MEIxAEMO Seminar Series

Melbourne Energy Institute

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Quarterly Energy Dynamics report: Q3 2024

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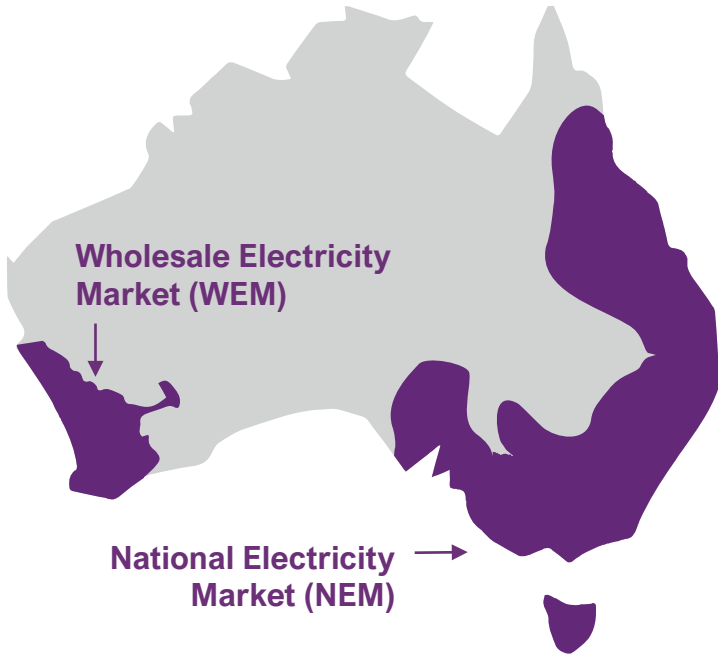
Quarterly Energy Dynamics Q3 2024 Report

Presented by:
Kerry Galloway

Agenda

1. National Electricity Market (NEM)
   - Demand and price
   - Interconnector flows and frequency control and ancillary services (FCAS)
   - Generation
2. East coast gas

Electricity



Gas

Declared Wholesale Gas Market (DWGM)

Short Term Trading Market (STTM)

and

Gas Supply Hub (GSH)

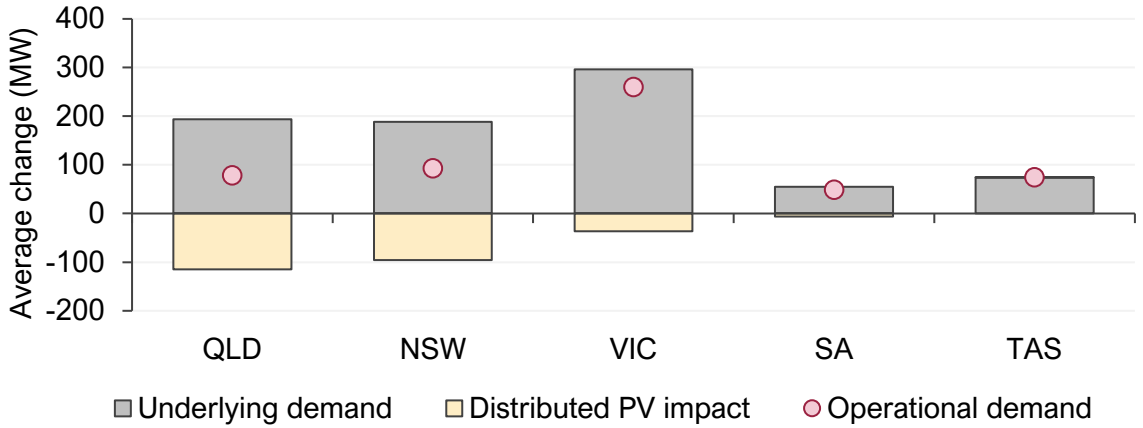
NEM dynamics

Colder weather pushed operational demand up

- After a particularly warm Q3 last year, colder conditions led to higher demand.
- Operational demand rose by 555 MW (+2.6%) to average 21,825 MW.
- A new Q3 high record of 6,786 MW for Queensland, up 193 MW (+3%).
- New South Wales up 189 MW (+2%) to an average of 8,688 MW.
- Victoria experienced the largest growth - averaged 5,436 MW, up 260 MW (+5%).
- Distributed PV impact was marginal in the southern regions of the NEM.

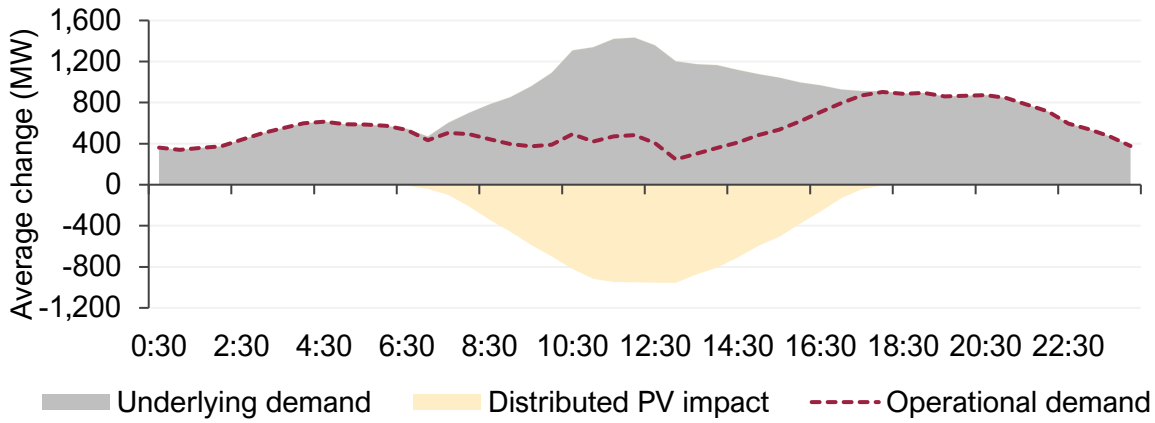
❑ Year-on-year increases in operational demand in all regions, led by Victoria

Changes in average demand components by region – YOY



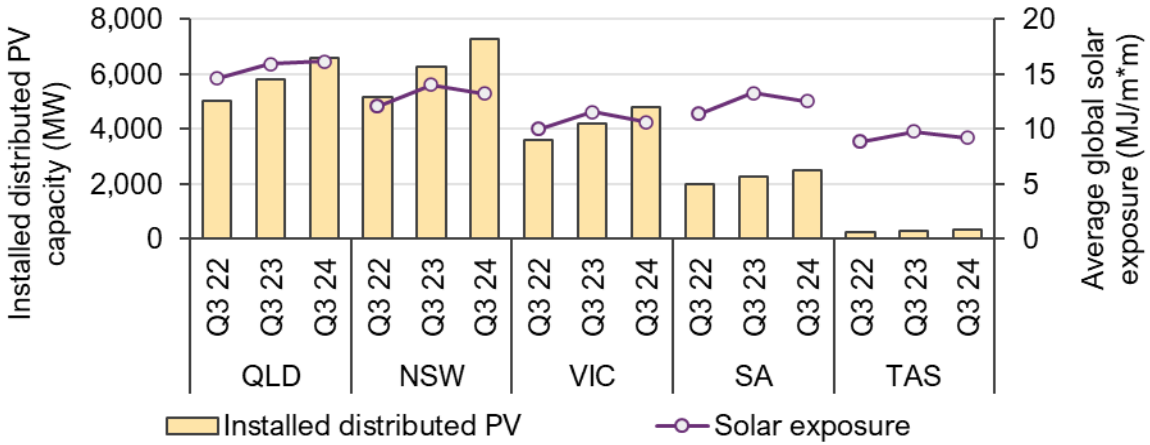
❑ Operational demand increased at all times of the day

Changes in NEM average operational demand by time of day – YOY



❑ Lower solar exposure and capacity growth rates for distributed PV

Estimated distributed PV capacity and solar exposure by region – Q3s

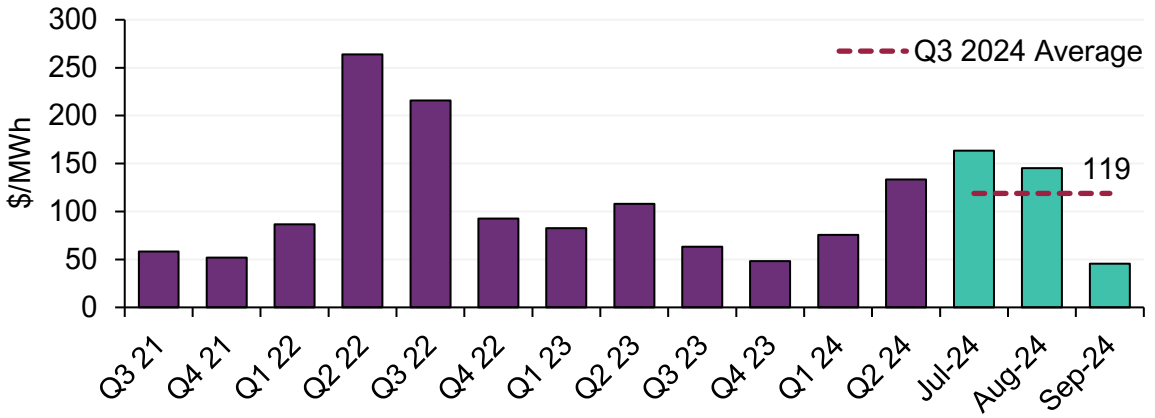


Year on year increase in average spot price

- Prices averaged $119/MWh across the NEM, up $56/MWh (+88%) year on year,
- Driven by higher average and peak operational demands, reduced hydro generation, and network outages limiting interconnector flows
- Prices were most volatile during July and August
- The increase in prices was seen in both energy and cap components in all regions.
- Negative price occurrence in NEM increased slightly (to 19.5% of intervals, from 19.3% in Q3 2023).

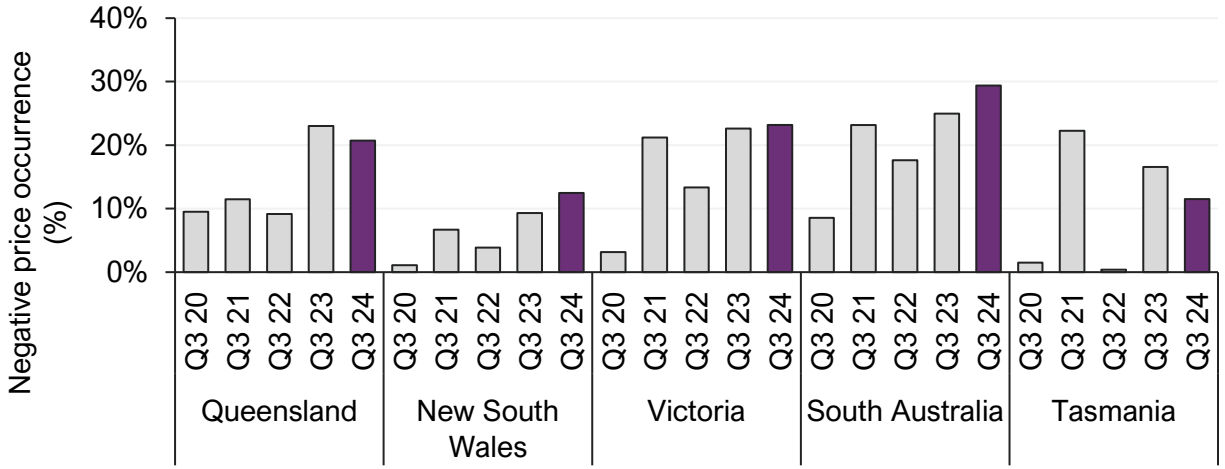
❑ **Year-on-year increase in NEM average wholesale spot prices**

NEM average wholesale electricity prices – quarterly since Q3 2021



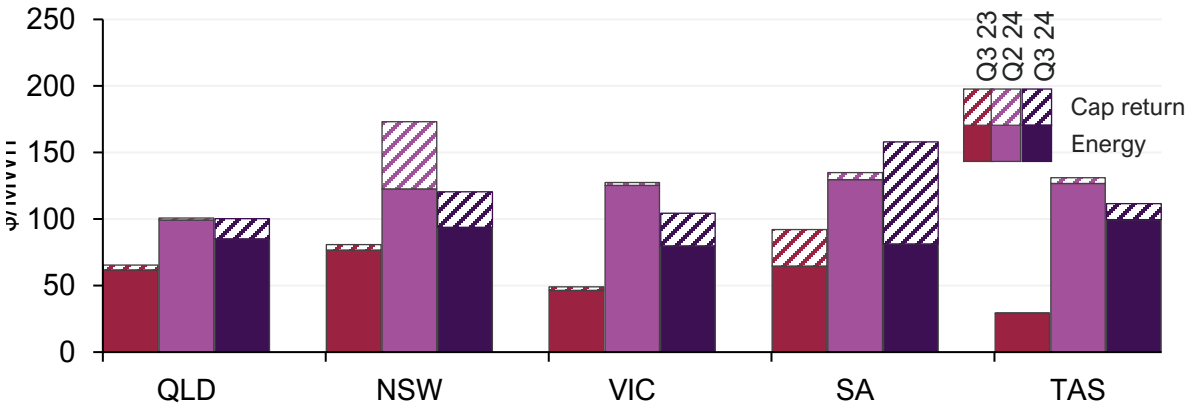
❑ **Slight increase in negative price occurrence in NEM**

Negative price occurrence in NEM regions – Q3s



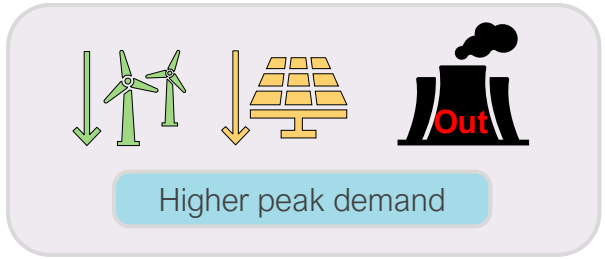
❑ **All regions saw elevated average spot prices year-on-year**

Average spot price by region – energy and cap return components

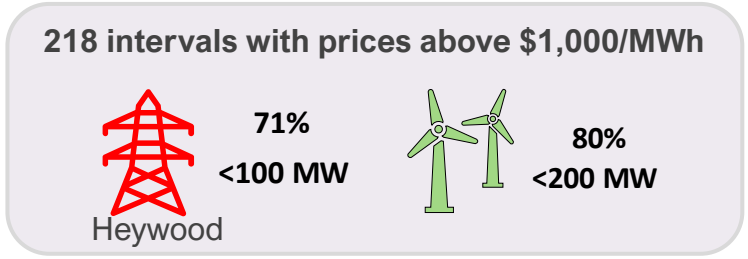


Increased price volatility in the NEM

NEM-wide price spikes due to tighter supply (End of July and early August)



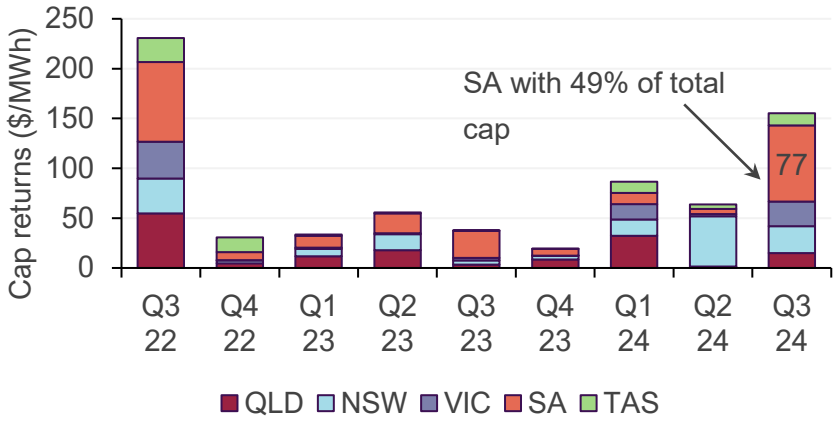
Price spikes in SA throughout the quarter



Dispatch of higher priced volumes during these instances

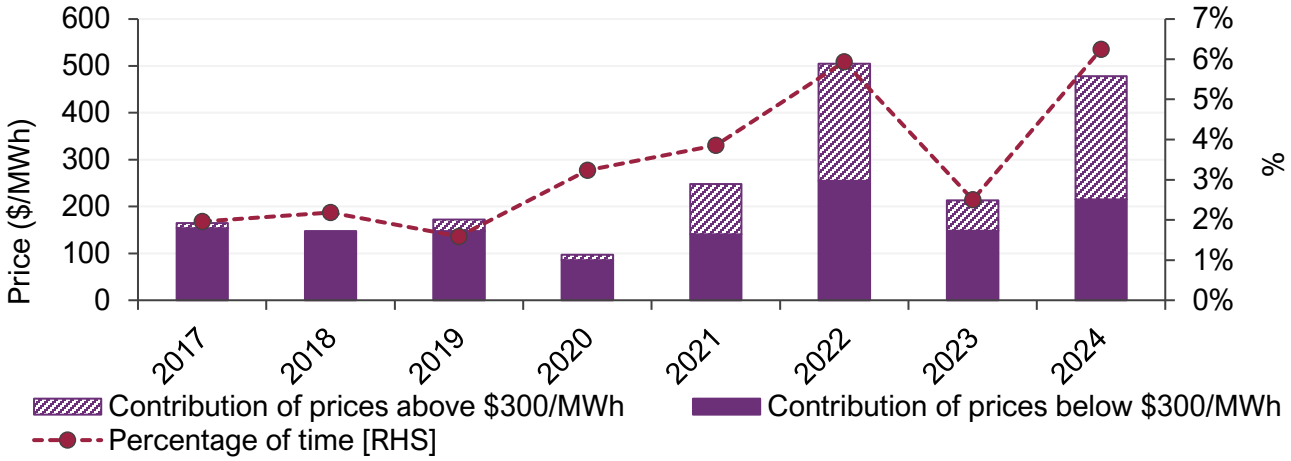
❑ **SA accounted for almost half of NEM cap returns**

Cap returns by region – quarterly



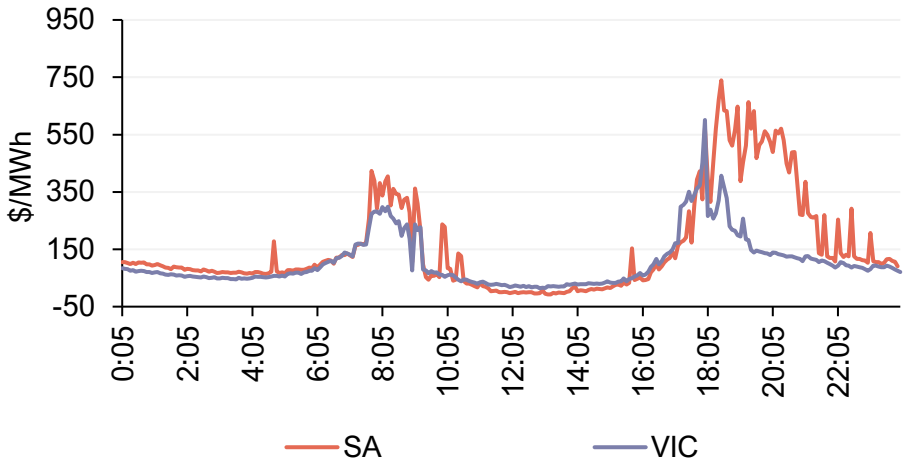
❑ **Increase in volatility driven by higher instances of peak operational demand**

NEM average price and the percentage of time with NEM operational demand above 28,000 MW – Q3s



❑ **Significant price gaps between South Australia and Victoria**

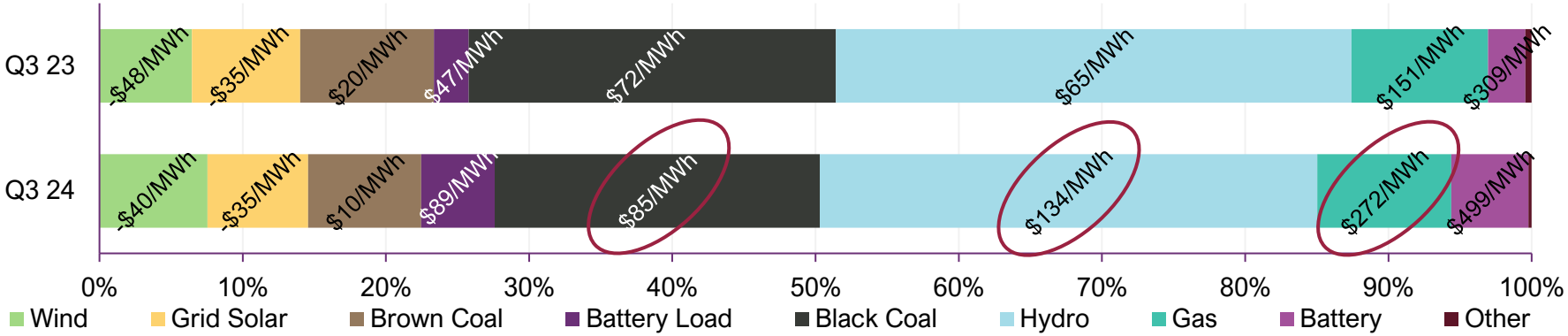
Average regional spot price by time of day – Q3 2024



Drivers pushed prices up in both energy and cap price territories

❑ **Batteries, gas, and hydro saw largest increases in average prices when marginal**

NEM price-setting frequency and average price when price-setter by fuel type – YOY



Drivers of higher energy prices

1. Higher operational demand in all NEM regions
   → Increased gas and black coal generation with higher prices when marginal

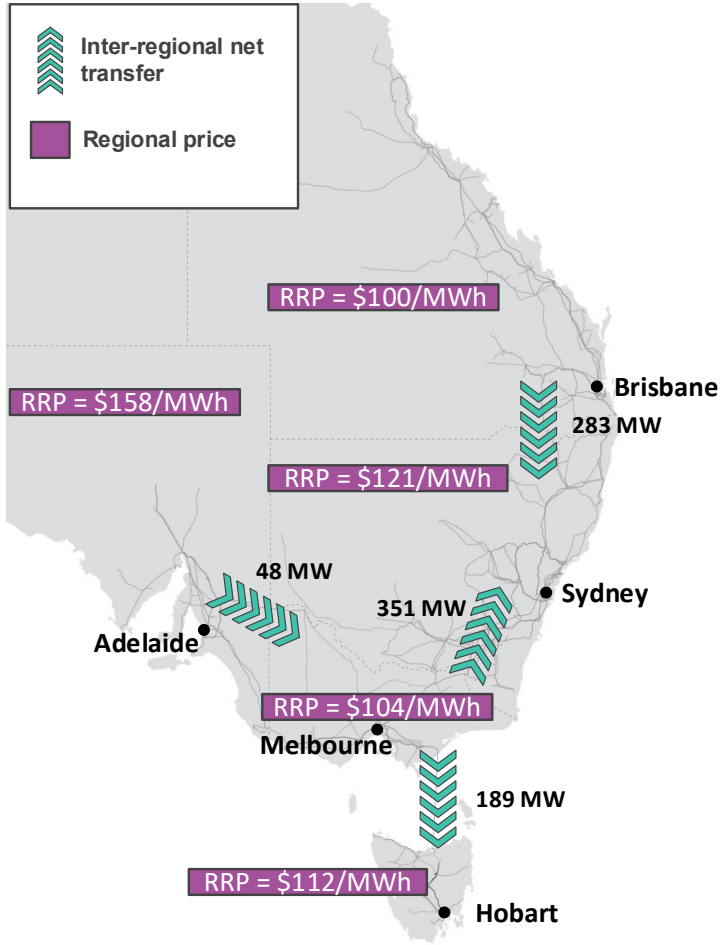
2. Low rainfall and lower storage levels → Higher priced hydro offers
   → Largest uplift in energy component seen in Tasmania (+240%)

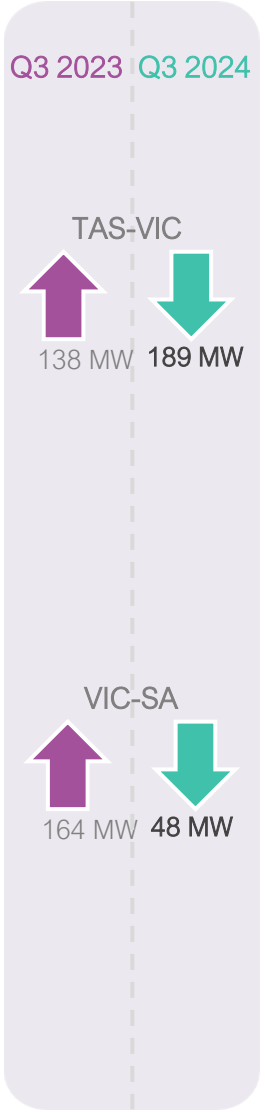
Drivers of higher cap component

1. • Higher evening peak demand
   • Coal outages
   • Instances of low VRE
   → Tight supply and demand conditions

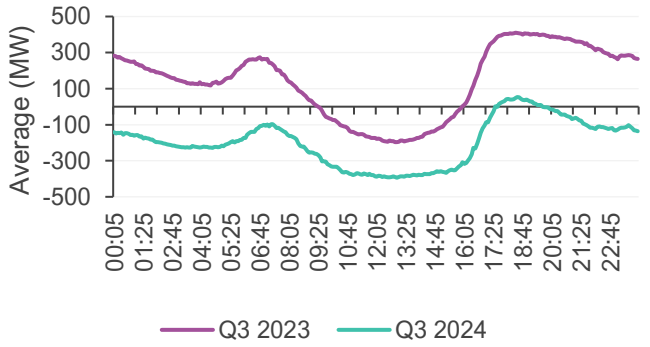
2. Interconnector limits

Net flows increased towards Victoria and Tasmania

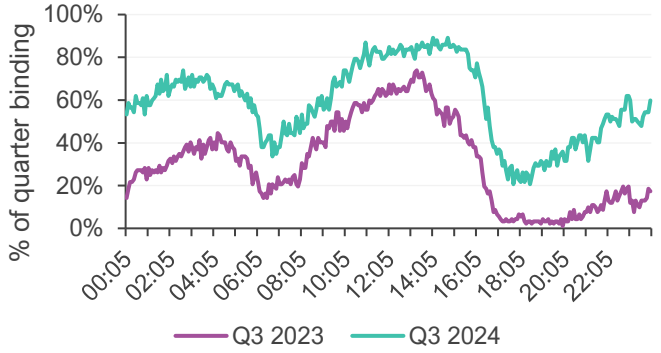




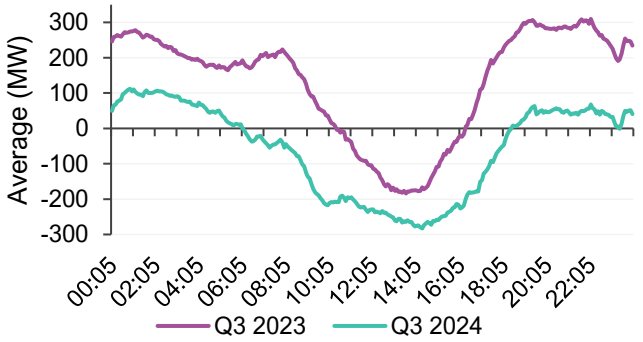
❑ **Basslink flows shifted strongly southwards**



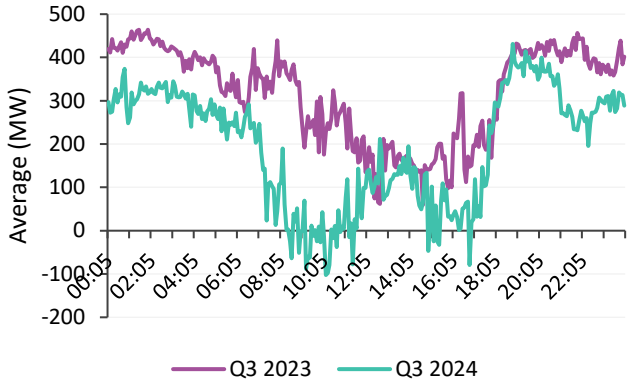
❑ **Basslink southwards limit bound more often**



❑ **Heywood flows shifted towards Victoria**



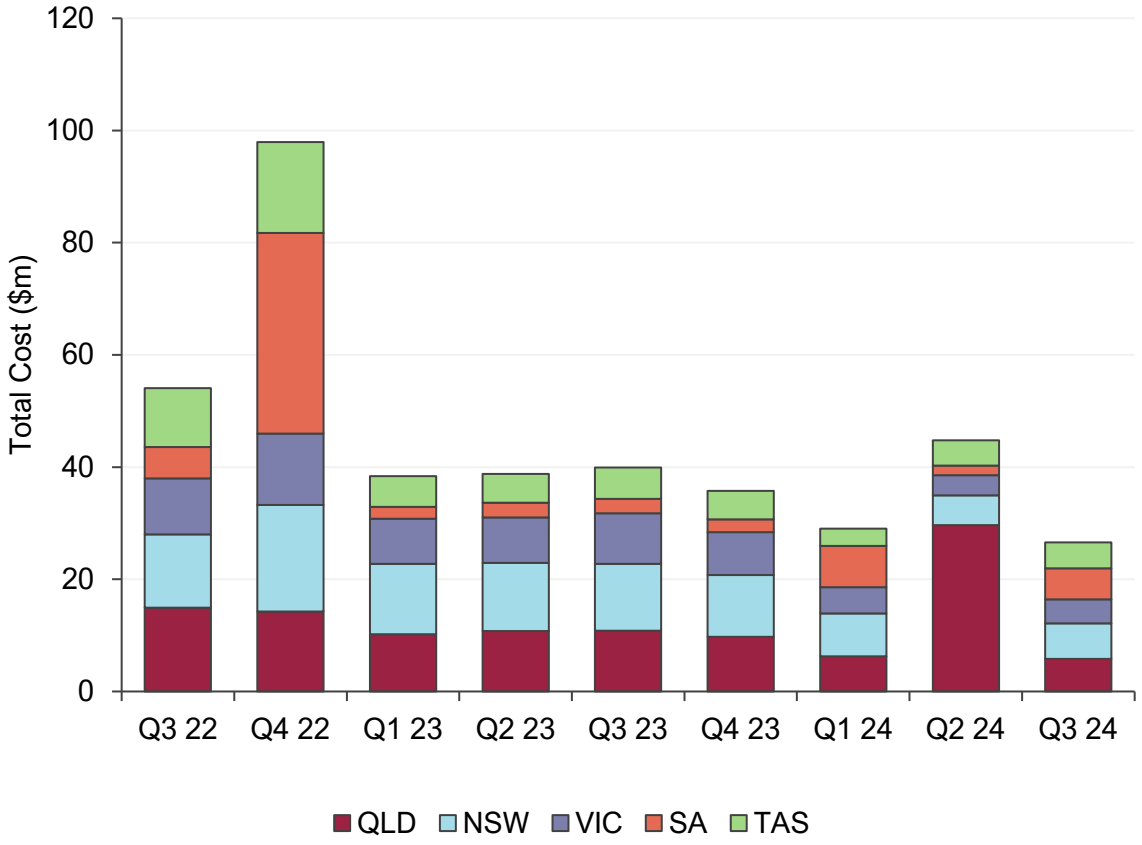
❑ **Heywood export limit drops significantly**



Lower FCAS costs across all regions except South Australia

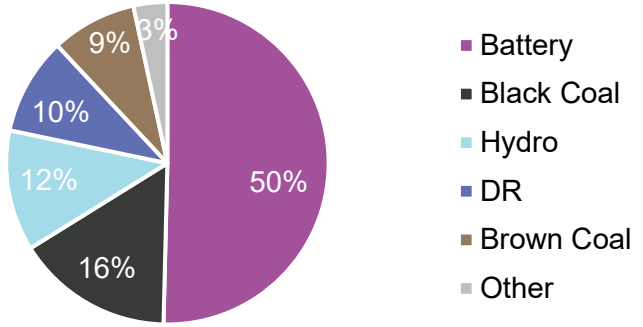
❑ **FCAS costs reduced across all regions except South Australia**

Quarterly FCAS costs per region



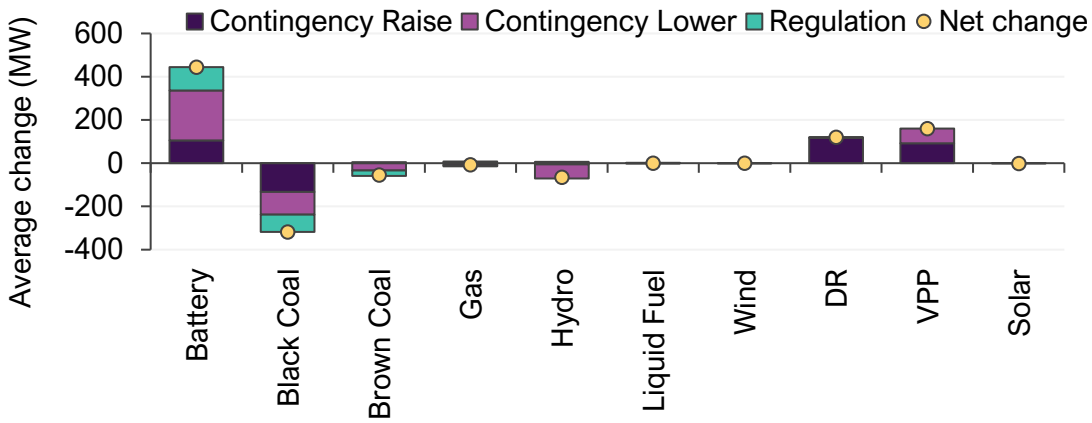
❑ **Batteries continued to dominate FCAS market share**

FCAS volume market share by technology – Q3 2024



❑ **Higher enablement for batteries, demand response and VPP**

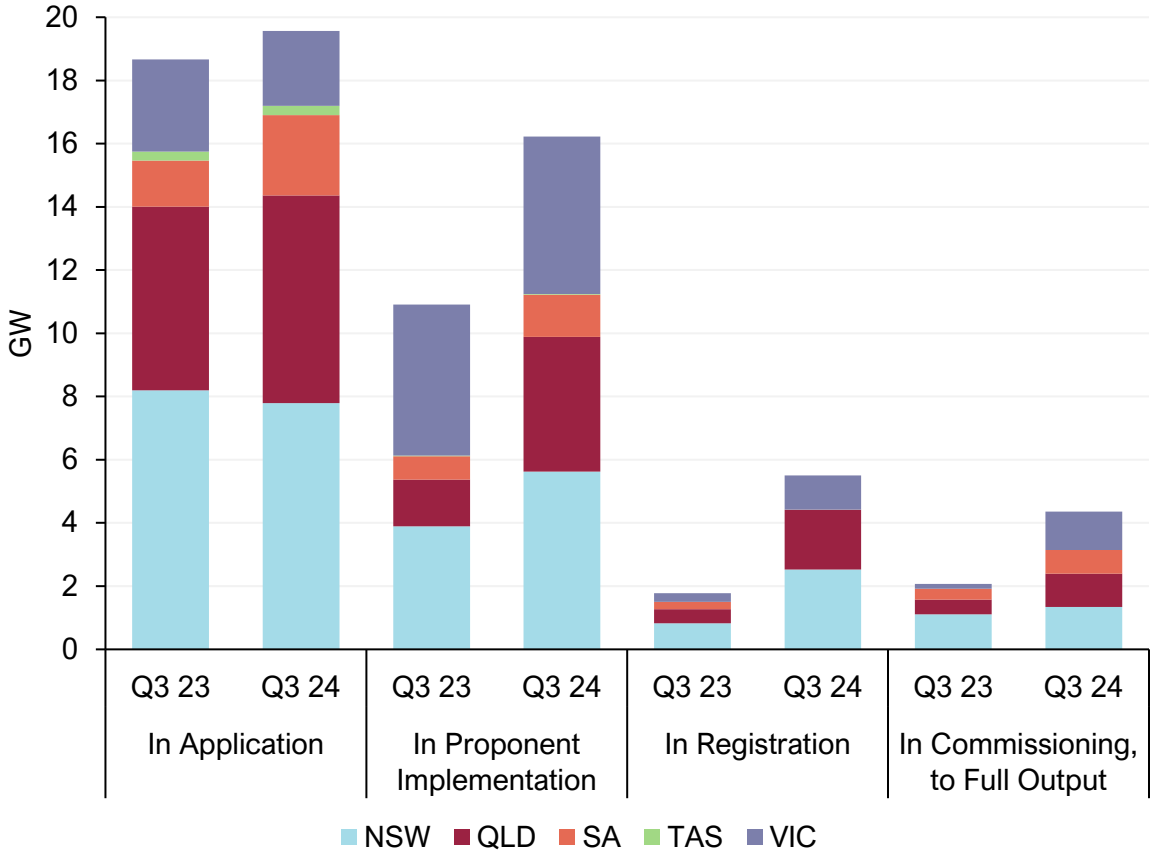
Change in FCAS enablement by technology – Q3 2024 vs Q3 2023



Connections pipeline continued to grow, with more projects reaching milestones

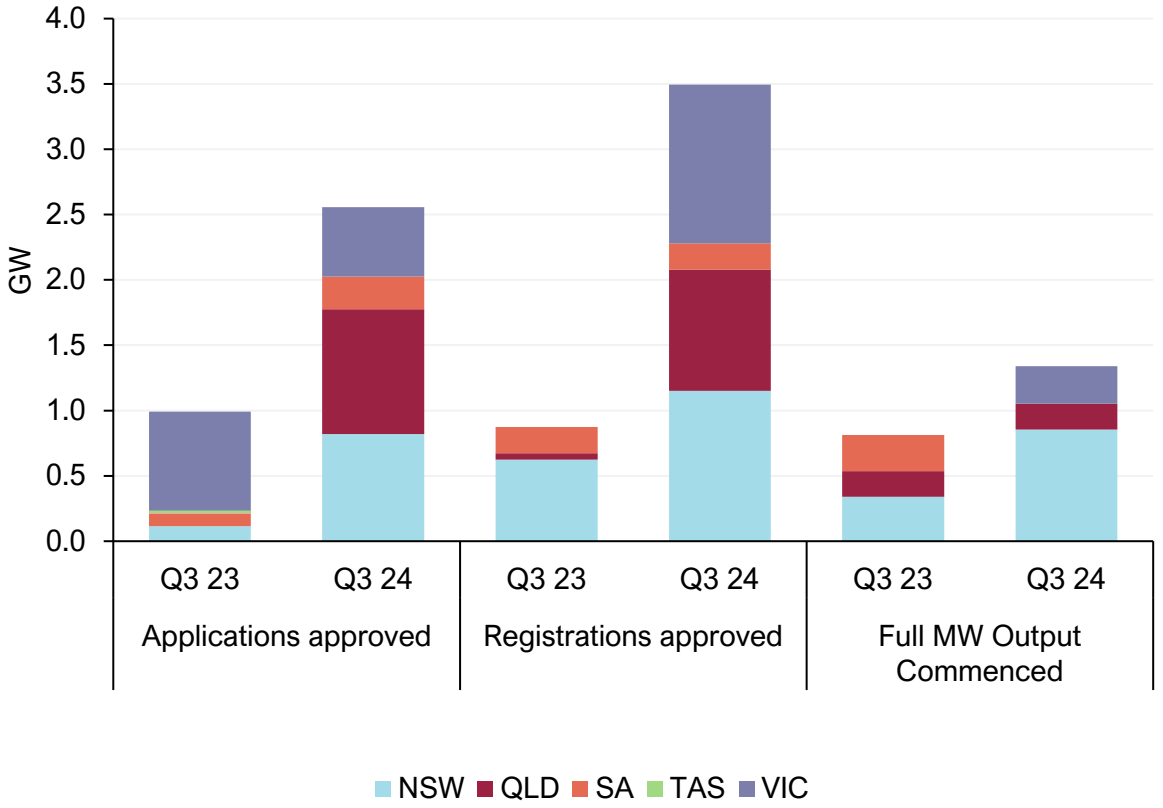
- **Increased capacity in proponent implementation, registration and commissioning stages**

Connections snapshot as at end Q3 for 2023 and 2024



- **Substantial increase in application approvals, registrations and commissioning in Q3 2024 compared with Q3 2023**

Comparison of applications approved, registrations and commissioning in Q3 for 2023 and 2024



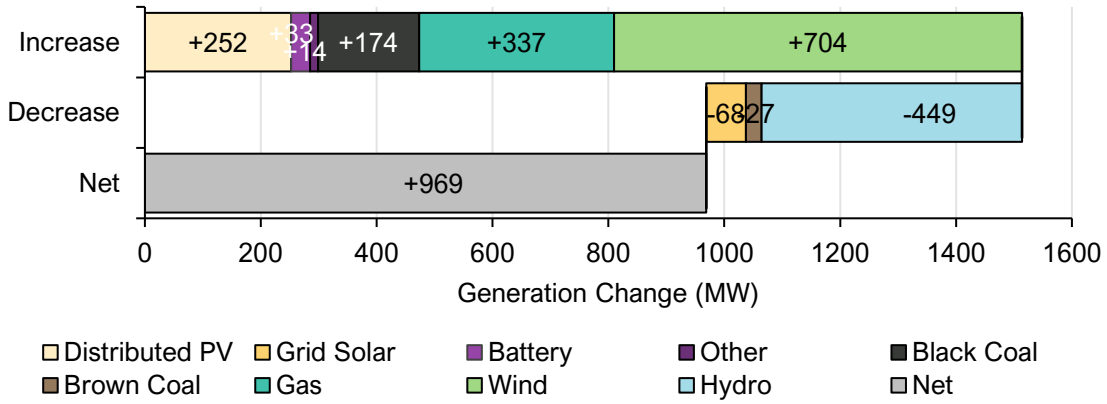
Q & A

Growth in underlying demand growth drove increased output from most fuel types

- Total NEM quarterly average generation up 4.1% from Q3 2023 to 24,881 MW this quarter, driven by the increase in NEM underlying demand.
- Higher wind generation (+21%) and increased distributed PV output (+11%) offset reductions in hydro (-22%) and grid-scale solar (-4.5%) generation to lead to overall contribution of renewables of 39.3% - a new Q3 high (up from 38.9% in Q3 2023)
- Thermal generation increased overall, with increased black coal-fired (+1.8%) and gas-fired (+29%), offsetting decreased brown coal-fired (-0.7%) generation.
- NEM total emissions increased (0.7 MtCO2-e) on Q3 2023 levels reaching 28.4 MtCO2-e but emissions intensity decreased to 0.59 from 0.60.

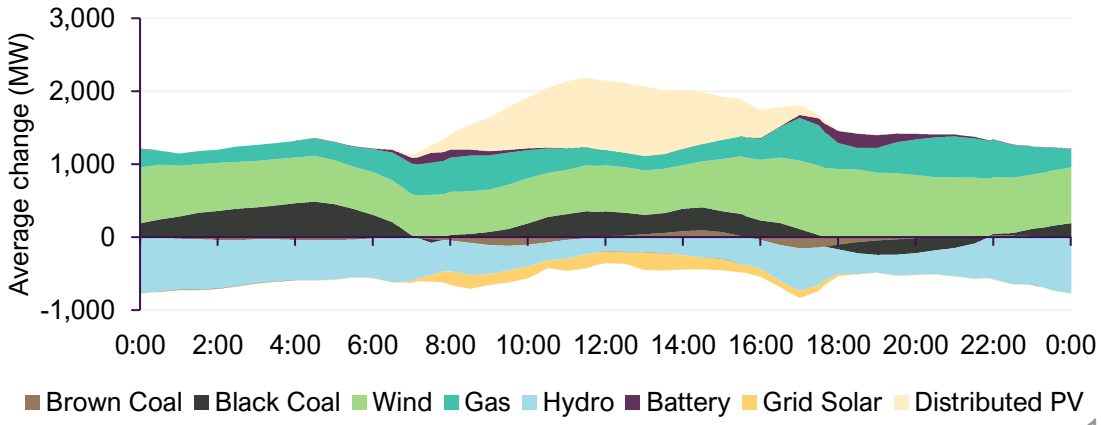
❑ **Underlying demand growth drove increased output from most fuel types**

Change in NEM supply by fuel type – Q3 2024 vs Q3 2023



❑ **Output from wind, gas and batteries increased to meet peaks**

NEM generation changes by time of day – Q3 2024 vs Q3 2023



❑ **NEM supply mix contribution by fuel type**

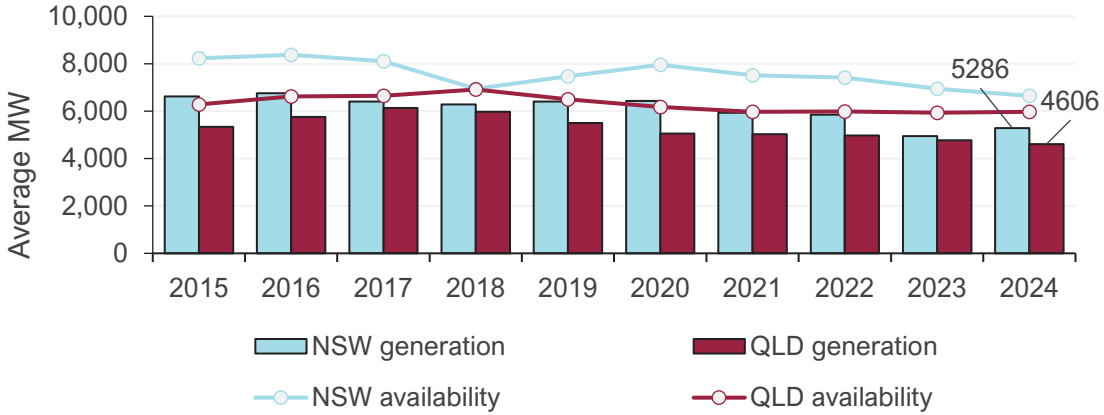
Quarter	Black coal	Brown coal	Gas	Liquid fuel	Distributed PV	Wind	Grid solar	Hydro	Biomass	Battery
Q3 2023	40.6%	15.6%	4.8%	0.02%	9.6%	14.0%	6.4%	8.6%	0.2%	0.2%
Q3 2024	39.8%	14.9%	6.0%	0.01%	10.2%	16.3%	5.9%	6.4%	0.2%	0.3%
Change	-0.9%	-0.7%	1.2%	-0.01%	0.6%	2.3%	-0.5%	-2.1%	0.1%	0.1%

Coal-fired and gas-fired generation increased

- In New South Wales, black coal-fired generation increased (+342 MW, +7%) despite a decrease in availability (-307 MW, -4%).
- In Queensland, black-coal fired generation decreased (-167 MW, -4%) with a small increase in availability (+36 MW, +1%).
- Brown coal-fired generation decreased marginally (-27 MW, -0.7%), with a small increase in availability (+41 MW, +1.0%).
- Gas generation increased year-on-year (337 MW, +29%) with increases in all regions.

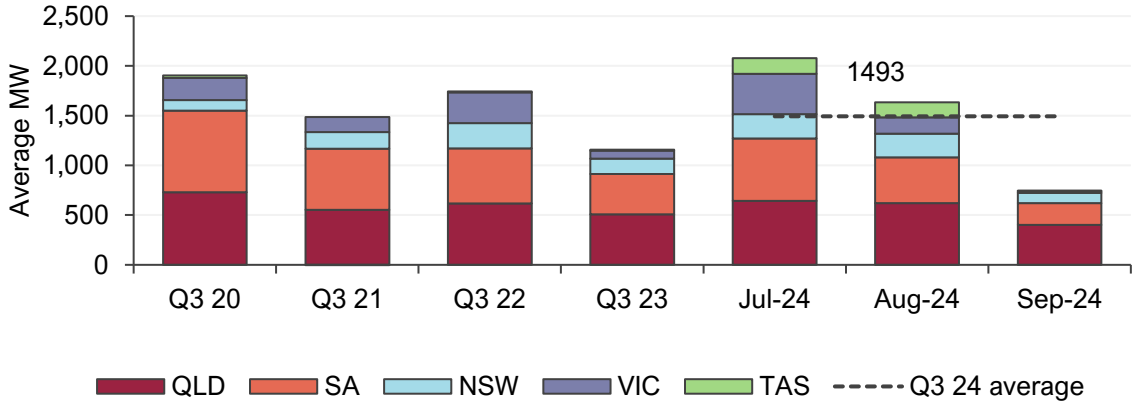
❑ NEM black coal-fired generation increased despite decrease in availability

Quarterly average black coal-fired generation and availability by region – Q3s



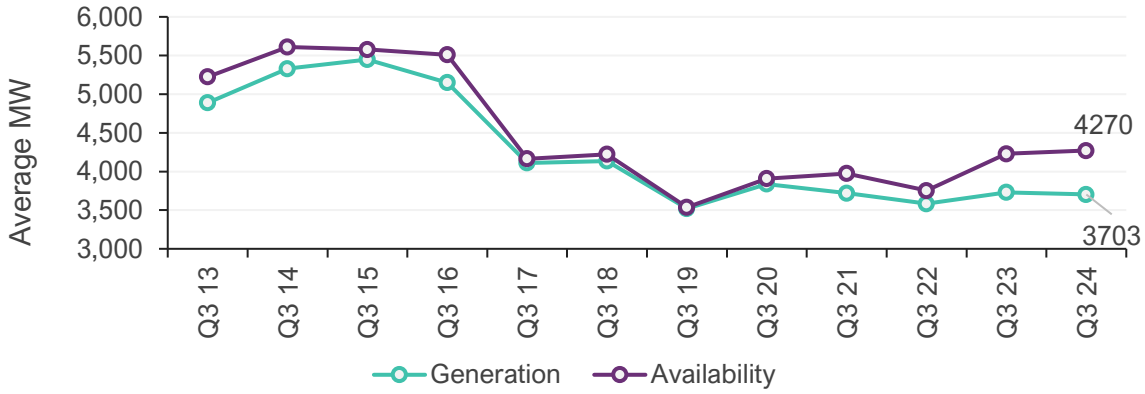
❑ Gas-fired generation higher than Q3 2023 in all NEM regions

Average gas-fired generation by region – Q3s



❑ Brown coal-fired generation decreased

Quarterly average generation and availability – Q3s

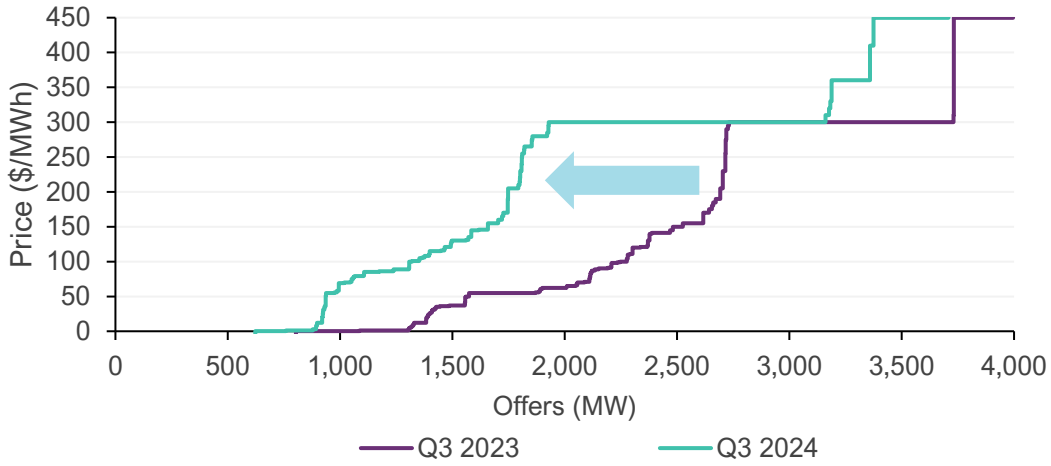


Hydro output lowest Q3 average since 2008

- Hydro generation reduced in Tasmania (-377 MW, -32%) however energy in storage across the main storage system increased over the quarter to finish at 48%.
- Hydro generation decreased in New South Wales hydro generation (-42 MW, -11%) and Victoria (-69 MW, -18%) and increased in Queensland (+39 MW, +29%).
- Around 640 MW to 1,060 MW less volume was offered at price bands between $50/MWh to $300/MWh.

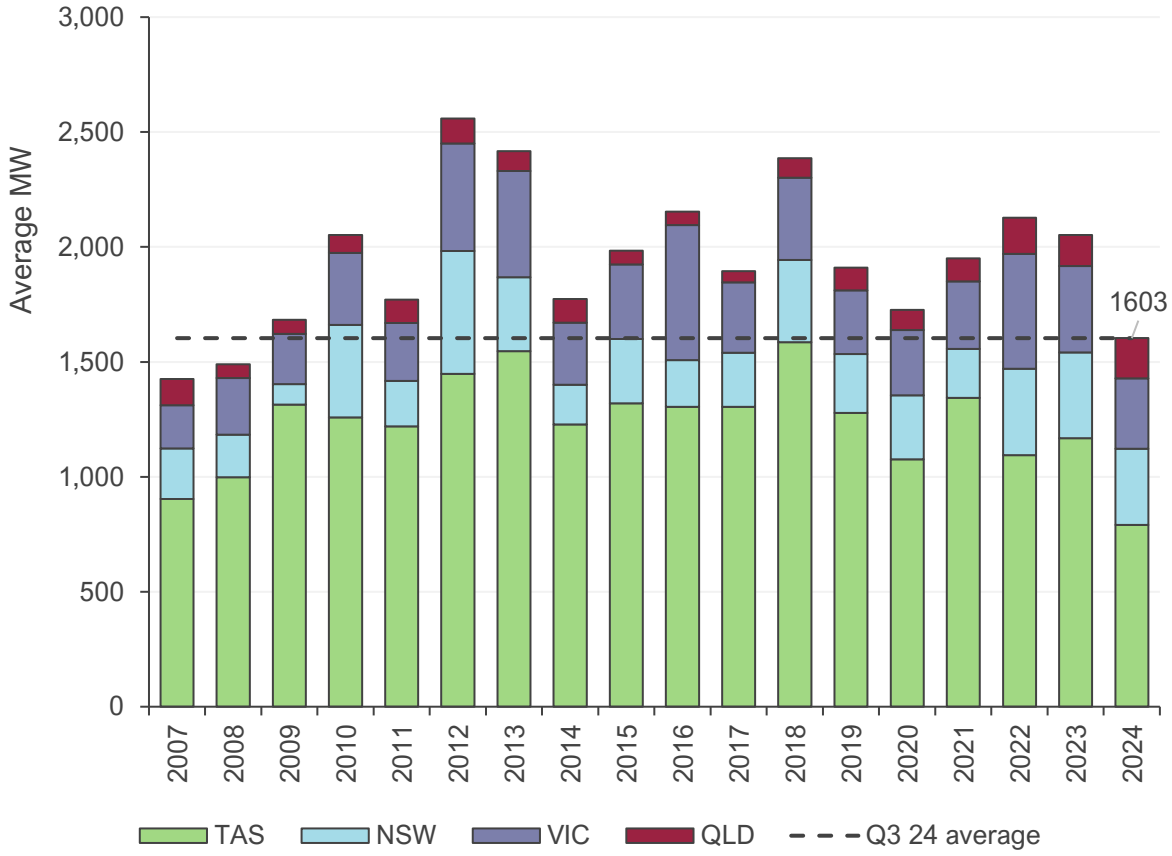
❑ Hydro generation low-priced offer volumes declined

NEM hydro supply curve – Q3 2024 vs Q3 2023



❑ Hydro generation decreased in all regions except Queensland to reach lowest Q3 level since 2008

Average hydro output by region – Q3s

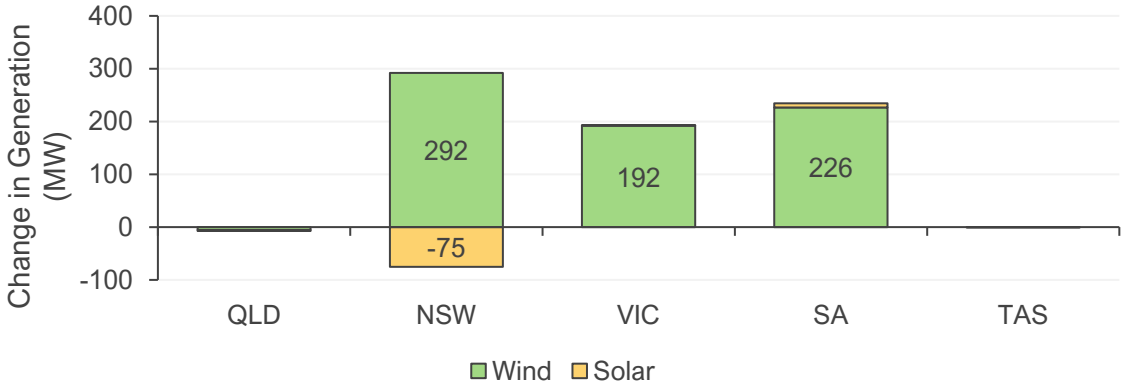


Wind generation increased, while grid-scale generation decreased

- Wind generation increased to a new quarterly high (+704 MW, +21%), driven by increases in New South Wales, Victoria and South Australia.
- NEM-wide quarterly volume-weighted available capacity factors for wind at 39.5% (up from 25.3% in Q2 2024 and 34.4% in Q3 2023).
- Solar generation decreased overall (-68 MW, -4.5%), NEM-wide quarterly volume-weighted available capacity factors for solar generation decreased to 21.1% (down 1.7 percentage points).

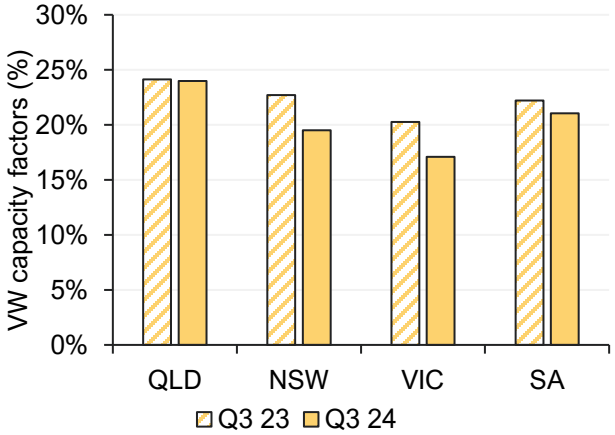
❑ Renewable growth driven by wind in NSW, VIC and SA

Average change in VRE output by region – Q3 2024 vs Q3 2023



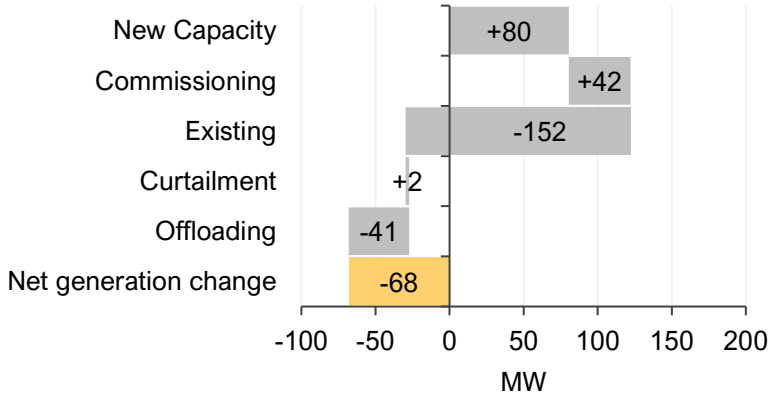
❑ Reduced availability due to lower solar irradiance and planned network outages

Volume-weighted grid-scale availability capacity factors – Q3s



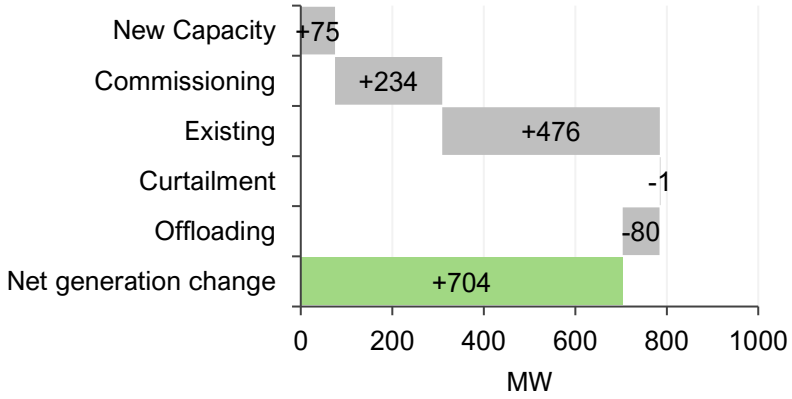
❑ Reduction in availability at existing solar farms and increased economic offloading

Changes in grid-scale solar generation – YOY



❑ Growth in output from new, commissioning and existing wind farms

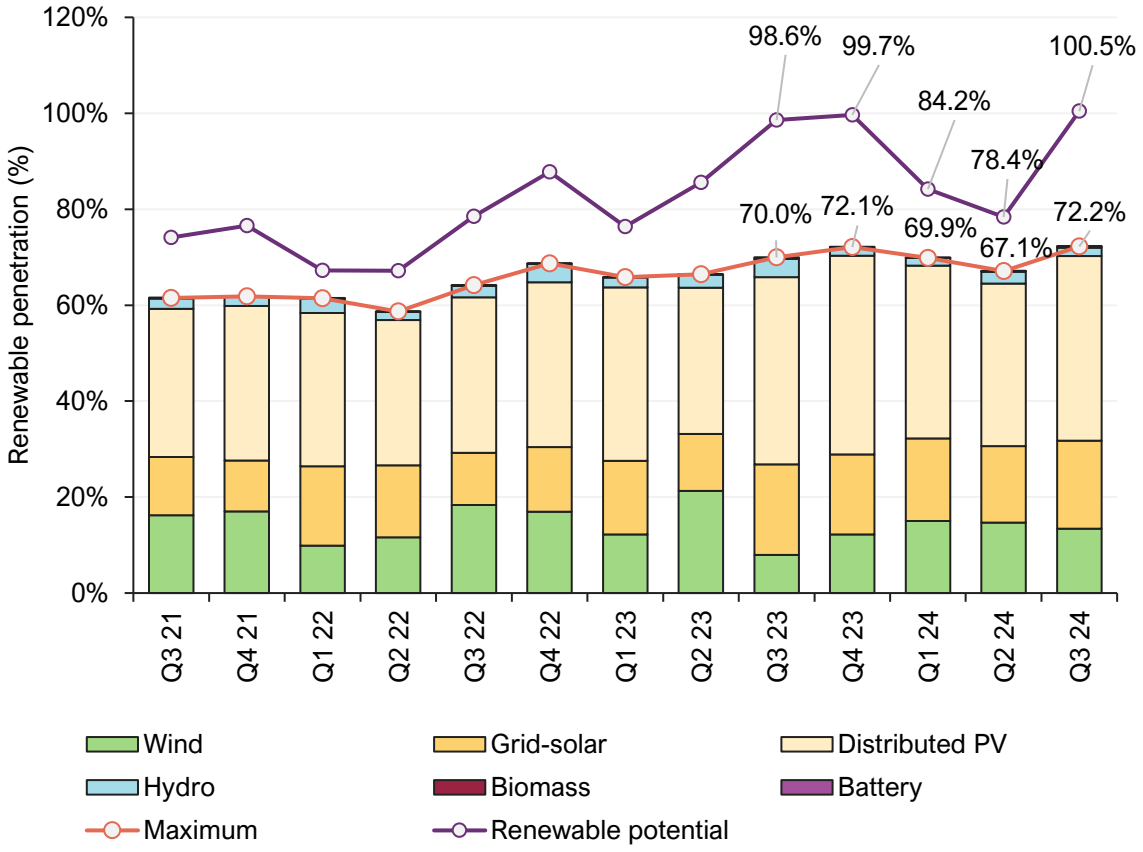
Changes in wind generation – YOY



Renewable contribution

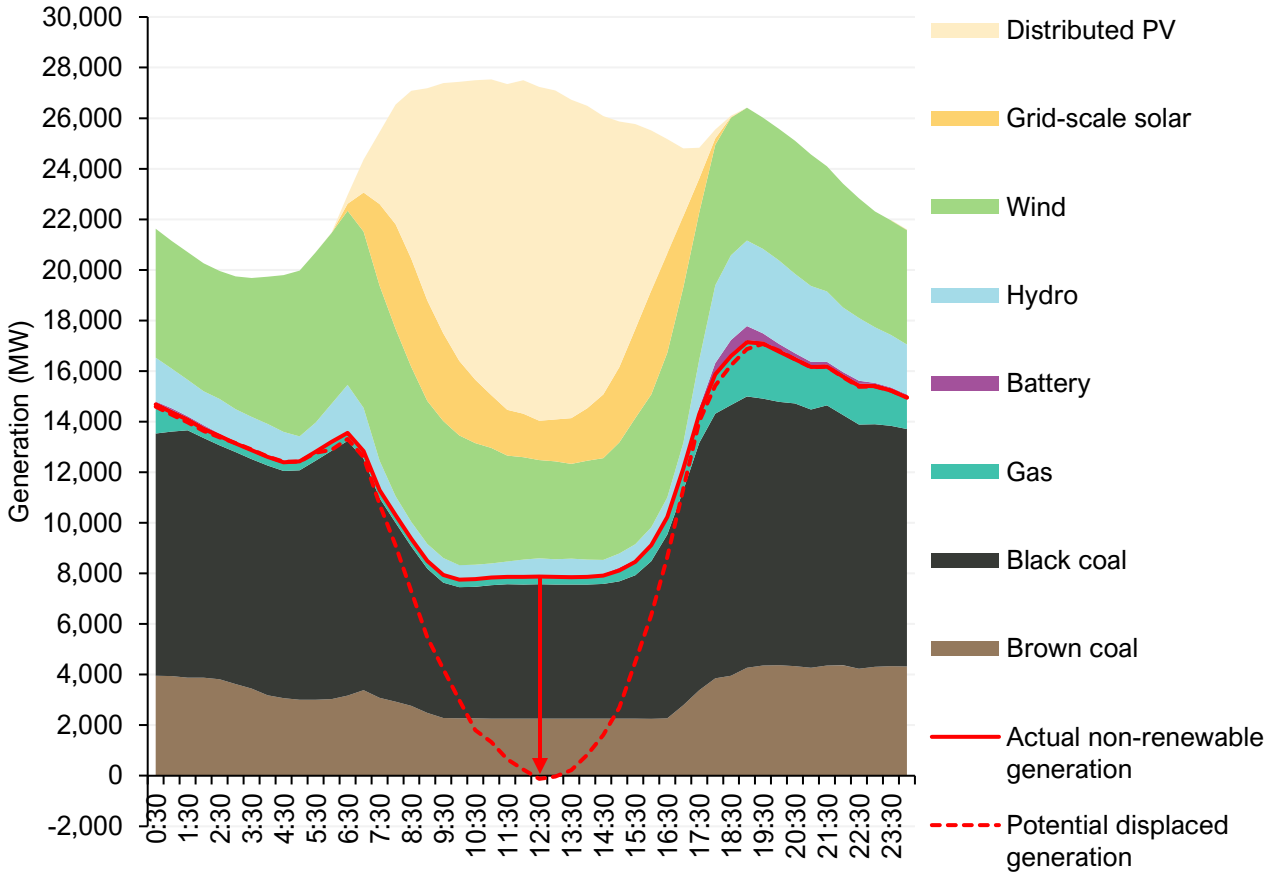
❑ **Peak renewable contribution reached all-time high**

Percentage of NEM supply from renewable energy sources at time of peak renewable contribution



❑ **Record high peak renewable potential on Wednesday 18 September 2024**

Output by fuel type and potential renewable output – 18 September 2024



Growth in battery generation and revenue

❑ **Increase in battery revenue from higher energy arbitrage**

Quarterly revenue from NEM battery systems by revenue stream

Net Revenue
$76 million
+ 135%

=

Arbitrage Rev
$64 million
+ 265%

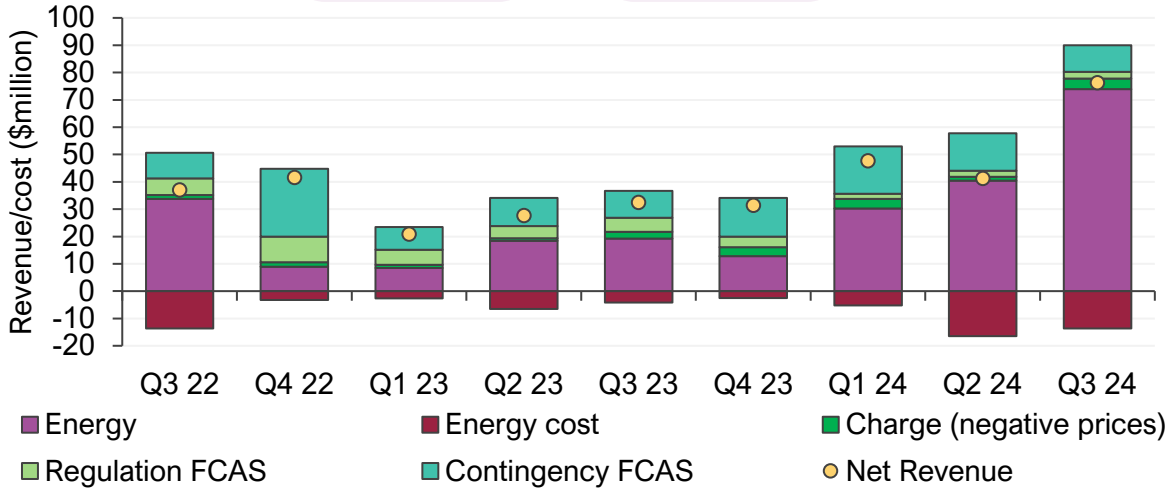
+

FCAS Rev
$12 million
- 18%

Energy Rev
$78 million
+ 258%

−

Energy Cost
$14 million
+ 230%

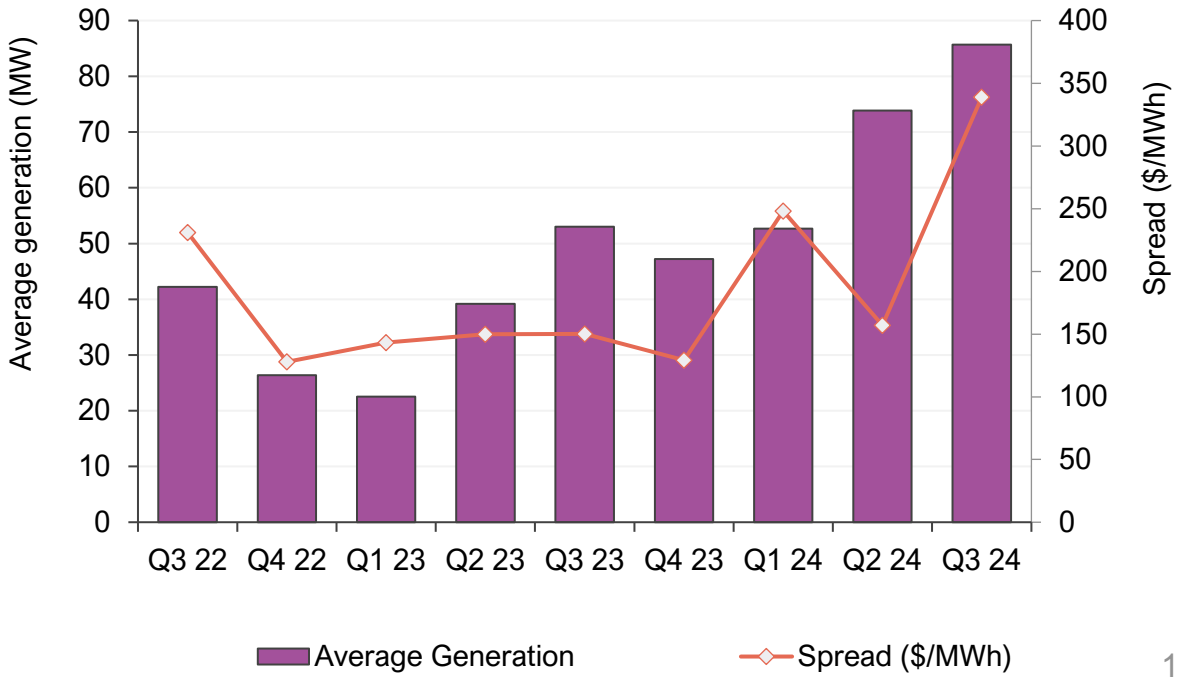


❑ **Increase in NEM-wide price spread**

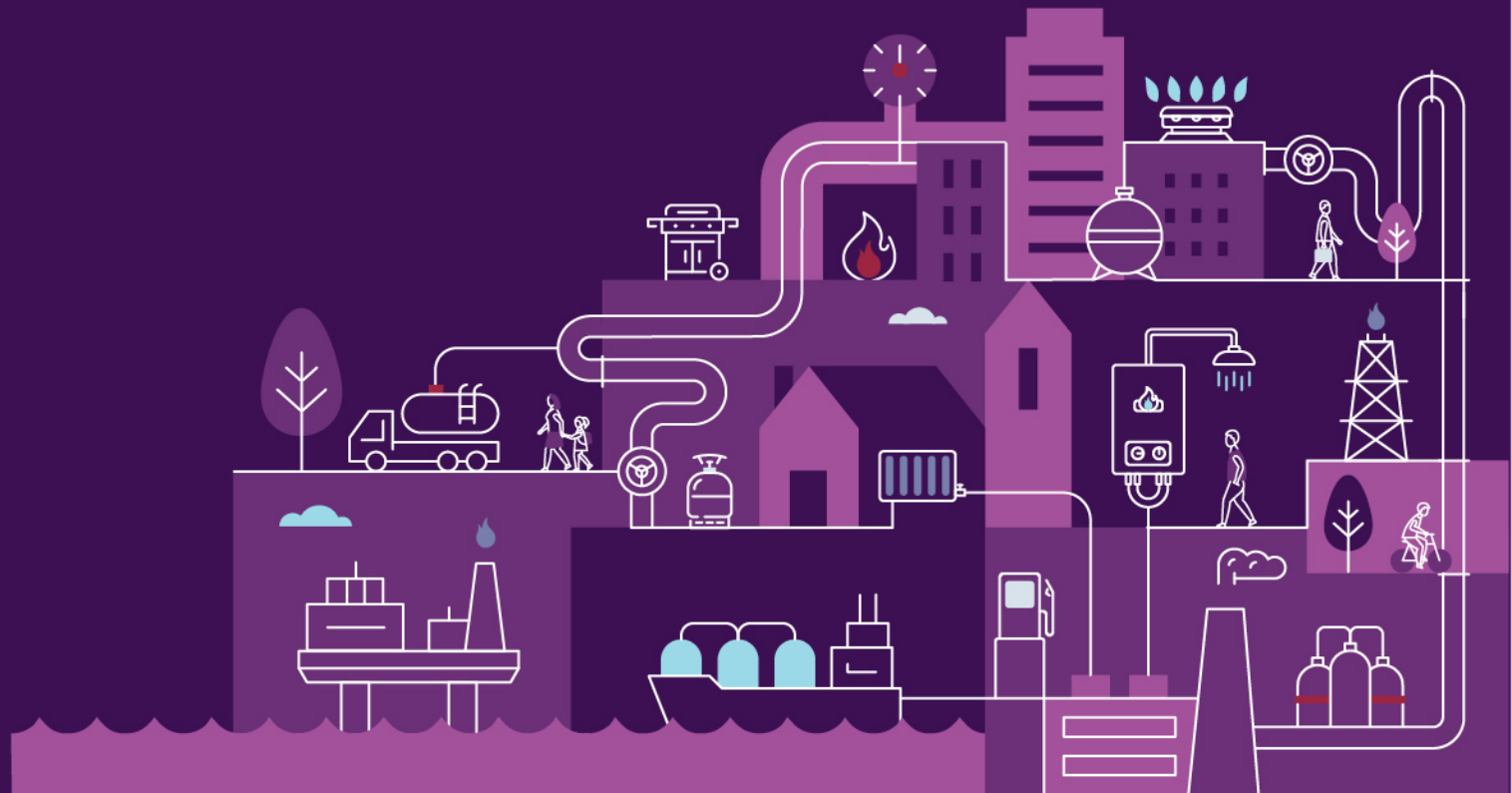
Average quarterly battery generation (MW) and price spread ($/MWh)

Battery Generation
86 MW
+ 62%

Price Spread
$339/MWh
+ 126%



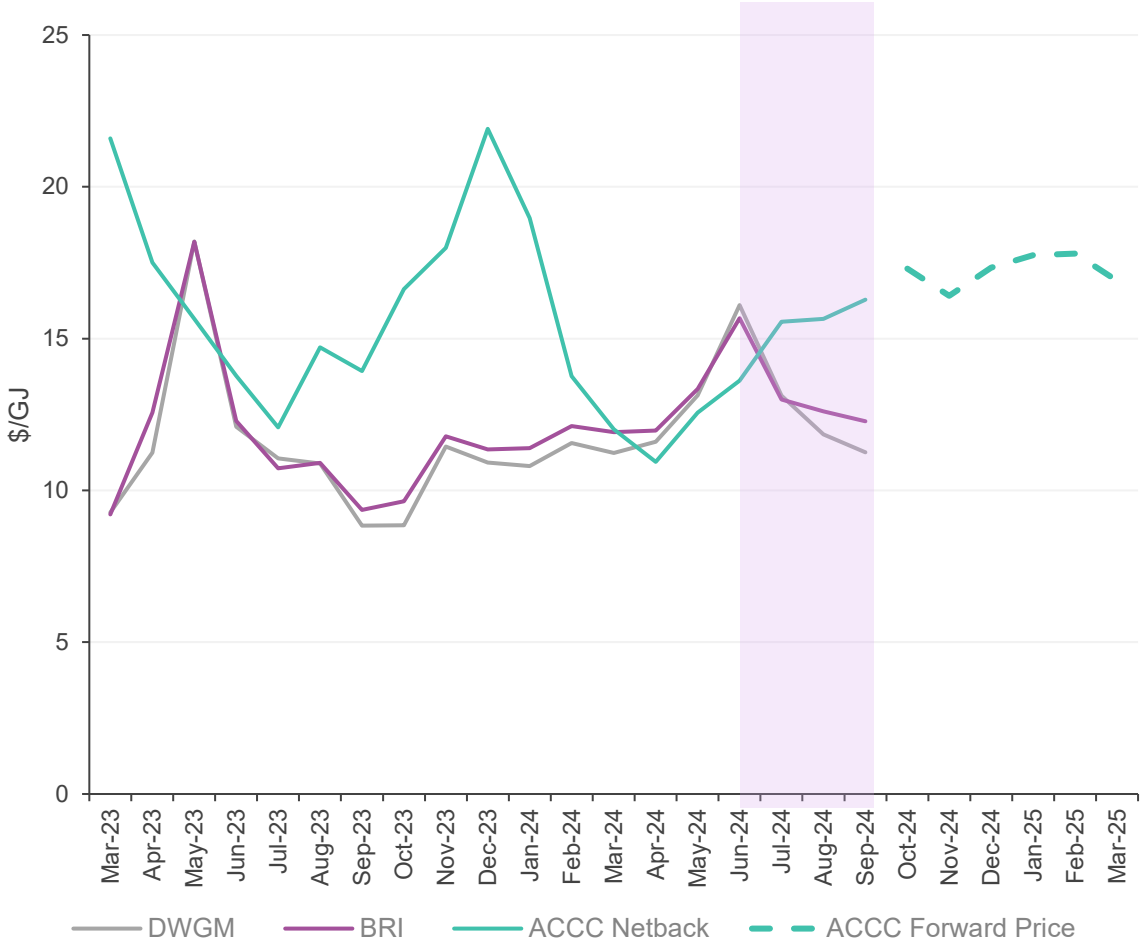
Gas market dynamics



East coast gas prices and demand

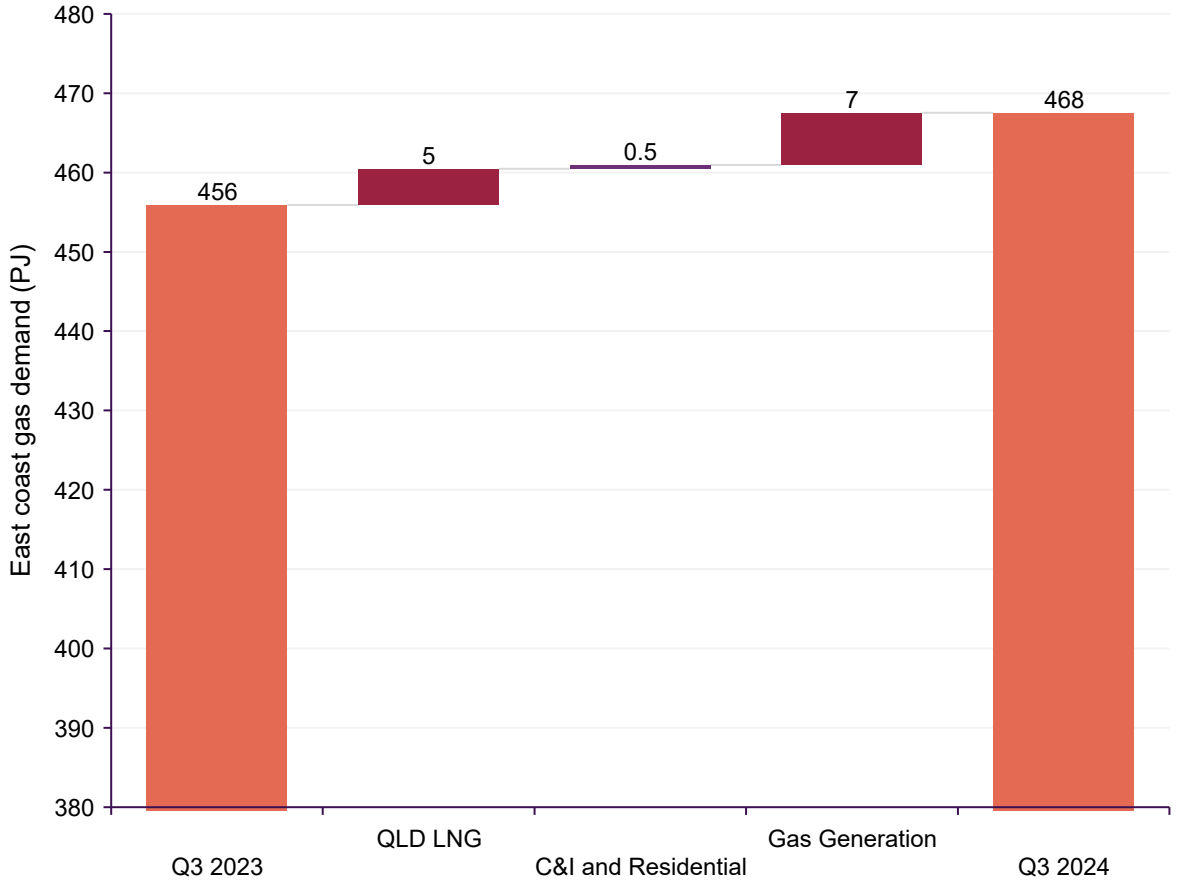
❑ **Domestic gas prices fell quarter on quarter, whereas international prices trended in an upward direction.**

DWGM and Brisbane average price compared to ACCC LNG Netback price



❑ **Demand increases across the entire the east coast**

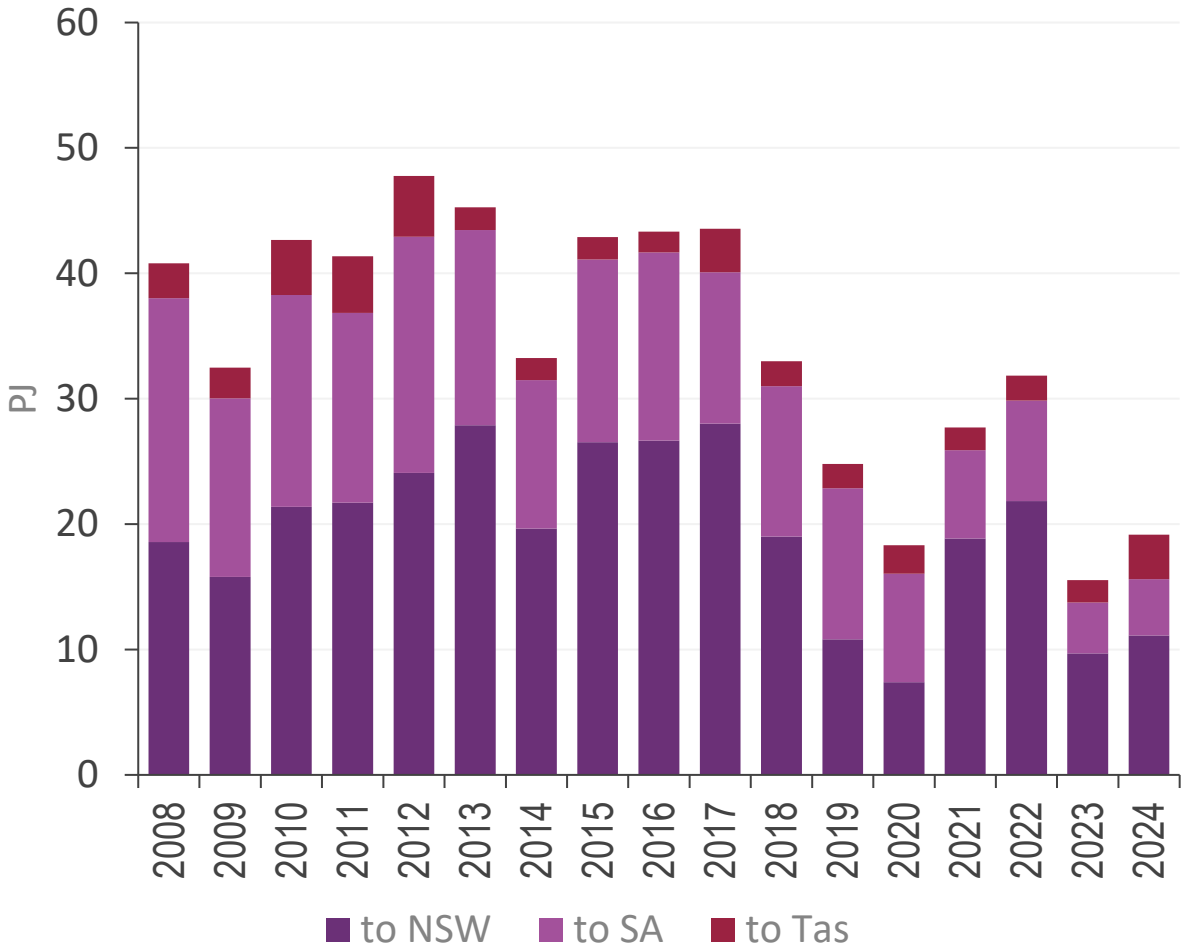
Components of east coast gas demand change – Q3 2023 to Q3 2024



Victorian exports up slightly along with gas fired generation

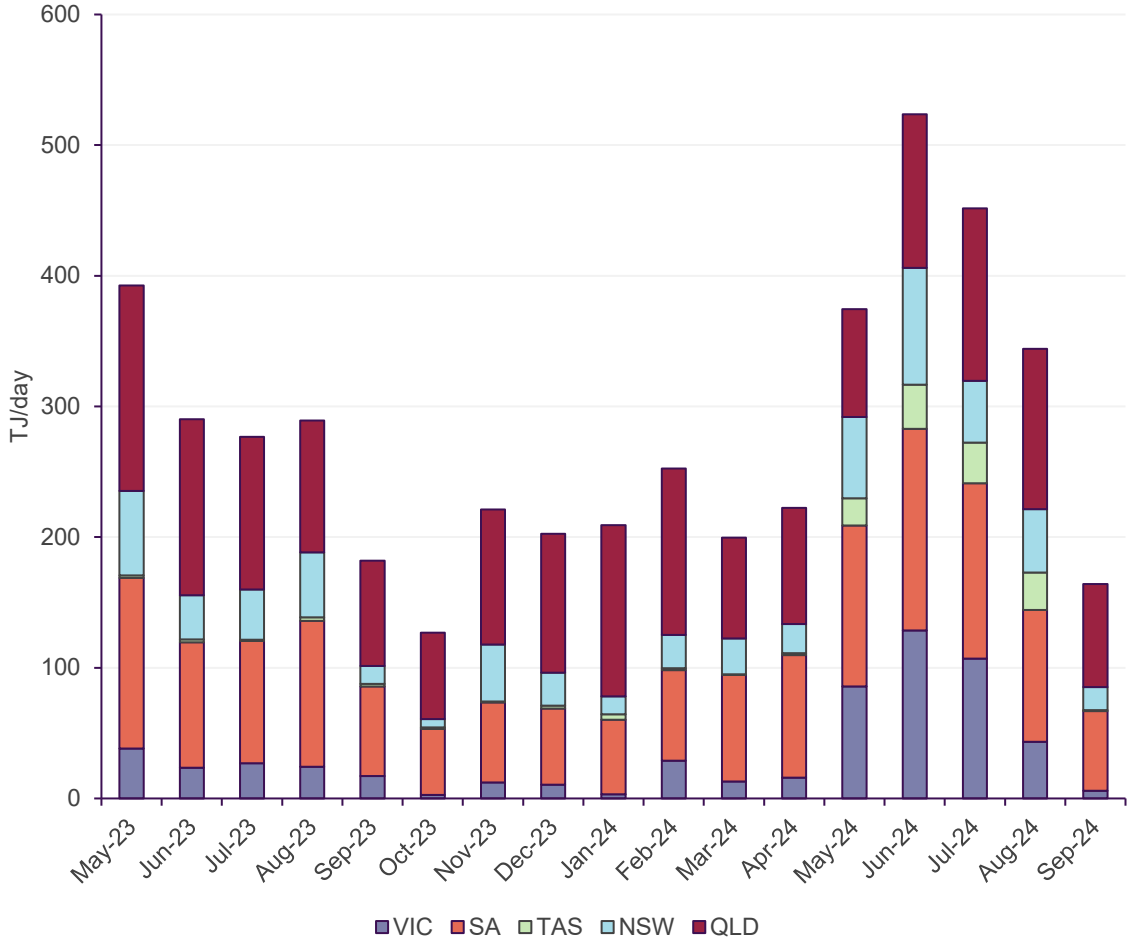
- **Victorian gas exports slightly higher year on year, increase flows to Tasmania largest since 2012**

Victorian net gas transfers to other regions – Q3s



- **Increase in gas fired generation across all states**

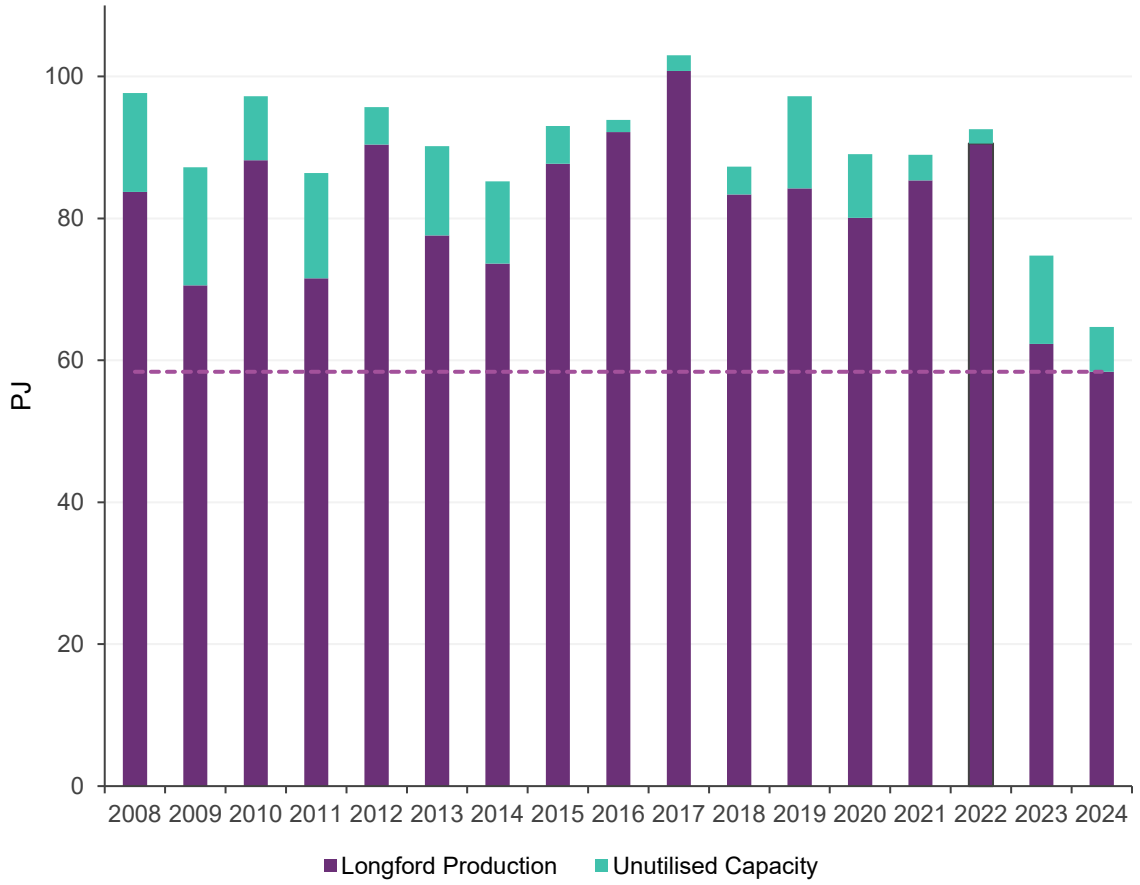
Gas fired generation, state by state from Q2 2023



Longford aggregate and daily production continues to decline

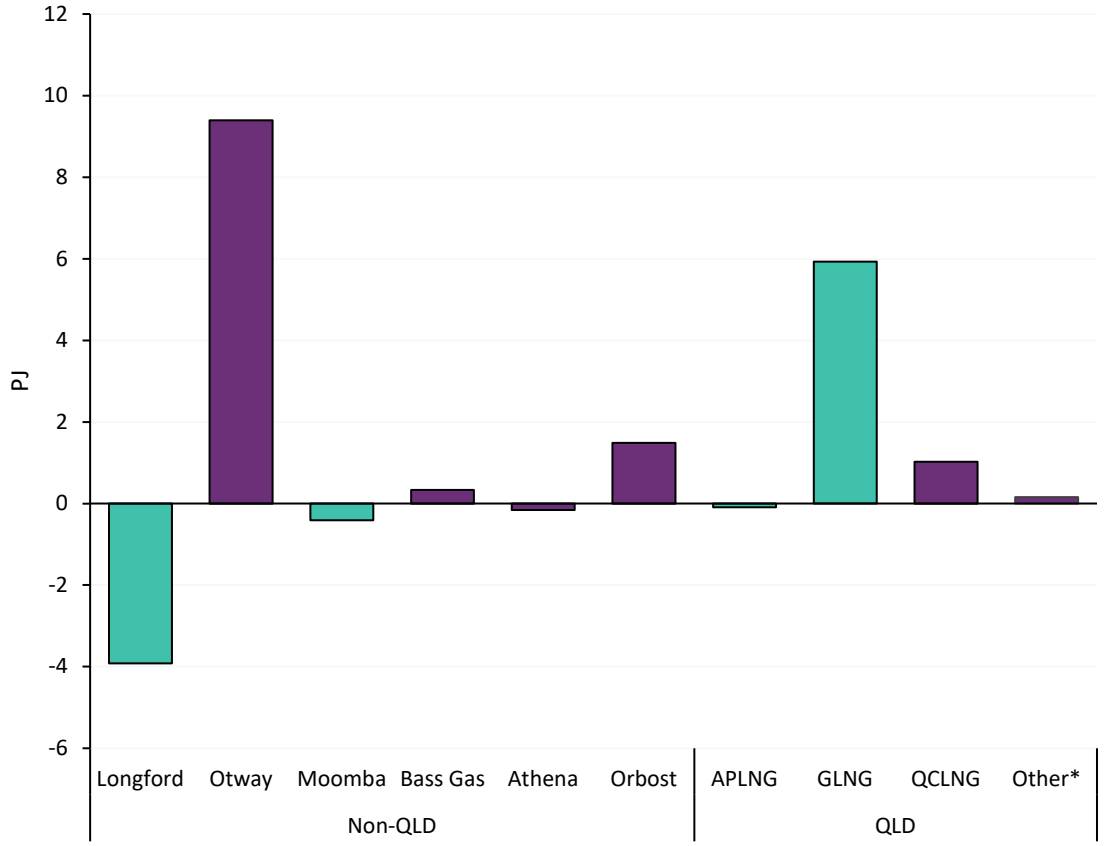
❑ **Lowest Longford Q3 production since data reporting began**

Longford Q1 production versus unutilised capacity



❑ **Longford production continues to decline whereas Otway successfully increased production**

Change in production year on year showing Otway increase



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