# AUSTRALIAN CONFERENCE OF ECONOMISTS
## 6-9 JULY 2025, SYDNEY
## ECONOMICS FOR A CHANGING WORLD

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# ACE2025 ECONOMICS FOR A CHANGING WORLD

# Projecting electricity and energy costs over the transition

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# Contents

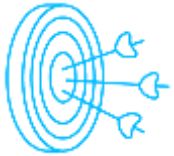


# Providing an outlook for electricity prices and energy costs

## BACKGROUND

- From 2011, the AEMC has released three-year forecasts of electricity prices annually.
- We identified a need to pivot to a longer term outlook that is more robust to short-term market volatility following feedback from stakeholders. This provides more scope for useful insights.
- A successful transition to net zero will need households to rapidly electrify and the electricity grid to decarbonise.
- Our revised approach is to:
  - Model how price dynamics for each component of electricity costs might evolve in an increasingly renewable grid.
  - Project how electrification might impact total household energy costs as they switch fuel sources.
  - Consider important distributional impacts for households depending on their level of electrification.

## PURPOSE



- The purpose of providing a 10-year outlook for residential electricity prices to consumers, policy makers and the industry is to:
  - Promote transparency with a publicly available and tested price outlook which documents the method and assumptions we have used.
  - Show which cost drivers are most influential to help policymakers target the most effective policies to achieve affordable electricity.
  - Provide consumers with an understanding of how their decisions around electrification could influence their total energy expenditure.
- We also identify high-level policy implications.
- Our outlook is subject to a range of risks, uncertainties and modelling limitations – in reality, prices may materially differ from this outlook.

# Providing an outlook for electricity prices and energy costs

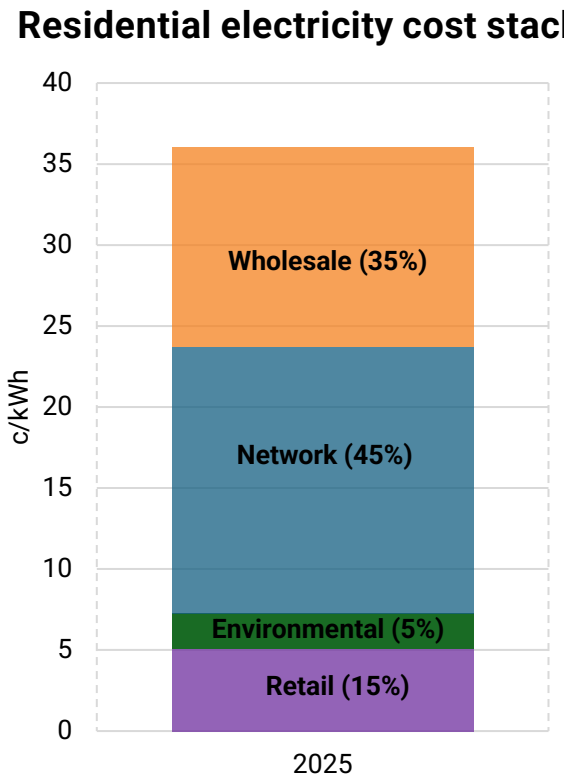
A 10-year residential electricity price outlook is estimated by modelling each cost component with public information and our assumptions, using AEMO's ***Integrated System Plan*** (ISP), and developing in-house assumptions for future costs and market behaviour.

**Estimate electricity cost stacks**
Develop methodology to project each component of residential electricity costs, including wholesale, network, retail and other costs
Produce results for the next 10-years by region and for the NEM

**Conduct scenario analysis**
Wholesale and network assumptions were changed and the models re-run to analyse the impact of changes to supply and demand conditions.

**Analyse household energy wallet**
Electricity price trends were analysed alongside total energy spending to see how electrification impacts consumers' total energy expenditure.

# What costs make up a typical retail residential electricity price?




**Wholesale** electricity costs include spot market costs (~80%), contract market costs (~15%), anciliary services and market fees

**Network** costs include the costs of the distribution network (~70%), transmission network (~15%), metering (~10%) and jurisdiction schemes (~5%)

**Environmental** costs include the costs of national renewable certificate schemes, and state-based energy efficiency schemes

**Retail** costs include retail operating costs (e.g. CARC), smart meter costs and retail margins

# How did we model wholesale electricity costs?

Develop PLEXOS market model using ISP buildout and demand forecast

Simulate NEM dispatch over the horizon at a 30min granularity

Apply ex-post volatility adder and cap prices in line with market settings

Add cashflows resulting from representative retailer contracting behaviour

## Use AEMO's published 2024 Final ISP model as a basis

- Convert the long-term 'capacity expansion' model into a short-term 'dispatch' model
- Change Eraring's retirement date to 2027 in line with Government announcements
- Update detailed generator settings based on AEMO's ESOO

## Determine dispatch and prices through bidding assumptions

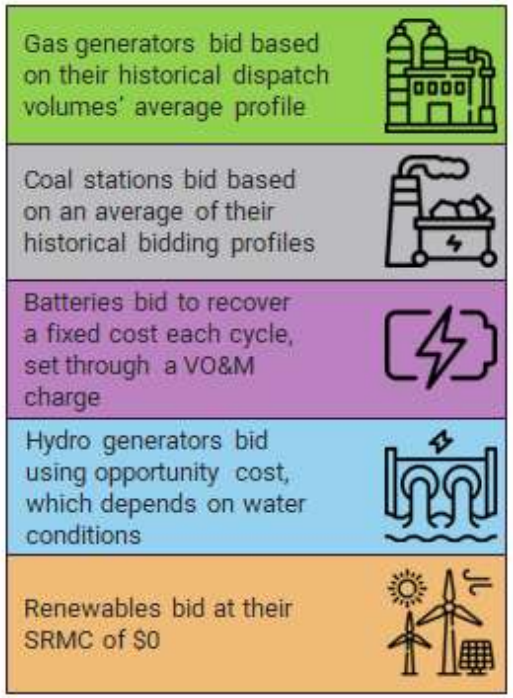
- Apply bidding assumptions vary by technology type (see graphic)
- Use a median weather reference year (2016) as a basis for supply and demand
- Use a median outage sample to account for outages and maintenance

## Capture additional real-world factors with post-modelling adjustments

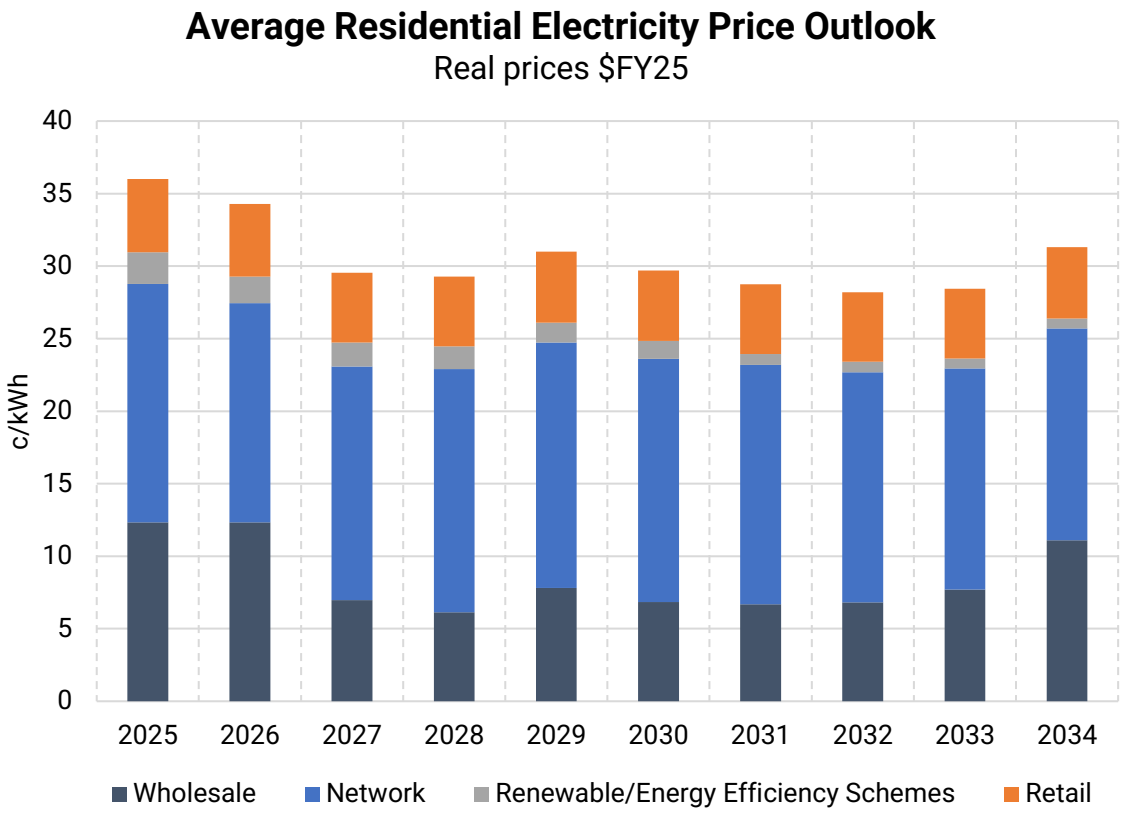
- Estimate relationship between supply-demand balance and prices, and proxy real-world volatility with an uplift that depends on the projected supply-demand balance
- Adjust prices for market settings (MPC and APC), where applicable

## Model hedging behaviour of a 'representative' retailer

- Purchase a mixture of base swaps, caps and options
- Use historical outcomes to estimate a fixed hedging premium
- Book build to match POE10 demand
- Overlay short-term market expectations



# Average residential electricity prices were projected to decline




On a national basis, our 2024 outlook showed that prices are modelled to fall by 13% (about 5c/kWh) over the next 10 years under our base case

Our 2024 outlook showed that:

***Network costs*** are projected to fall by about 11% over the outlook. An increase in residential demand offsets higher levels of network investment.

***Wholesale costs*** are the most variable. Changes in the supply-demand balance in the wholesale market drive year-to-year movements:

- Overall, prices – which account for hedging by retailers – are projected to decrease by around 10%.
- They initially drop from their current levels as the projected new renewable energy supply from the Final 2024 ISP connects to the grid.
- Prices rise in the last few years, reflecting a tighter supply-demand balance: increased demand from commercial and residential electrification, as well as gas-powered generation supply constraints and coal retirements.

***Renewable/energy efficiency schemes costs*** are expected to fall significantly over the outlook as a number of current schemes expire in 2030.

***Retail costs*** are relatively flat over the modelled period.

# We modelled supply and demand scenarios

## *Supply-side delay scenarios*

**Wind and transmission:**
The connection of new wind farm builds in Renewable Energy Zones, and selected transmission projects, are delayed by 12 months.

**Hydro and battery storage:**
12-month delays to the majority of new grid-scale battery projects, and the Snowy 2.0 and the Borumba Hydro Schemes.

## *Demand-side scenarios*

**Sub-optimal CER orchestration:**
Demand from EV charging is not spread across the day but concentrated in the evening peak.

**Faster electrification:**
An additional 10TWh of electrification demand in each year from FY27 (equivalent to a ~5% increase in total demand).

**Slower electrification:**
A delay in electrification demand as forecast by the ISP by 12 months.

## *Network related scenarios*

**Higher network investment:**
The rate of replacement capital expenditure is doubled after the current AER determination periods.

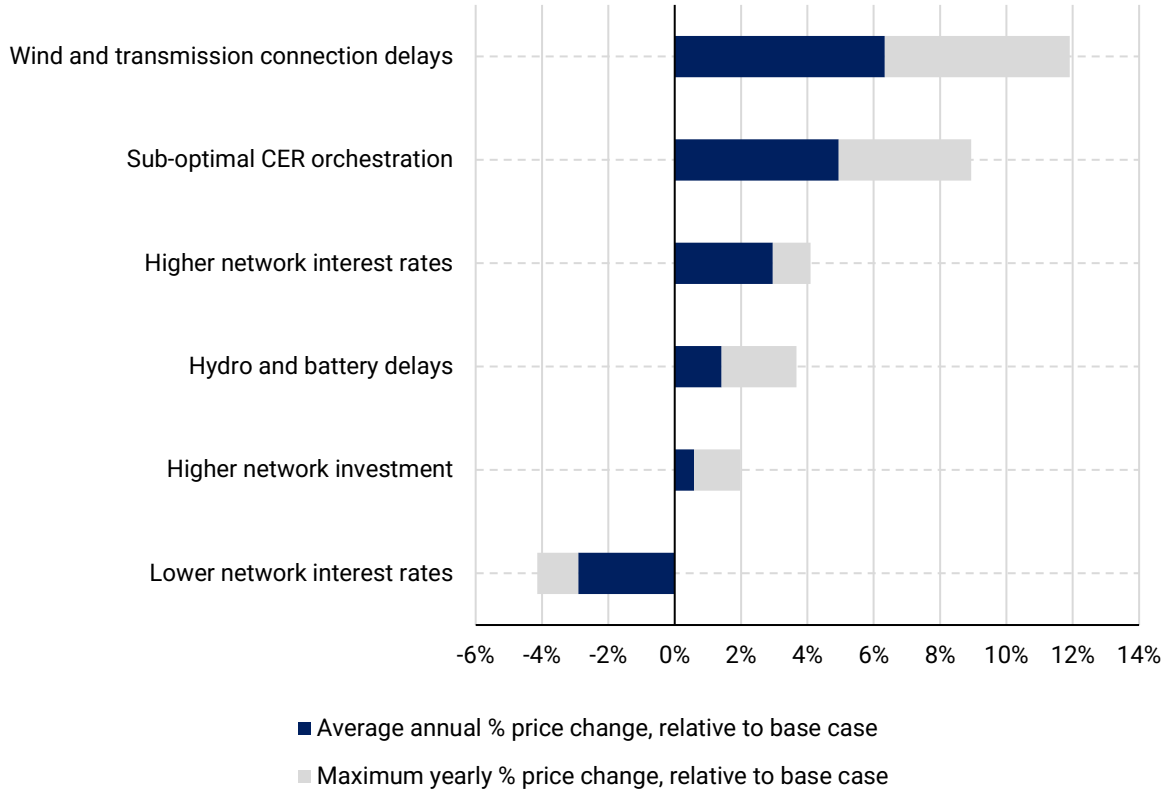

**Higher interest rates:**
Interest rates are 1% higher over the next decade.


**Lower interest rates:**
Interest rates are 1% lower over the next decade.

# Wind and transmission delays, and demand side changes, had the largest price impacts

**Residential Price Outlook - Scenario analysis**

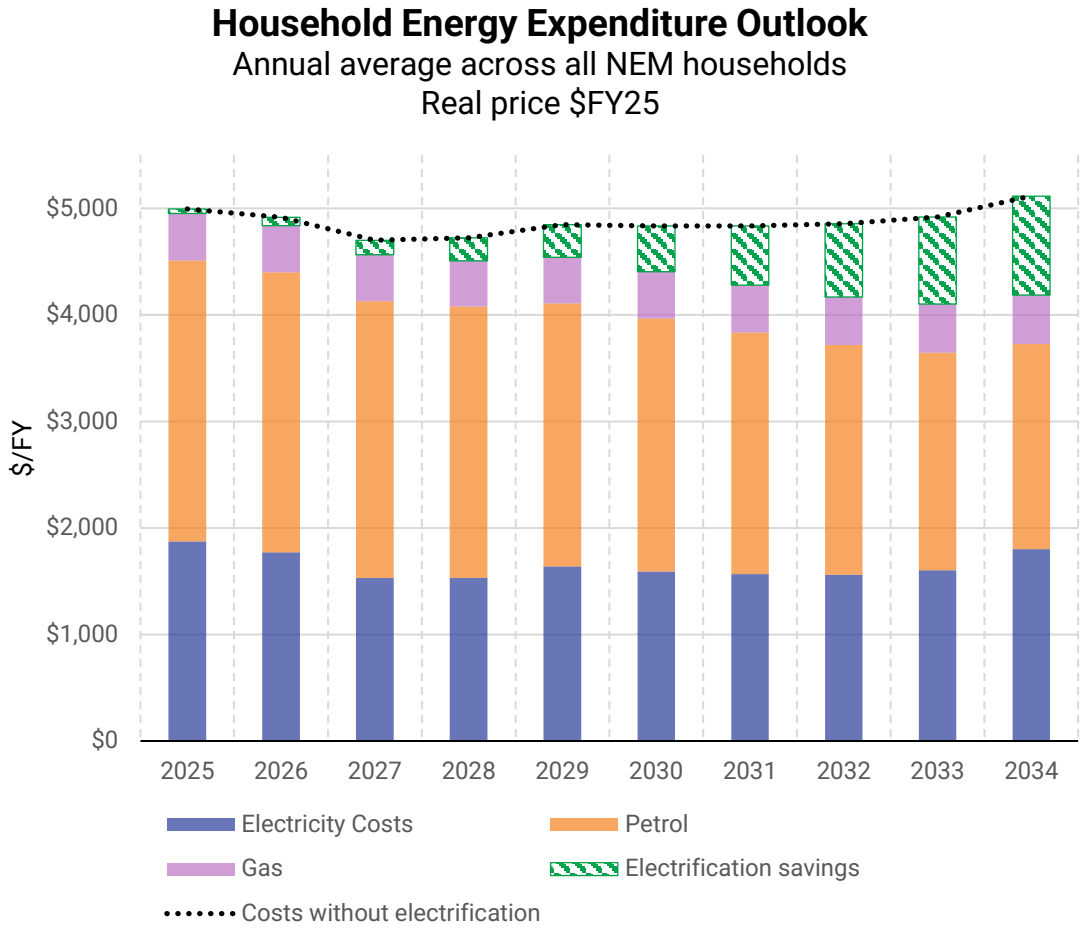
Annual percentage price impact, relative to base case; Real $24-25




The chart plots the average percentage change in prices under each scenario, compared to the base case. The solid bars plot the average annual impact over the 10 years, and the grey bars reflect the maximum price impact for an individual year.

- The wind and transmission connection delay scenario had the most significant price impact, demonstrating the critical importance of wind in the transition in diversifying the electricity supply portfolio.
- Sub-optimal CER orchestration produced the second highest price impact, demonstrating that when electricity is consumed during the day (the load profile) can have a large impact on prices.
- The higher and lower interest rates scenarios highlight how impactful changes in interest rates can be to network costs.
- The higher network investment scenario suggests that uncertainty over future network capital investment is not projected to significantly impact prices over the next 10 years.

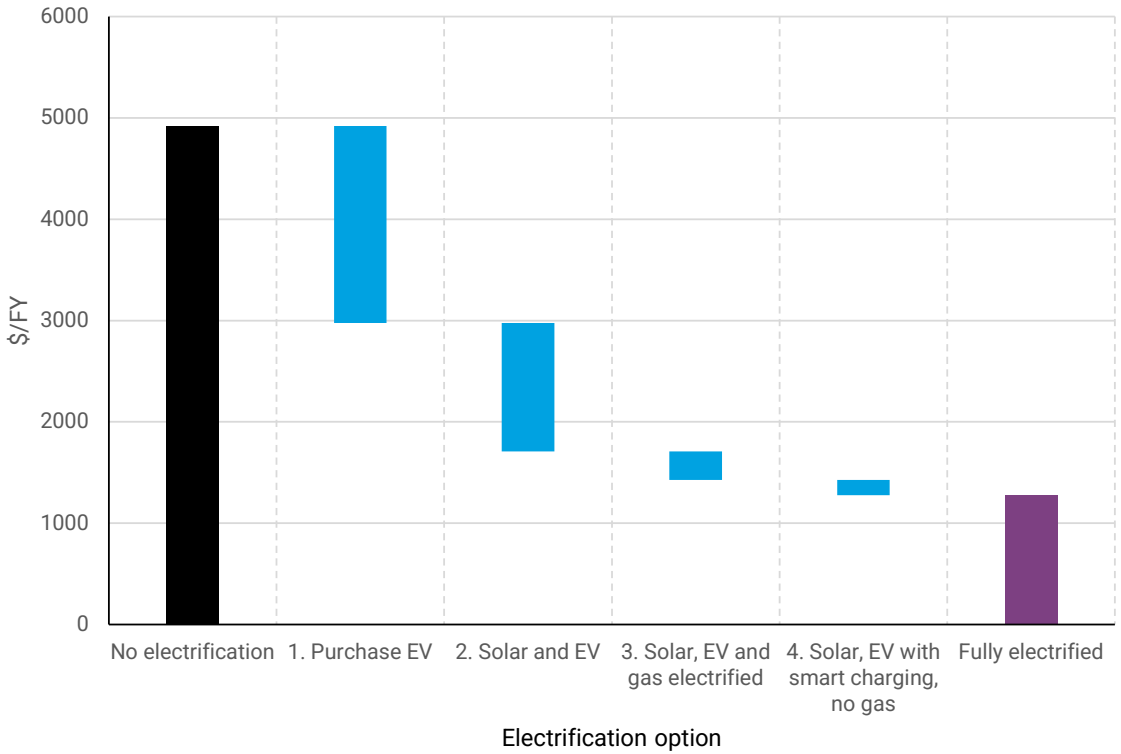
# Average household energy spending projected to fall with electrification




- Electricity bills are only one part of a household's energy spend. Most households also consume fuel for transport and gas for heating and cooking. And although a household's electricity usage may increase as they electrify, they avoid gas and fuel costs.
- We projected how electrification might impact household energy costs. We calculated average household spending on energy based on the rate of electrification in AEMO's latest system plan and our electricity price outlook.
- This analysis shows that – if policy and investment are effective and efficient – average household spending on energy will fall as households electrify.
- By the end of the 10-year outlook, electrification is projected to reduce average household energy costs by nearly $1,000 per year, or by almost 20% of current spending on energy.
- This chart does not account for up-front costs a household might incur to electrify, as these will vary for individual households.
- This chart only considers the results on average, based on the rate of electrification that is modelled in AEMO's ISP – over time, the costs for consumers will vary based on their individual energy needs and the extent to which they have electrified.

# A household who fully electrifies could reduce expenditure by 70%

**Typical energy cost savings if a household electrified today**
A household with annual electricity consumption of 3,900 kWh, real $FY25




- We modelled a typical household's spending on energy as they electrify, under a range of different electrification investments or how they consume electricity.
- Starting with a household with 'no electrification' – electricity and gas at home, and driving an Internal Combustion (ICE) vehicle – we modelled annual energy costs if that household:
  1. Purchases an Electric Vehicle (EV)
  2. Installs rooftop solar
  3. Switches their gas appliances to electric ones, and
  4. Charges their EV during the day when electricity is cheaper
- If a household is able to take advantage of all four electrification actions today, they could reduce their energy expenditure by more than 70% – from about $5,000 to under $1,500 a year.
- The savings are projected to increase slightly over the 10-year outlook, to be nearly 80% of household energy costs in 10 years' time. This is because gas costs are projected to increase with falling customer numbers.
- This analysis does not account for a household's up-front costs to electrify. Instead, it highlights the benefits of electrification to inform consumers' future decisions, and emphasise the importance of ensuring the broadest range of households can take advantage of electrification. This includes renters, households who live in apartments, and financially vulnerable households.

# Our 2024 outlook projected prices to fall if investment is efficient and policy coordinated

## 1 *Residential electricity costs are projected to decline*

Residential electricity prices are modeled to fall by about 13% over the next 10 years, under our base case.

This is an average across the regions in the National Electricity Market (NEM). It does not include Western Australia and the Northern Territory.

Most of the reduction is projected to occur in the next few years, driven by an anticipated increase in renewable generation in AEMO's system plan.

## 2 *Electrification should reduce household energy costs*

While electrification of household appliances and vehicles can increase a household's electricity costs, they also avoid spending on fuel and gas.

Overall, electrification is projected to reduce average household energy costs by nearly $1,000 per year, or by almost 20% of current spending on energy, by the end of the 10-year outlook under our base case. These reductions do not include costs incurred to purchase electric appliances and vehicles.

## 3 *Households with CER will benefit most*

A household who fully electrifies could reduce their energy expenditure by 70%.

While consumers need to weigh these savings against the costs of electrifying vehicles and appliances, we project large energy cost savings for consumers who purchase an EV, solar panels, or switch off gas.

Ensuring all households are able to electrify would promote an equitable energy transition.

## 4 *Effective integration of CER would reduce costs*

If the electricity demand from Electric Vehicles and other 'Consumer energy resources' is not well coordinated, it could increase electricity bills for all households by almost $100 per year.

The National Consumer Energy Resources Roadmap is progressing the effective integration of CER, and the AEMC is delivering a number rule changes and reviews, including the accelerated rollout of smart meters by 2030.

## 5 *Delays to renewables would increase costs*

Delaying the connection of renewable generation and transmission into the market would put upward pressure on residential electricity costs.

This is particularly true for wind generation because it diversifies the supply portfolio.

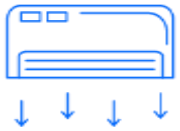
Consumers would benefit from an ongoing focus on efficient investment and timely connections to the grid.

# Three actions to ensure all households benefit from electrification

## 1 *Efficient investment in critical resources*

- Our analysis highlights the importance of timely and efficient investment in connecting renewable generation and transmission to the market, as electricity demand increases with electrification.
- We found that the largest benefits were for connecting wind generation because it offers diversification benefits compared to other generation types.
- While the investment pipeline remains healthy, previous AEMC analysis has highlighted that the rate at which announced projects move to the commissioning stage is low.
- Initiatives underway to address the barriers to new supply include the recent AEMC rule change to speed up the process of connecting new generation to the grid, and recent Commonwealth and state initiatives to improve the efficiency of planning and environmental approval processes.

## 2 *Effective integration of CER*



- Ensuring the new demand from electrification is managed well requires the coordinated use of Consumer Energy Resources (CER) such as electric heat pumps and EVs.
- By allowing consumers to draw electricity when it's cheapest, we found that effective CER integration would lower electricity purchase costs for all households by reducing the need for network investments and the risk of spikes in wholesale prices.
- To effectively integrate CER into the market, the AEMC is delivering a number of rule changes and reviews, including the accelerated rollout of smart meters by 2030, and the review *Electricity pricing for a consumer-driven future*, which aims to promote flexibility for consumers to use energy more efficiently and save money on their bills.
- The National Consumer Energy Resources (CER) Roadmap outlines how governments will enable CER's vast potential to lower bills, improve reliability and cut network costs.

## 3 *Address electrification barriers for all households*

- Household energy costs are projected to be lower for consumers who electrify. While Australians continue to take up solar PV, batteries, EVs and other forms of CER at rapid rates, not all consumers will be able to invest in CER in the next five-10 years due to barriers which include: renting; living in a dwelling, such as an apartment, without access to rooftop PV; or not having the access to, or the ability to install, an EV charger.
- The households who cannot electrify are likely to face higher energy costs.
- To promote an equitable transition, policymakers should ensure the broadest spectrum of households can take advantage of solar and batteries, and can access a range of EV charging options.
- Addressing the inequities and barriers to electrification may become increasingly important as more households rent and/or live in apartments.