4/9/26

TIMES-NZ 3.0

How we built it and what it's telling us

Presentation to EPOC Winter Workshop 2026

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EECA ENERGY EFFICIENCY & CONSERVATION AUTHORITY
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Overview

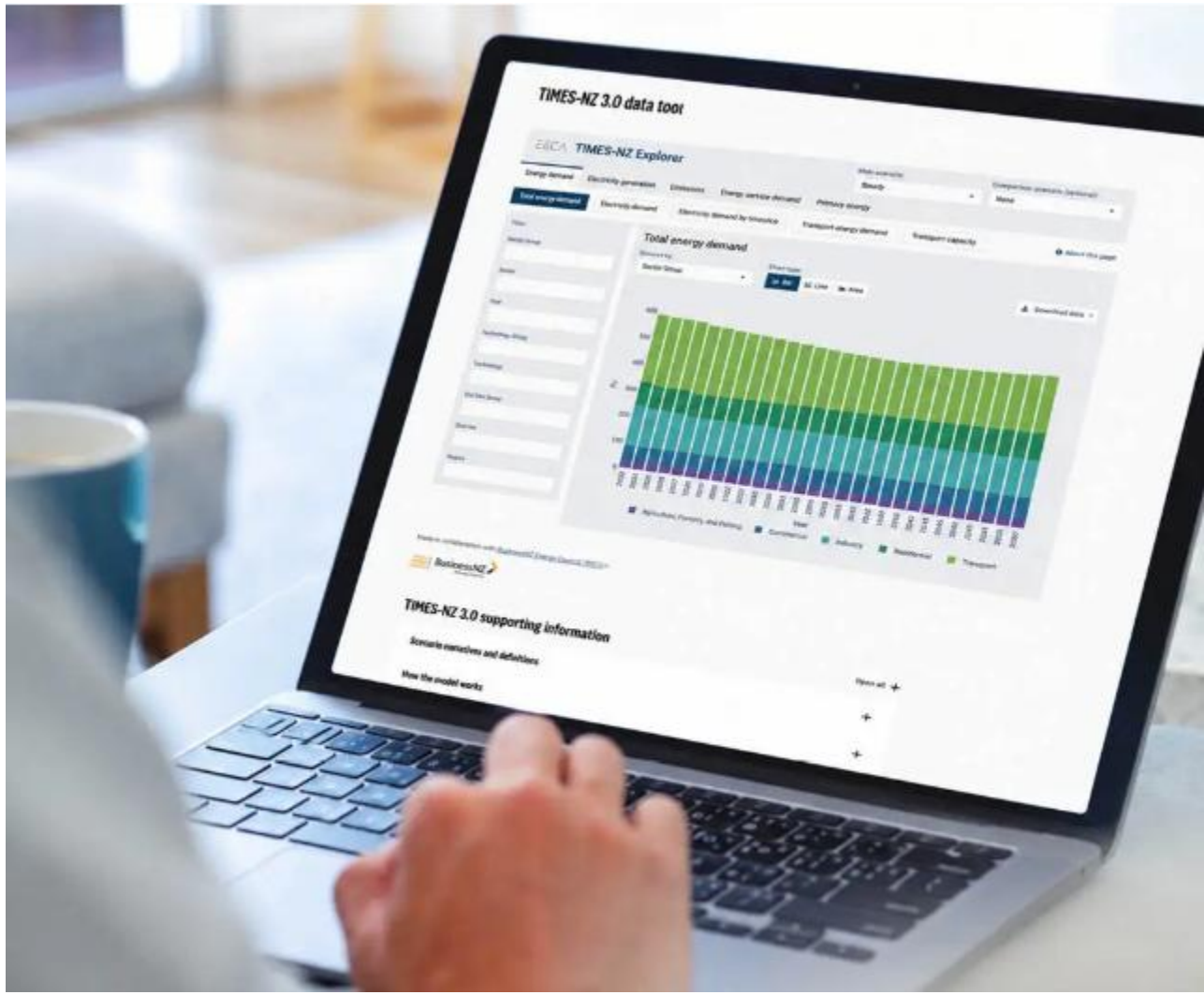
The TIMES-NZ project

The TIMES framework

Building TIMES-NZ:

- Managing complexity
- Scenario design

What the model is telling us



The TIMES-NZ project

A partnership of EECA and BusinessNZ Energy Council

Project history

- 2015: v0 aka BEC2050 | ‘Kayak’ and ‘Waka’
- 2019: v1 aka BEC2060 | ‘Kea’ and ‘Tui’
- 2021: v2 | Refresh of ‘Kea’ and ‘Tui’
- 2026: v3 | ‘Steady’ and ‘Shift’

WORLD ENERGY COUNCIL | BusinessNZ Energy Council | EECA

The TIMES framework

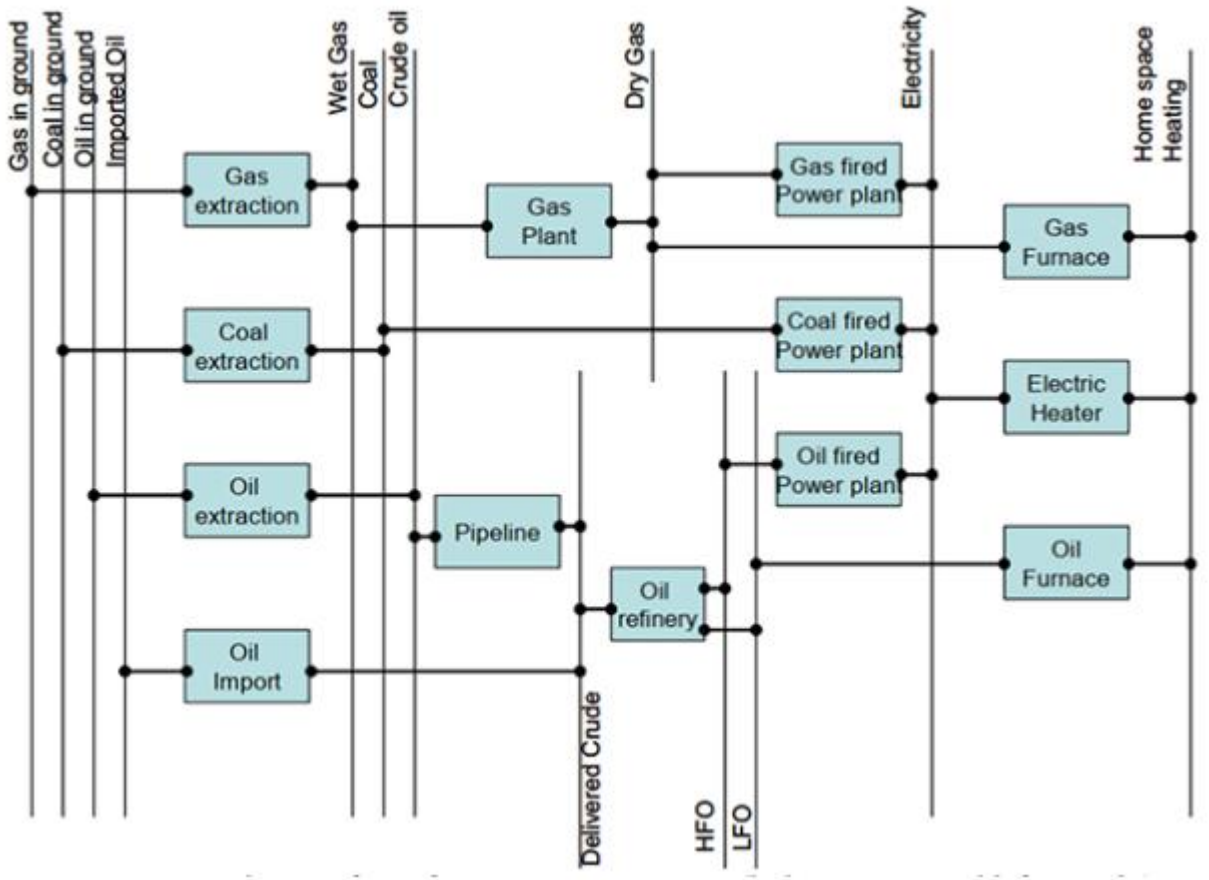
Energy system modelling

The TIMES framework

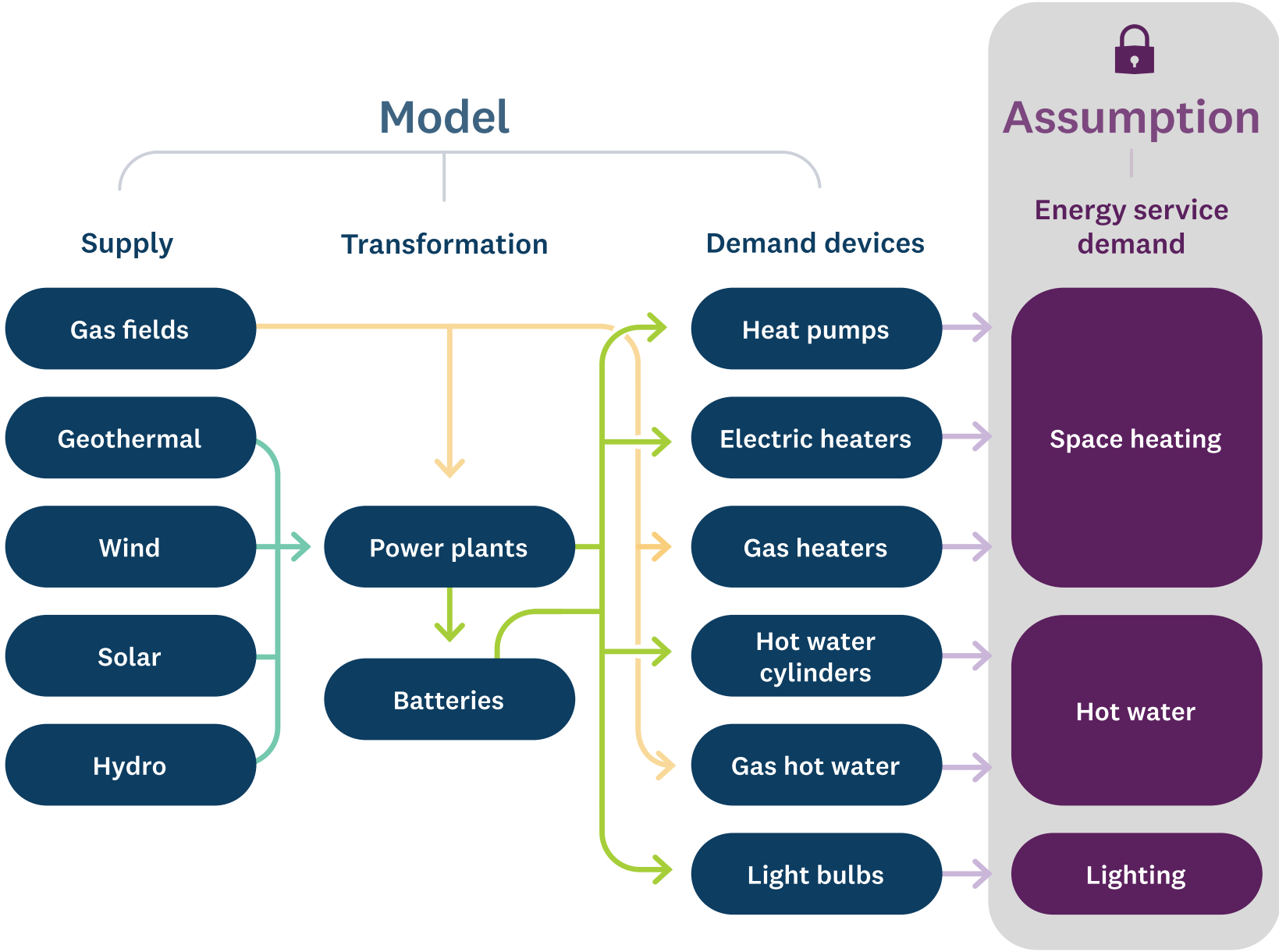
Covers the entire energy system – primary energy, transformation, transportation, distribution, end use, service demand

Key concepts:

- *Energy Service Demand*: focused on meeting demand of useful energy
- *Reference Energy System:* tracks commodity flows through thousands of distinct processes



How it works


Model
Assumption
Supply
Transformation
Demand devices
Energy service demand
Gas fields
Geothermal
Wind
Solar
Hydro
Power plants
Batteries
Heat pumps
Electric heaters
Gas heaters
Hot water cylinders
Gas hot water
Light bulbs
Space heating
Hot water
Lighting

Framework pros and cons

Strengths

Comprehensive and flexible: can reflect many complex interactions

Fuel switching results are model outputs, not input assumptions – genuine insights possible

Feature set built over decades: performant and comprehensive

Weaknesses

Deterministic scenarios: not full coverage of uncertainty

System cost approach does not always reflect real-world capital constraints: tweaking and tuning required

Complexity of interactions: challenging to troubleshoot

Building TIMES-NZ

Managing complexity

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Building TIMES-NZ: the databases

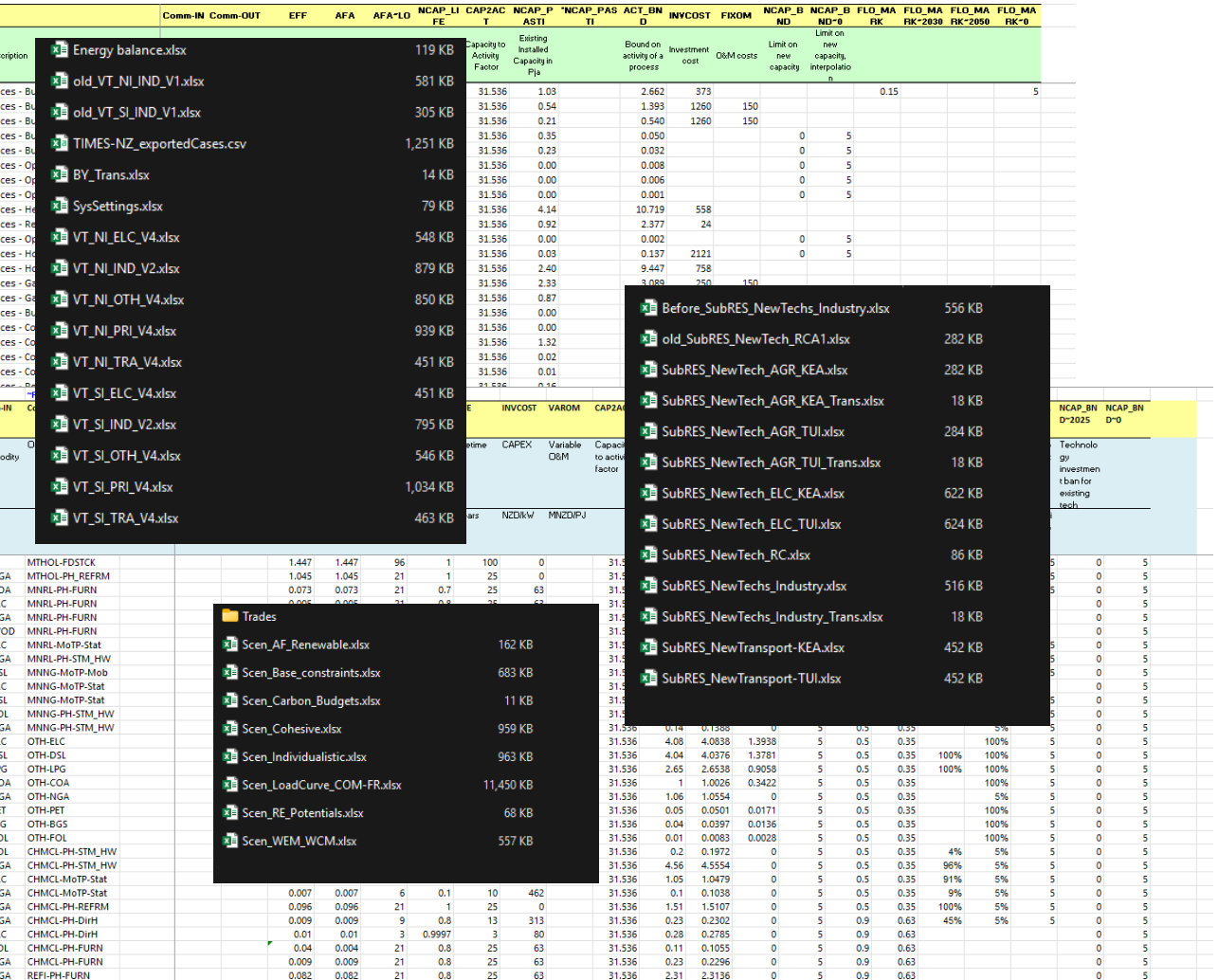
The boring stuff is the real work

Underlying database of:

- Demand devices, efficiencies, costs
- Powerplants (present and future)
- End use demand profiles and related technologies
- Demand regionalisation
- Transmission, distribution, HVDC parameters
- Cost curve scenarios
- Security margins
- More…

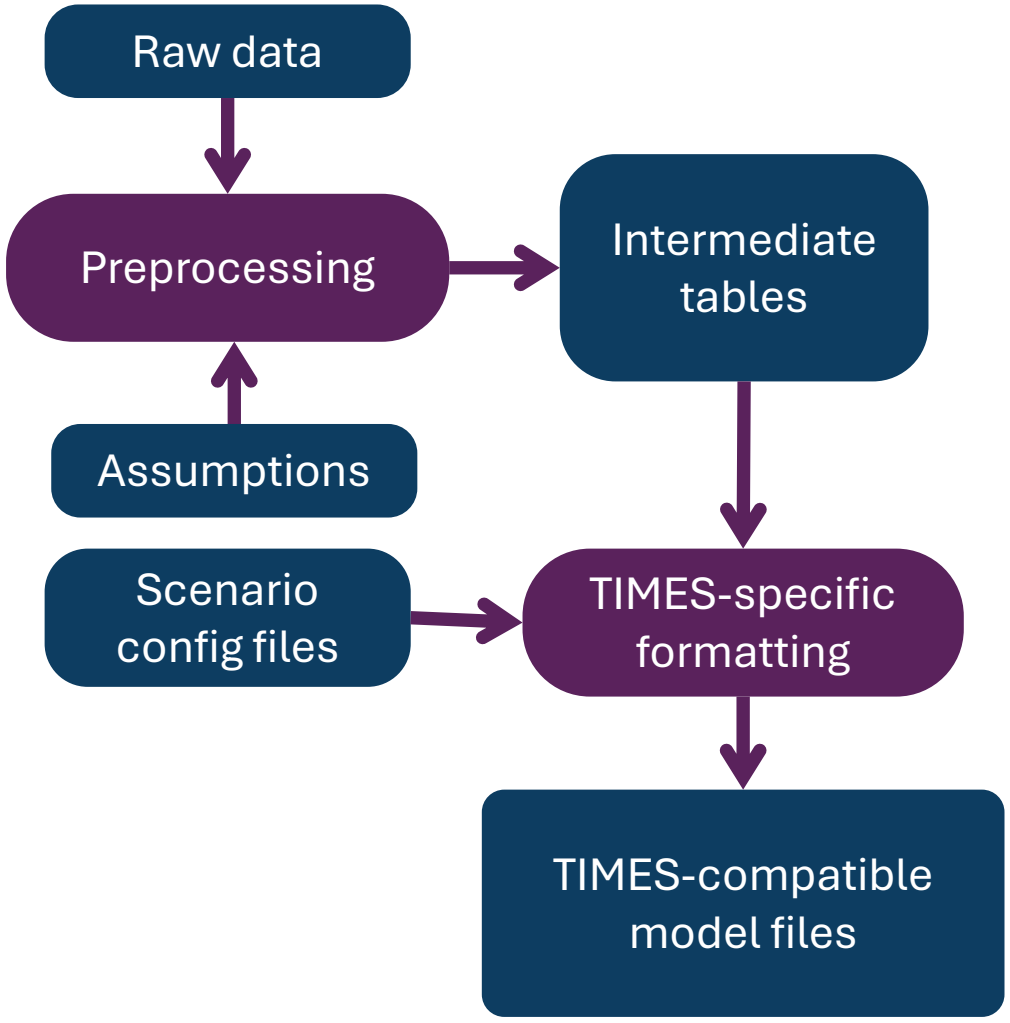
Building TIMES-NZ: the old pipeline

The boring stuff is the real work

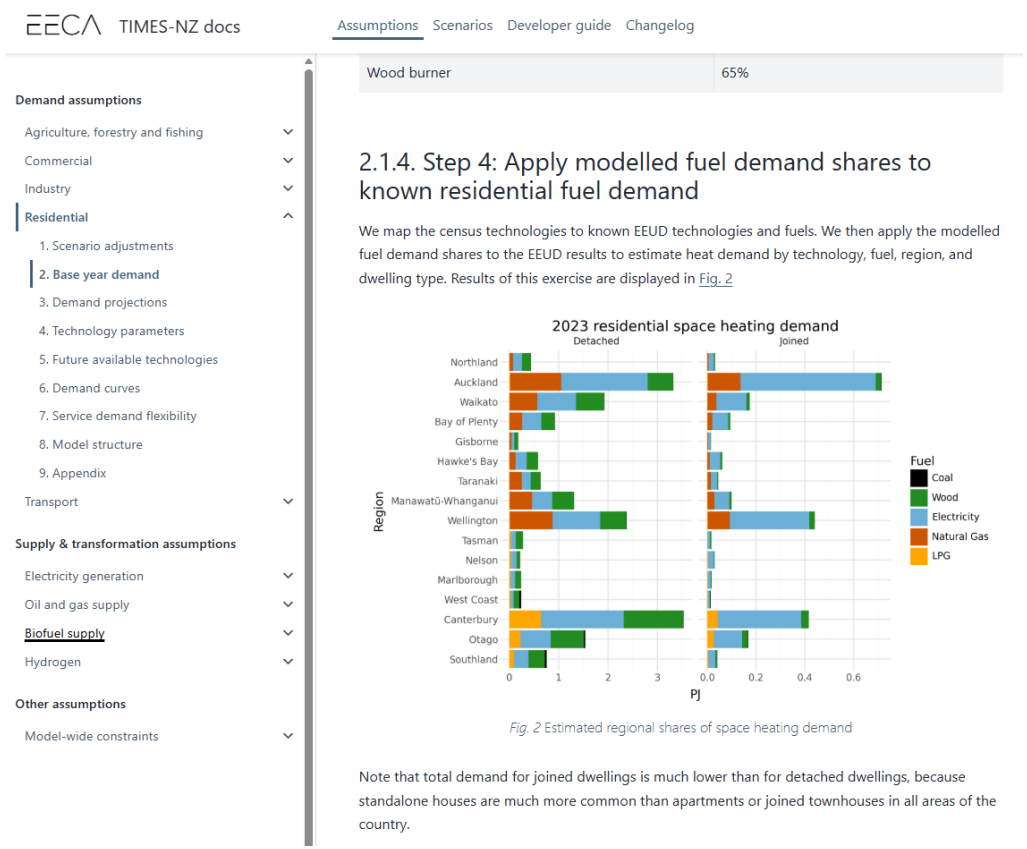


- Hundreds of GAMS-tagged tables across dozens of spreadsheets
- Derivation/source data often not included
- Labour-intensive, vulnerable to turnover
- Changes not trackable, methods not transparent, models not replicable
- Change tracking done by diffing binary files

Building TIMES-NZ: the new pipeline



- **Transparent, replicable**
- **Maintainable**
- **Open-source**



Possible structural improvements

List not exhaustive

Unit dispatch features (warmup times, minimum load levels, ramping constraints)

Natural gas seasonality (sectoral demand curves, supply inflexibility, storage)

Retrofitting methods (boiler conversions)

Increased temporal detail (hourly, half-hourly electricity demand/dispatch)

Increased spatial detail (RC-level demand, interregional trade)

Elasticity of demand (eg via CGE linkage)

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Building TIMES-NZ

Scenario design

Scenario Design

Two scenarios capture dichotomies across *key uncertainties* identified by stakeholders

Steady

Shift

Key uncertainties

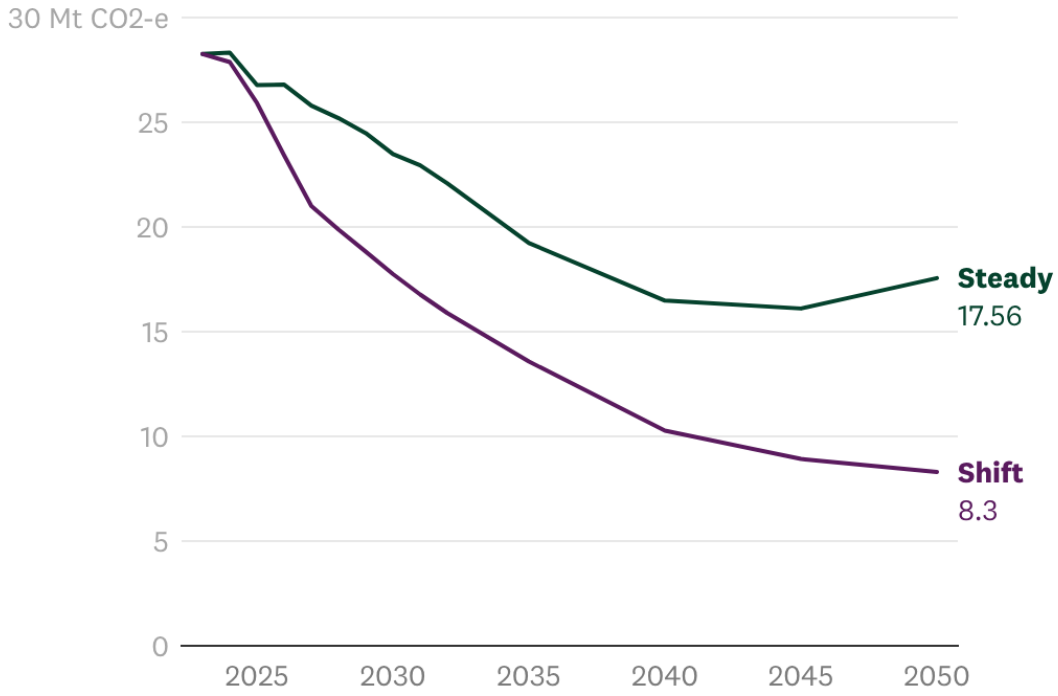
	Steady	Shift
Economic structure		
Technology costs		
Climate policy, societal trends		
The role of natural gas		

What it’s telling us

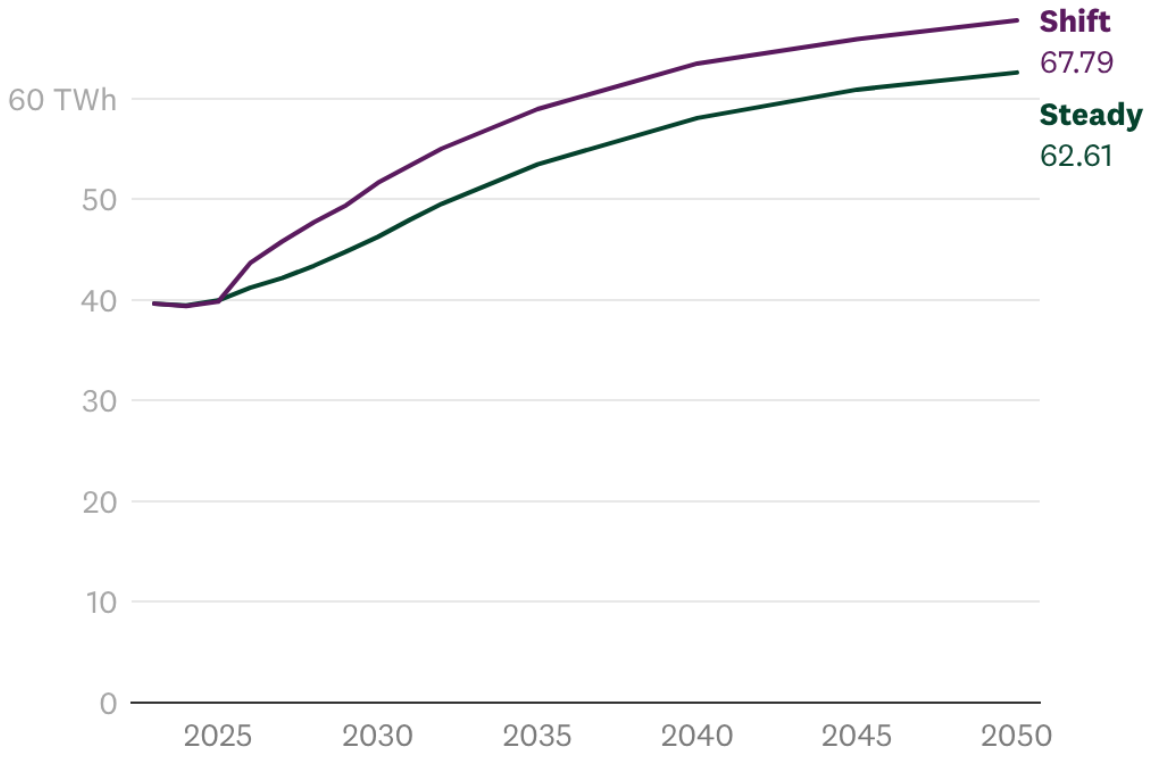
Efficient pathways

Scenarios drive different outcomes

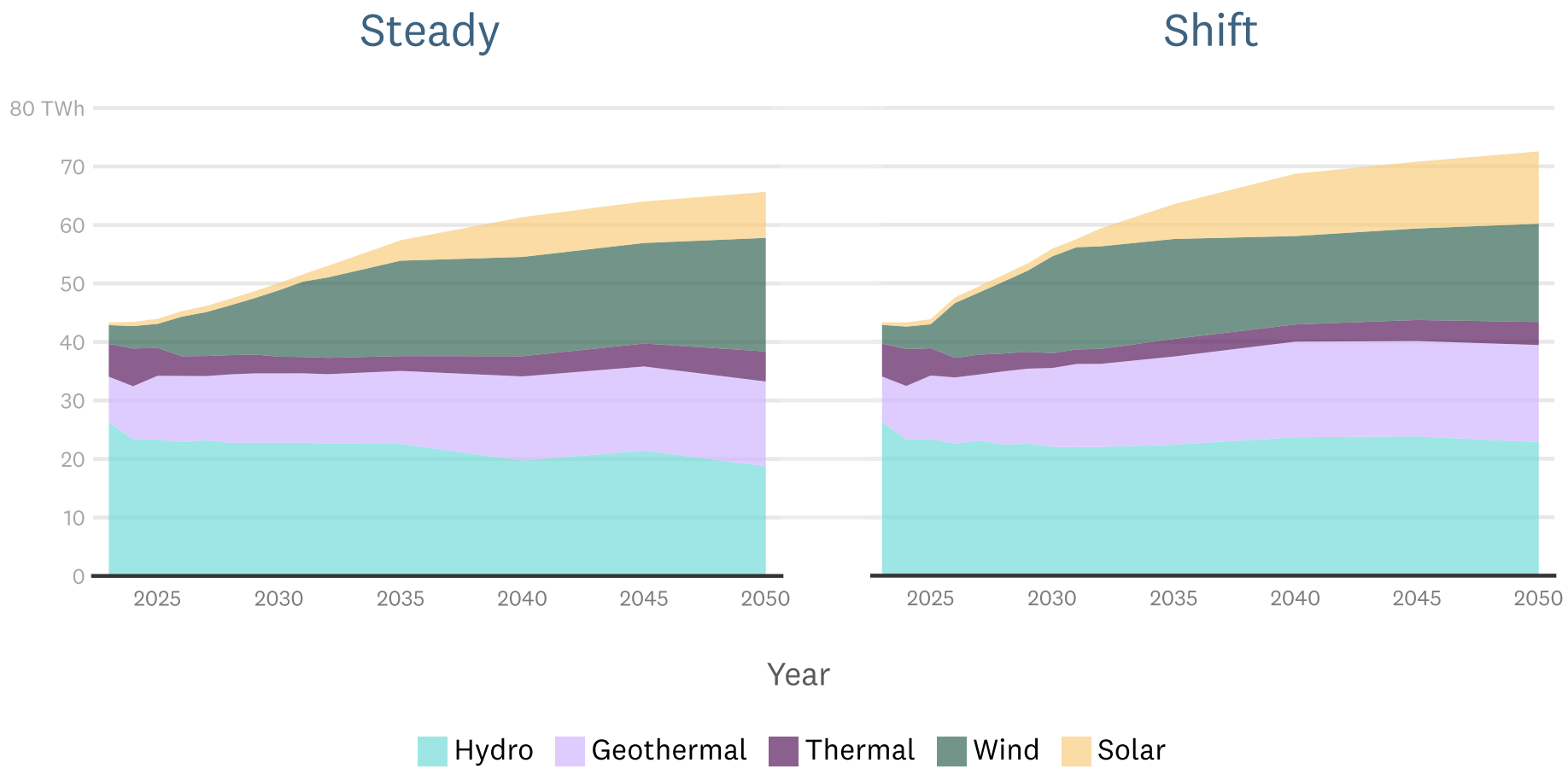
Energy emissions



Electricity demand



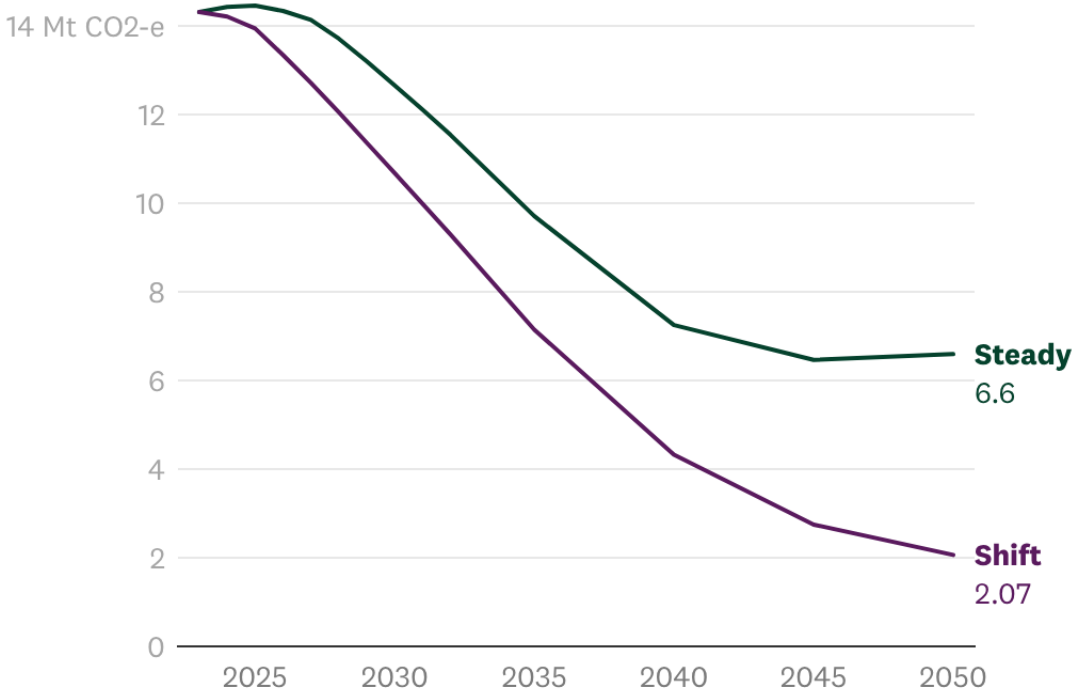
Thermal support still needed



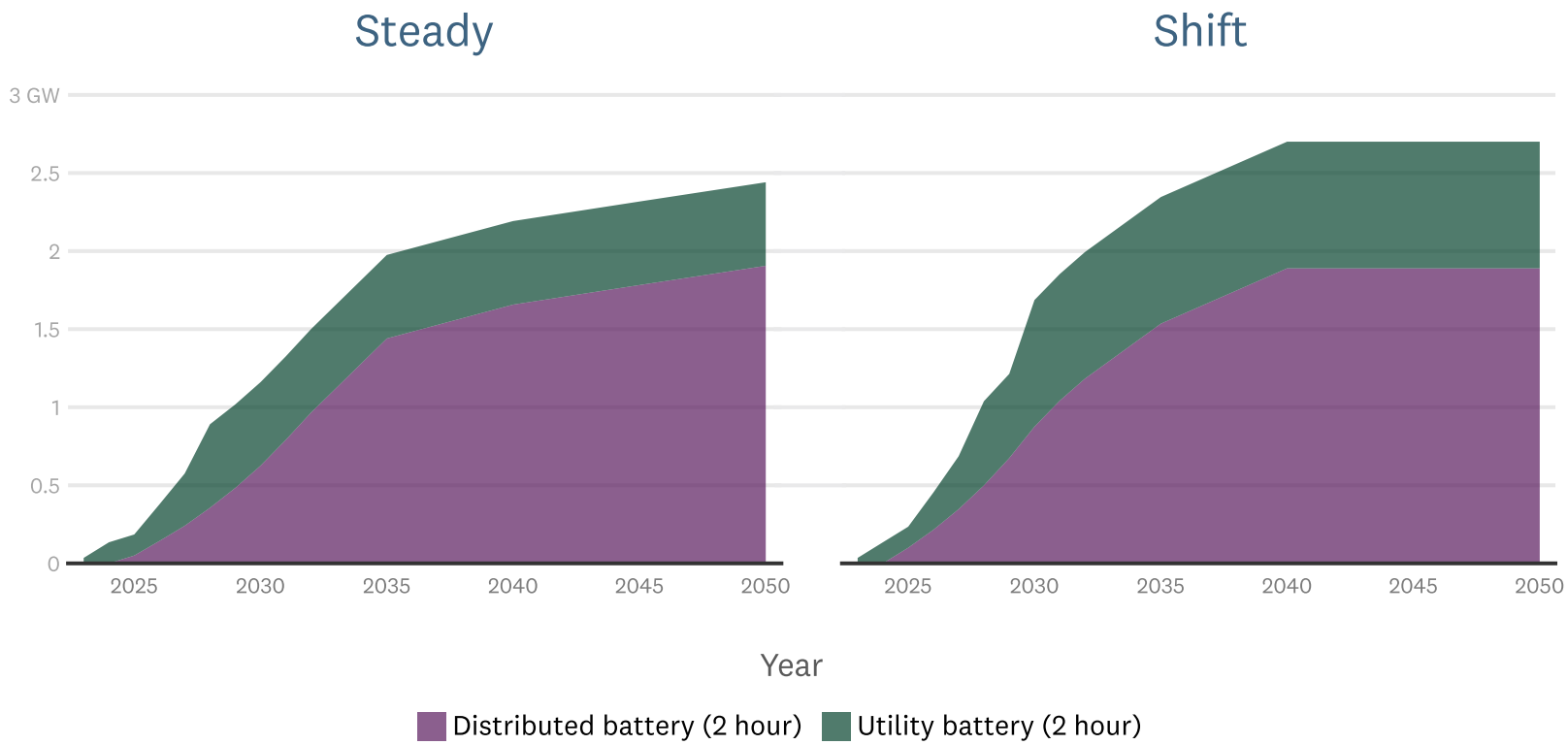
Heavy transport: a key marginal area

Truck electrification

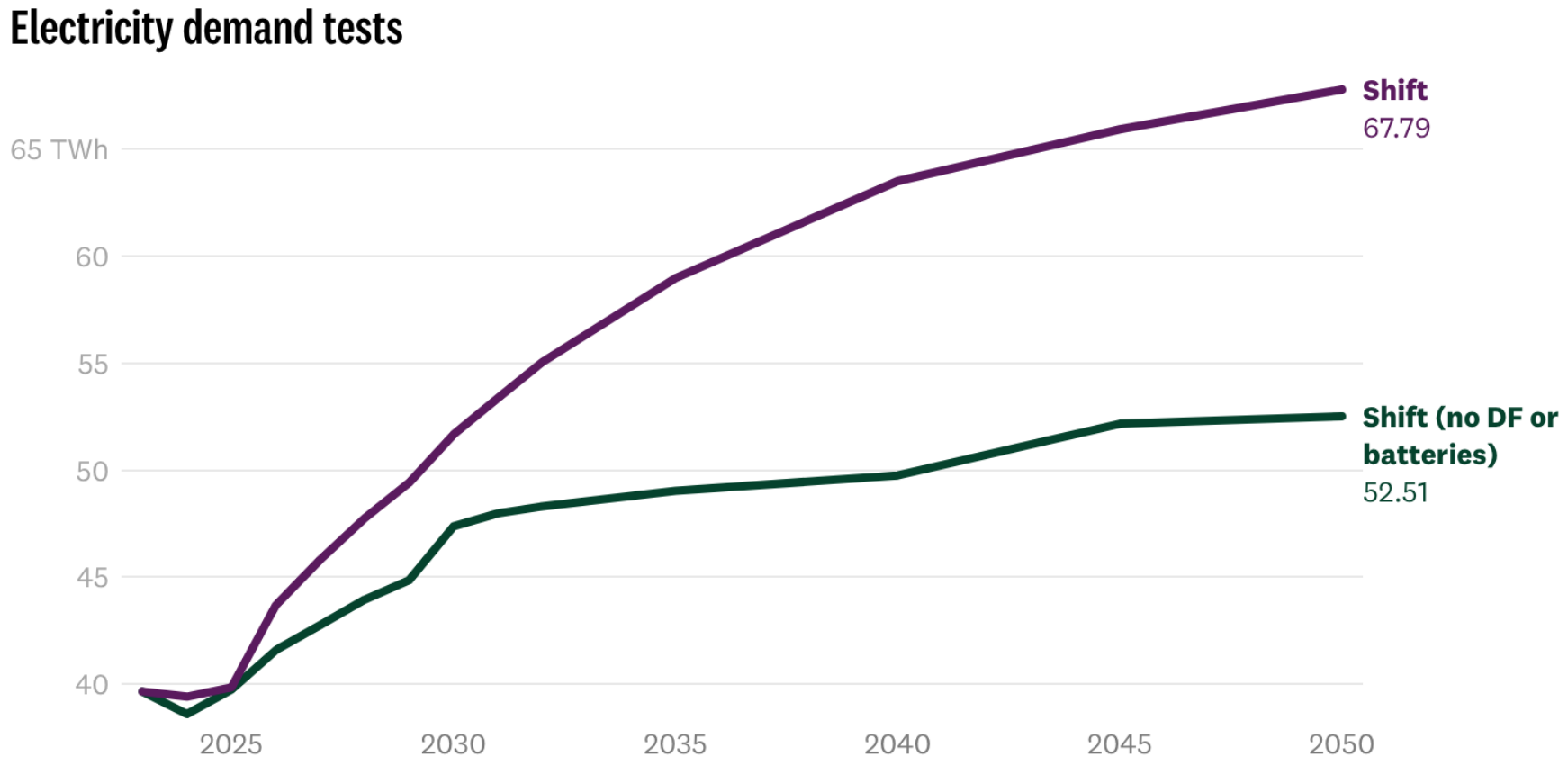
Transport emissions



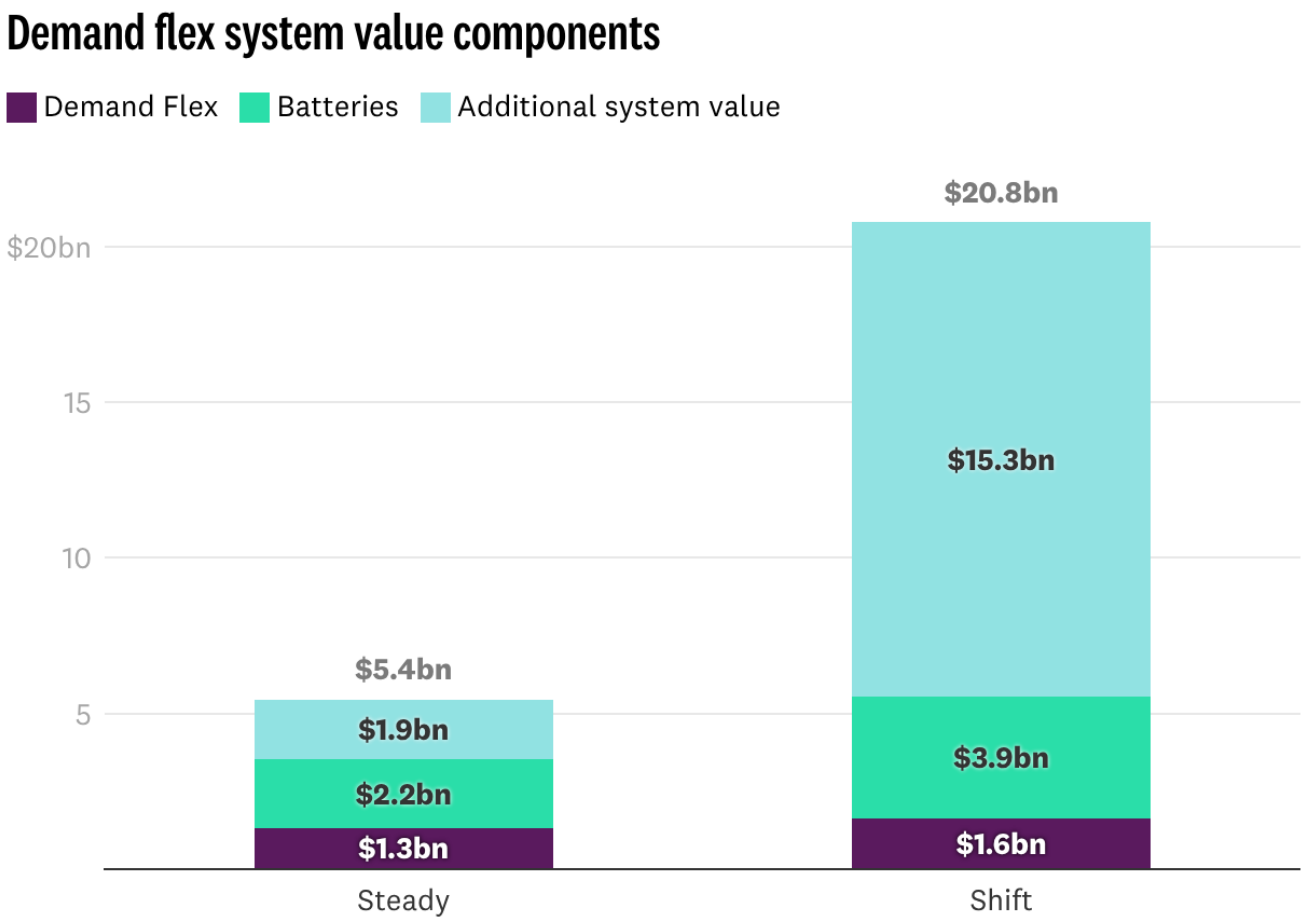
DER: reducing transmission load



Demand flex: impacts on electrification



Value of demand flexibility



Ngā mihi

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