Australia's National Science Agency

Electric and fuel cell vehicle projections

Projection results

Paul Graham | 28 April 2021

Key differences to 2020

- More scenarios explore net zero emissions and we assume EVs will be targeted by governments to play a role
- More global vehicle manufacturers announcing dates they will discontinue design and manufacturing of internal combustion vehicles
- COVID-19 not found to impact sales
- States to introduce EV road user charges

Changes to projections since last FRG

- Net Zero more closely aligned to Current Trajectory before 2030 in line with original intent and Sustainable Growth hydrogen light vehicle uptake
- Rapid Decarbonisation more closely aligned to Sustainable Growth hydrogen vehicle uptake
- Checked whether vehicle to grid and vehicle to home assumptions are consistent with battery uptake projections
- Fixed various transition issues between long and short term forecasting and between PHEVs and BEVs
- Inclusion of regional results was requested

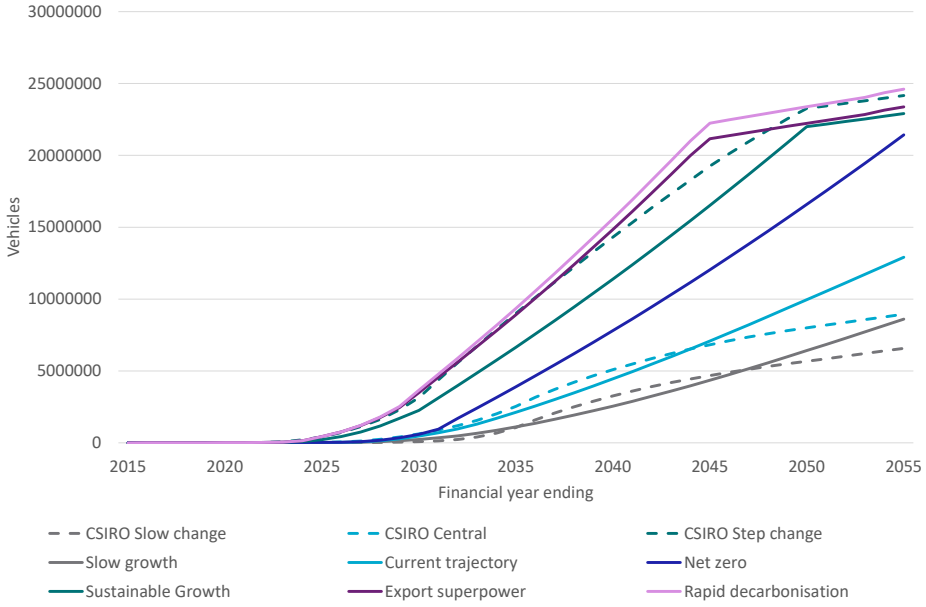
Key assumptions

These assumptions are unchanged from last FRG

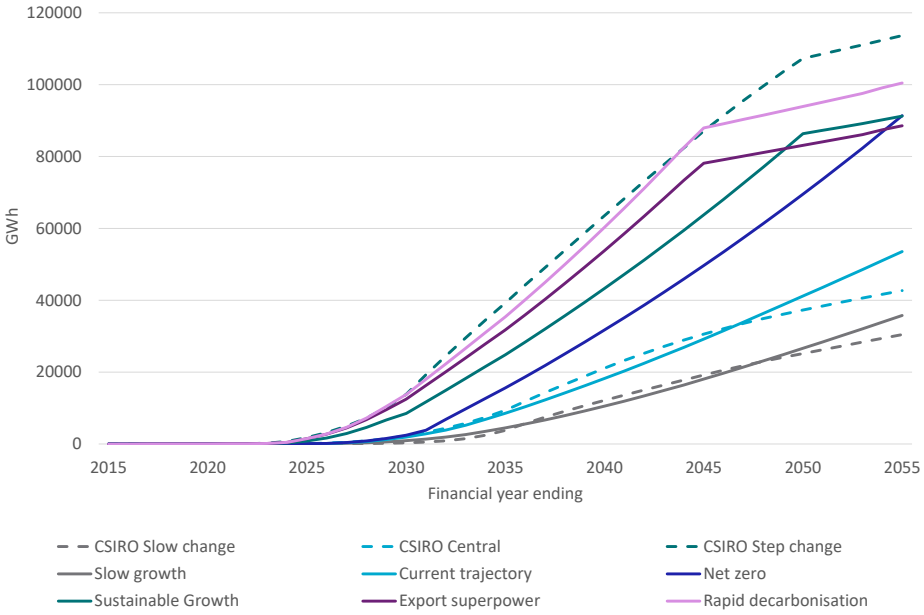
	Slow change 2020	Central 2020	Step change 2020	Slow growth	Current trajectory	Net zero	Sustainable growth	Export super power	Rapid decarbonisation
ICEs not available from	NA	NA	2040	2070	2060	2040	2040	2030	2030
ICEs deregistered	NA	NA	2050	NA	NA	2055	2050	2045	2045
Max market share SREV	12%	15%	33%	12%	15%	16%	25%	31%	31%
Max market share LREV	46%	57%	100%	46%	57%	100%	100%	100%	100%
Max market share FCV	4%	10%	10% light 50% trucks	4%	8%	8% light 30% trucks	10% light 50% trucks	30% light 90% trucks	10% light 50% trucks
Timing of SREV parity	2035	2030	2025	2035	2030	2030	2025	2025	2025

Number of vehicles and consumption NEM (BEV)

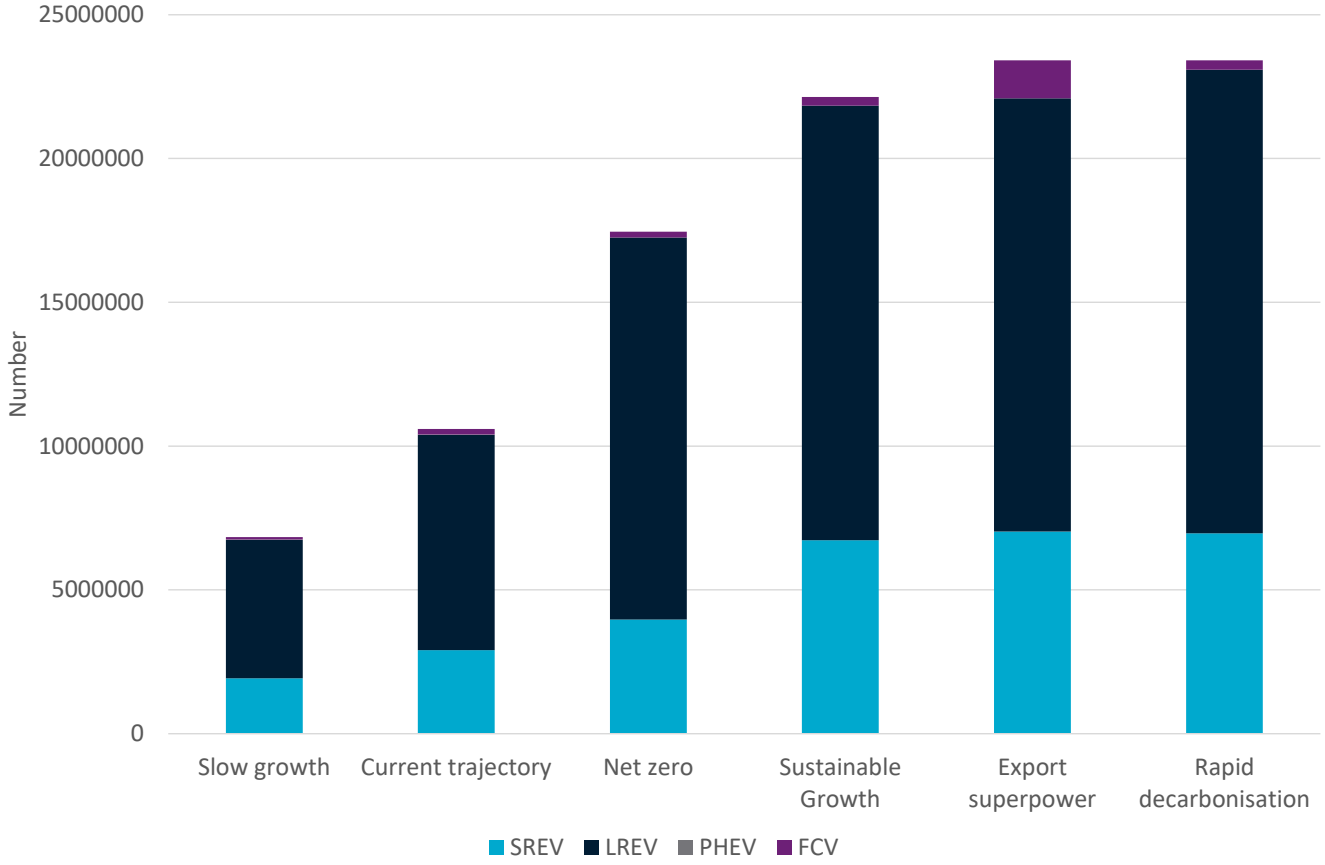
Vehicles



Consumption



Number by technology type 2050, NEM

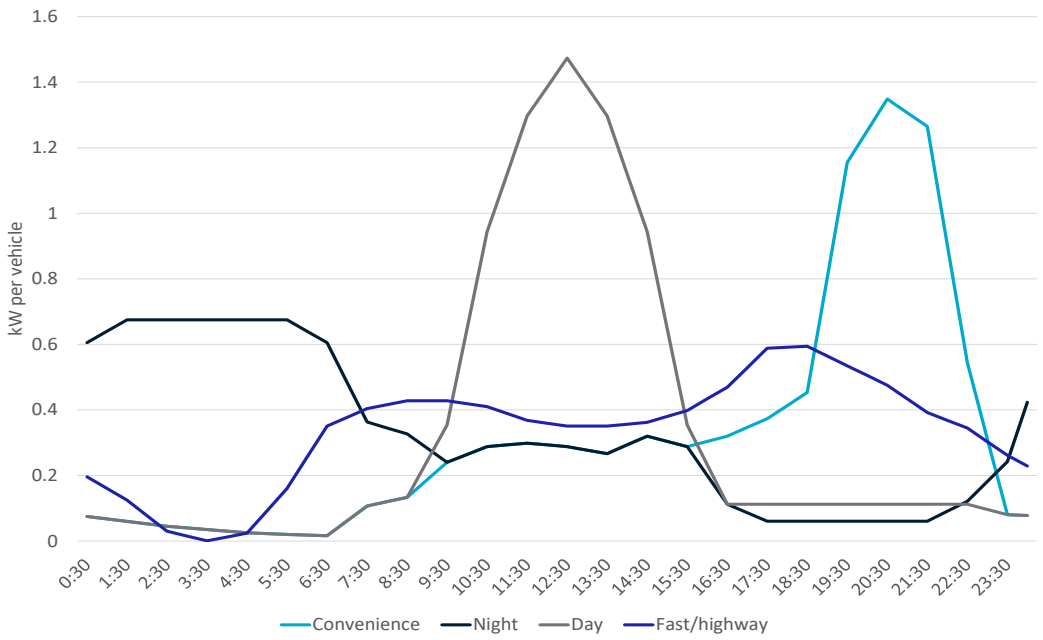


Short range electric (SREV) limited by two car households

Plug-in hybrid EVs difficult to justify economically once long range EVs (LREVs) are cheaper to run than internal combustion vehicles

Fuel cell vehicles vary across scenarios, but at much smaller penetration than BEVs.

Estimated EV charge profiles: medium passenger vehicle



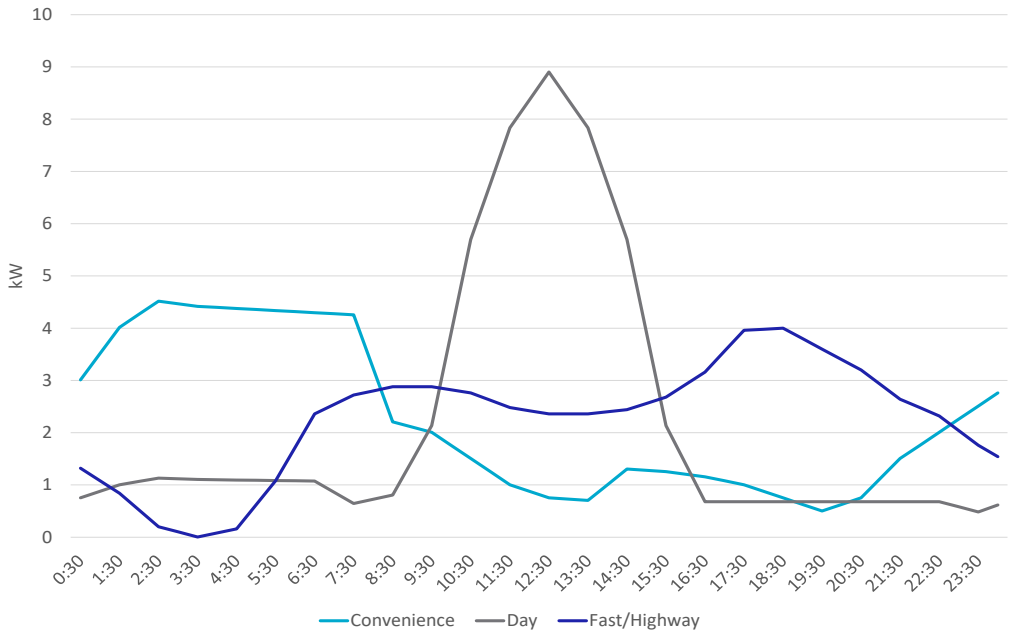
Consumer behaviour shows a strong preference for convenience charging. This is reduced over time, particularly in the faster change scenarios.

Convenience and Fast/highway are observation based. Remainder are assumptions.

Shares are assumptions designed to fit scenario settings such as degree of demand side participation.

By 2050	Current trajectory	Slow growth	Net zero	Sustainable development	Rapid decarbonisation	Export superpower
Convenience	73%	78%	66%	59%	53%	53%
Night	4%	3%	5%	6%	7%	7%
Fast/highway	5%	5%	5%	5%	5%	5%
Day/solar aligned	6%	5%	6%	1%	0%	0%
Vehicle to home/grid	12%	9%	18%	29%	35%	35%

Estimated EV charge profiles: commercial rigid truck



For commercial vehicles, their convenience profile is more akin to the night profile of residential vehicles.

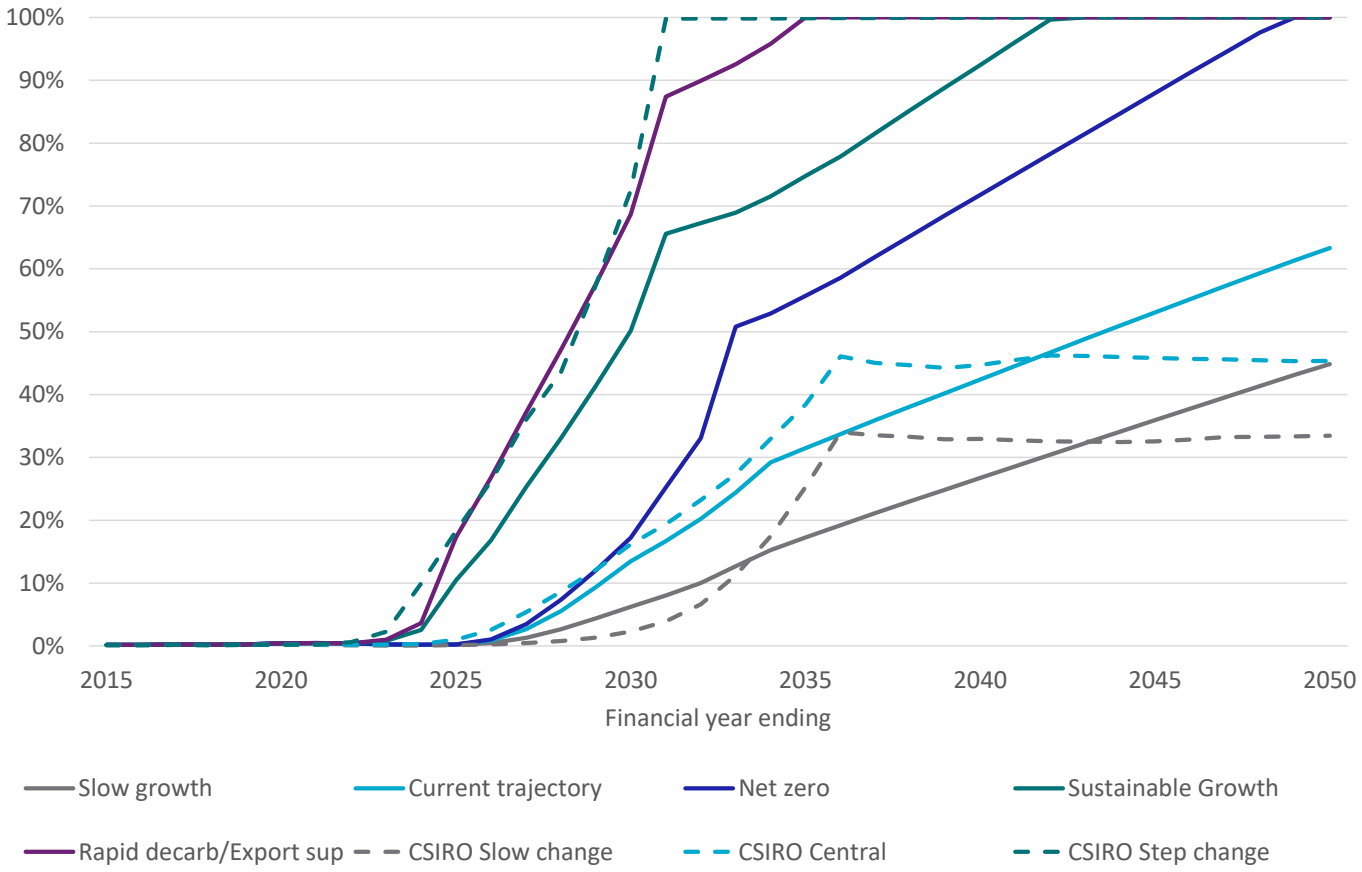
By 2050	Current trajectory	Slow growth	Net zero	Sustainable development	Rapid decarbonisation	Export superpower
Trucks & buses - Convenience/night	76%	81%	71%	67%	62%	62%
Trucks & buses - Day/solar aligned	19%	14%	24%	29%	33%	33%
Trucks & buses - Fast/highway	5%	5%	5%	5%	5%	5%

Thank you

Energy
Paul Graham
Chief Economist Energy

+61 2 4960 6061
paul.graham@csiro.au

Sales share EV

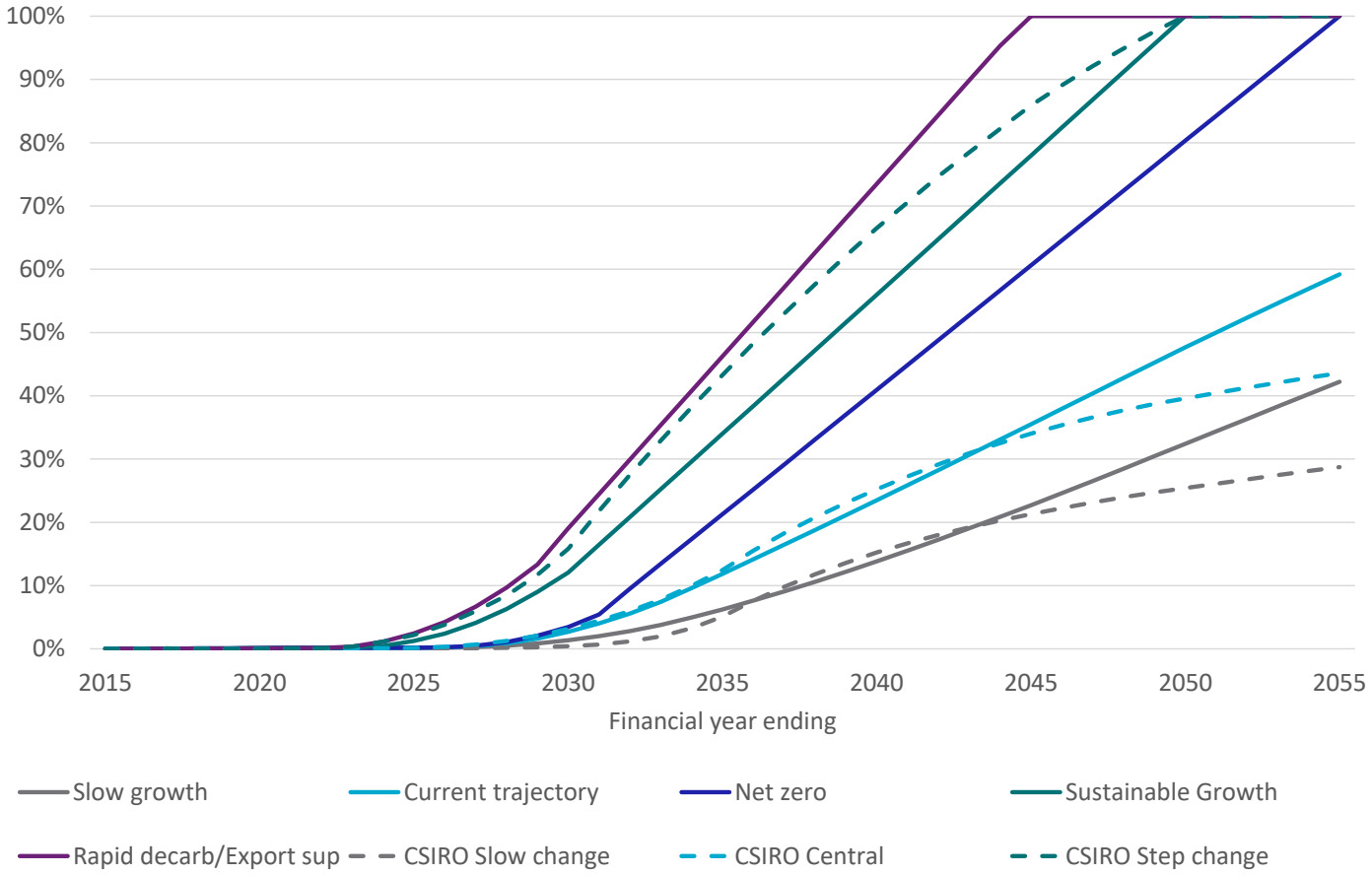


The “kink” in sustainable growth represents an acceleration in sales due to timing of cost parity.

In 2020 Step change, sales were forced to 100% by 2030. However for 2021 we allow over-build of EVs as a way of meeting 100% fleet without 20 years of 100% sales.

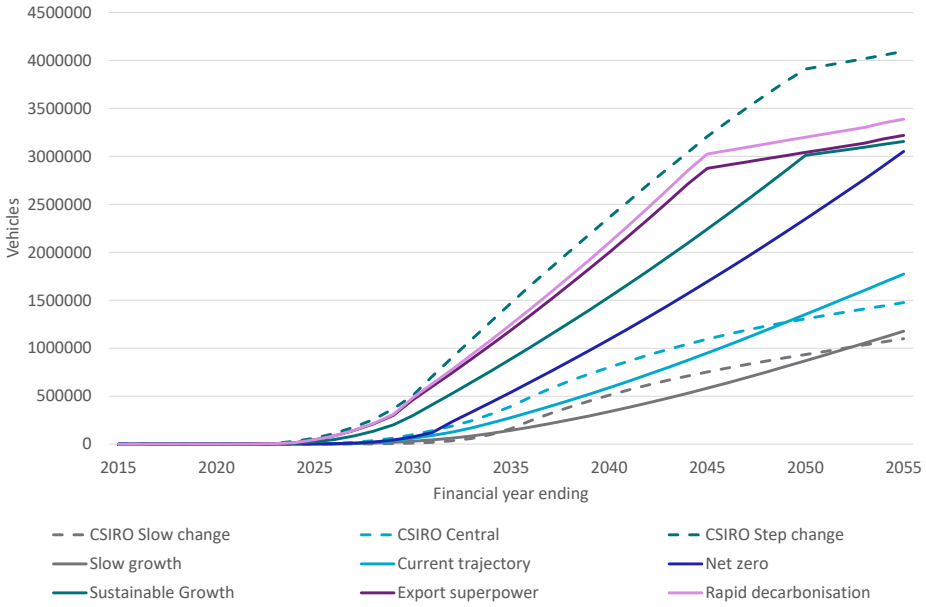
Net zero has an end target which promotes earlier action than current trajectory. This assumes sufficient notice to act.

Fleet share EV

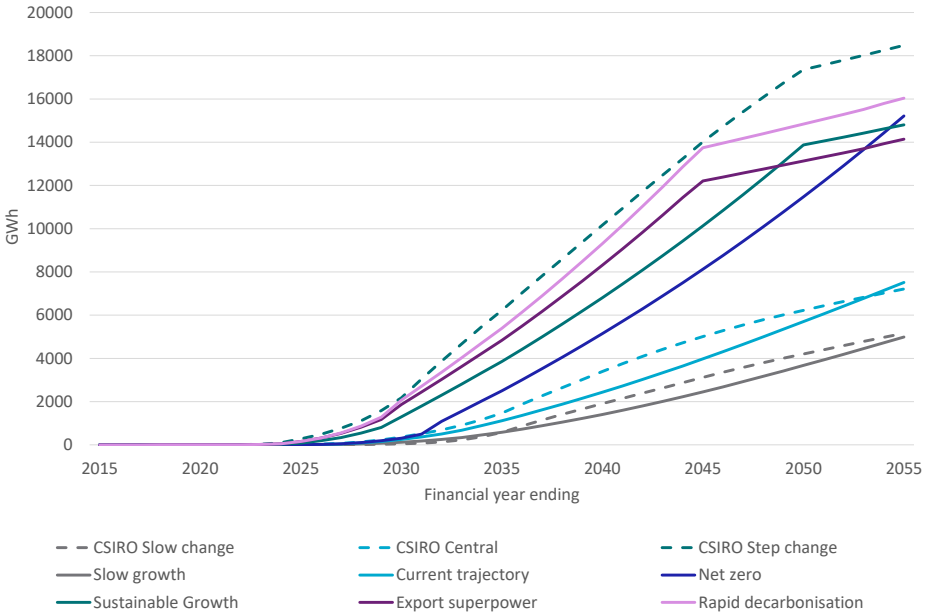


Number of vehicles and consumption WEM (BEV)

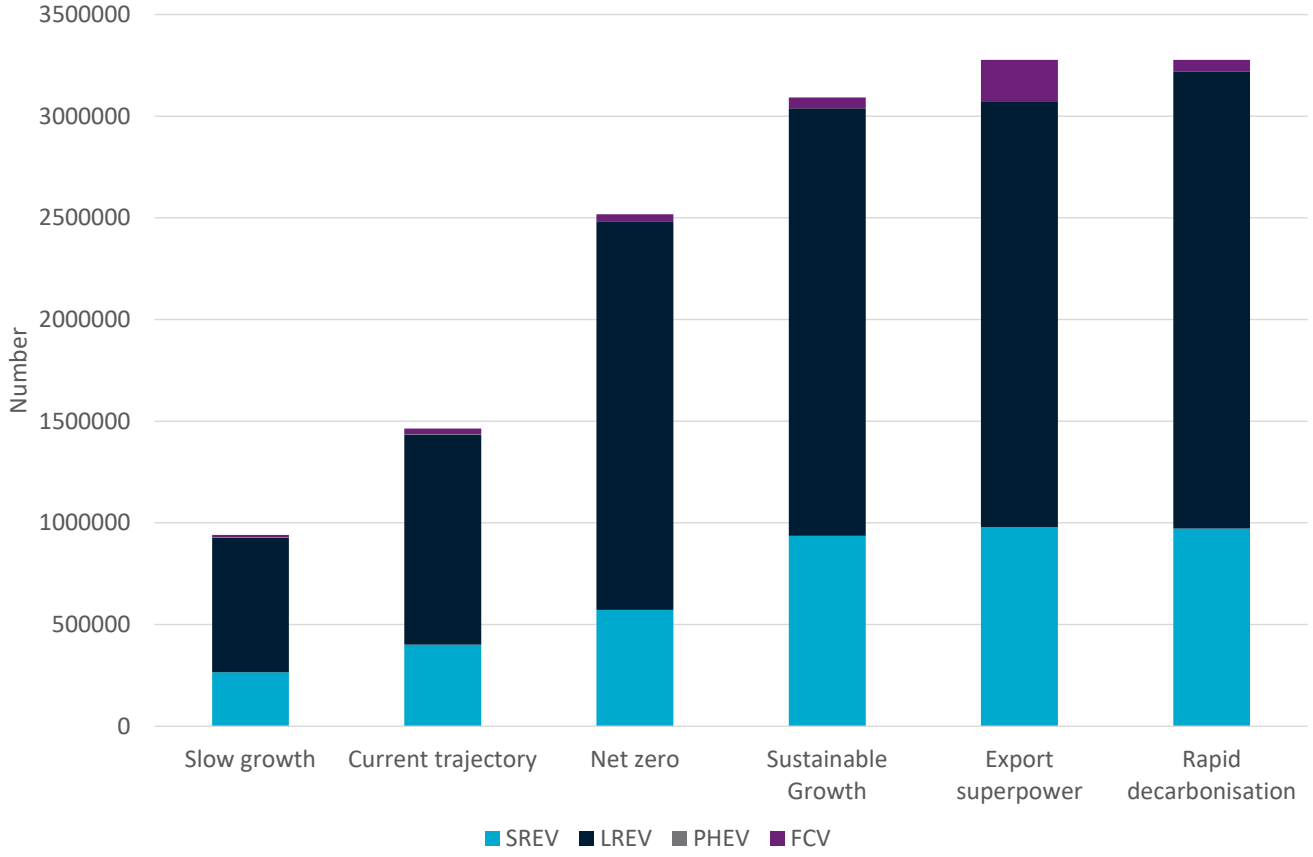
Vehicles



Consumption



Number by technology type 2050, WEM



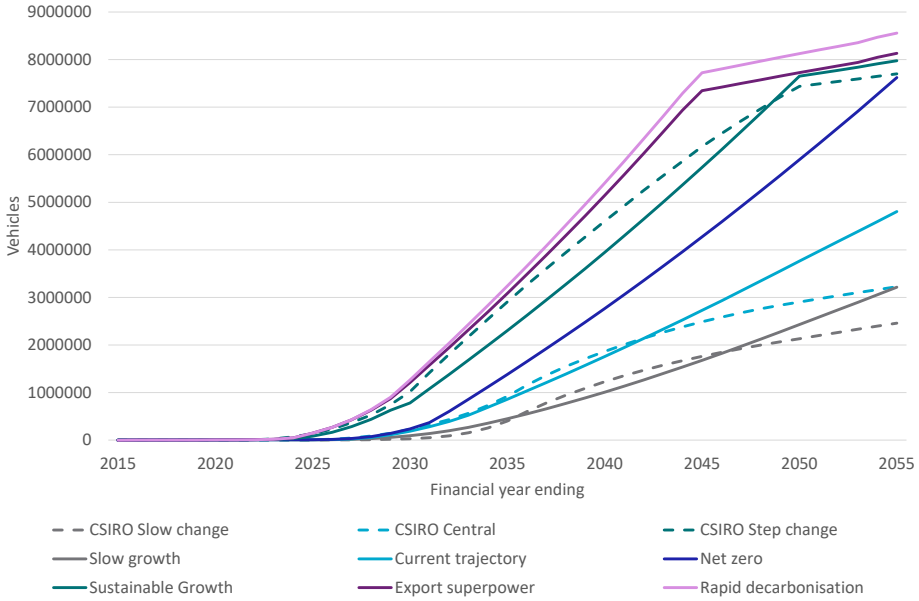
Short range electric (SREV) limited by two car households

Plug-in hybrid EVs difficult to justify economically once long range EVs (LREVs) are cheaper to run than internal combustion vehicles

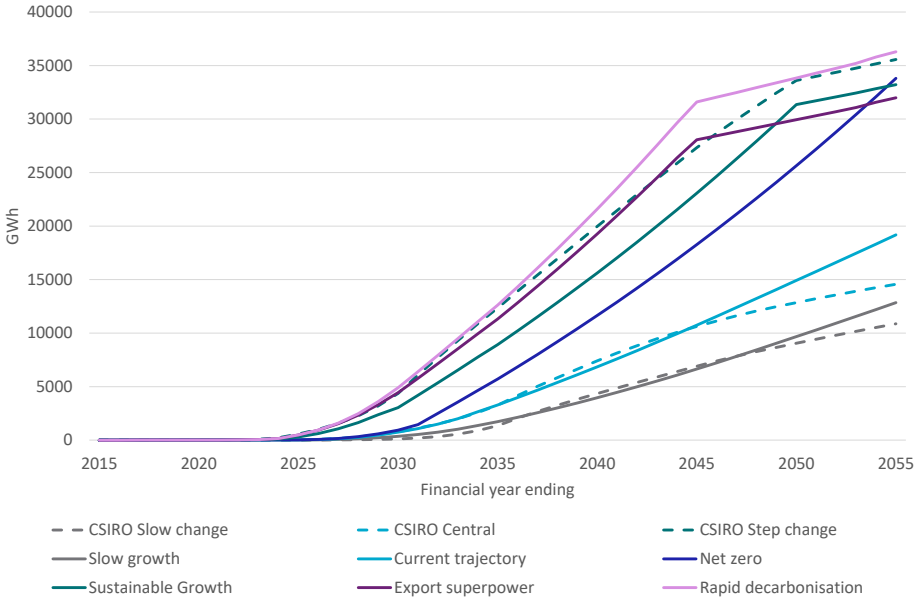
Fuel cell vehicles vary across scenarios, but at much smaller penetration than BEVs.

Number of vehicles and consumption NSW (BEV)

Vehicles

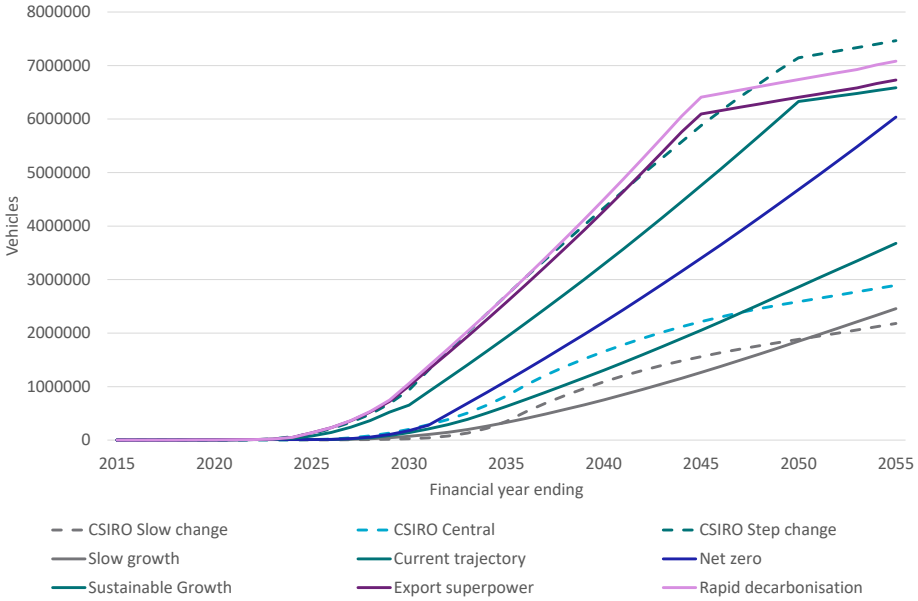


Consumption

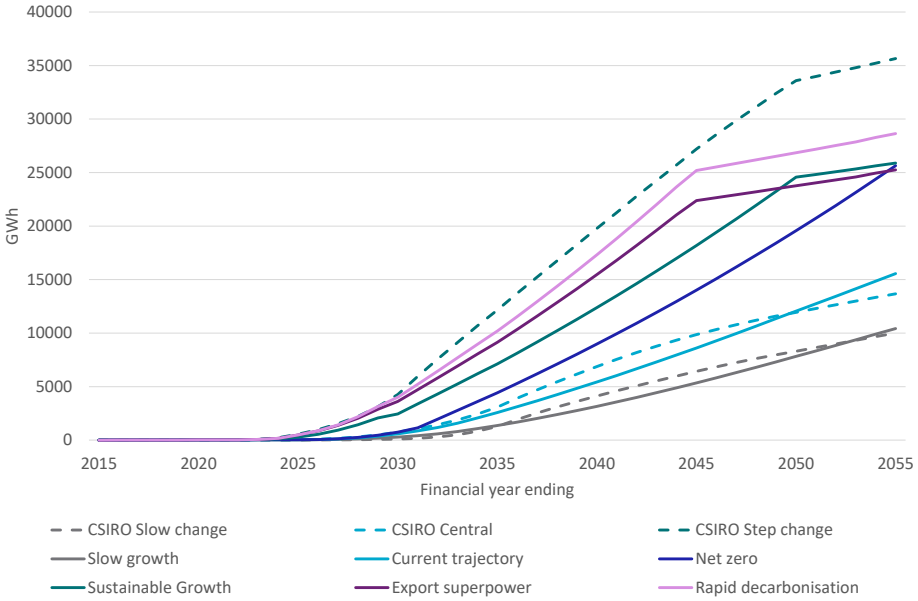


Number of vehicles and consumption VIC (BEV)

Vehicles

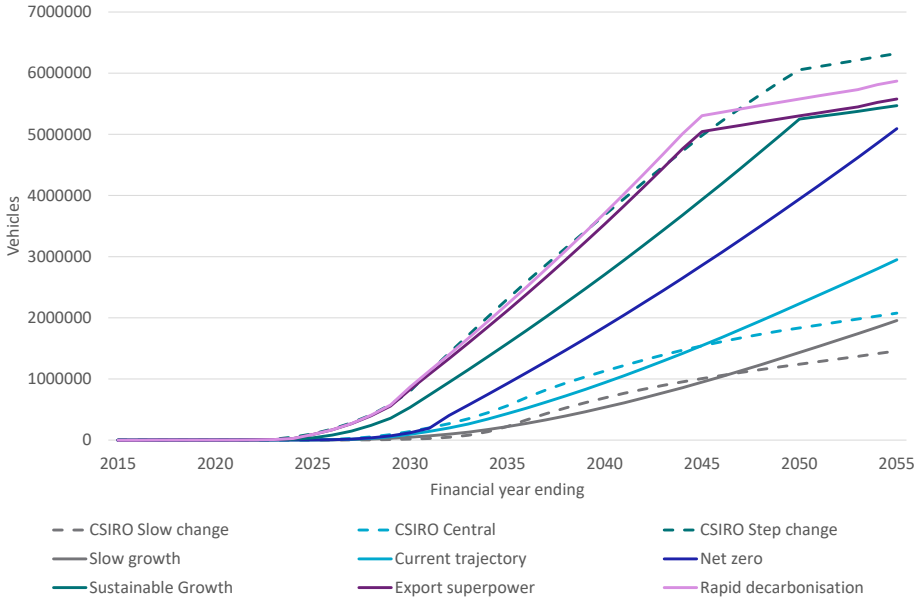


Consumption

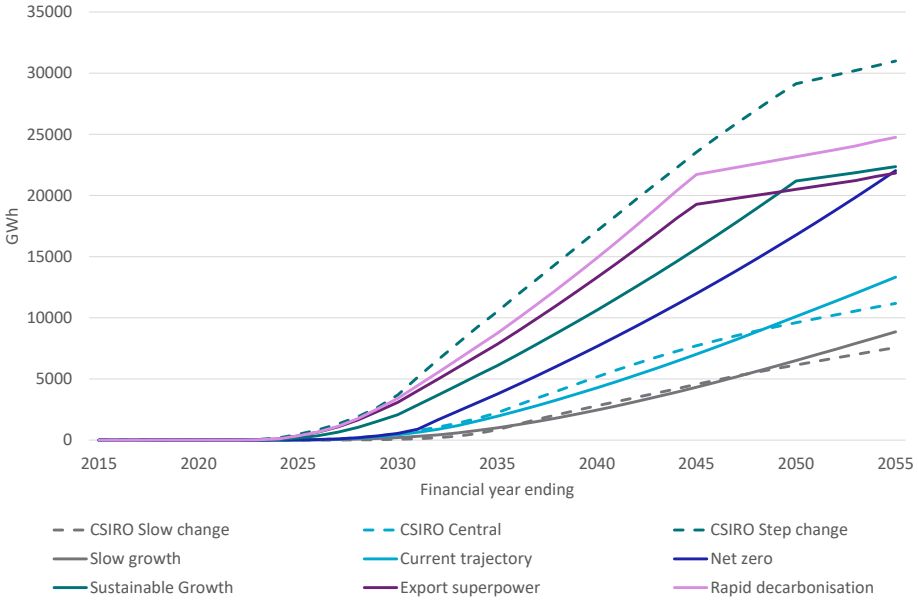


Number of vehicles and consumption QLD (BEV)

Vehicles

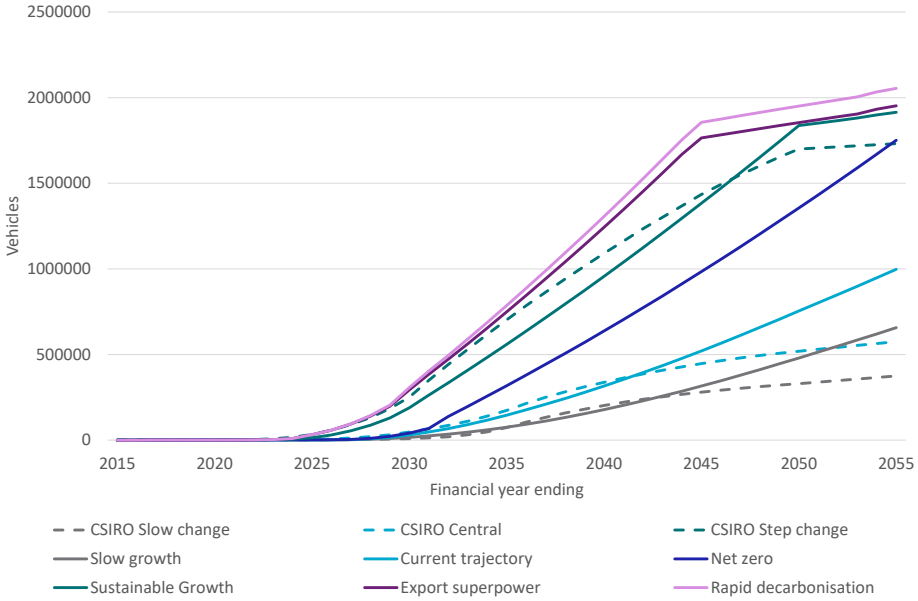


Consumption

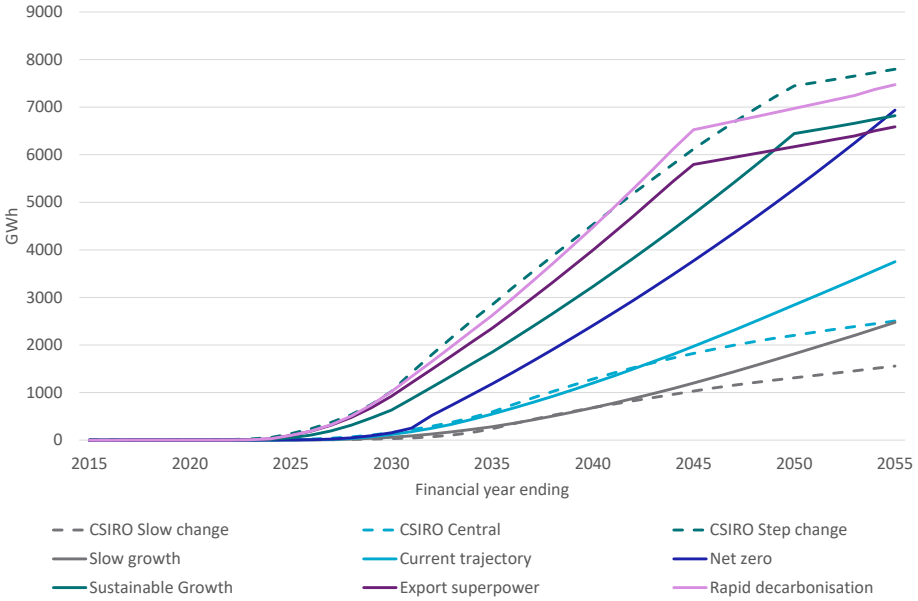


Number of vehicles and consumption SA (BEV)

Vehicles

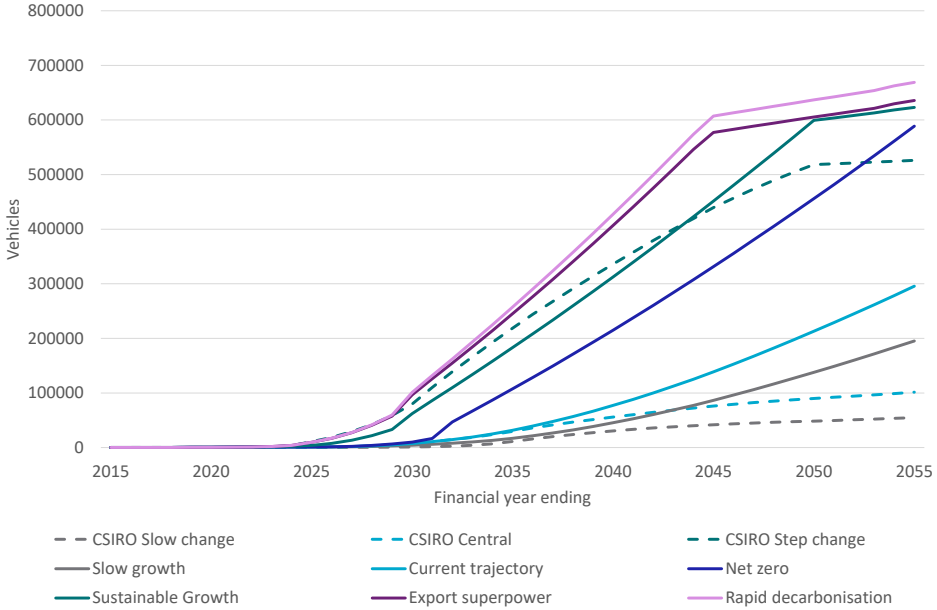
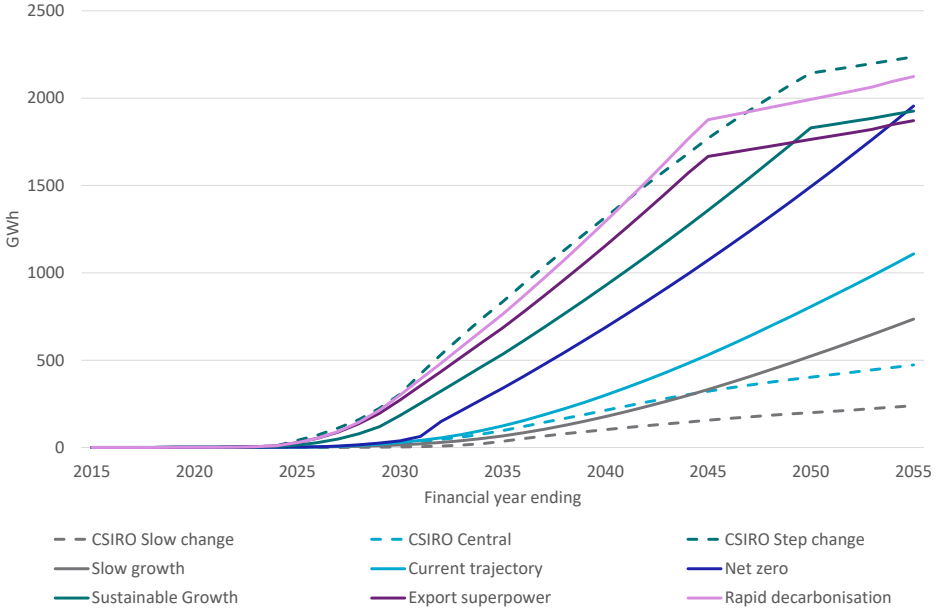


Consumption



Number of vehicles and consumption TAS (BEV)

Vehicles



Consumption