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Melbourne  
Energy  
Institute



# Quarterly Energy Dynamics report Q4 2021

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# Highlights

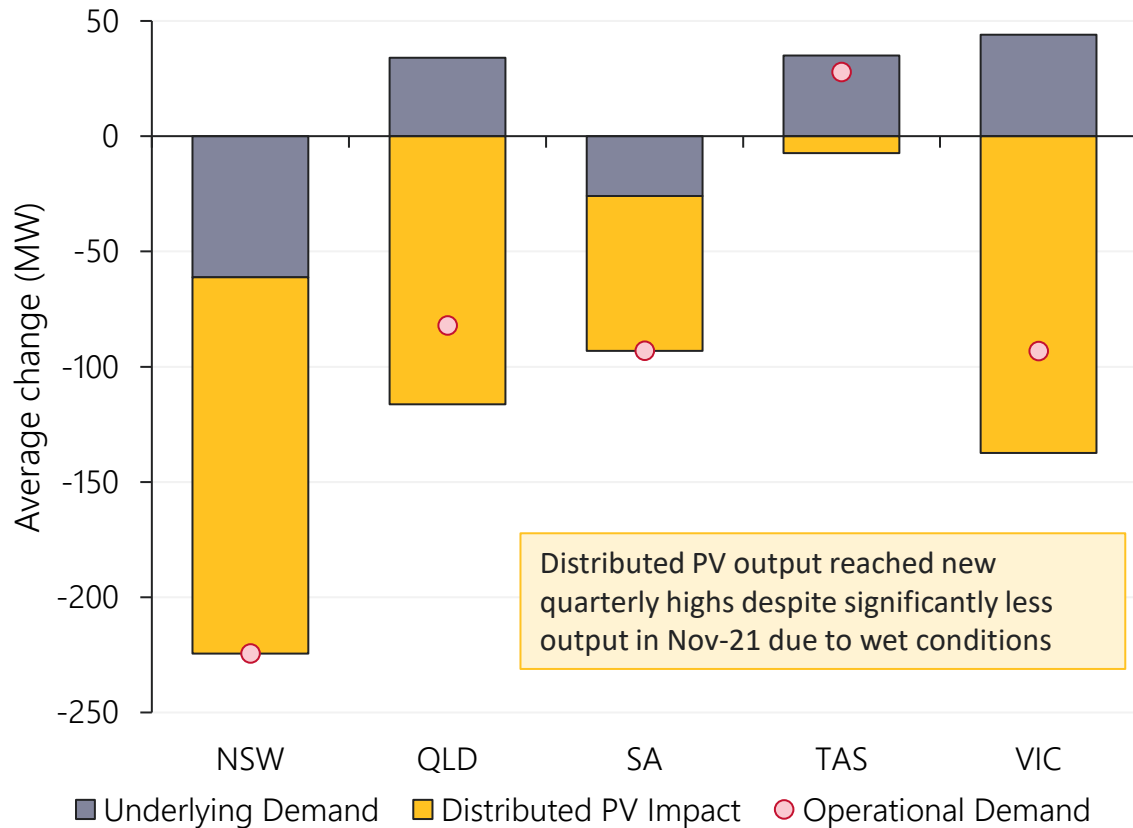
## Highlights from Q4 2021

1. NEM demands down with a cool Q4 but prices and volatility resumed a rising trend, after falling through Q3
2. Price divergences between regions and by time of day increasing
3. Renewables growth continues to displace thermal generation. Gas in South Australia further reduced with completion of synchronous condenser commissioning and testing.
4. East coast gas prices remain elevated with surging international prices driving high LNG exports

# NEM demands generally fell

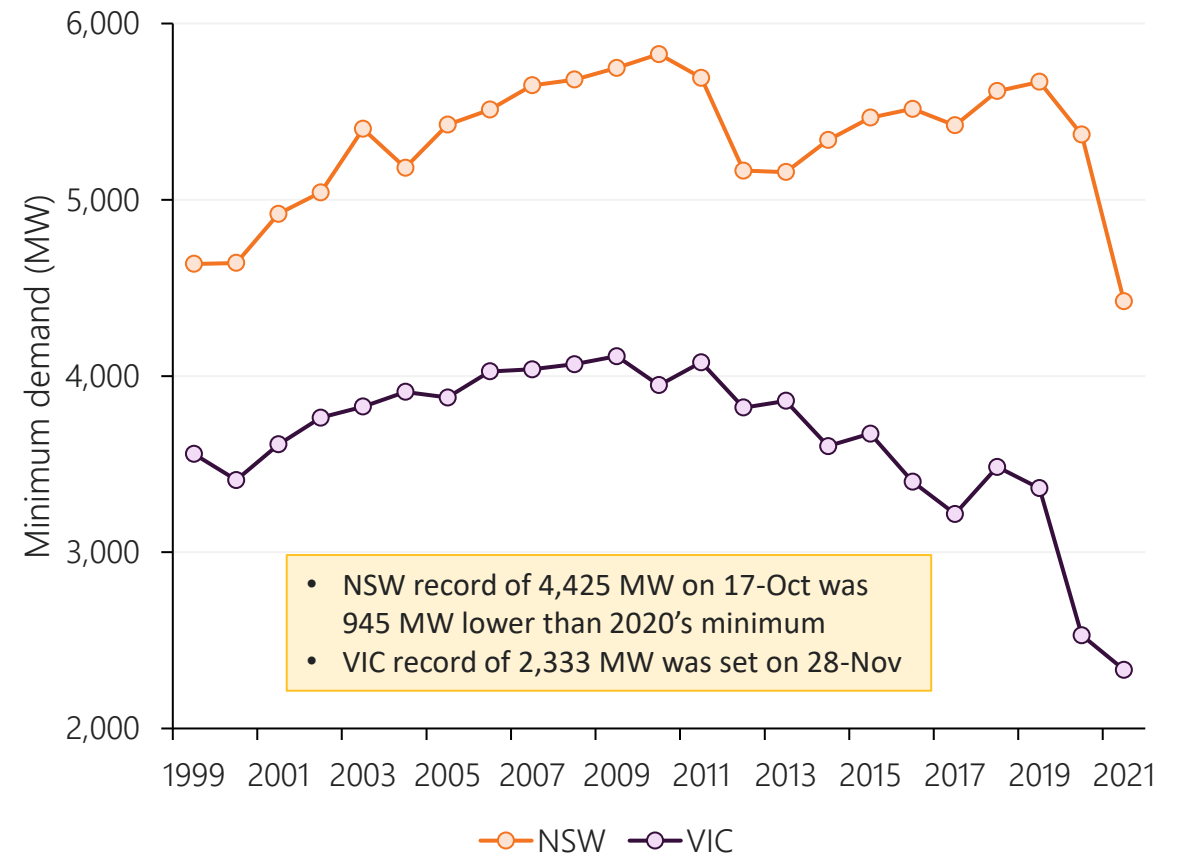
## Rooftop PV lowered operational demand

Changes in operational demand by state – Q4 2021 vs Q4 2020



## Minimum demand records continue to fall

New South Wales and Victoria minimum operational demand - annual



# Increased intra-day demand swing

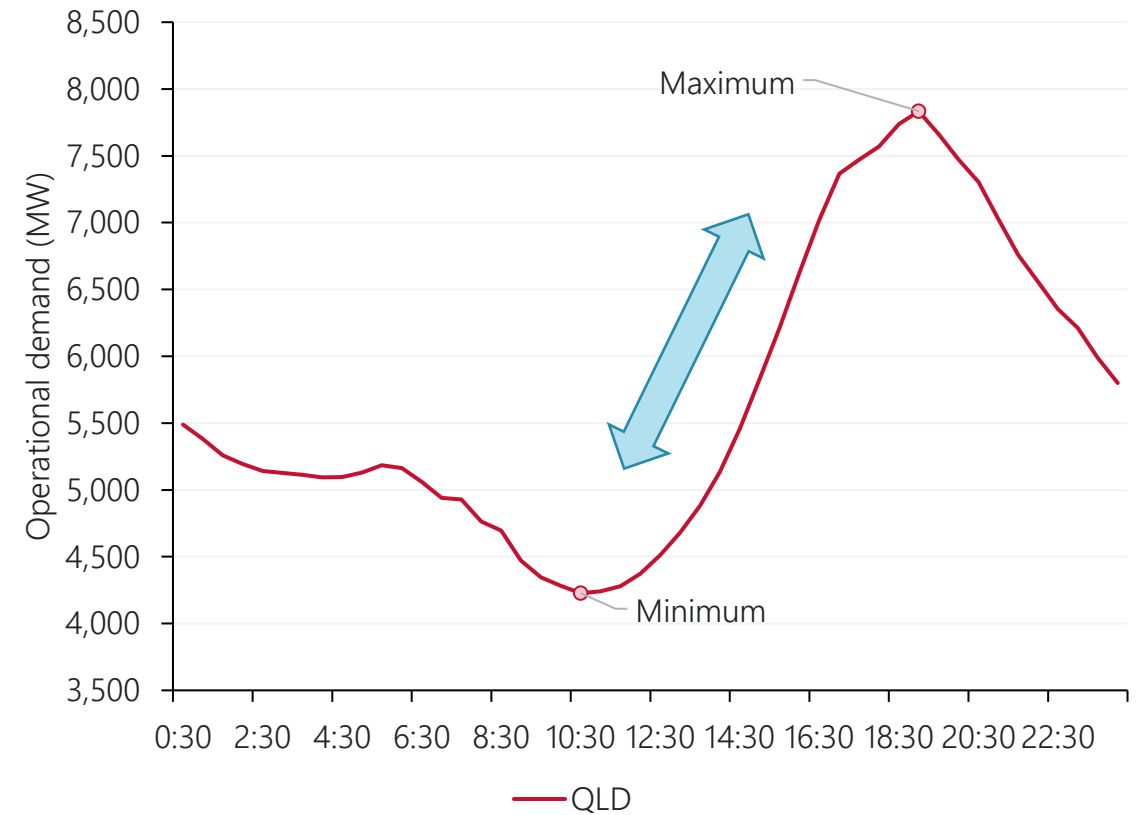
## Record Q4 daily demand swing in QLD

QLD maximum daytime intra-day operational demand swing (Q4s<sup>1</sup>)



## Intra-day QLD demand swing of 3,605 MW

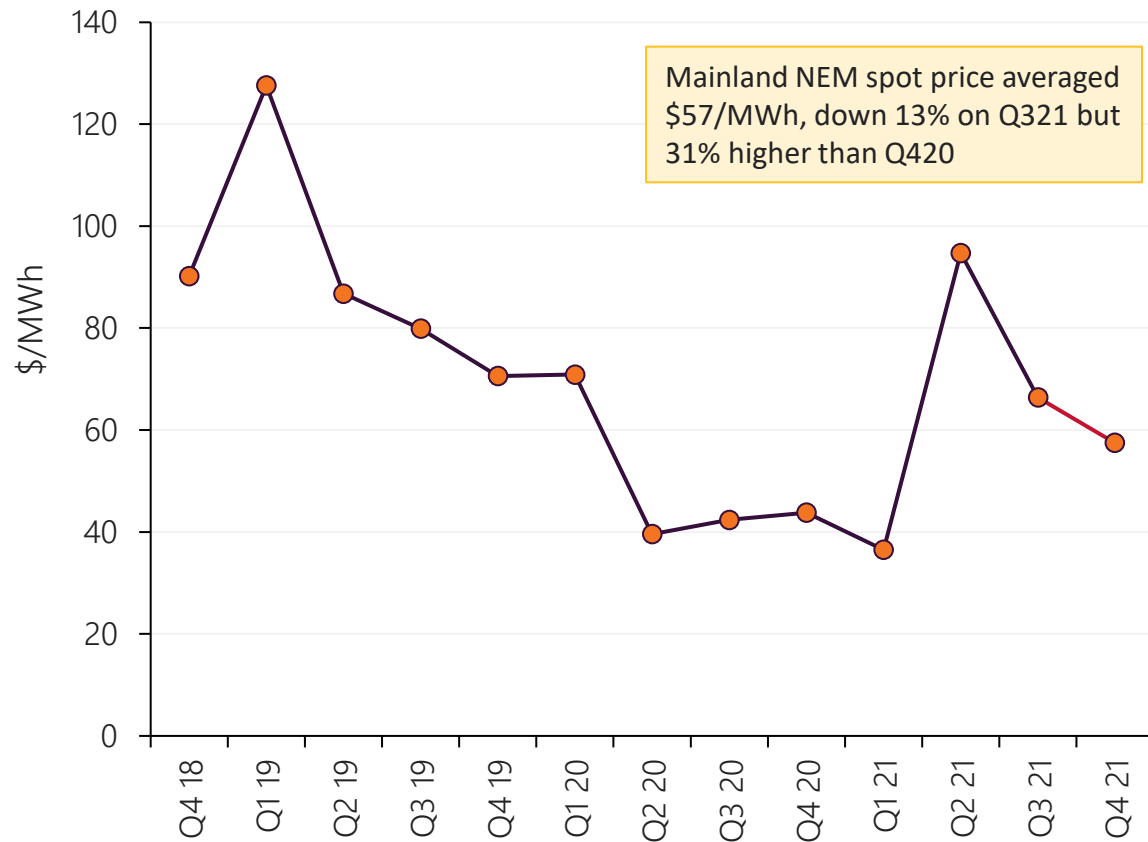
QLD operational demand – 4 October 2021



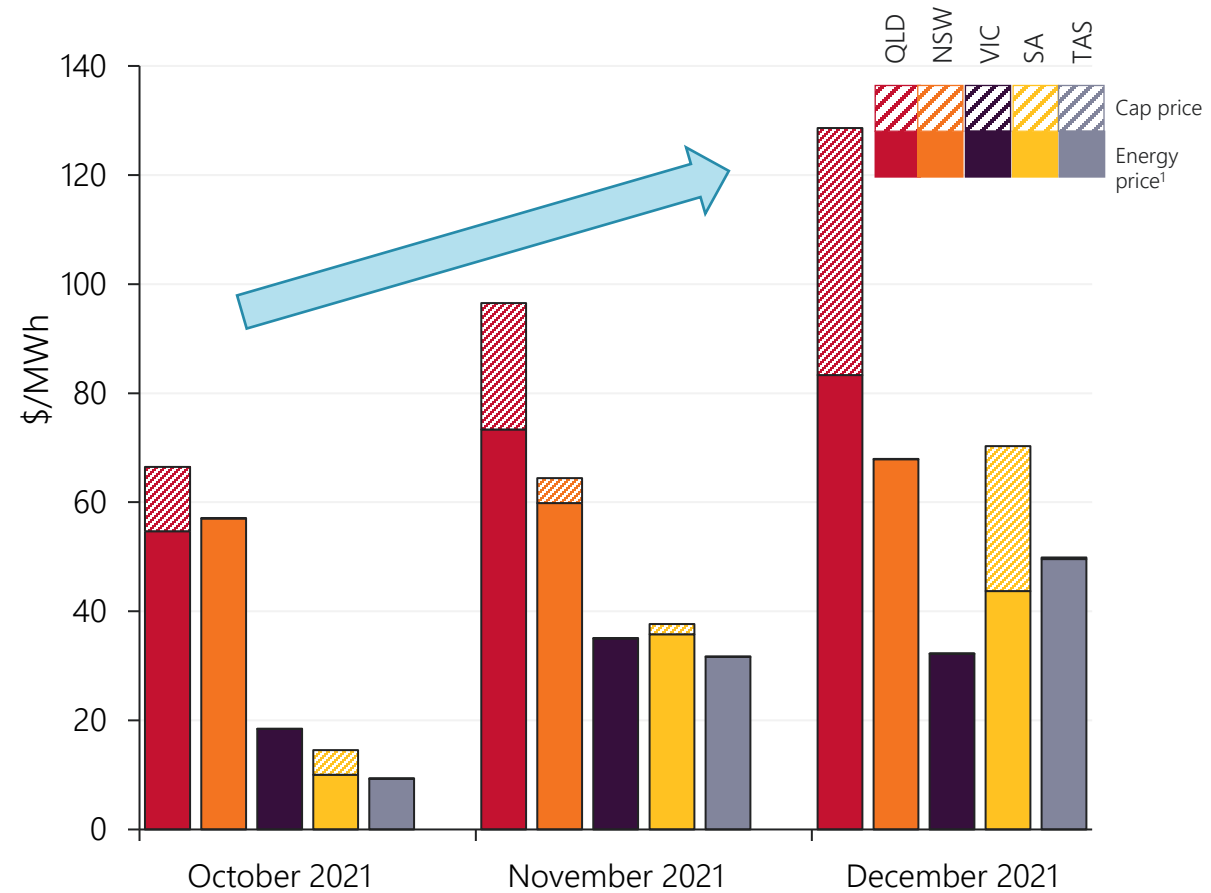
<sup>1</sup>Daytime intra-day operational demand swing is measured for each day as the difference between minimum and maximum operational demands recorded between 0600 hrs and 2000hrs.

# NEM prices began lower but rose steadily

Mainland quarterly average was slightly lower ...



... but prices and volatility rose through Q4

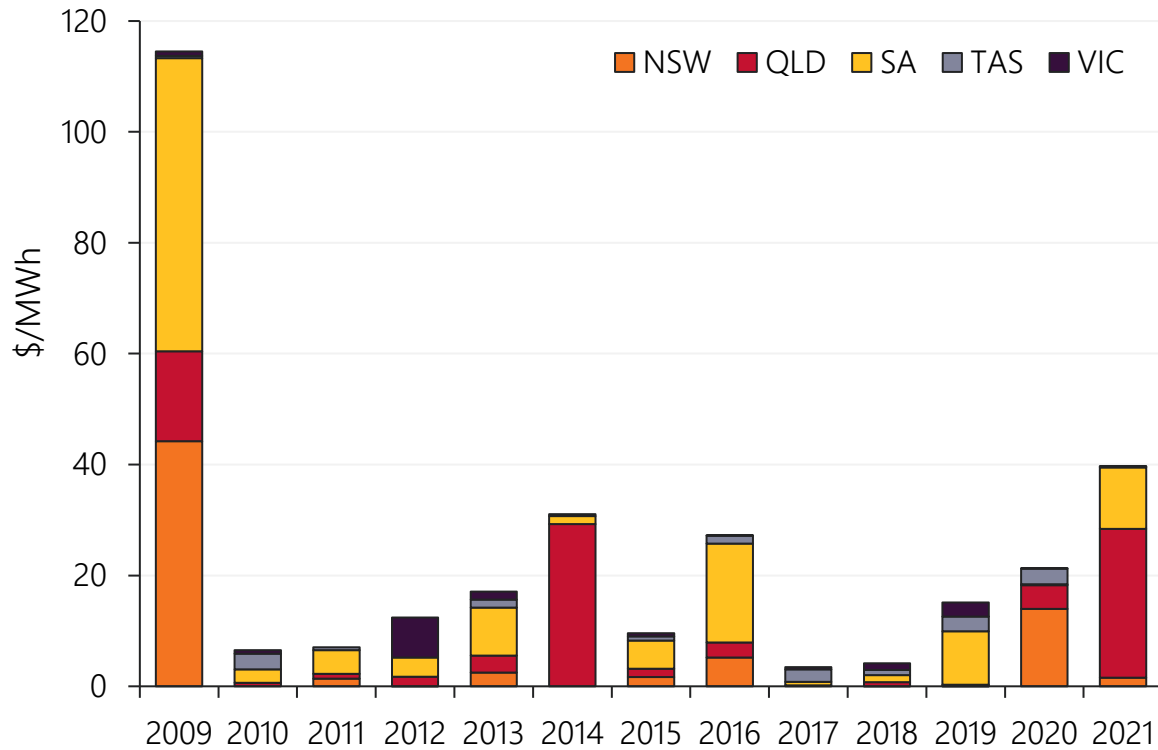


<sup>1</sup>Energy price<sup>1</sup> is used in electricity pricing to remove the impact of price volatility (that is, price above \$300/MWh). Since commencement of 5MS from 1 October 2021, energy and cap prices are calculated on a 5-minute basis.

# Higher Q4 volatility with varied causes

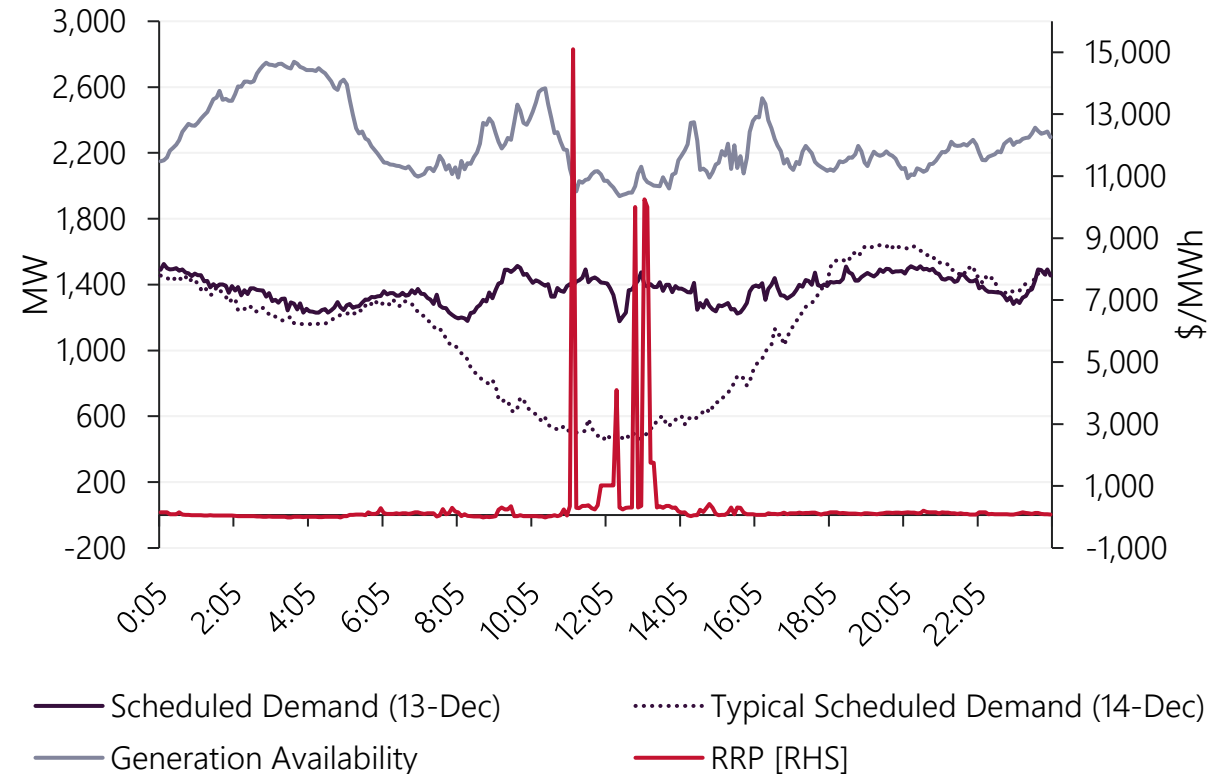
## Highest aggregate cap returns in Q4 since 2009

Q4 cap returns<sup>1</sup> by region - stacked



## Rapid fluctuations in net demand create volatility

South Australia volatility on 13 December 2021

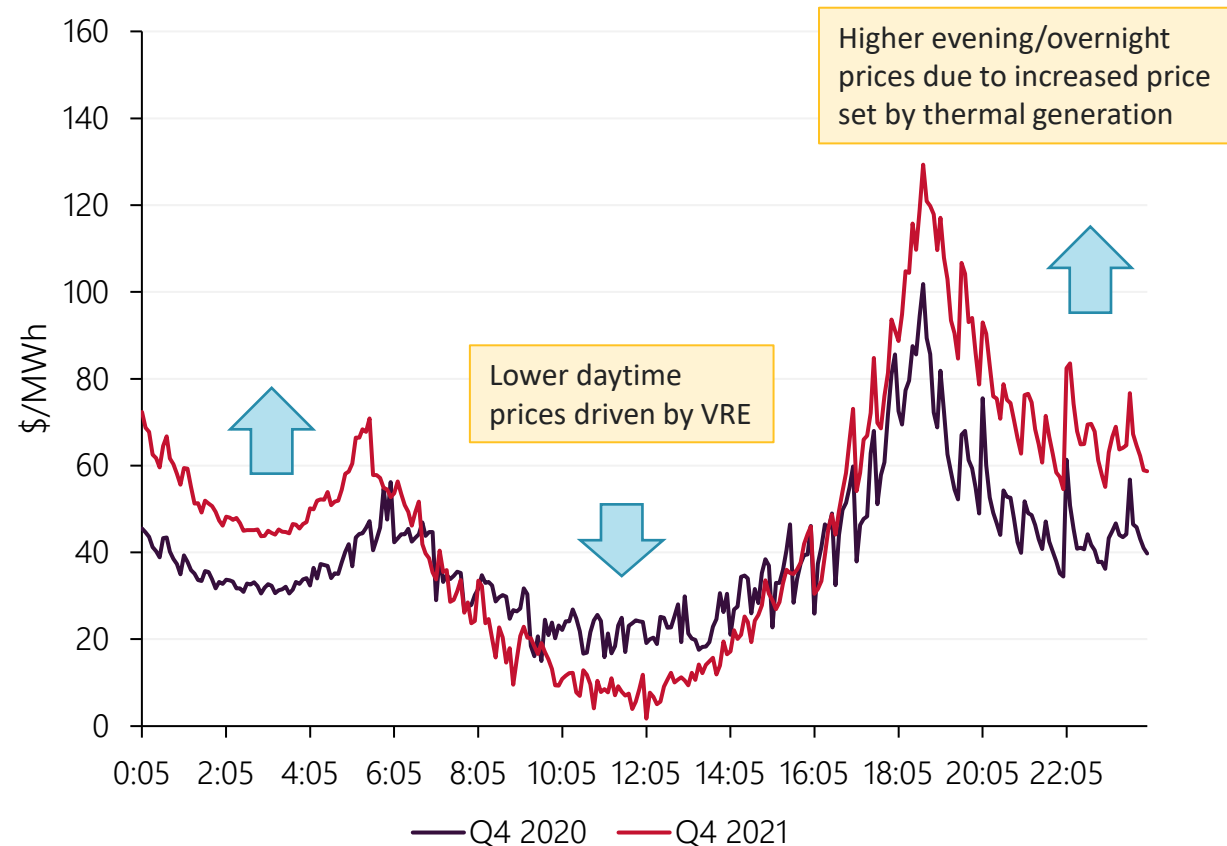


<sup>1</sup>A measure of volatility in electricity prices is the presence of high price events – prices above \$300/MWh. This is often represented as 'quarterly cap returns', which is the sum of the NEM pool price minus the \$300 cap price for every half hour in the contract quarter where the pool price exceeds \$300/MWh, divided by the number of half-hours in the quarter.

# Price divergences by time of day

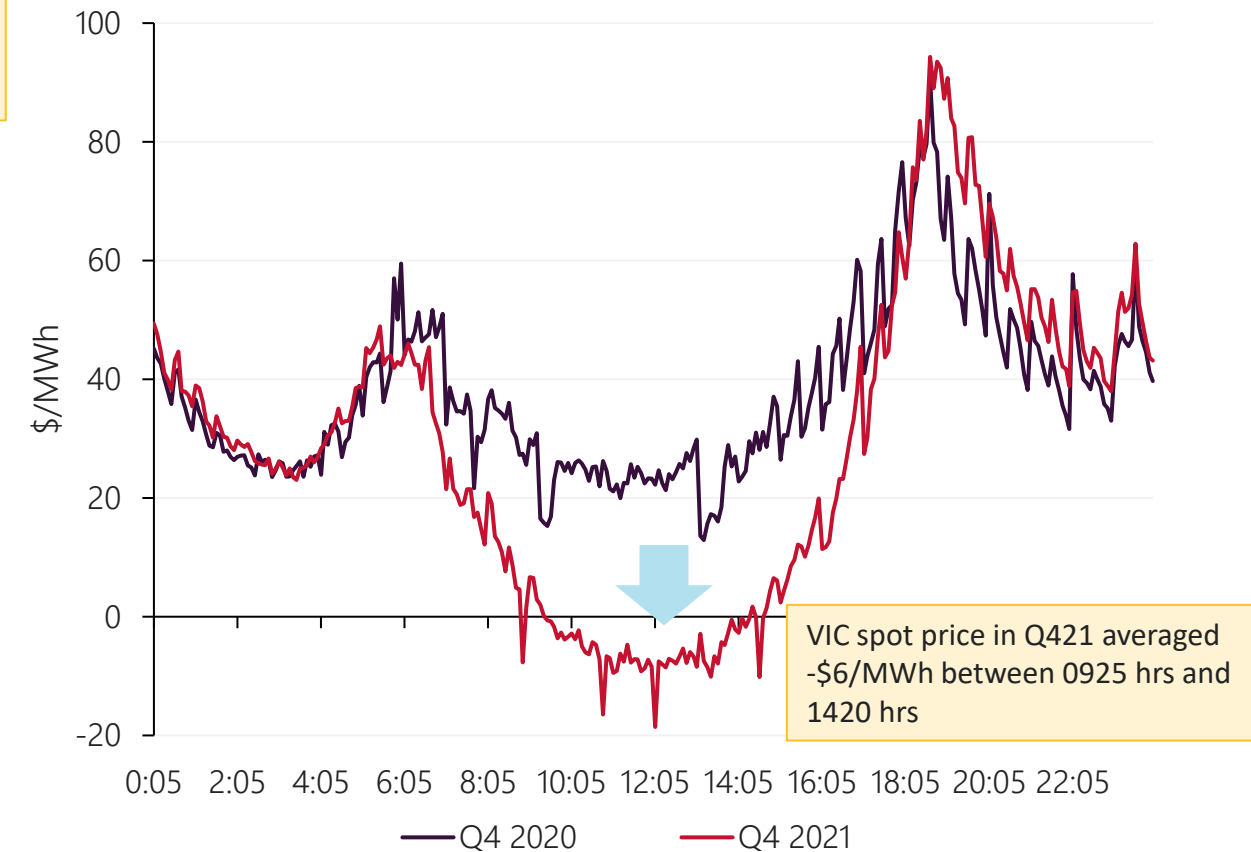
## Daytime prices lower but evenings-overnights up

Mainland NEM average energy (capped) price by time of day



## Victorian middle of day prices fall below zero

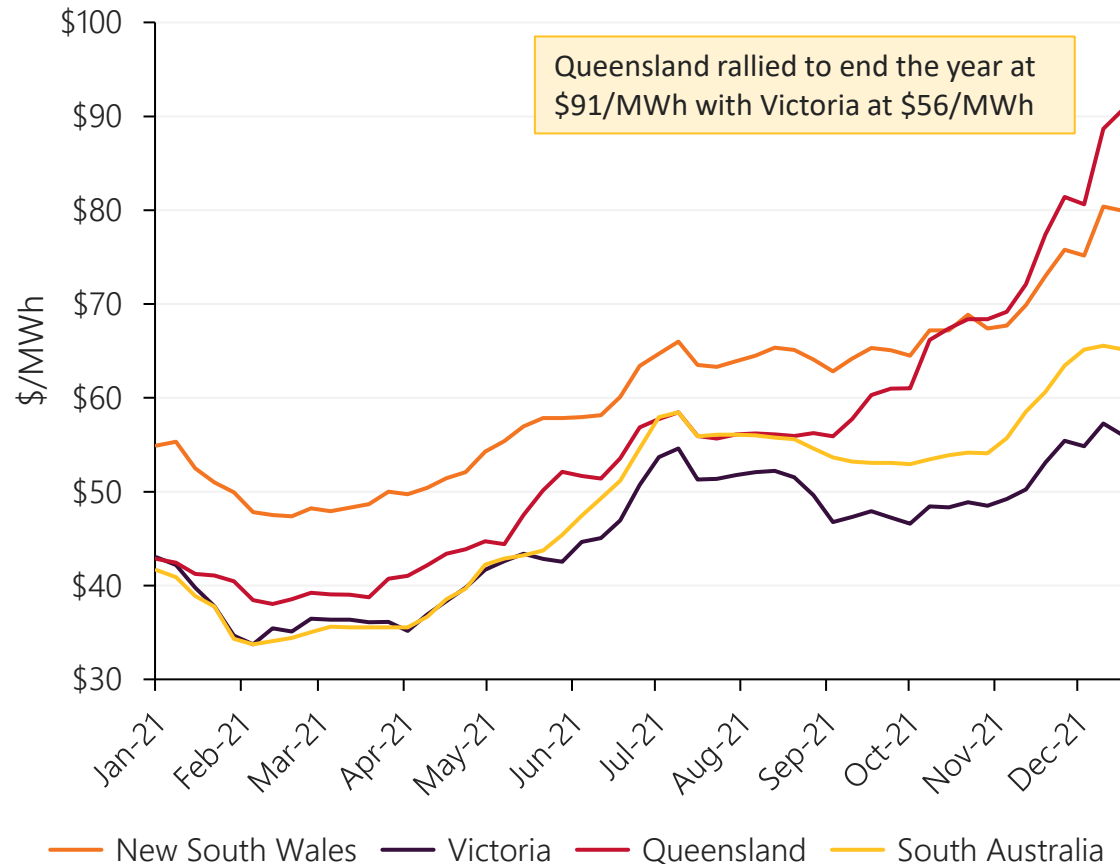
Average spot price by time of day - Victoria



# Price divergences by region

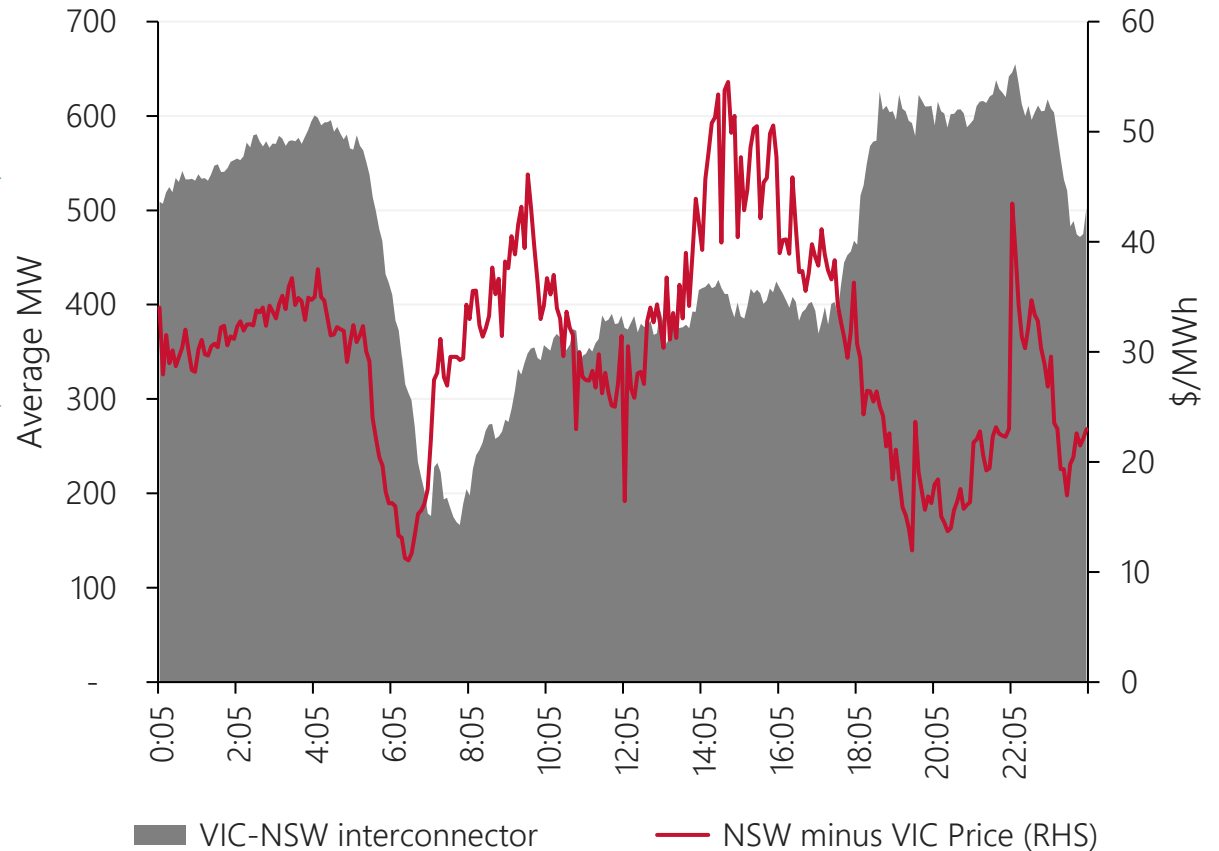
## Rising futures prices also reflecting spot divergence

Cal22 ASX futures



## Daytime northward exports restricted

VNI exports and (capped) energy price difference by time of day

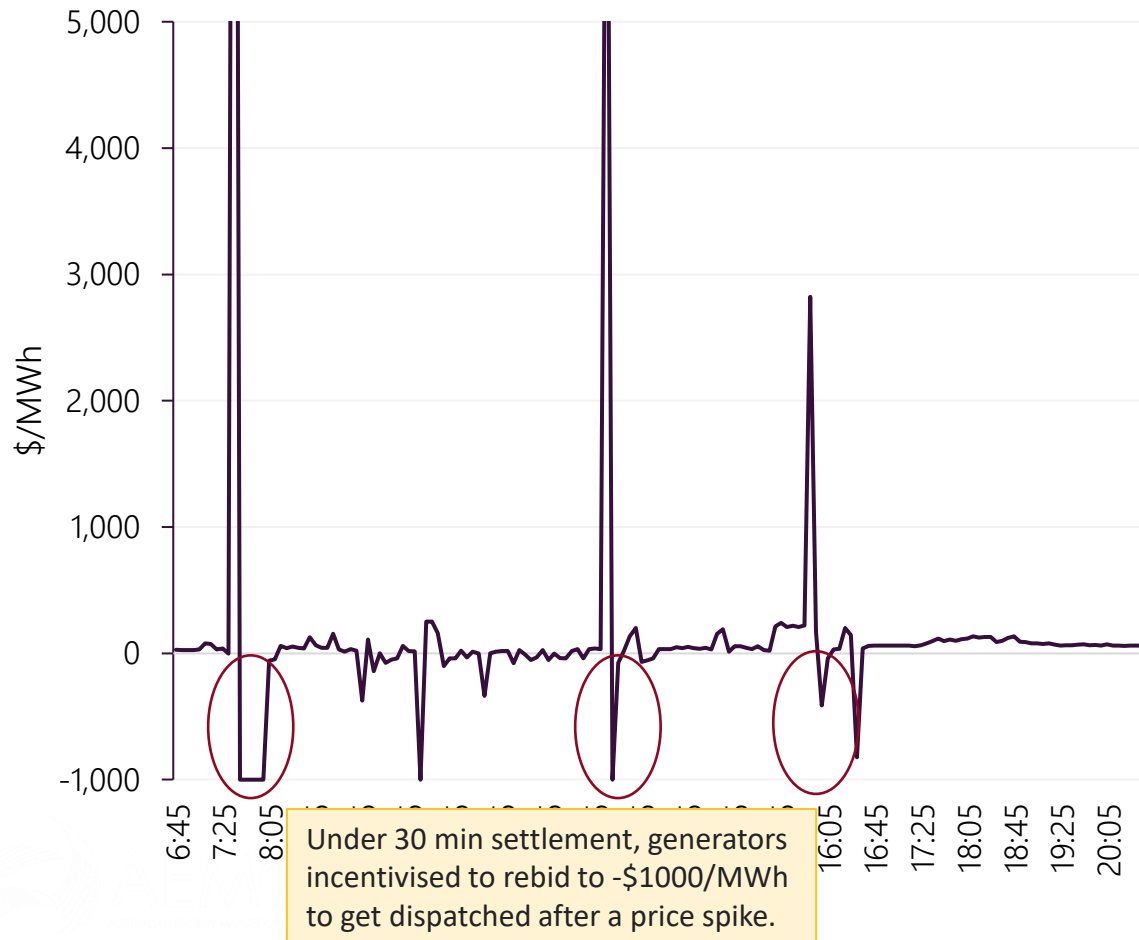




# Impacts of 5MS

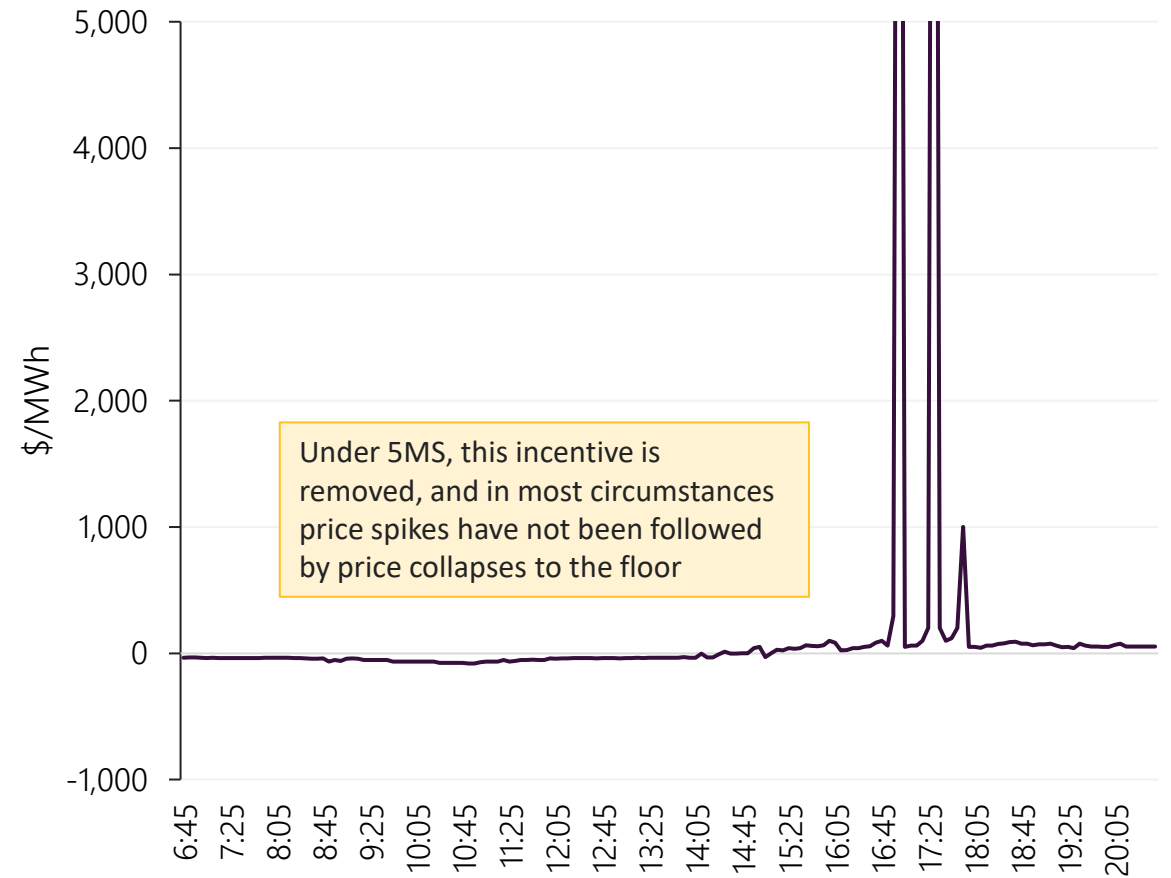
## Pre 5MS - Rebidding after Qld price spikes

5 minute prices on 30 Sept 2021



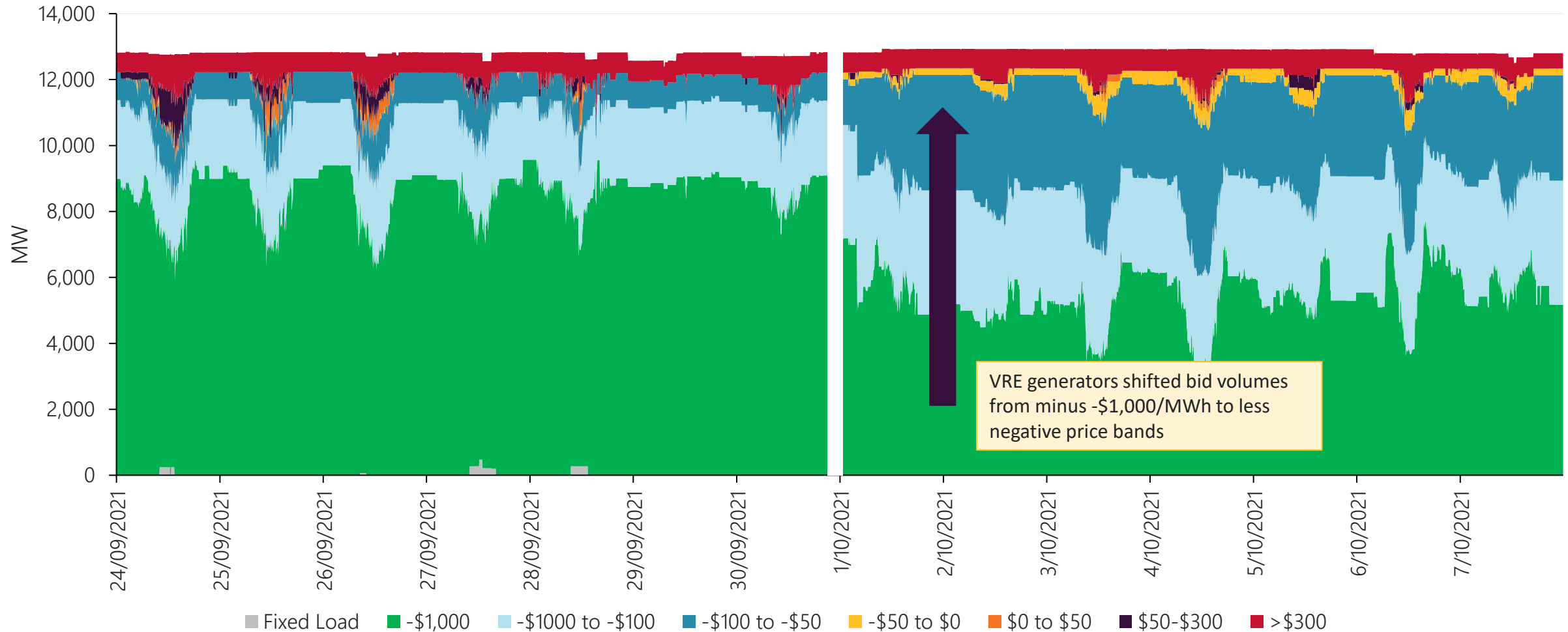
## Post 5MS – No rebidding after price spikes

5 minute prices on 4 Oct 2021



# Renewables moved offer prices up at start of Q4

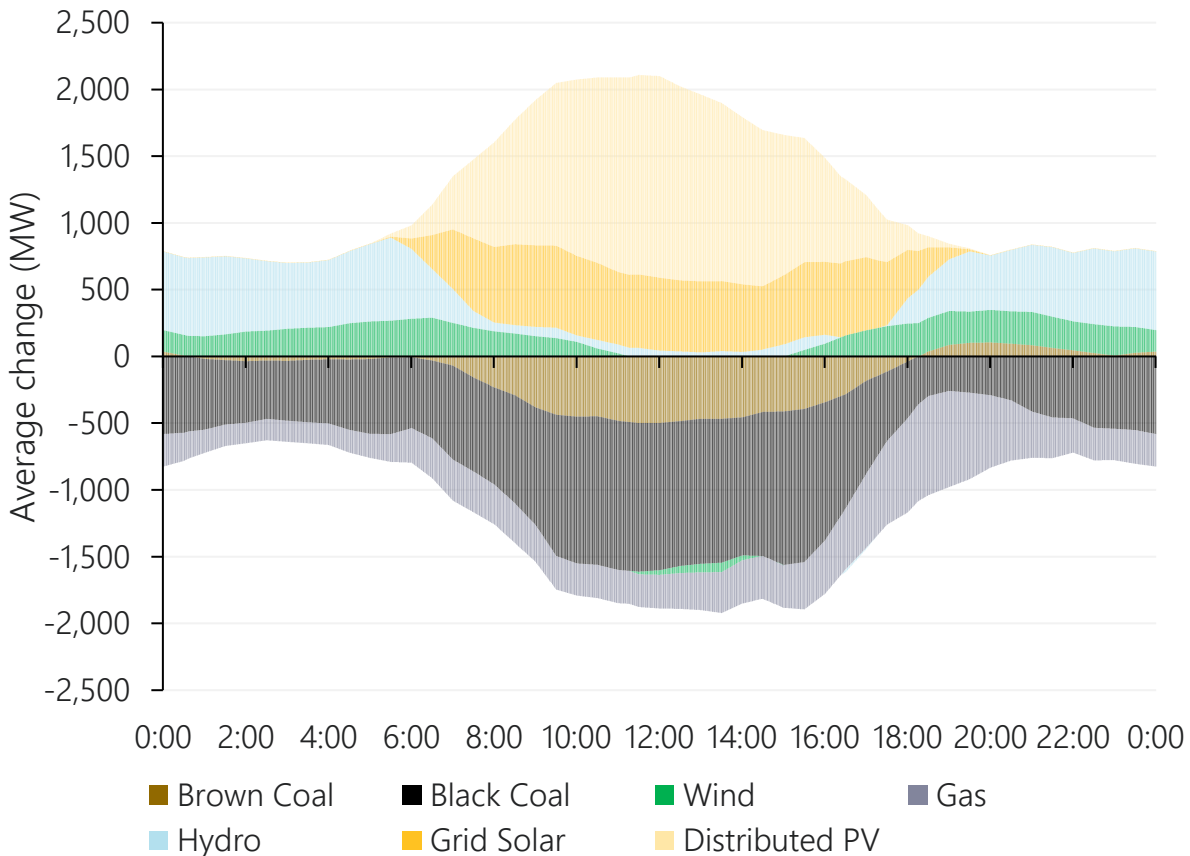
Nominal volumes offered by price range – semi-scheduled wind and solar



# Renewables continued to displace thermal sources

## Strong growth in distributed PV and grid solar

Average output change by time of day - Q4 2021 vs Q4 2020



## Highest growth in New South Wales and Victoria

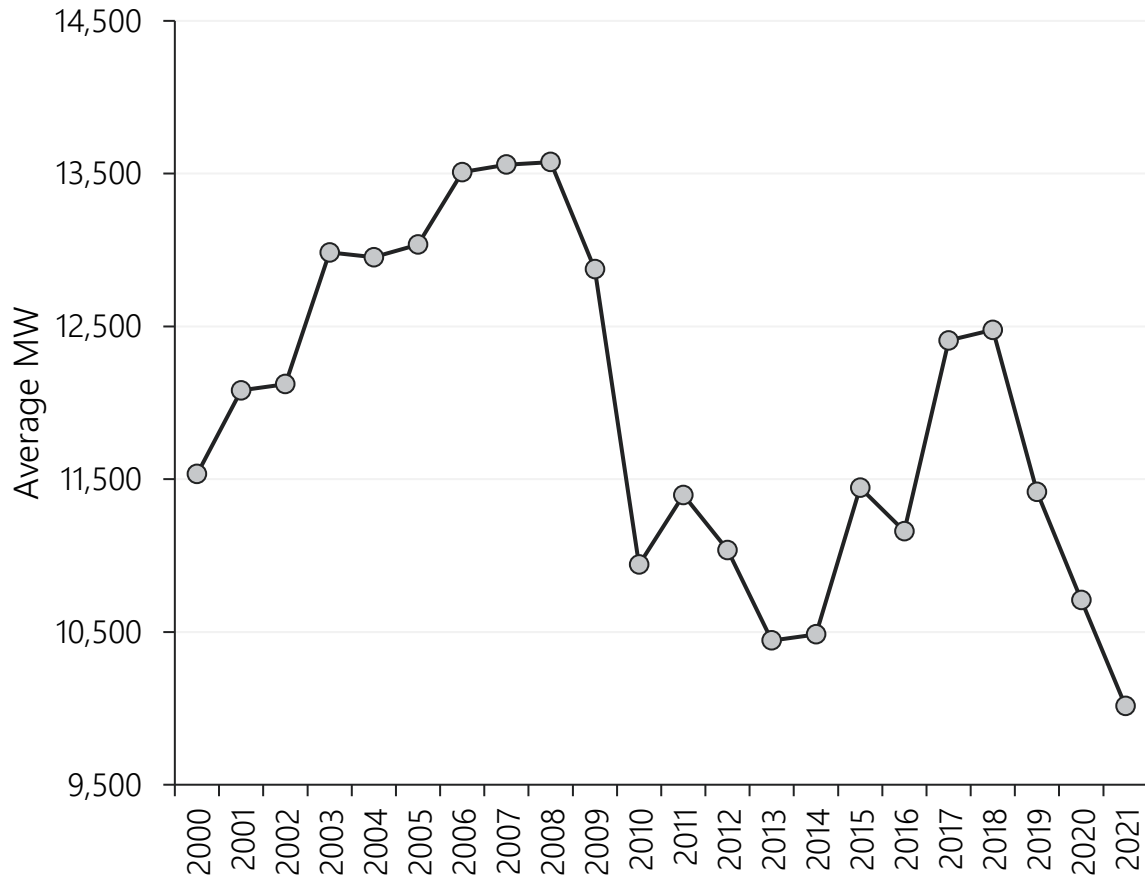
Average change in VRE output by region - Q4 2021 vs Q4 2020



# Thermal generation fell with higher renewable output

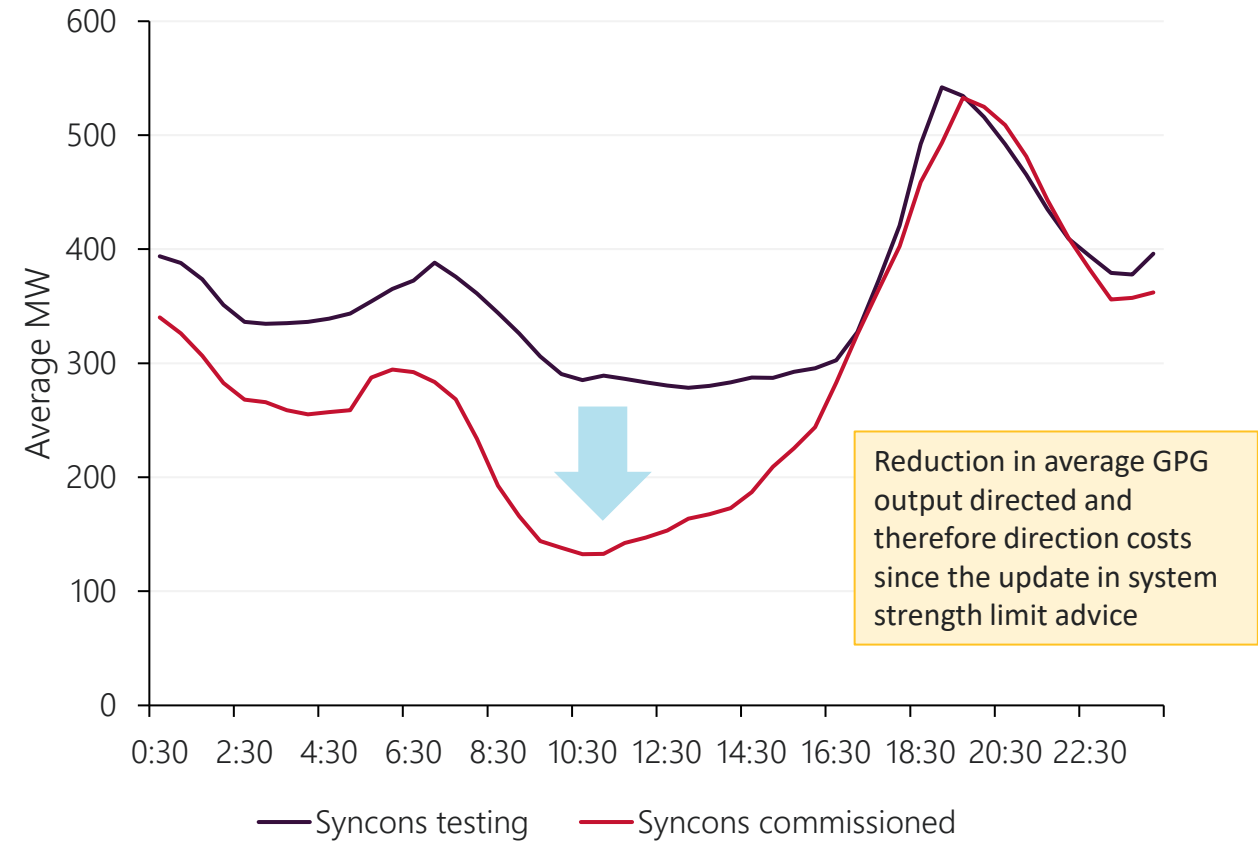
## Black coal output fell to a new Q4 low

Quarterly average NEM black coal-fired output – Q4s



## South Australian GPG requirements reduced in Q4

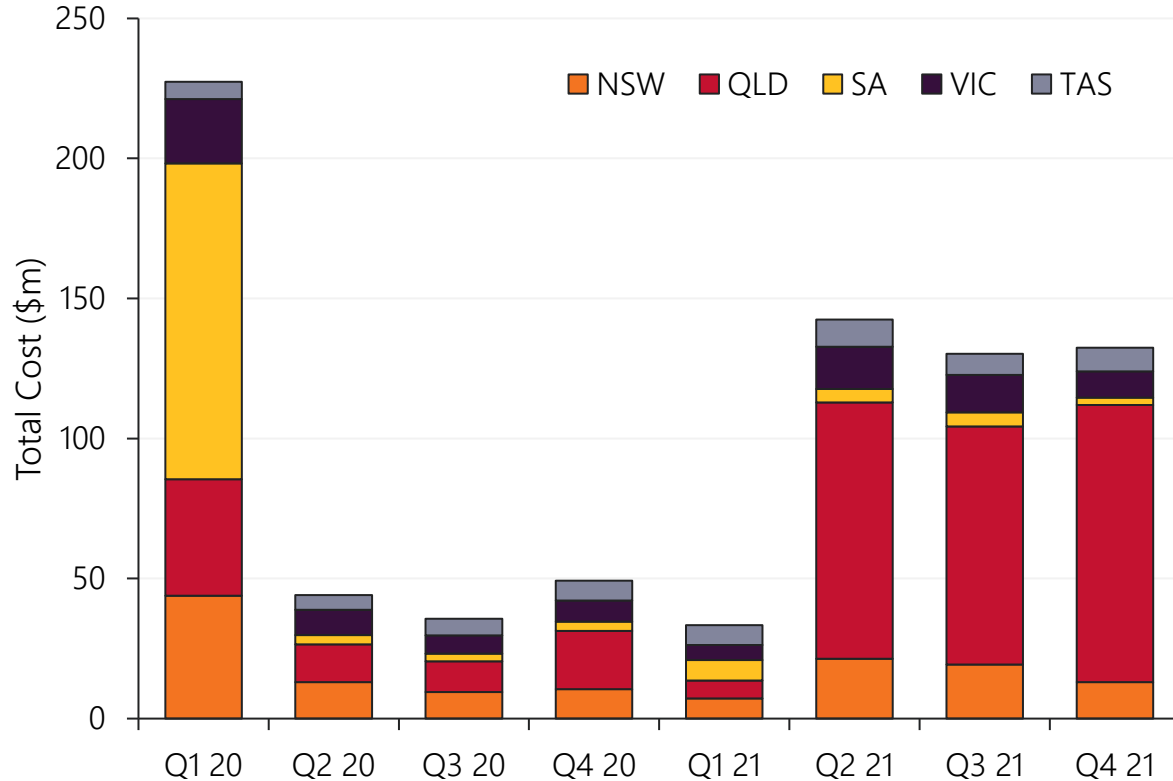
GPG by time of day – before and after synchronous condenser changes



# FCAS volatility and costs remained elevated

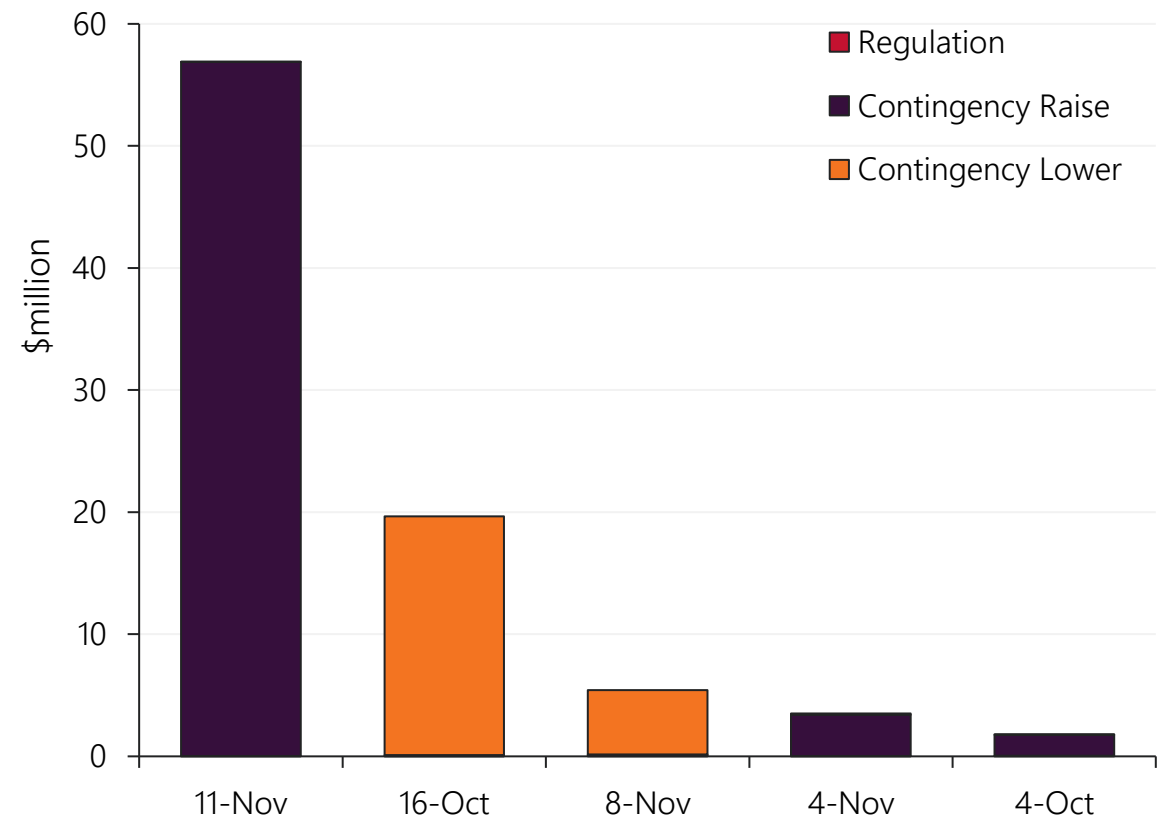
## High Queensland FCAS costs continued

Quarterly FCAS recovery costs by region



## ... driven by QNI constraints on isolated days

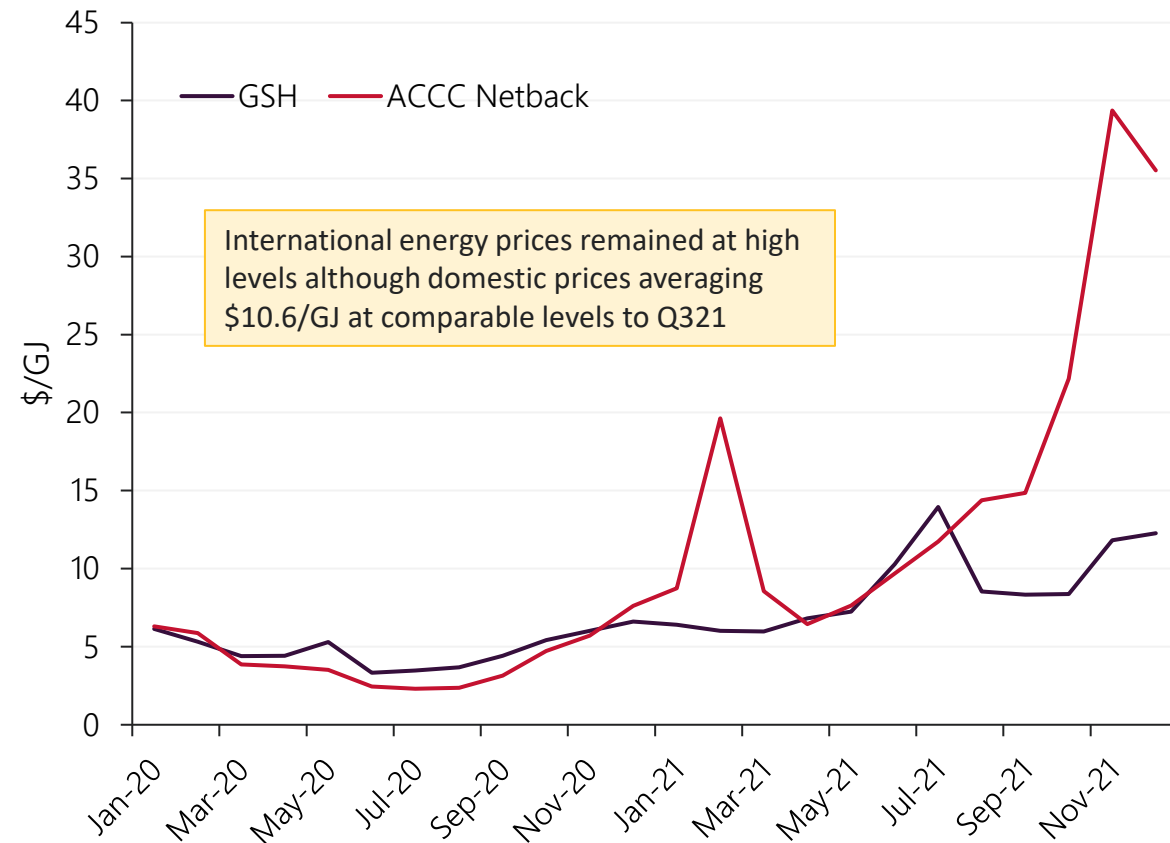
Queensland daily FCAS recovery costs Q4 2021 – Top 5 days



# East coast gas prices remained high

## Domestic prices remained close to records

Gas Supply Hub prices vs ACCC netback - monthly



## Iona gas storage finish year at low levels

Victoria's Iona gas storage levels

