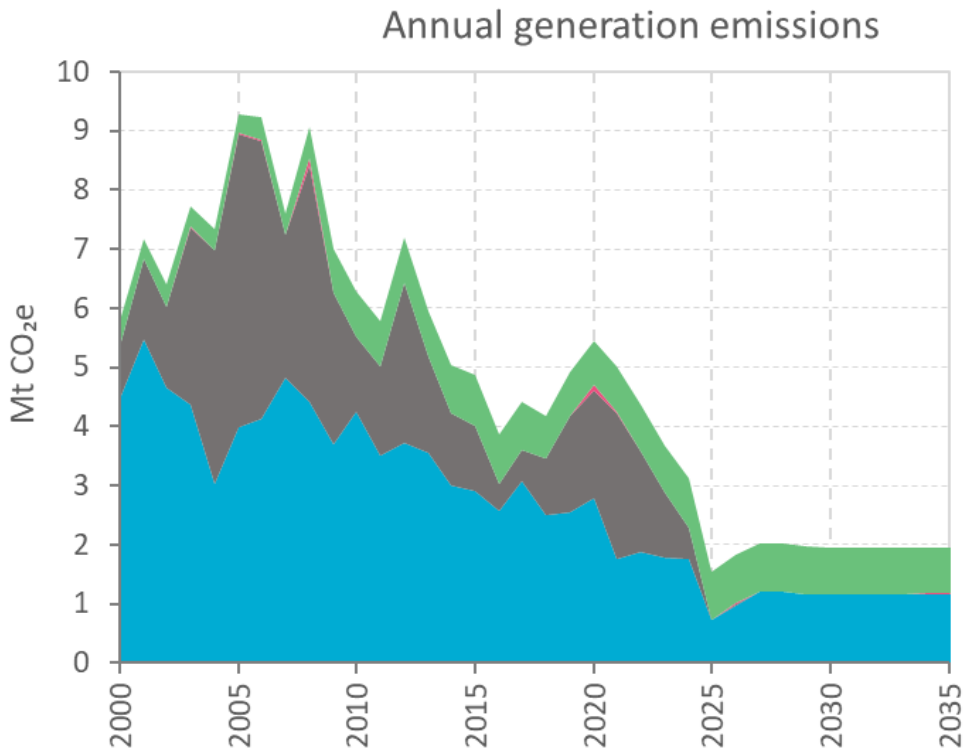


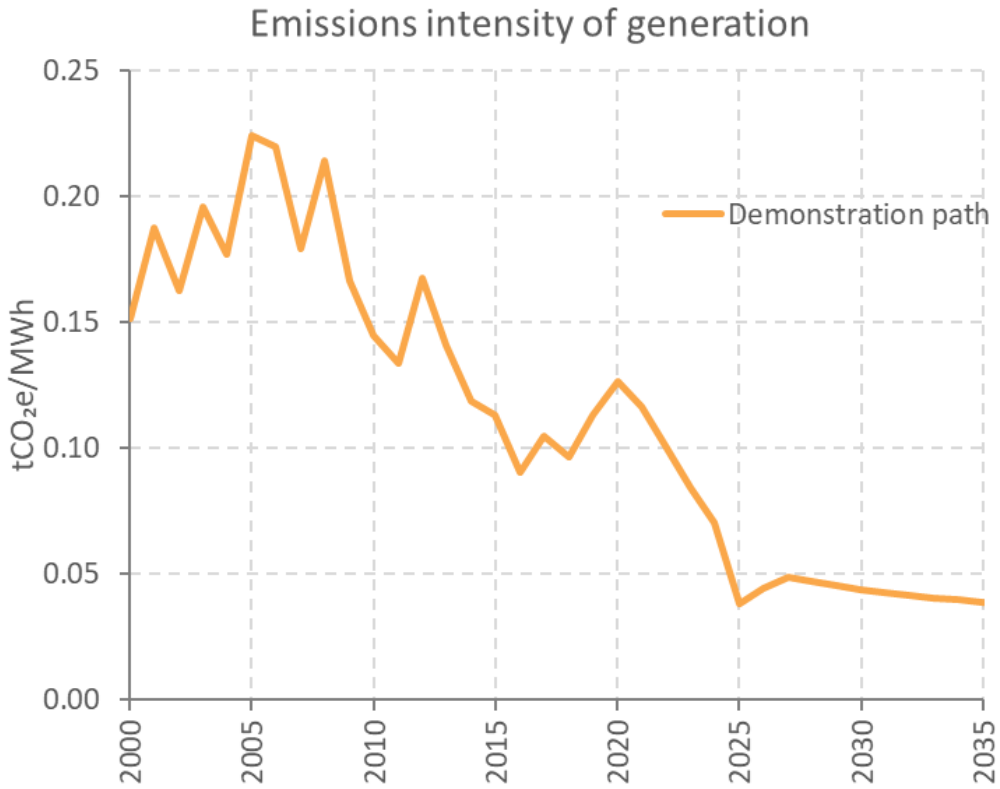
Generation operation and expansion



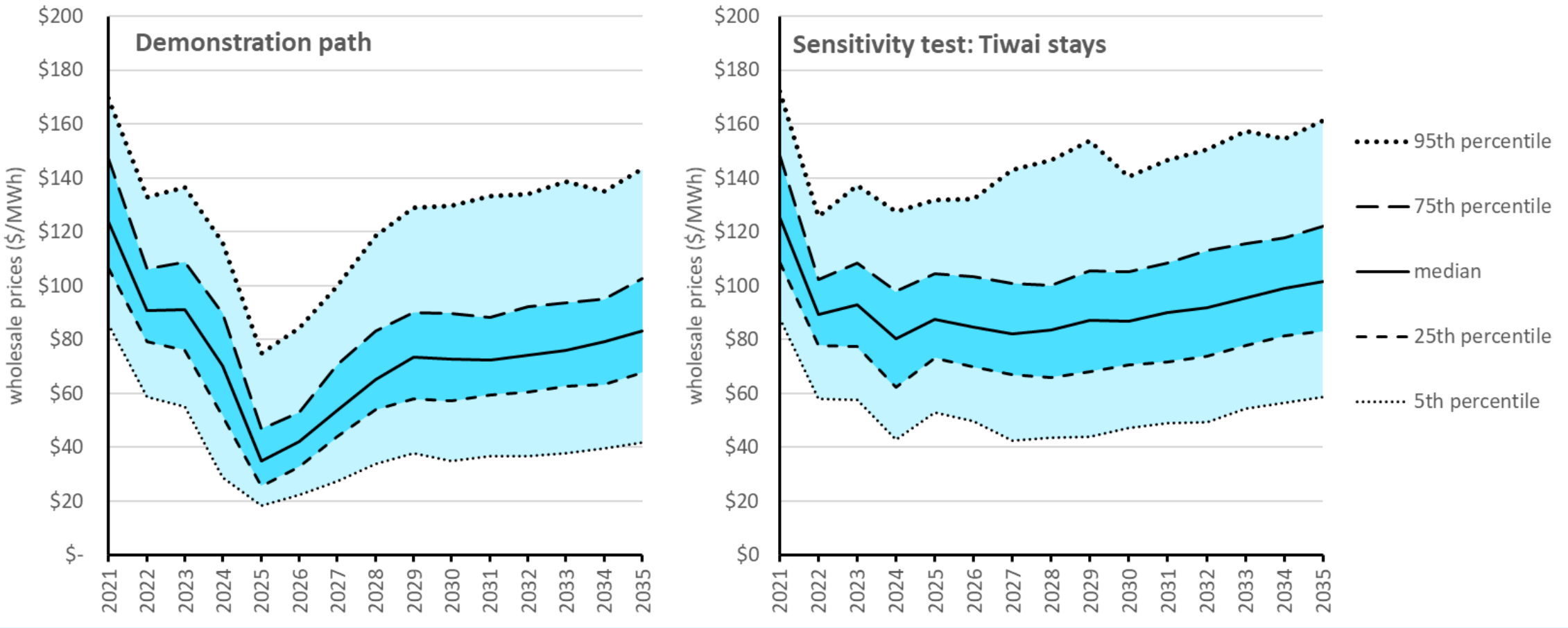


Generation emissions





Wholesale prices

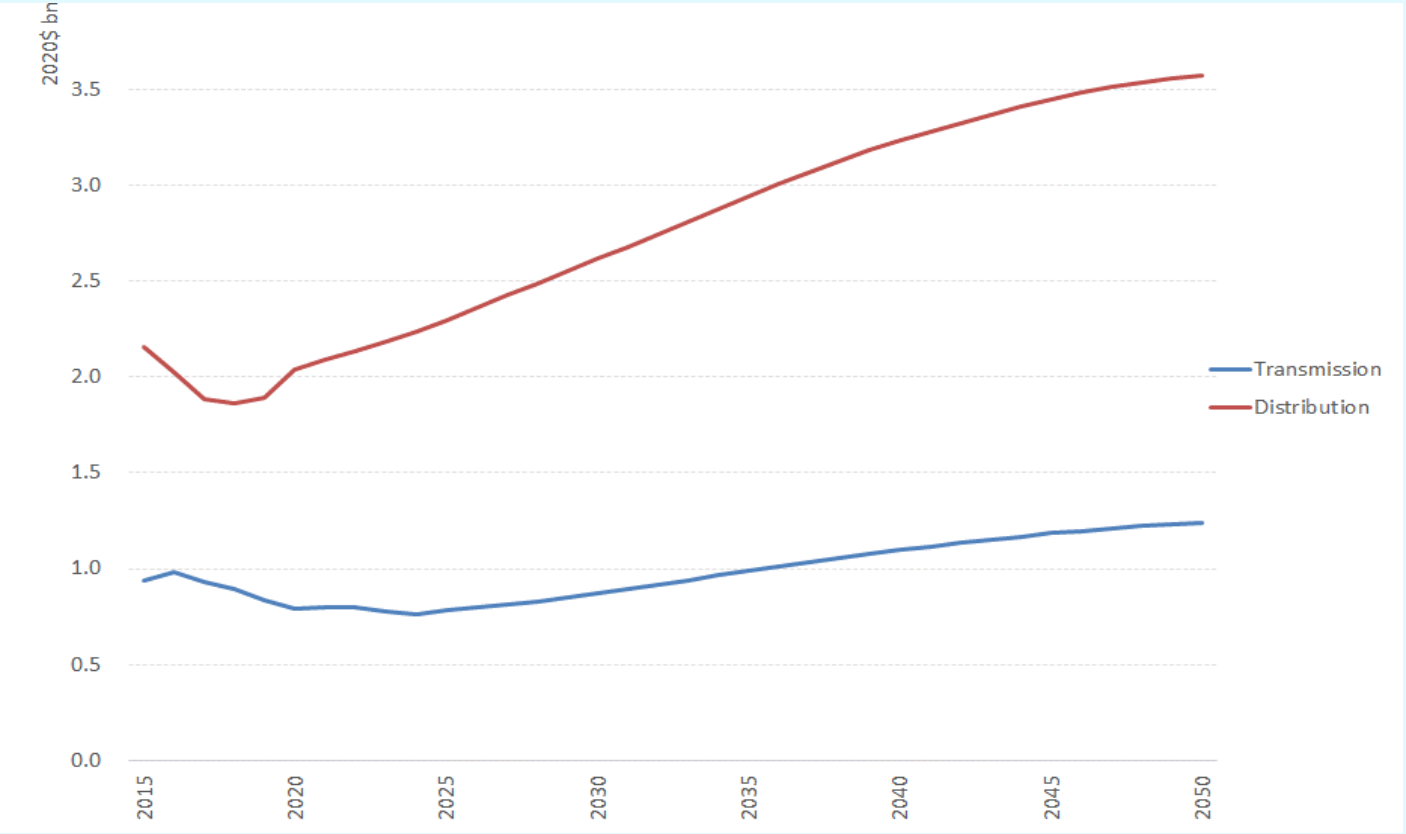


Time-weighted average wholesale prices the Haywards GXP ($/MWh 2020)

Network costs

Network costs are driven by:

- Gross demand (MW, GWh)
- Number of ICPs (network extent)
- Other factors (e.g maintenance)

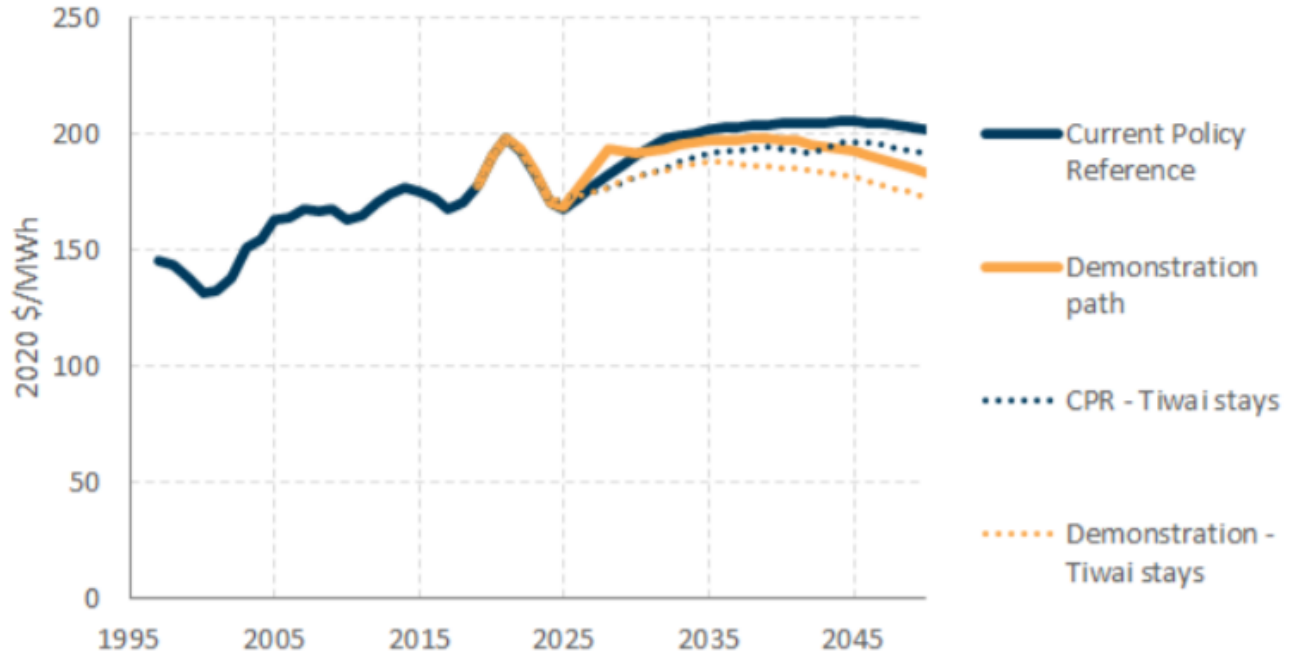


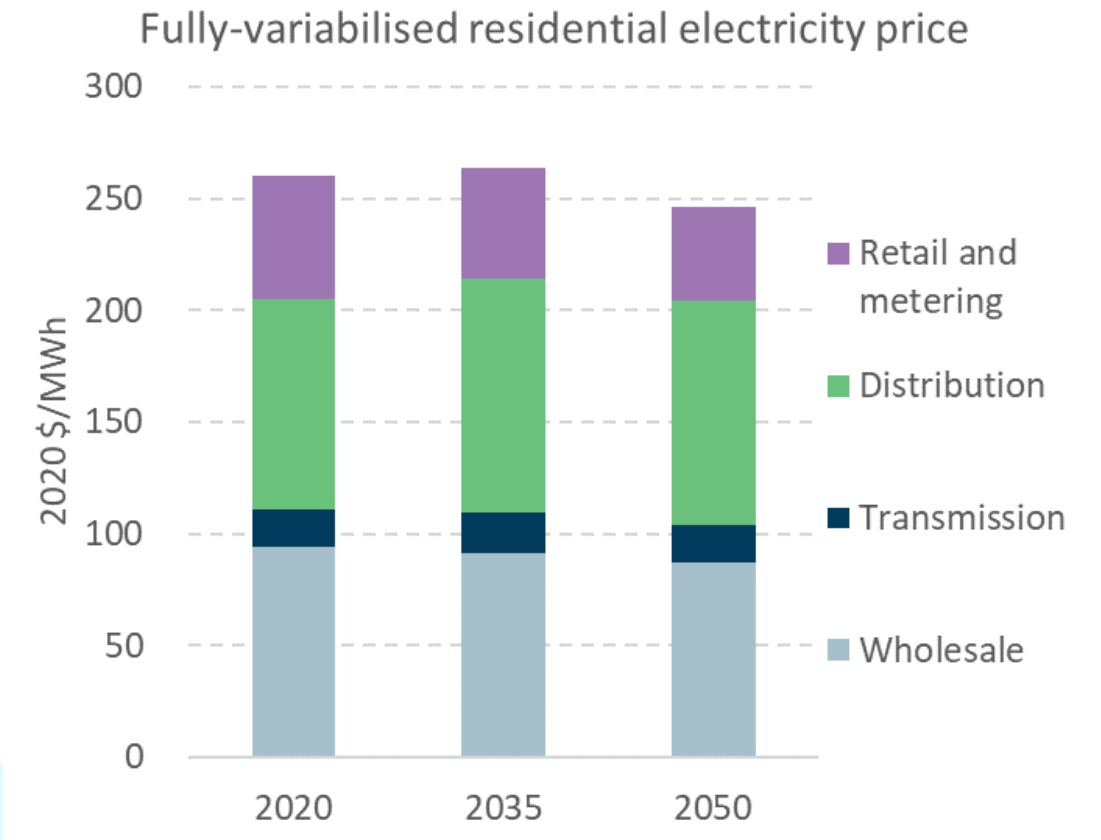
Projected electricity network costs under the demonstration path (2020 $bn)

Source: Modelling energy costs and prices – A technical note supporting Ināia tonu nei, Concept Consulting

Consumer prices

Figure 7: Fully-variablised electricity prices across all consumers





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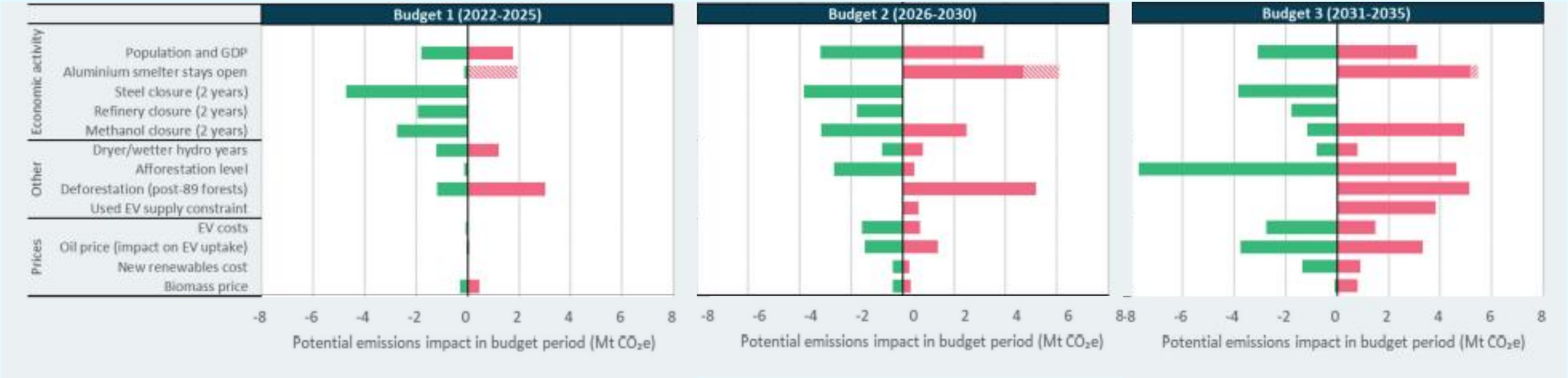
Sensitivities



Thanks

For more information:

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CCC

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- Greg Sise

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