



# Past, present, future

## Australia's energy transition

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**GRATTAN**  
Institute

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Australia's energy system

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Progress to date

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Current challenges

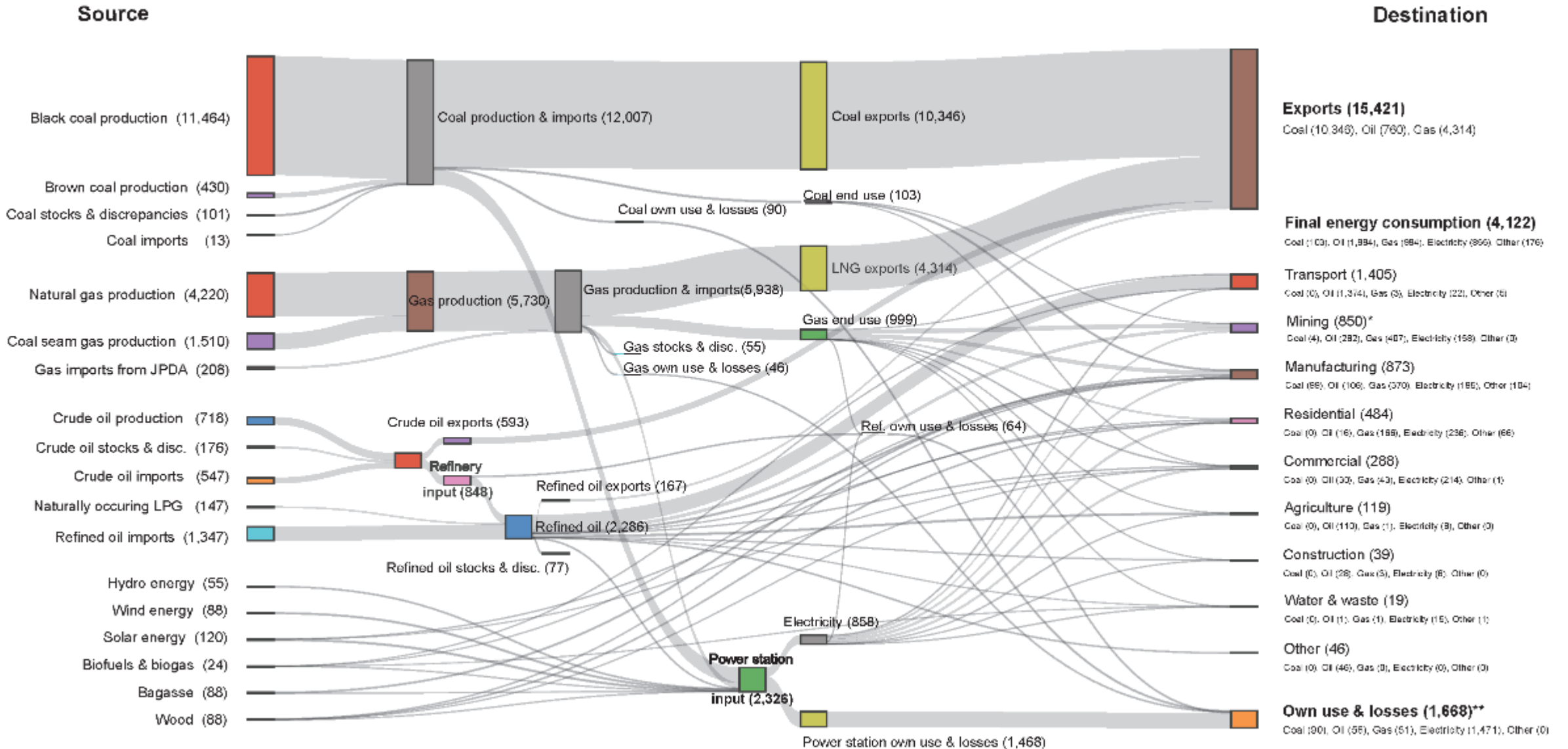
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Future directions

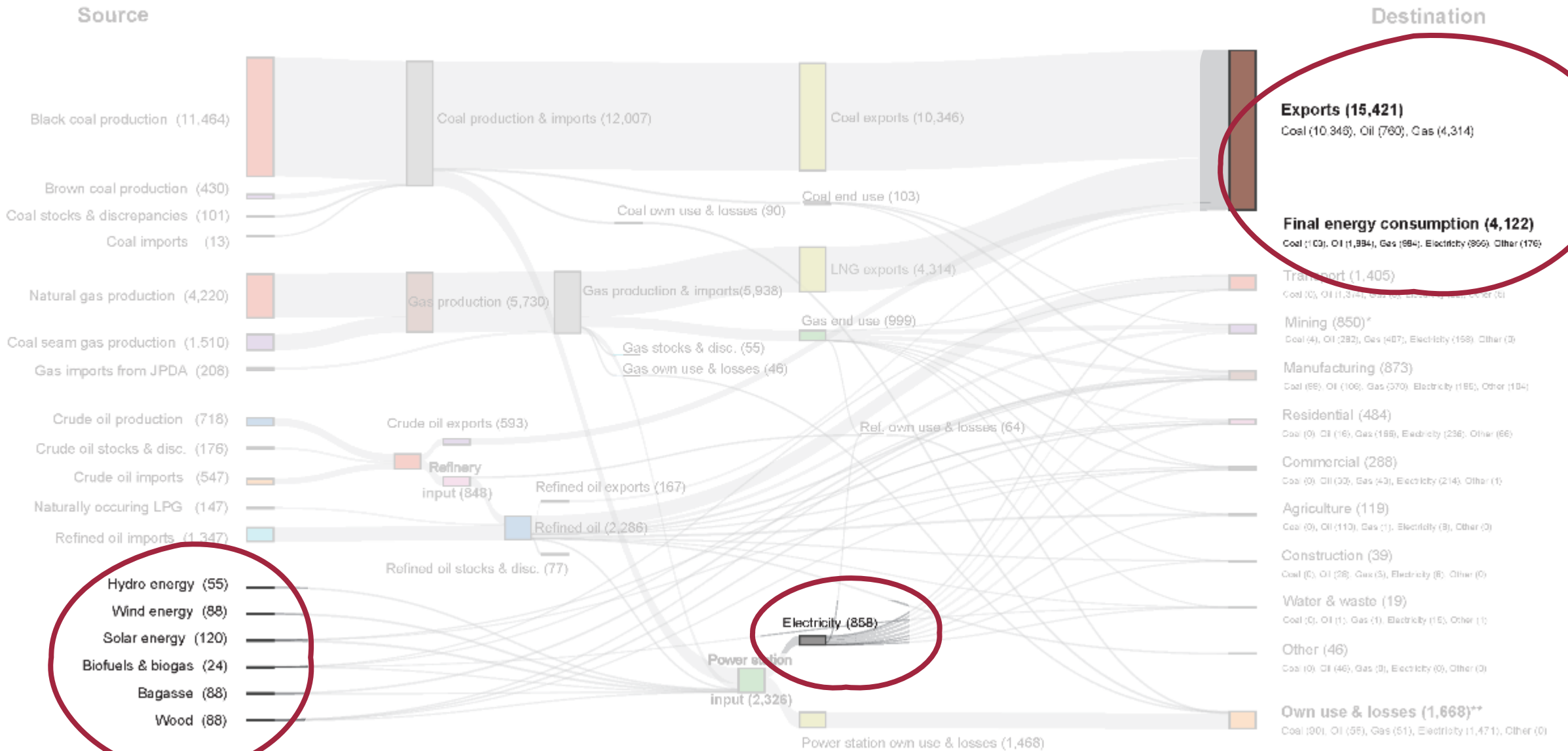
# Australia's energy system

*A very quick overview*

# Energy flows in the Australian economy 2024



# Exports and emissions are drivers of change



# Progress on the energy transition

Australia has made big gains in decarbonising the electricity sector, but very little on other sources of energy.

Rooftop solar and batteries are success stories.

# Australia has made good progress in reducing emissions in the electricity sector

Change in emissions since 2005 (Mt CO2-e and %)



Source: Grattan analysis of AGEIS

# But growth in other energy sources means energy emissions have hardly changed since 2005

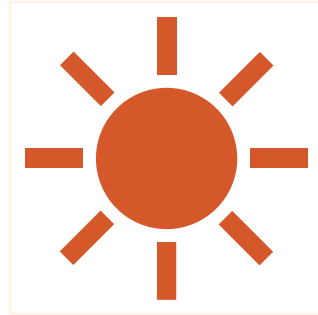
Change in emissions since 2005 (Mt CO<sub>2</sub>-e and %)



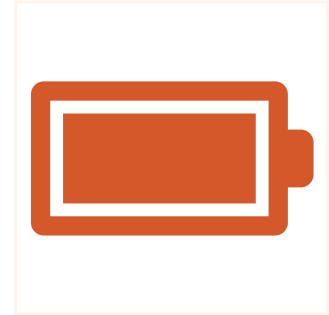
# Three success stories



Renewables



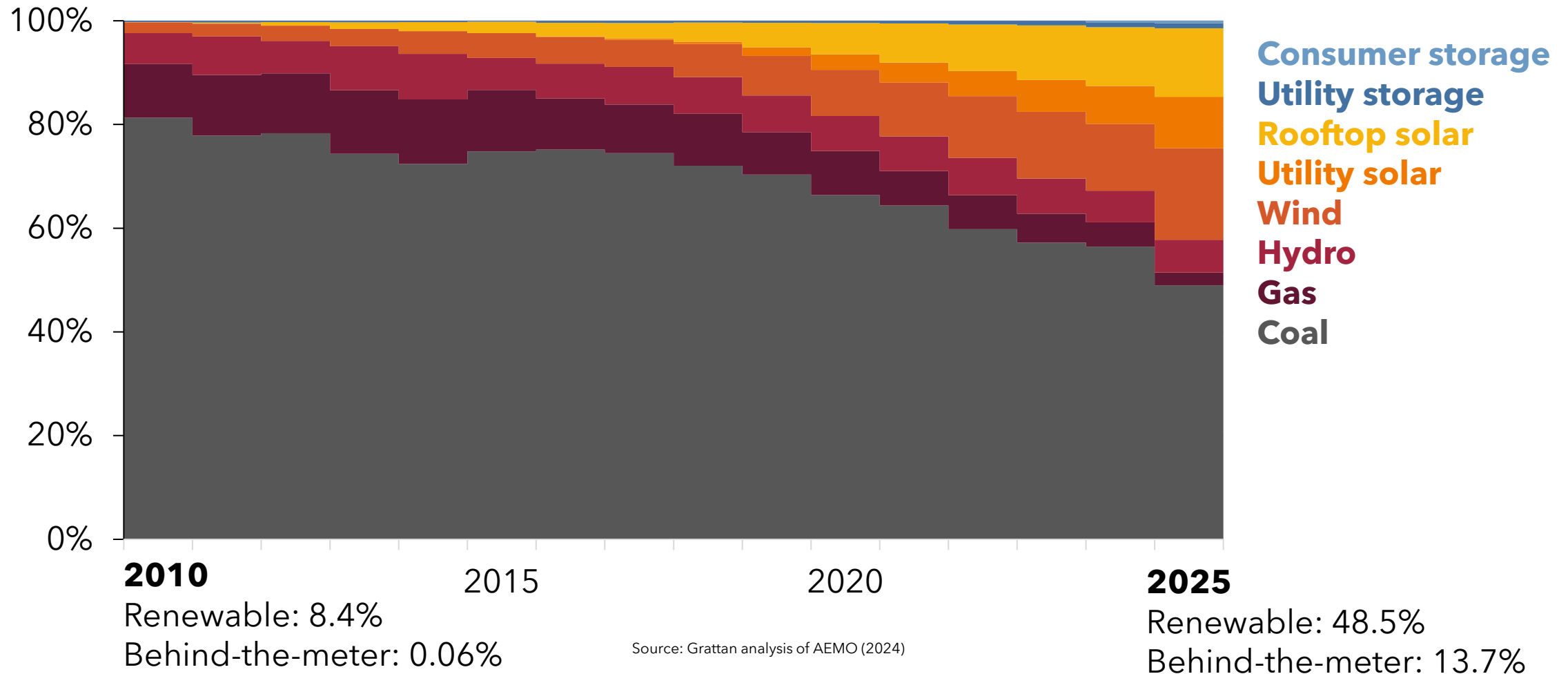
Rooftop solar



batteries

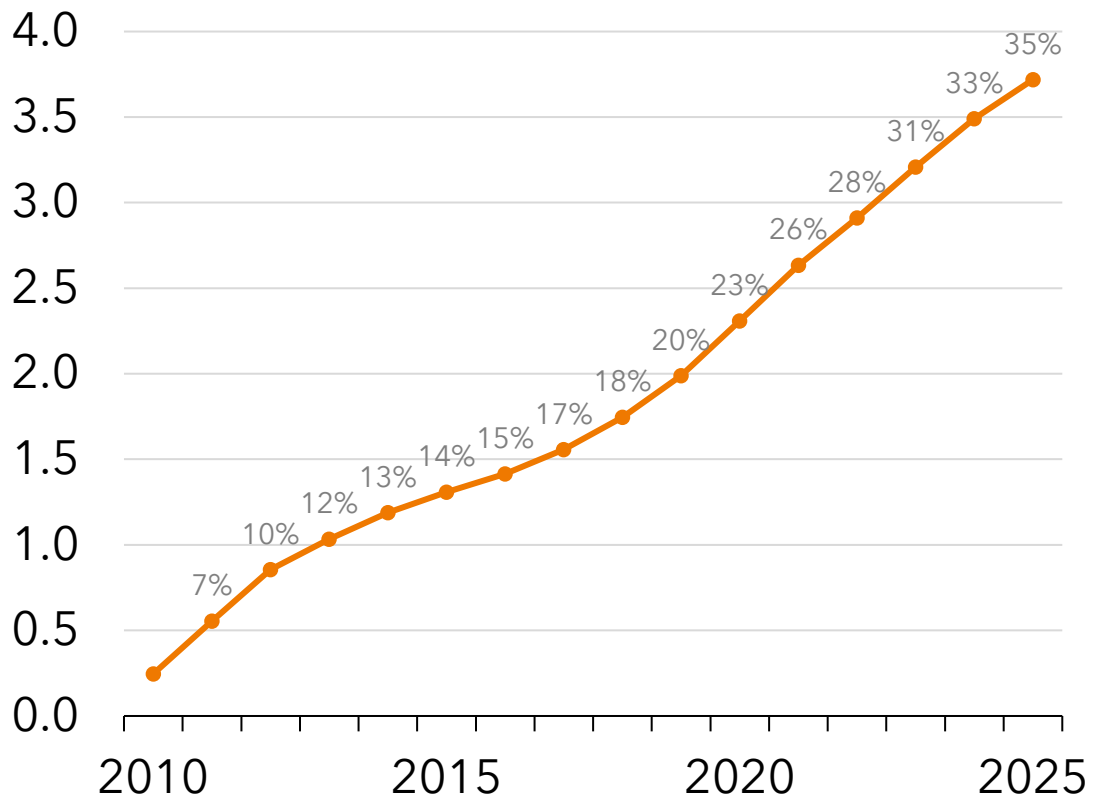
# Renewables have been growing steadily

% generation by source, NEM

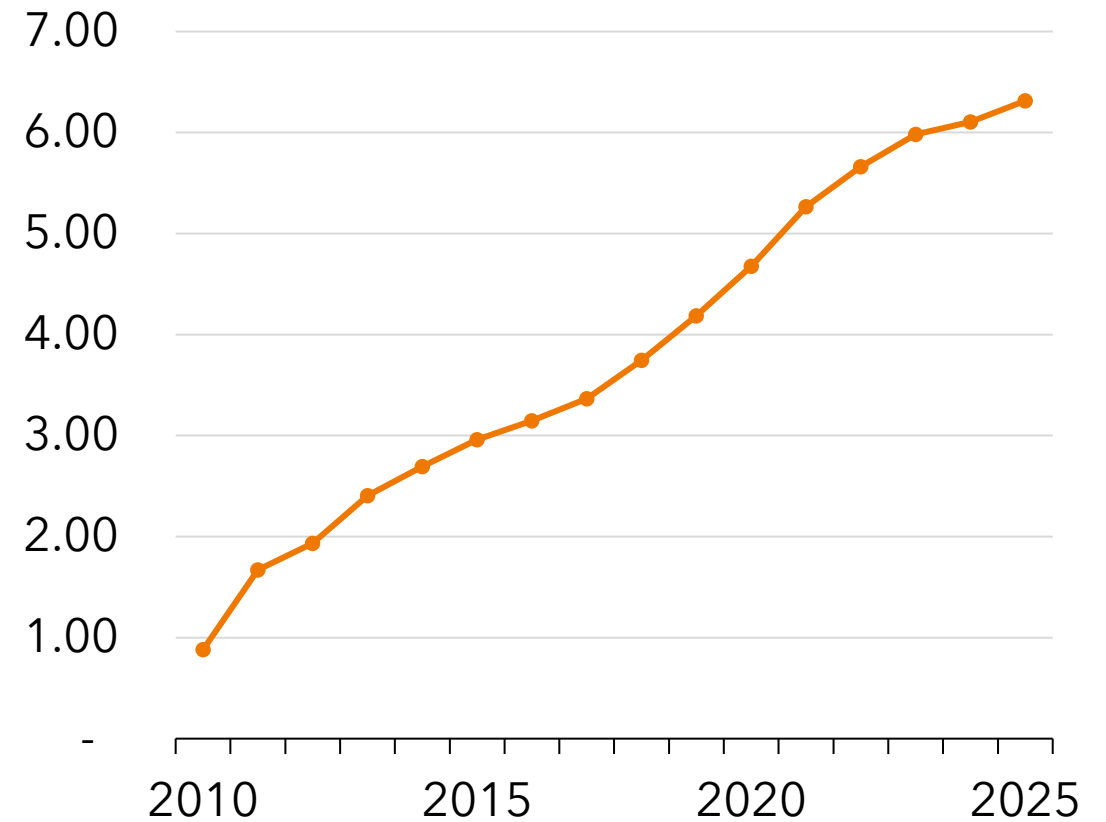


# Rooftop solar is our success story

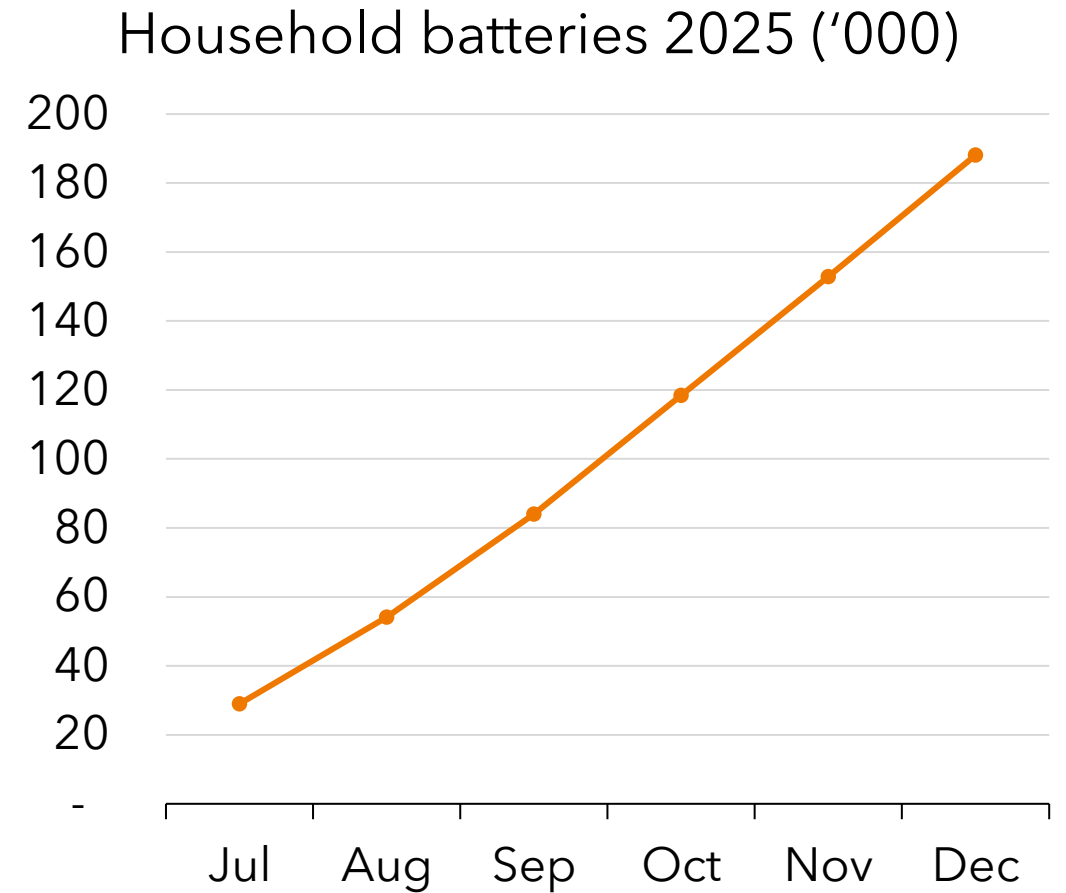
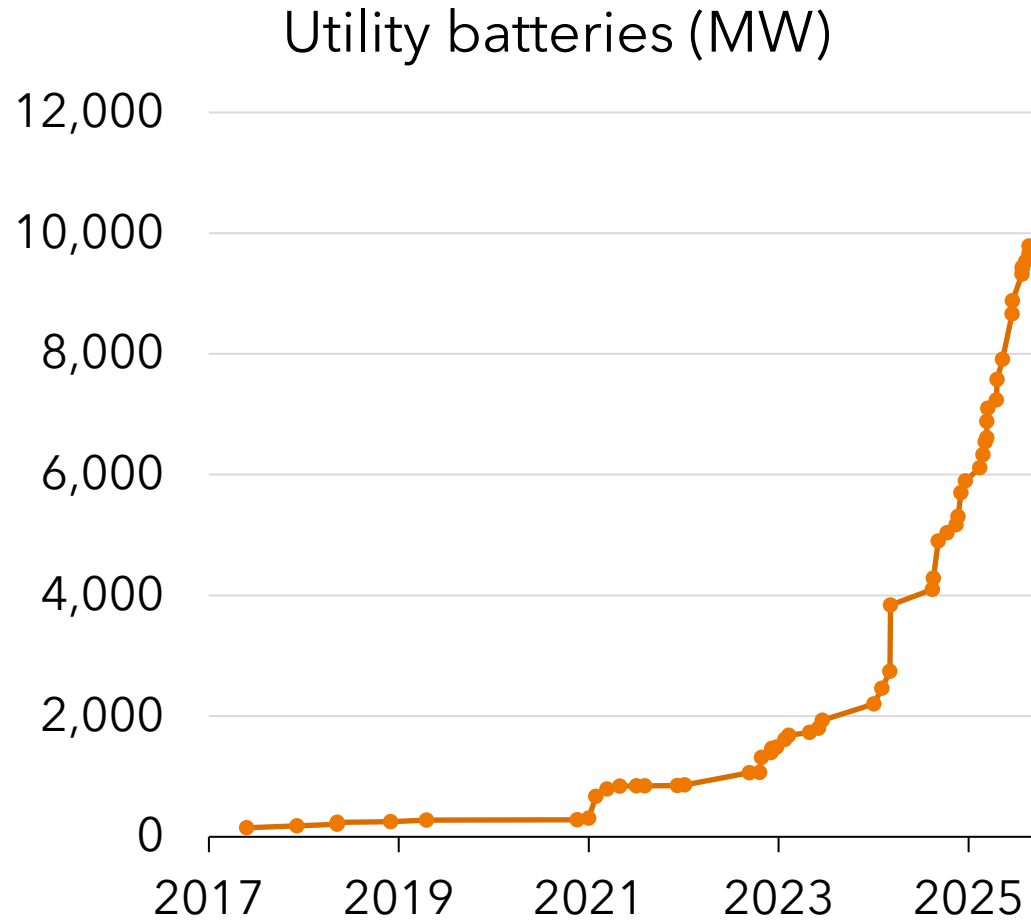
## Number of homes with solar (millions and %)



## Average system size (kW)

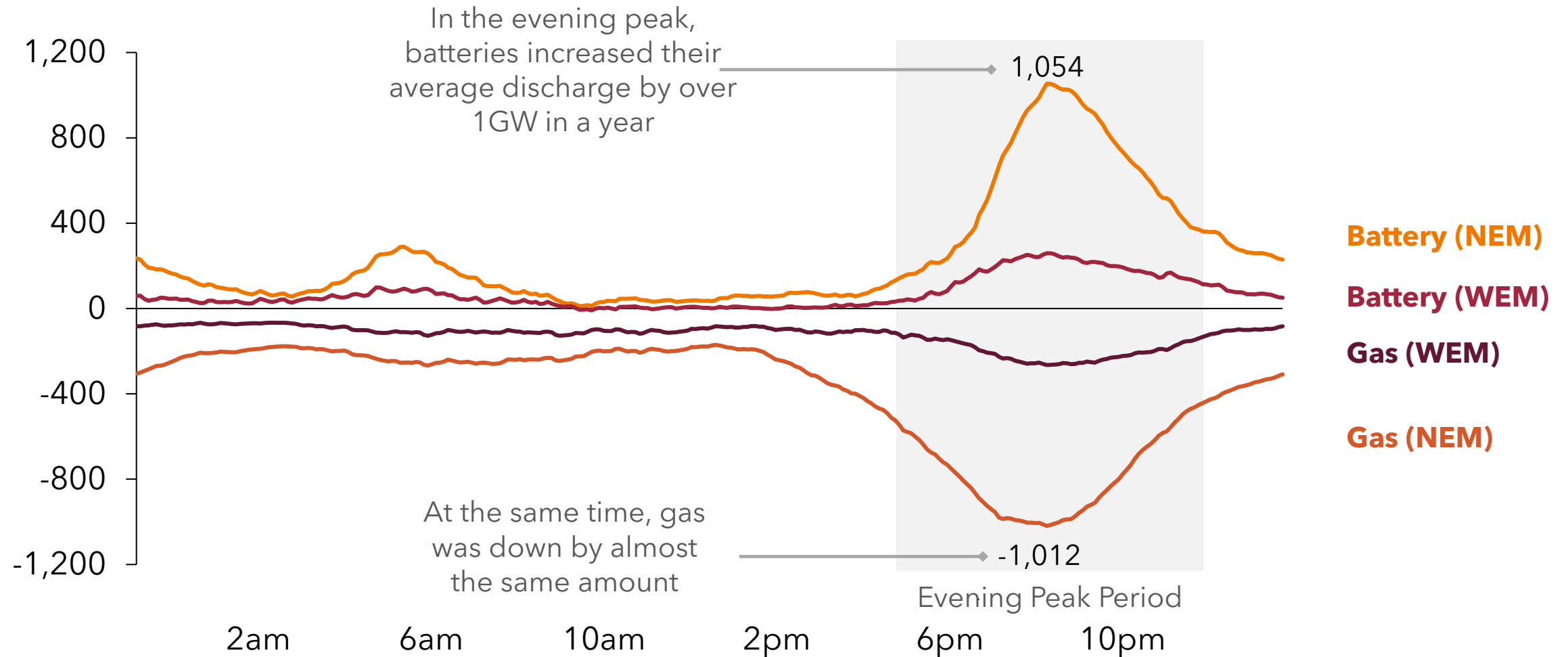


# The batteries are coming...



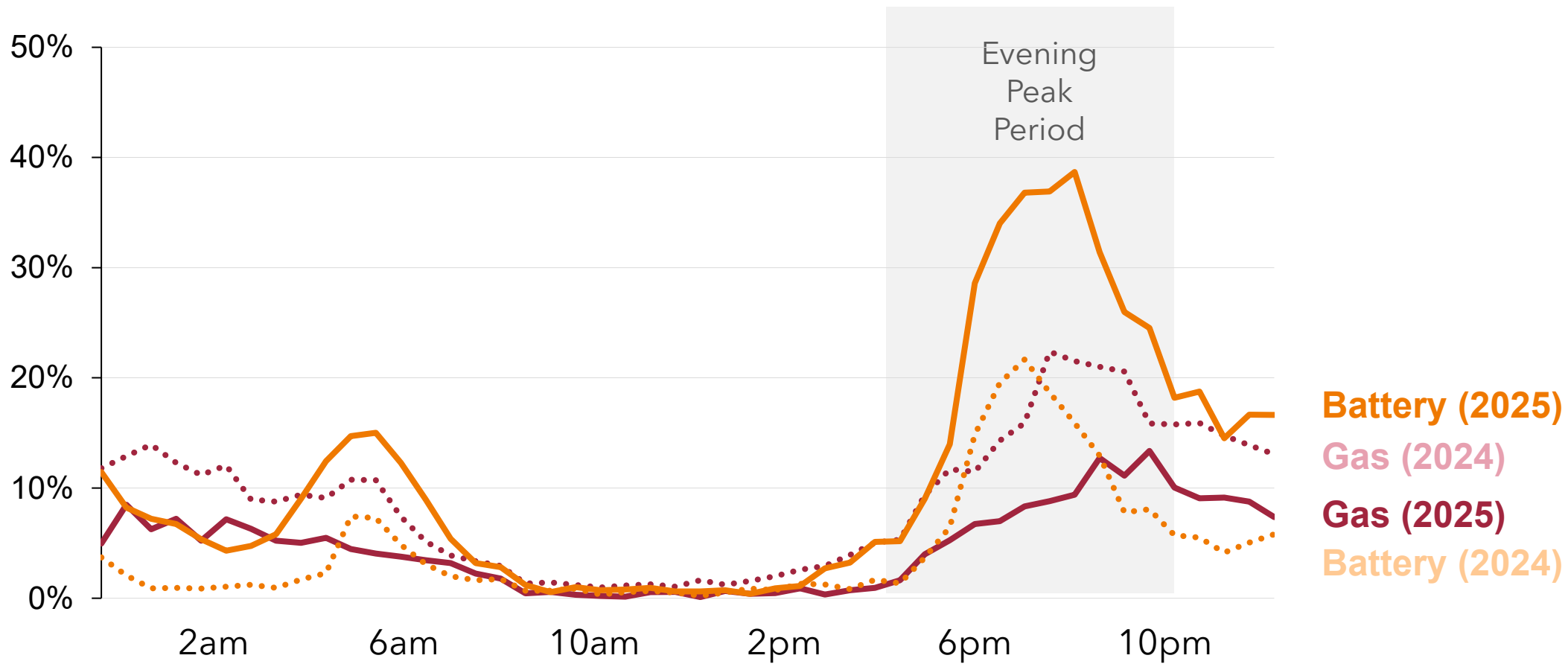
# ... they are taking market share from gas

Change in average output (MW) by time of day from Q4 2024 to Q4 2025



# ... and they are setting peak prices

Percentage of time peak price is set by gas or batteries



# Current challenges

Australia is aiming to reduce emissions by 43% below 2005 levels by 2030, and 62%-70% by 2035, achieving net zero by 2050. We also aim to have 82% renewable electricity by 2030.

Financing and building capacity to meet these targets is challenging.

# Three things we're finding hard to manage



Coal exit



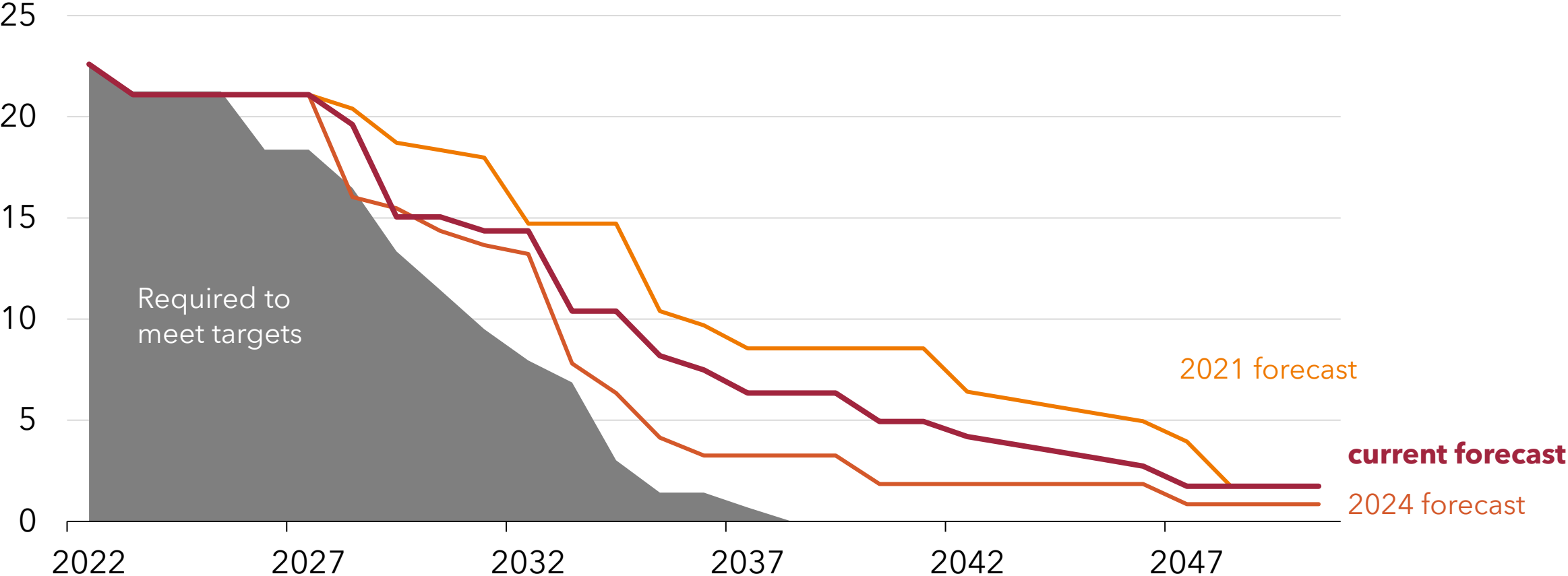
Curtailment



Negative prices

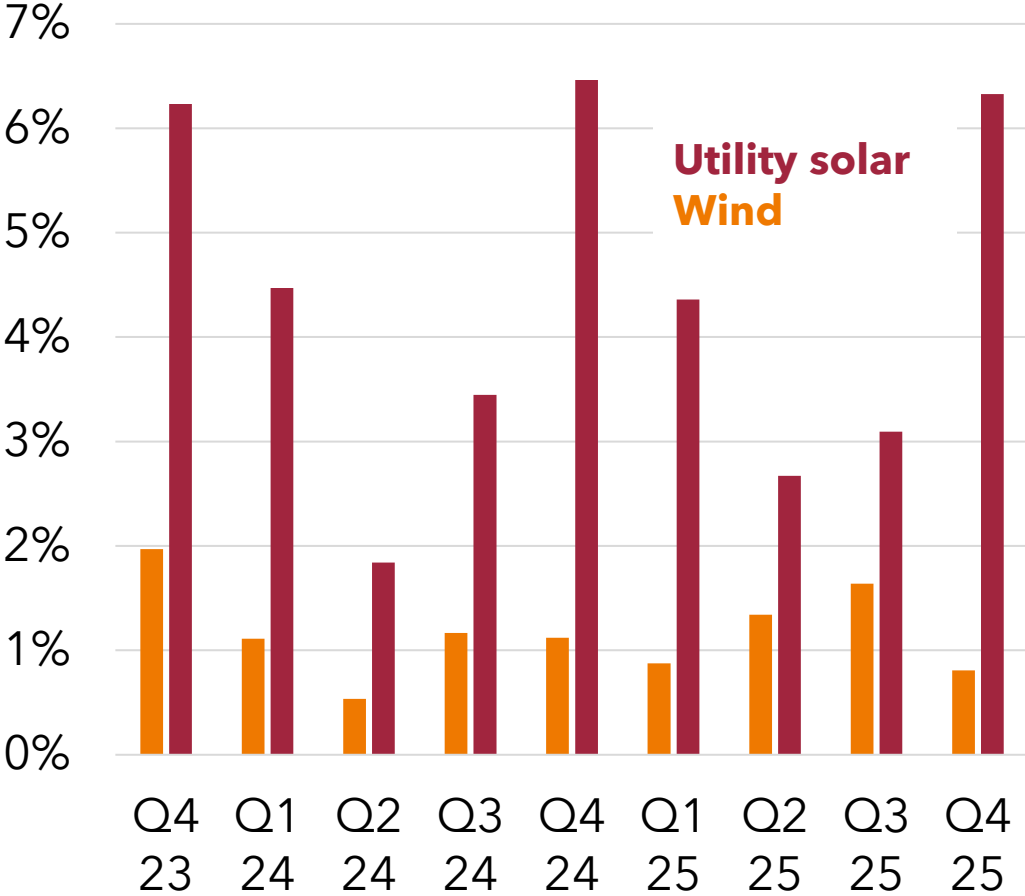
# We have to go faster and slower on coal closure

Coal capacity (forecast)

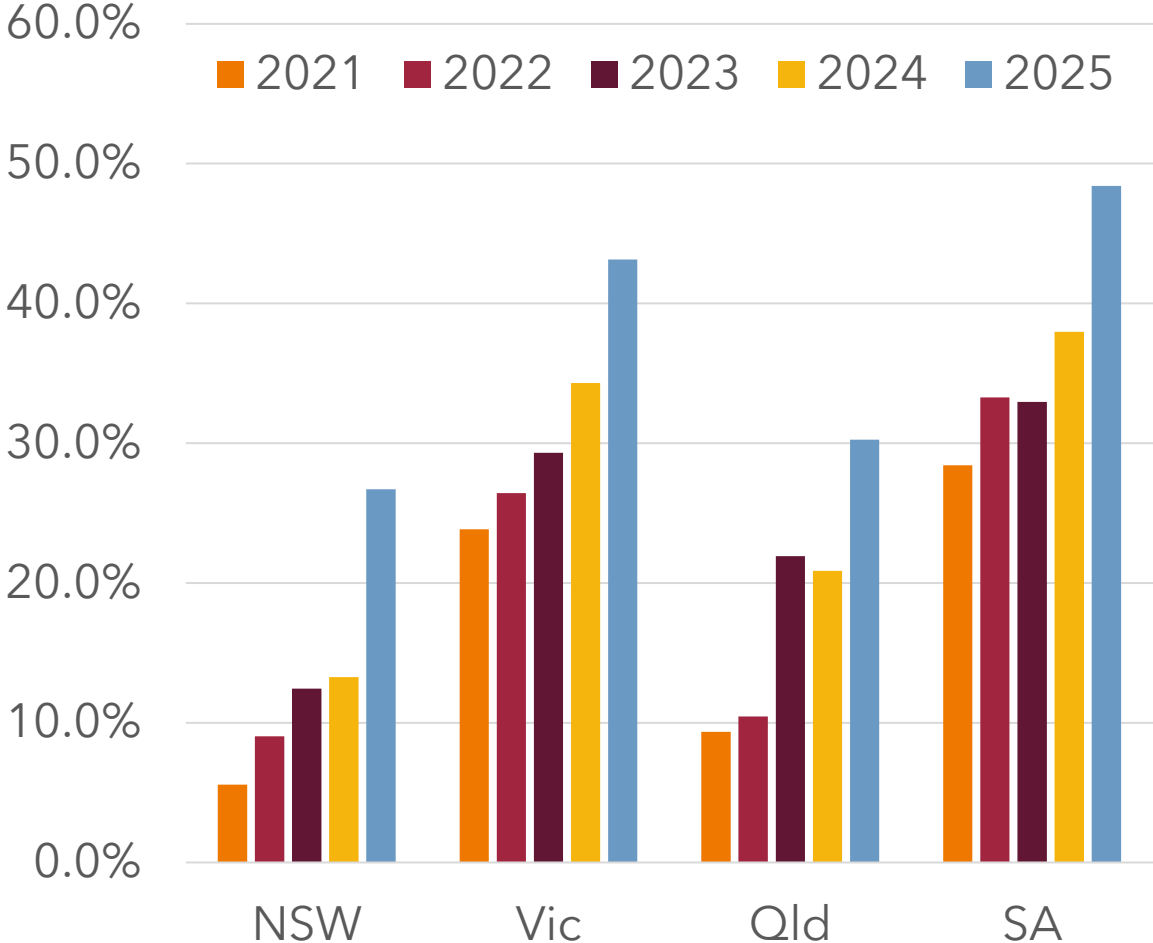


# Curtailment and negative prices are making it harder to finance new renewables

Curtailment (%)



Negative price %



Source: AEMO Quarterly Dynamics

# Future directions

To decarbonise most energy use, Australia needs to build an electricity system three times larger than what it is today. Public support is fragile.

More fundamentally, Australia needs to clarify the role of gas, and use carbon pricing to get cheaper, cleaner electricity

# Four challenges ahead



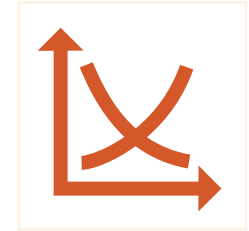
Can we build it?



Will the community  
accept it?



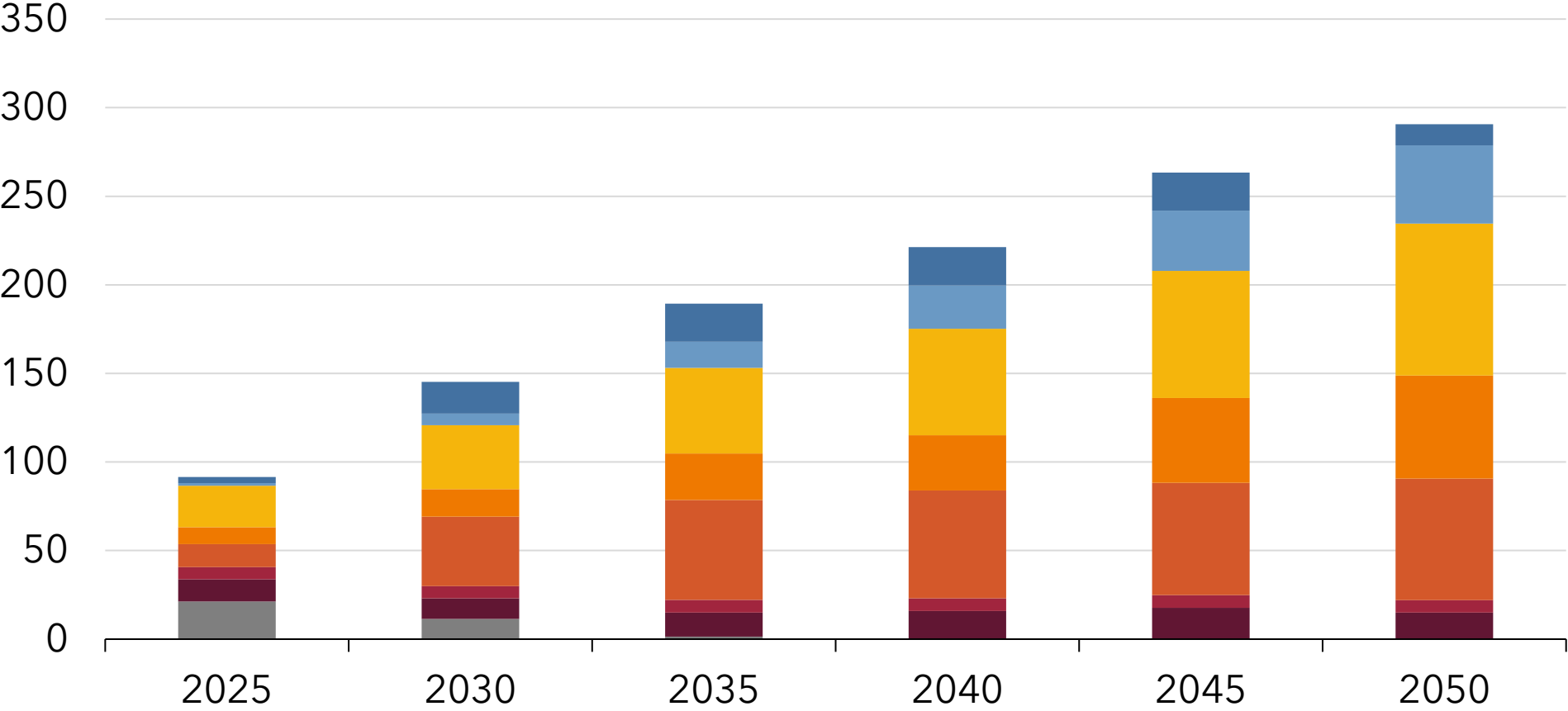
What is the role of  
gas?



Do we need  
carbon pricing?

# Australia needs to build an electricity system three times larger than the current one

Capacity (GW)



**Consumer storage**  
**Utility storage**  
**Rooftop solar**  
**Utility solar**  
**Wind**  
**Hydro**  
**Gas**  
**Coal**

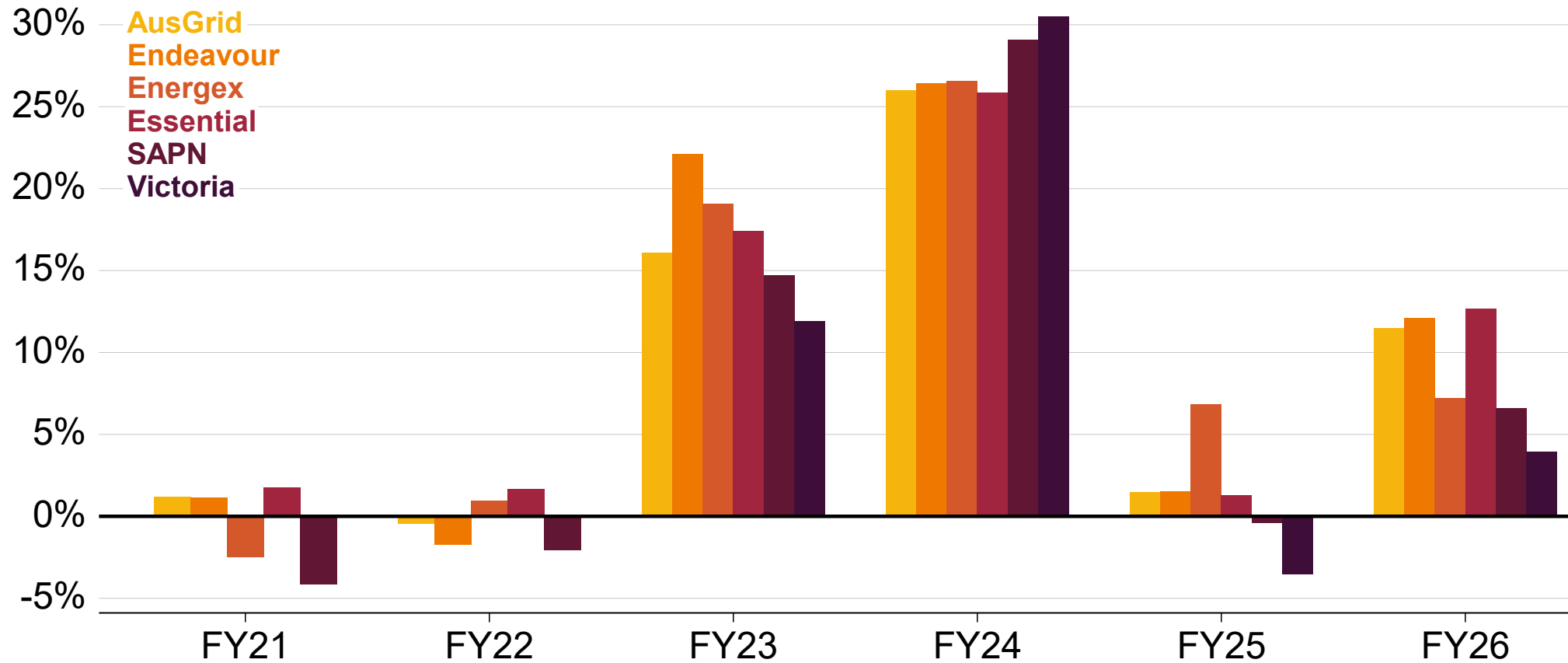
# Opposition to renewables is rising



Photo credit: ABC News

# Households are tiring of high prices

% change year on year in default electricity offer by network

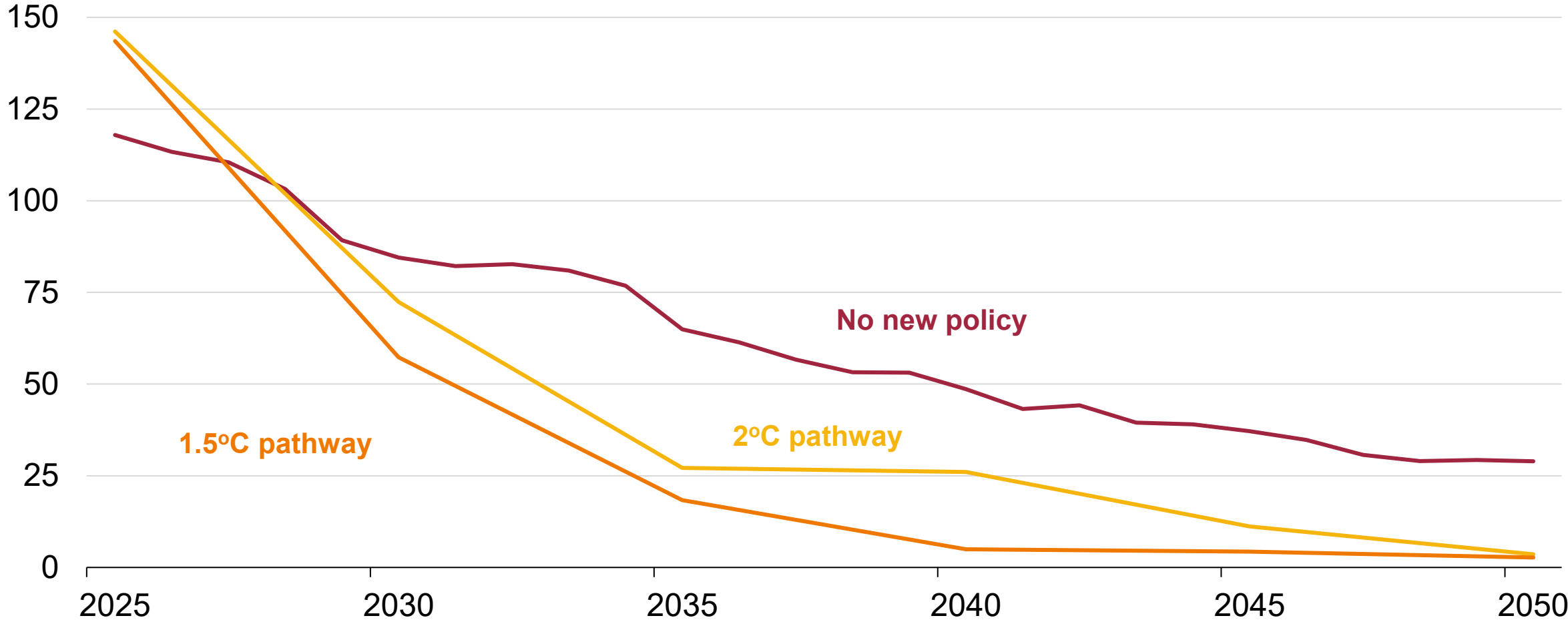


# Australia needs more clarity on the role of the gas



# Without a price on carbon, electricity emissions will stay too high for too long

Electricity sector emissions (MtCO<sub>2</sub>-e)



Note: CCA = Climate Change Authority. CCA scenarios only report data every five years. For a full description of the assumptions behind the 'No new policy' scenario, see Appendix B.  
Source: Jacobs (2025), CCA (2024b).

# Climate change is the biggest challenge of all



# Independent policy research to improve the lives of all Australians



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- photo credit: RE Alliance

Slide 4 & 5:

- Australian Energy Update 2025, <https://www.energy.gov.au/publications/australian-energy-update-2025>

Slide 7&8:

- Australia's national greenhouse accounts, <https://ageis.climatechange.gov.au/>

Slide 10:

- Australian Energy Market Operator (2024), *Integrated System Plan*, <https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp>

Slide 11:

- Rooftop solar numbers: Clean Energy Regulator (2025), *Small-scale installation data*, <https://cer.gov.au/markets/reports-and-data/small-scale-installation-postcode-data>
- System size: Australian Energy Market Operator (2024), *Integrated System Plan*, <https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp>

Slide 12:

- Utility battery numbers: <http://OpenElectricity.org.au>
- Household battery numbers: Clean Energy Regulator (2025), *Small-scale installation data*, <https://cer.gov.au/markets/reports-and-data/small-scale-installation-postcode-data>

Slide 13:

- Australian Energy Market Operator, *Quarterly Energy Dynamics*, <https://www.aemo.com.au/energy-systems/major-publications/quarterly-energy-dynamics-qed>

Slide 14:

- Australian Energy Market Operator, *Quarterly Energy Dynamics*, <https://www.aemo.com.au/energy-systems/major-publications/quarterly-energy-dynamics-qed>

Slide 17:

- Australian Energy Market Operator (2024), *Integrated System Plan*, <https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp>; and *Generation Information*, <https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information>

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Slide 21:

- Australian Energy Market Operator (2024), *Integrated System Plan*, <https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp>

Slide 22:

- photo credits: ABC news

Slide 23:

- Australian Energy Regulator, *Default Market Offer*, <https://www.aer.gov.au/industry/registers/resources/reviews>

Slide 25:

- Grattan Institute, *Bills down, emissions down*, <http://www.grattan.edu.au/report/bills-down-emissions-down-a-practical-path-to-net-zero-electricity/>

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- photo credit: ABC news

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- Photo credit: Kat Clay