

OVERVIEW

2021 Inputs, Assumptions and Scenarios Report (IASR)

The 2021 IASR details how AEMO will model the future in its upcoming forecasting and planning publications.

WHY AEMO PUBLISHES THE IASR

AEMO forecasts the future of the National Electricity Market (NEM) using a wide range of data and assumptions. There are many different possible futures when we think about how we will source and use energy in 20 years and beyond. AEMO creates scenarios to make sure our planning considers the implications of the range of plausible futures. To model each of these future scenarios, we input different data and make different assumptions.

AEMO uses the scenarios, inputs and assumptions to assess the expected reliability of the future electricity and gas systems (whether there will be enough of the right resources to operate the systems and give businesses and homes the energy they need), and to help investors and policy-makers decide on prudent investments in supply, transmission and storage that can minimise the cost of developing, operating and consuming energy, even when the future is uncertain. Industry participants and consumer representatives work with AEMO to develop and refine scenarios, inputs and assumptions, and to regularly update them as new data becomes available, government policy settings evolve, and stakeholders – including industry, governments, and consumers – give their feedback.

AUSTRALIA'S NATIONAL
ELECTRICITY MARKET (NEM)

FIVE SCENARIOS FOR THE FUTURE

The 2021 IASR describes five scenarios, developed with industry participants and consumer representatives to cover a plausible range of energy futures. These scenarios assume different futures, depending on questions like:

- How much does the population and economy grow, and how much will we rely on electricity for our energy needs?
- How much will energy supply keep decentralising, as homes and businesses invest in their own rooftop PV and storage systems?
- What will be the impact of increasing digitalisation, changes in technology, and the emergence and growth of new technologies such as electric vehicles?
- How quickly will sectors, businesses and households seek to decarbonise, and how much will they switch from other fuels to electricity as electrical power comes more from renewables and less from fossil fuels?
- Will we see the rise of alternative fuels like biofuels and hydrogen?

In 20 years, what do the different scenarios look like for how people live and work in the NEM?



Steady Progress

- In 2040, the power system has continued to develop based mainly on market-led investments, with corporate goals driving economy-wide emissions abatement.
- The number of houses with rooftop solar has doubled and the amount of energy generated on the rooves of our homes has tripled since 2020. In winter, homes are still heated to a large extent by ducted gas heating systems.
- Industry and manufacturing have followed current technological trends, with no major changes.
- One third of our cars are electric vehicles.



OMT

Net Zero 2050

- In 2040, the NEM has seen 10 years of growth in deployment of emissions-abatement technologies and is on the way towards a national emissions abatement goal of net zero emissions by 2050.
- Rooftop solar on our homes and businesses is generating about four times as much energy as today. In winter, we are increasingly heating our homes with electric heat pumps and reverse cycle air-conditioning, with gas heating appliances reduced by 55% since 2020.
- Industry and manufacturing processes are now just over 30% powered by electricity (which is produced with significantly lower emissions than in 2020), up from 20% electricity in 2020.
- Almost half our cars are now electric vehicles, as their costs have become increasingly competitive and more charging infrastructure is available.

OVERVIEW: 2021 INPUTS, ASSUMPTIONS AND SCENARIOS REPORT



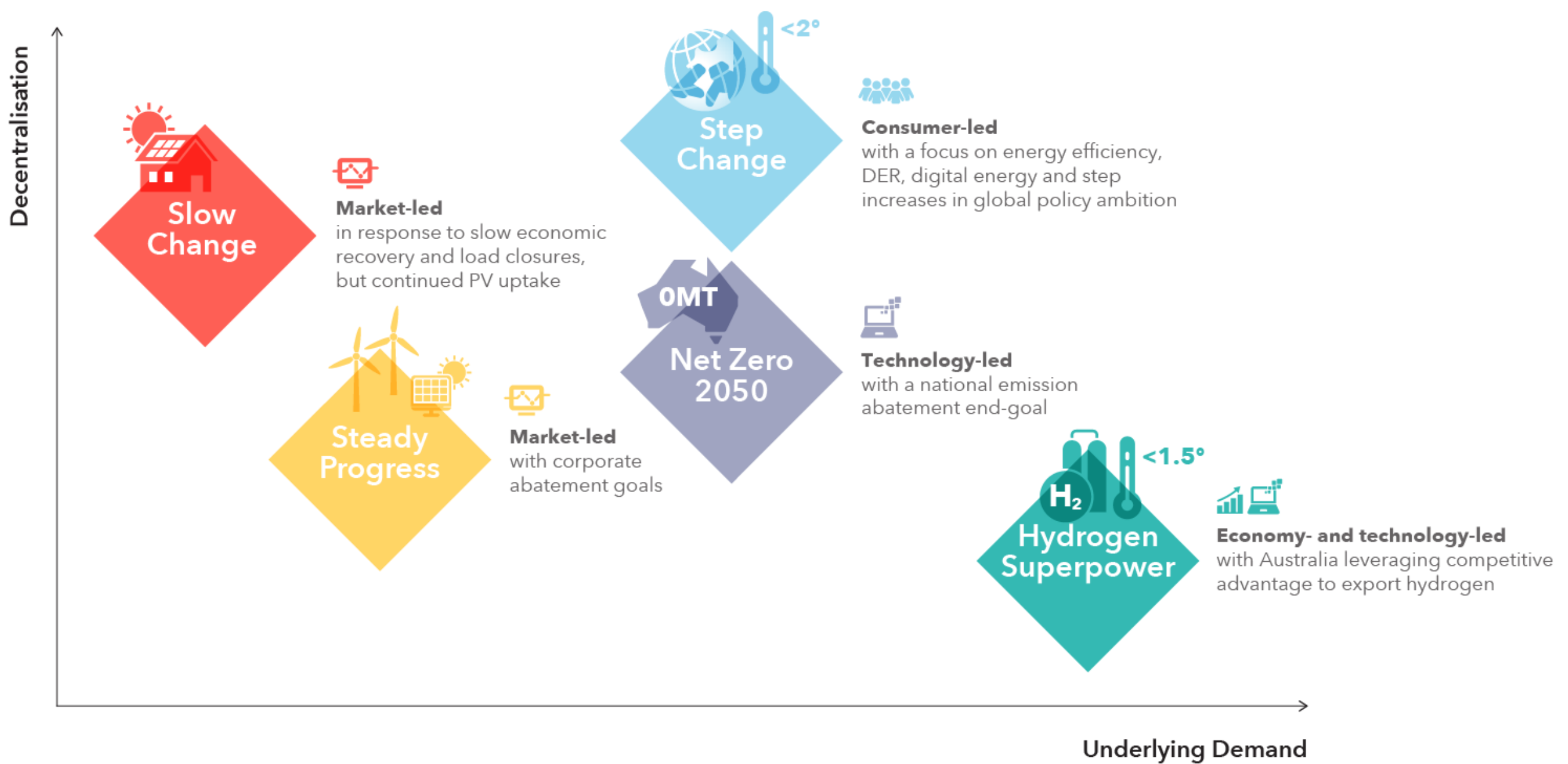
- In 2040, consumers have led a transformation by installing more of their own power sources, buying electric vehicles, and voting for strong global policy action to rapidly reduce carbon emissions.
- Because electricity is generated with near zero carbon emissions, businesses and households are preferring electricity ahead of more carbon-intensive options.
- Our rooftop solar capacity has more than quadrupled since 2020, with about triple the number of rooftops covered. Energy efficiency and switching to electric heating and appliances has cut our use of gas in our homes by 85% since 2020, on the path to using no gas in homes by 2050.
- Industry is using nearly 20% less gas, 30% less coal and 90% less oil than in 2020.
- Almost 60% of our cars are now electric vehicles, and almost a third of heavy vehicles, like articulated trucks, are fuelled by hydrogen



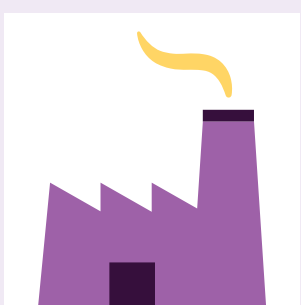
- In 2040, the energy sector (and Australia's economy) has been transformed by government policy, corporate action, and technology breakthroughs.
- Electricity is generated with zero or near zero emissions, and businesses and households are increasingly switching from other fuels to electricity.
- Rooftop solar is about five times the capacity we had in 2020.
- Houses are using 90% less gas for heating and cooking than they used in 2020, switching to hydrogen (54% of the change) or electricity.
- Some 75% of all cars are electric, heading towards 100% by 2050. Almost half of all articulated trucks on the road are fuelled by hydrogen.
- Hydrogen has become a significant source of energy in the NEM. Industry has reduced its use of natural gas by over 65% since 2020, with a bit over half of that demand shifting to hydrogen instead.
- There is also an important export market for hydrogen produced in the NEM – about half the size of Australia's east coast liquefied natural gas (LNG) exports in 2020, and the market expects production to more than triple by 2050. There is also a fledgling green steel industry showing signs of growth.



- By 2040, in a challenging economic environment, we have not made co-ordinated efforts to reduce carbon emissions or to use more electricity across the NEM.
- Rooftop solar capacity has tripled since 2020 as consumers take measures into their own hands to manage energy bills. Consumers are pursuing energy efficiency and switching to electric heating and appliances, but slowly.
- There has been limited change in industry's use of gas.
- One in five vehicles is electric.



SNAPSHOT OF 2040 COMPARED TO TODAY



2020 – 35% of industry and manufacturing processes is powered by gas
2040 – natural gas use in industry ranges across scenarios. In Net Zero 2050 it is 7% higher than in 2020, but it has reduced by 18% in Step Change and 56% in Hydrogen Superpower, with some earlier gas-fuelled processes now using hydrogen.



2020 – consumers own 8 GW of capacity in their rooftop solar and batteries (about 14% of all the capacity in the NEM). 5 million homes heated by gas
2040 – consumer-owned generation capacity could have tripled (Steady Progress and Slow Change), quadrupled (Net Zero 2050 and Step Change), or be approaching five times 2020 capacity (Hydrogen Superpower). Gas use in homes has reduced by about 15% (Steady Progress), 55% (Net Zero 2050), 85% (Step Change) or 90% (Hydrogen Superpower), as consumers have switched to electric heating options or clean fuel alternatives to save cost and reduce emissions



2020 – only 0.1% of our cars are electric vehicles
2040 – strong growth in electric vehicles in all scenarios except Slow Change, from one-third of all vehicles being electric (Steady Progress), to around half (Net Zero 2050 and Step Change), to 75% (Hydrogen Superpower)