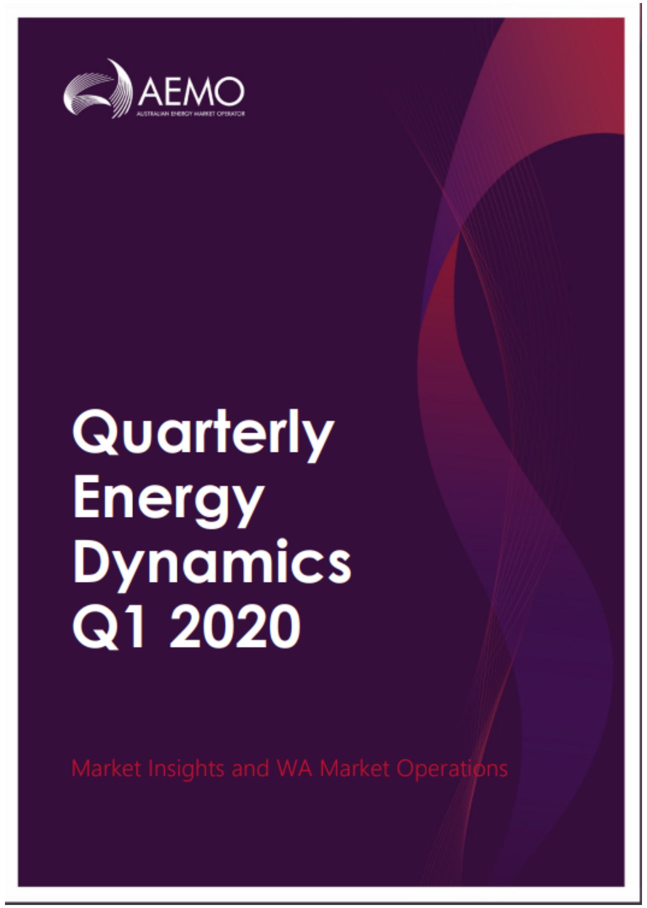
Quarterly Energy Dynamics Q1 2020

Market Insights

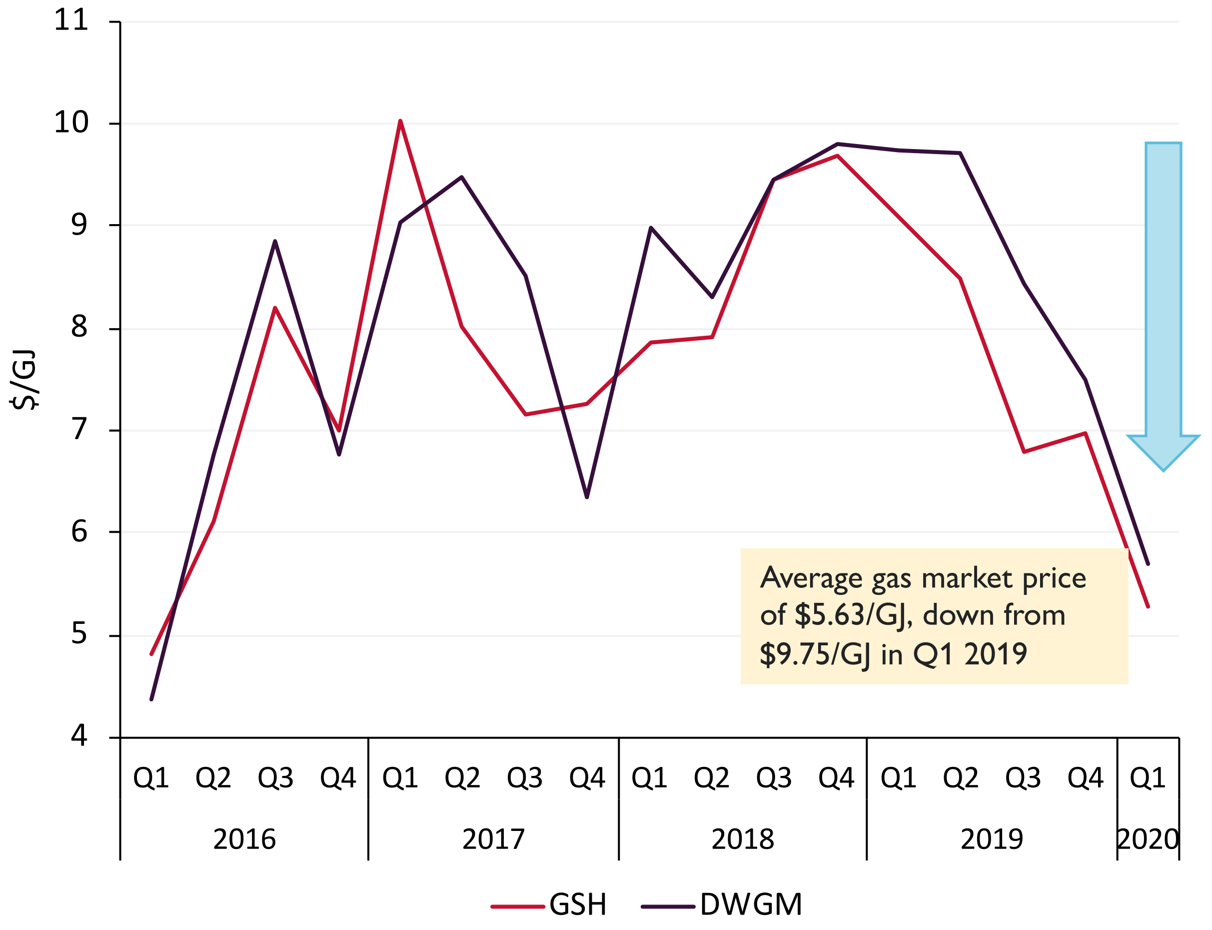
Outline

1. Lowest east coast wholesale electricity and gas prices since 2016
2. Emerging impact of COVID-19 restrictions on electricity demand and energy prices
3. Structural shift in the pricing of dispatchable generation in the NEM
   (Black coal, hydro and gas)
4. Major power system separation events drive record system costs



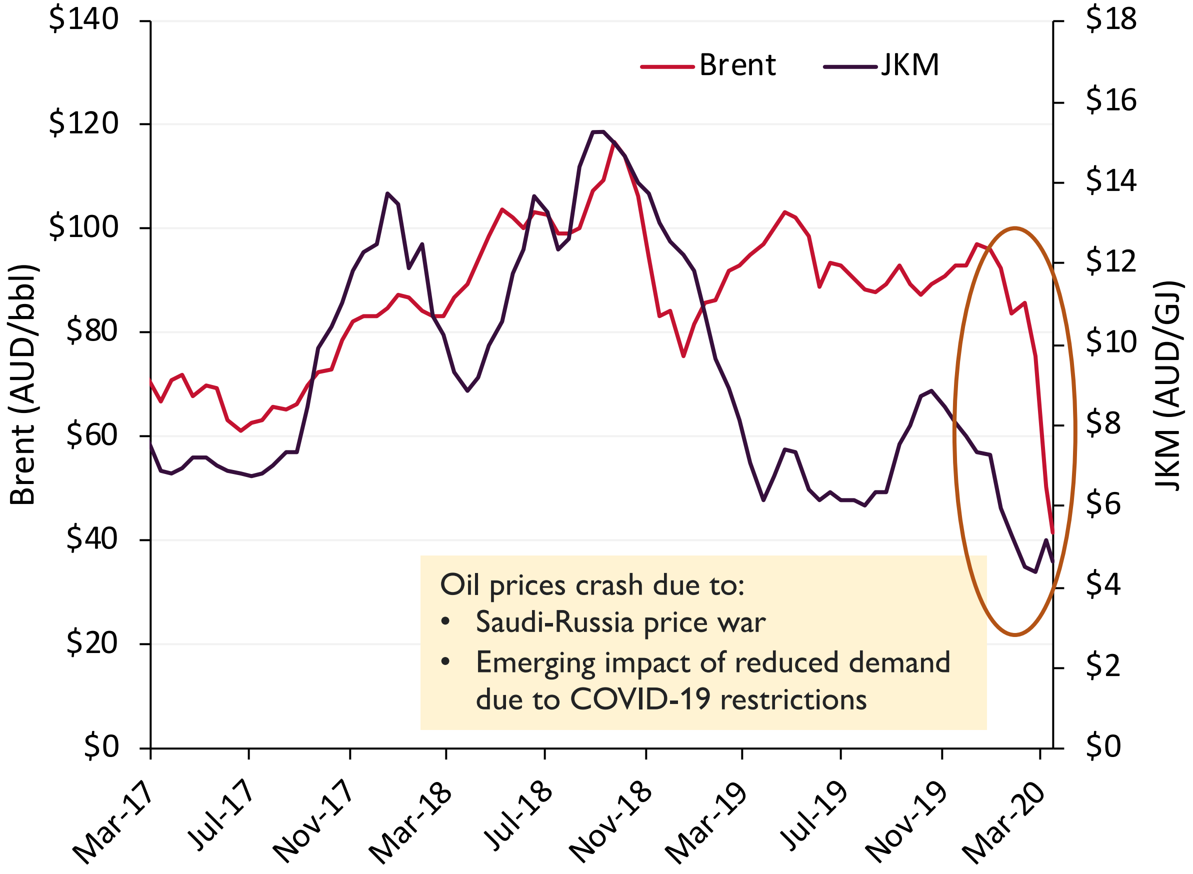
Lowest gas market prices in four years

Lowest east coast gas prices since Q1 2016



International oil and gas prices fall

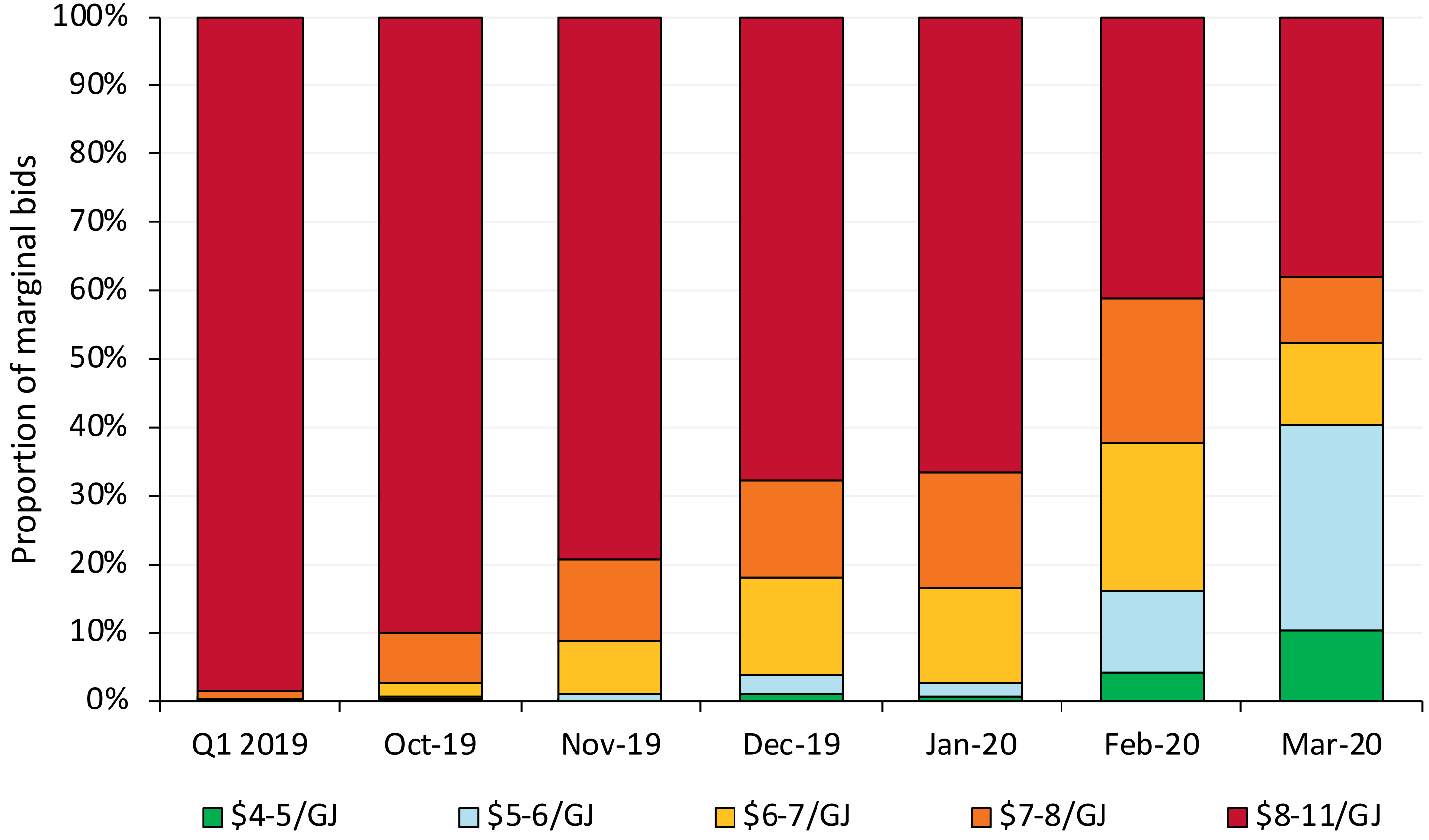
Brent Crude oil and JKM LNG prices in Australian dollars



Supply-side pricing the key driver

Structural shift in gas market bids continues

DWGM – proportion of marginal bids by price band



Structural shift in bids: in Q1 2020, 50% of bids in the DWGM were priced under $8/GJ, compared to 1.5% in Q1 2019. Bid changes coincided with:

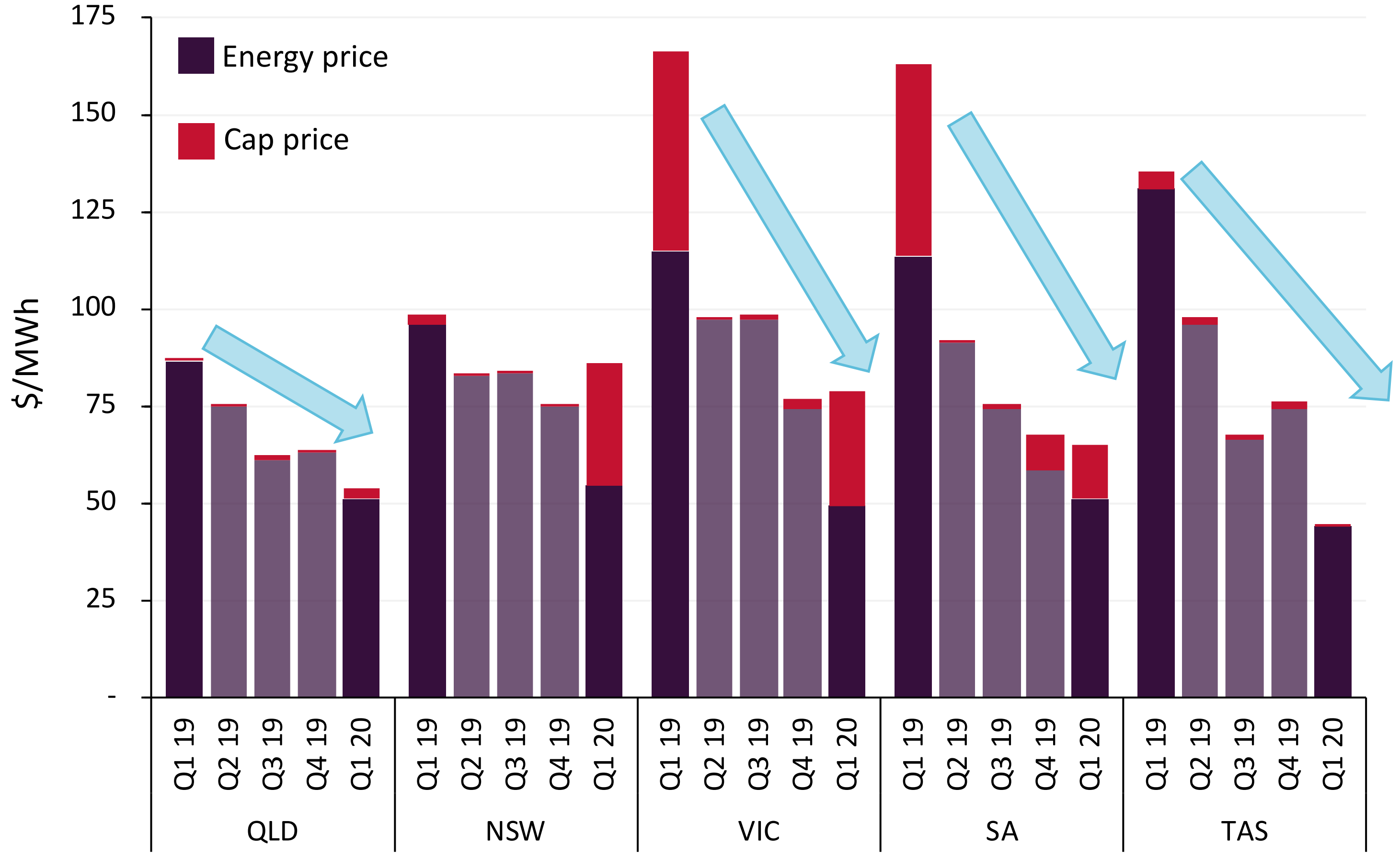
1. Declining international gas prices
2. Lower NEM spot and contract prices
3. Increased QLD production

Similar bid changes in other east coast gas markets.

Gas demand slightly up compared to Q1 2019 due to increased LNG exports (+9 PJ) more than offsetting reduced gas-powered generation demand (-7 PJ).

Wholesale electricity price fall continues

Lowest NEM spot electricity prices since Q4 2016



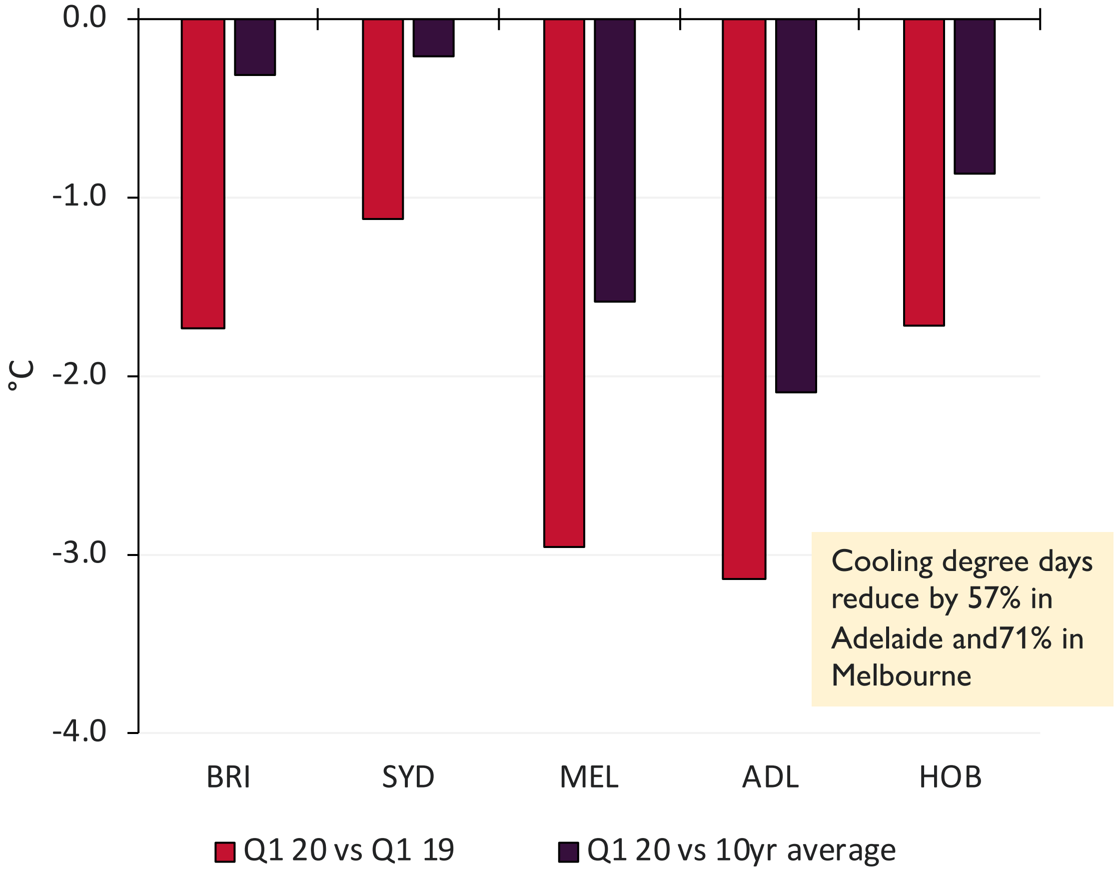
Summary

- Despite several Jan days with extreme price volatility, NEM-average spot prices declined to **$66/MWh**, representing lowest level since Q4 2016.
- Lower wholesale electricity prices were a function of:
    - Reduced operational demand
    - Lower wholesale gas prices
    - The resulting *structural shift in bids* from dispatchable generation (black coal, hydro and gas bids)
- High volatility days:
    - 4 Jan 2020 - separation of NSW and VIC, and record Sydney temps led to third most price volatility day in NSW history
    - 31 Jan 2020 – east coast heatwave, unplanned coal unit outages, low VRE cap factors, and separation of SA and VIC led to extreme VIC and NSW prices. Highest price volatility day on record for NSW.

Mild Q1 conditions cut electricity demand

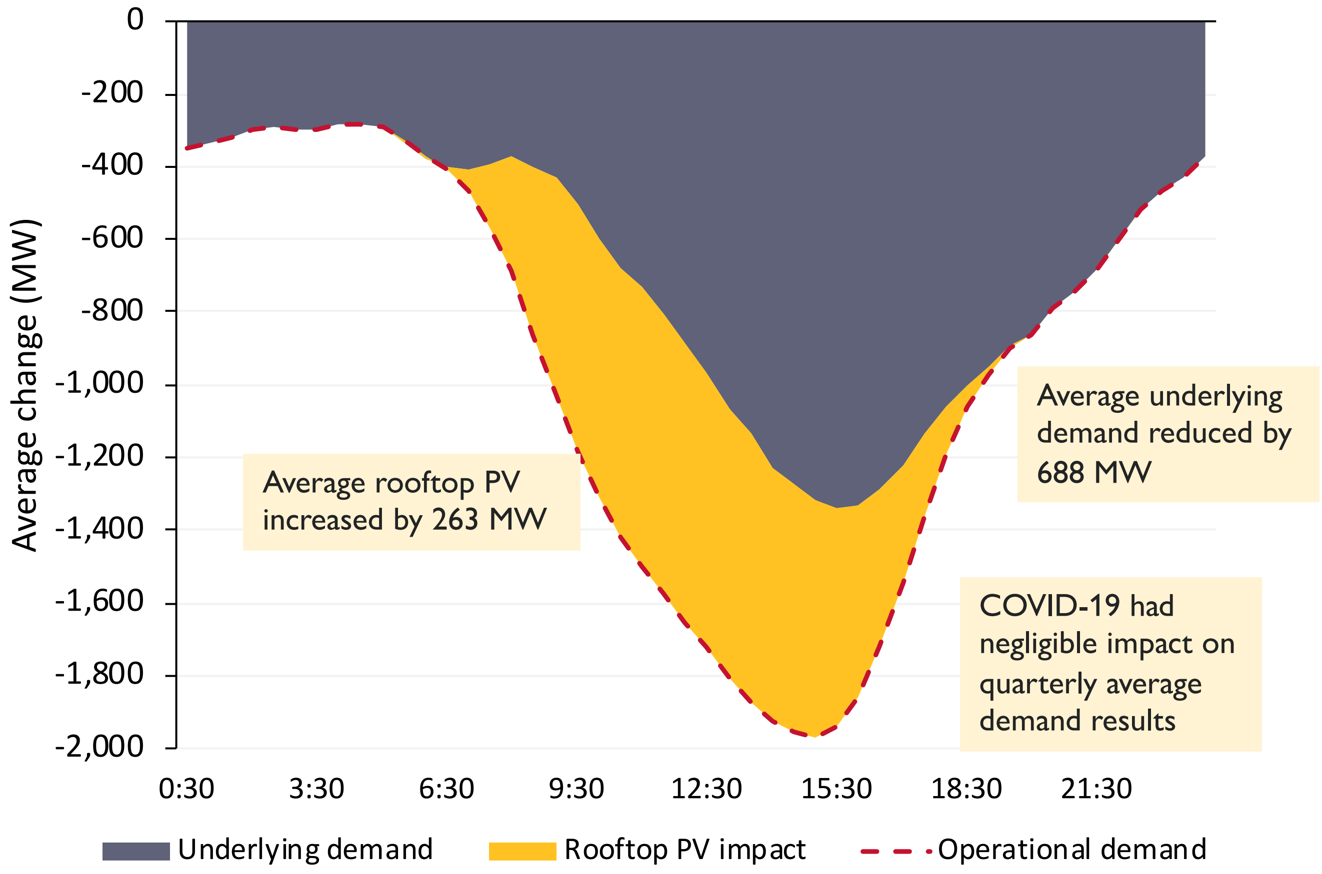
Mild Q1 across capital cities…

Average max temp change– Q1 2020 vs 10 year Q1 average



…leads to substantially reduction in electricity demand

Change in operational demand by time of day – Q1 2020 versus Q1 2019



COVID-19 demand impact - April

COVID-19 drives reduced electricity demand

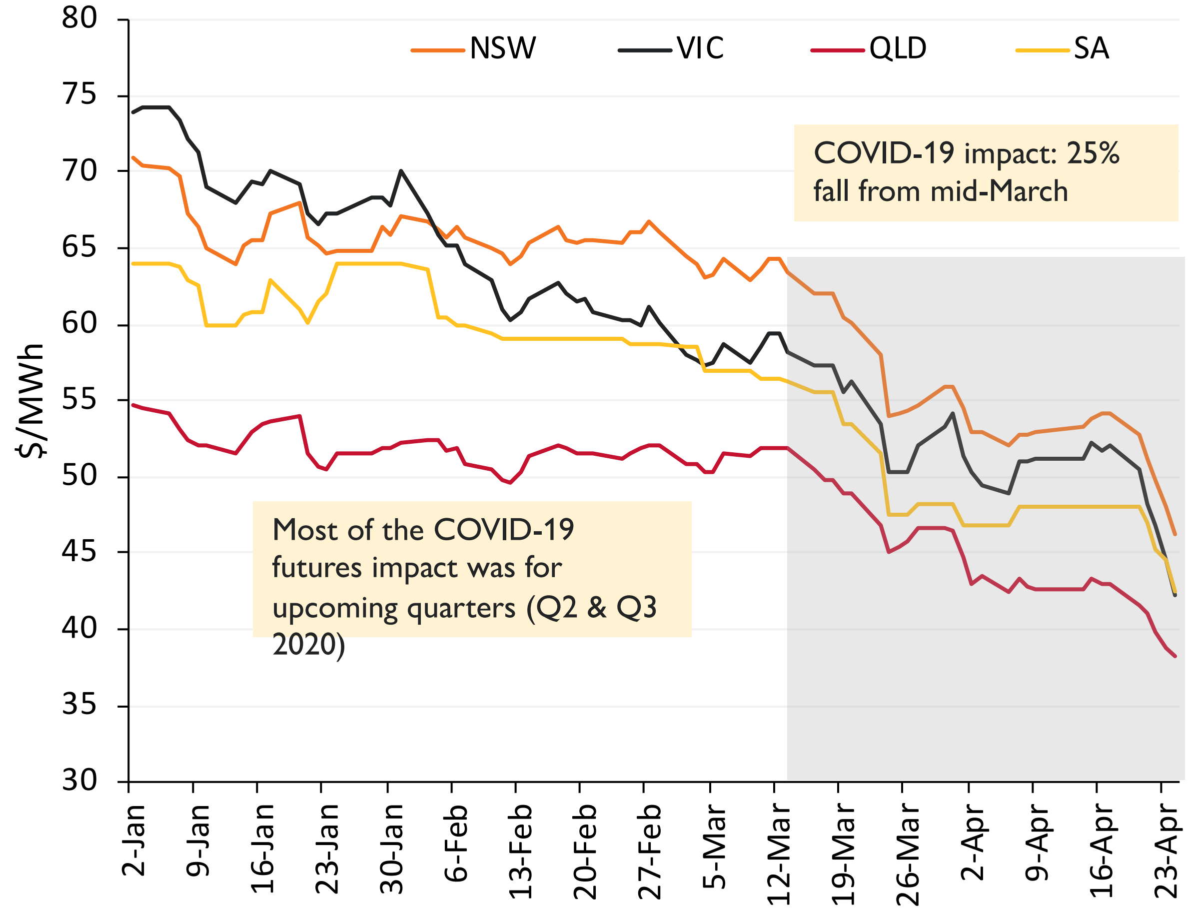
NSW operational demand – actual and pre-COVID-19 model

- Largest demand reductions observed in NSW & QLD
- Much greater reductions have taken place internationally

COVID-19 impact: energy futures markets drop

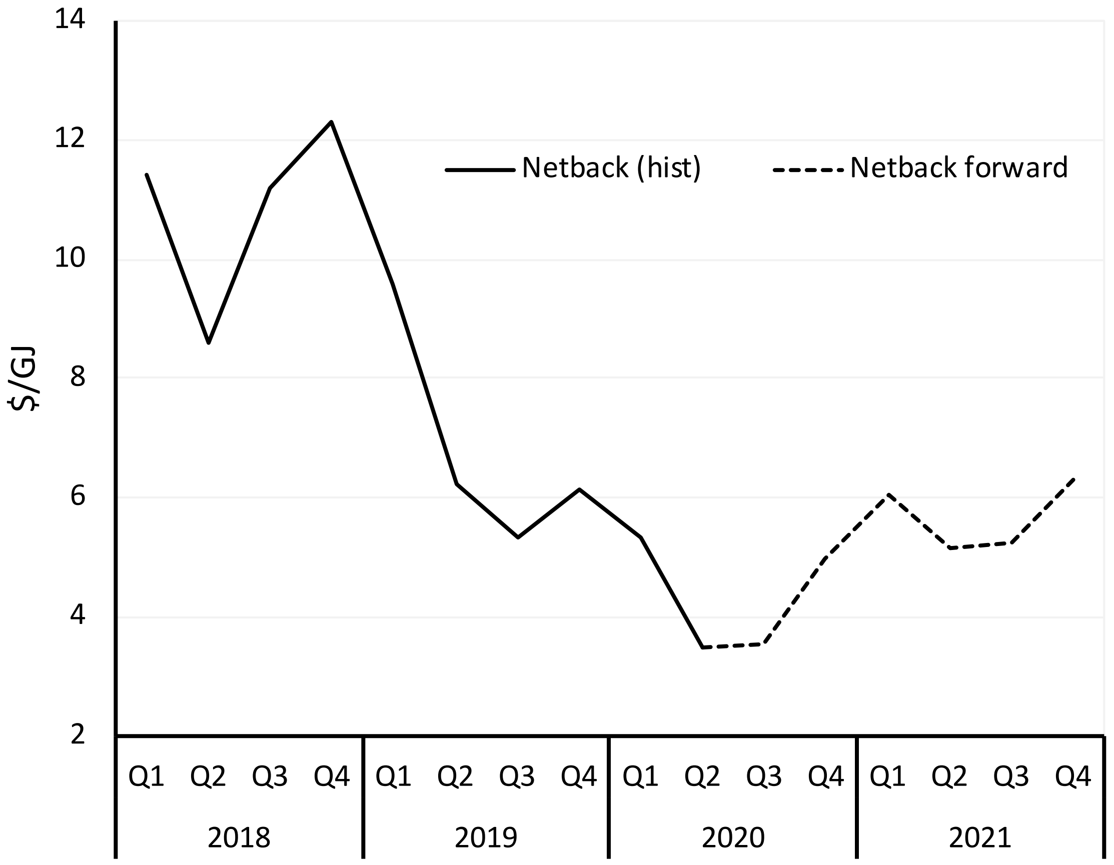
COVID-19 leads to electricity futures decline

ASX Energy – Q3 2020 swap prices by region



Netback gas prices now expected to remain below $6/GJ until the end of 2021

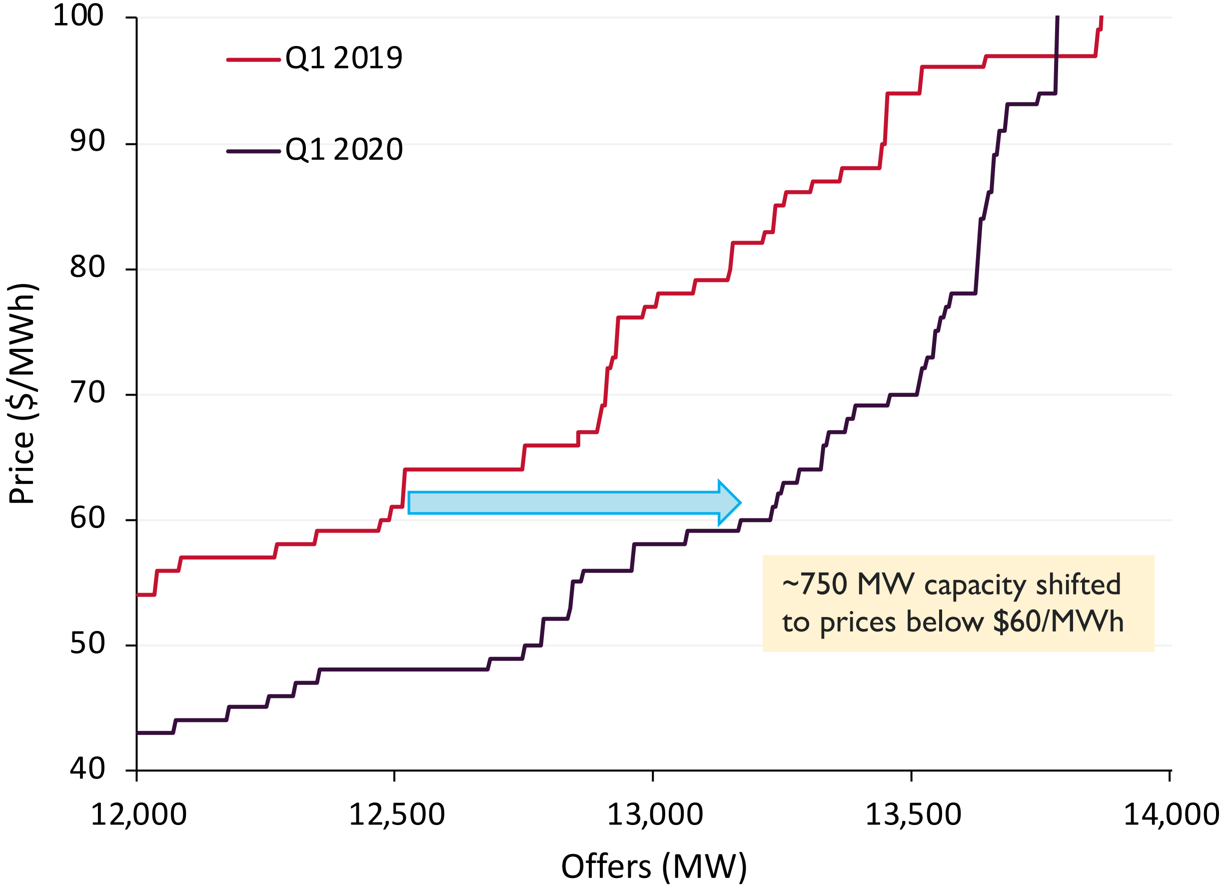
ACCC netback price – historical and forward



Structural shift in dispatchable generation bids

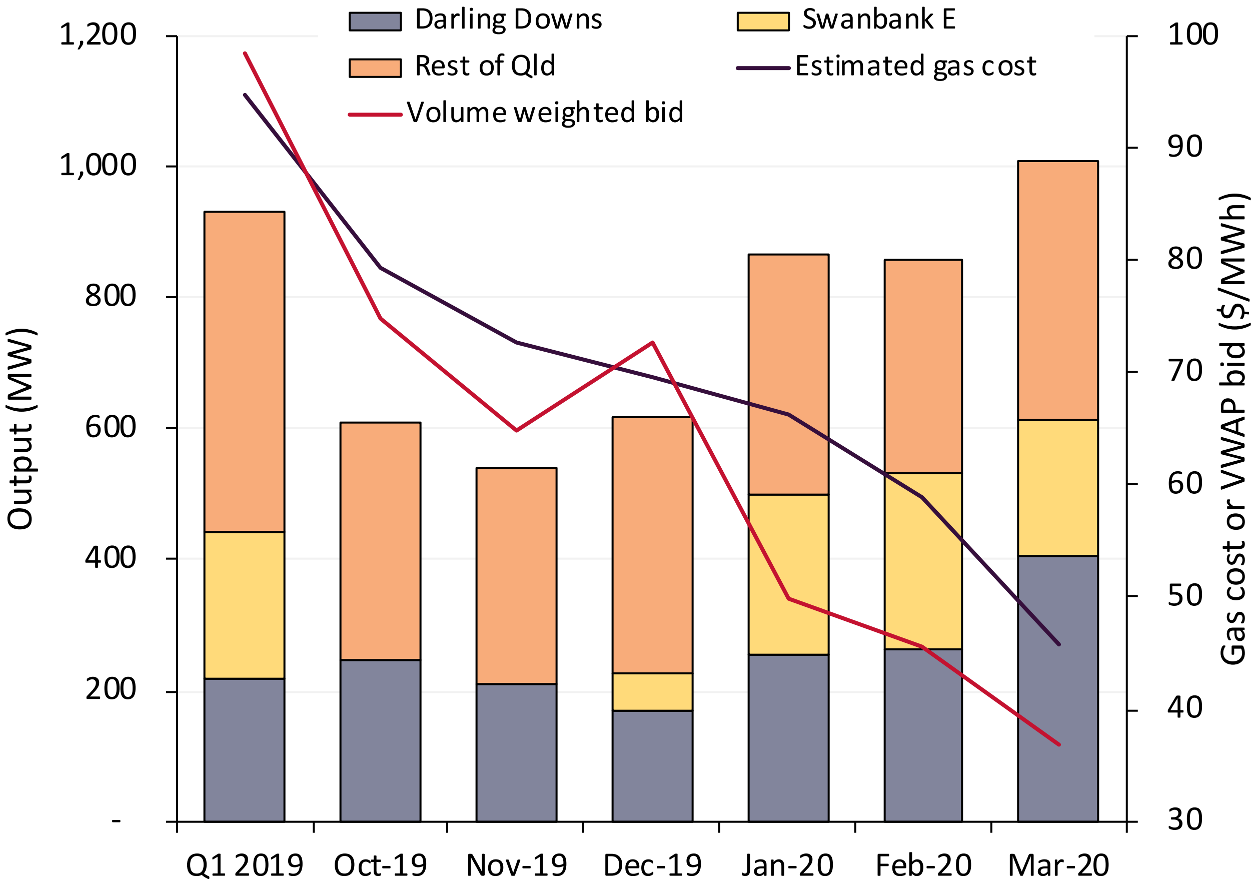
Black coal-fired generation bidding in at lower prices

Bid supply curve – Q1 2020 versus Q1 2019



Lower gas price drive increased QLD GPG output

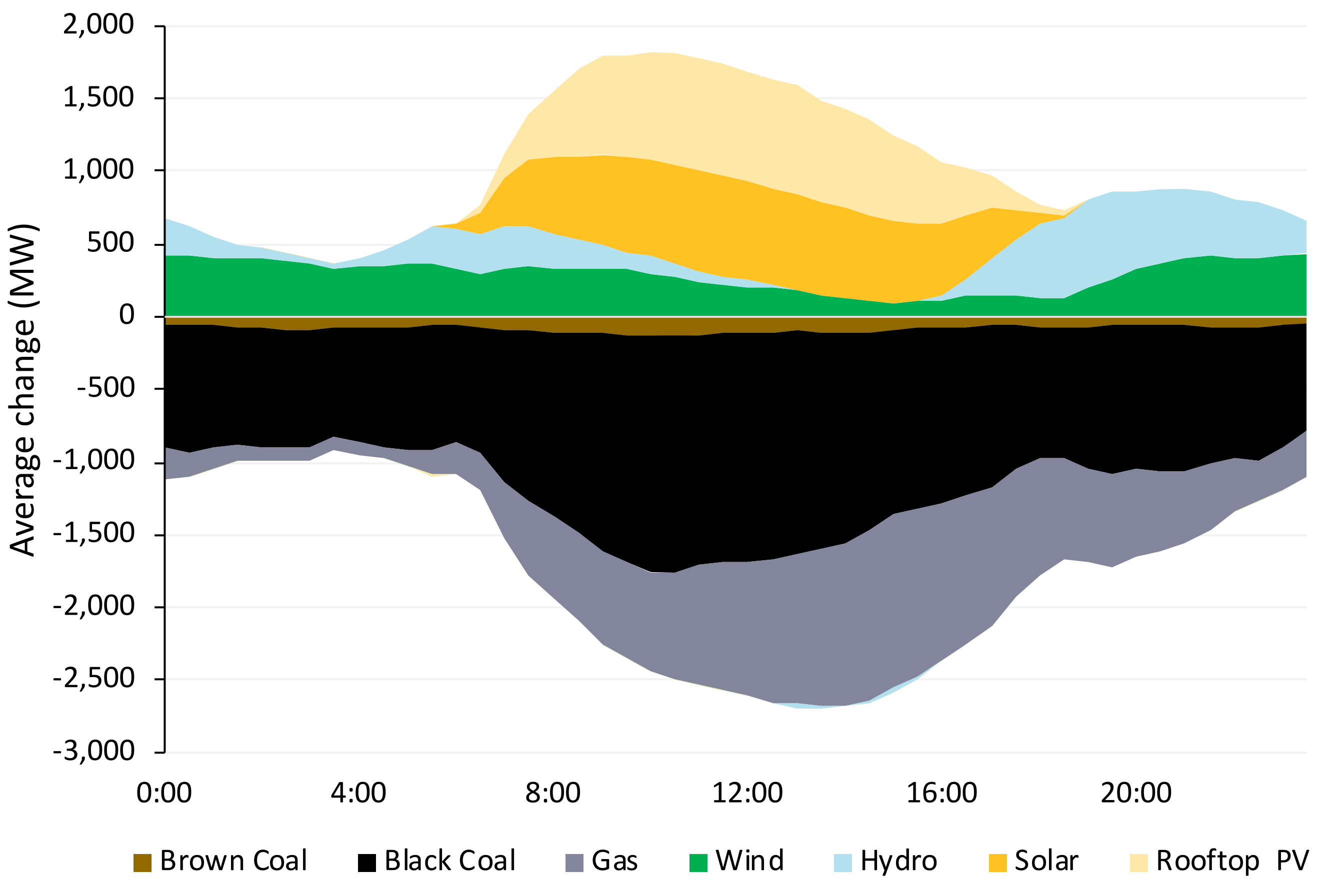
QLD GPG output, GPG VWAP bid, and estimated GPG input cost



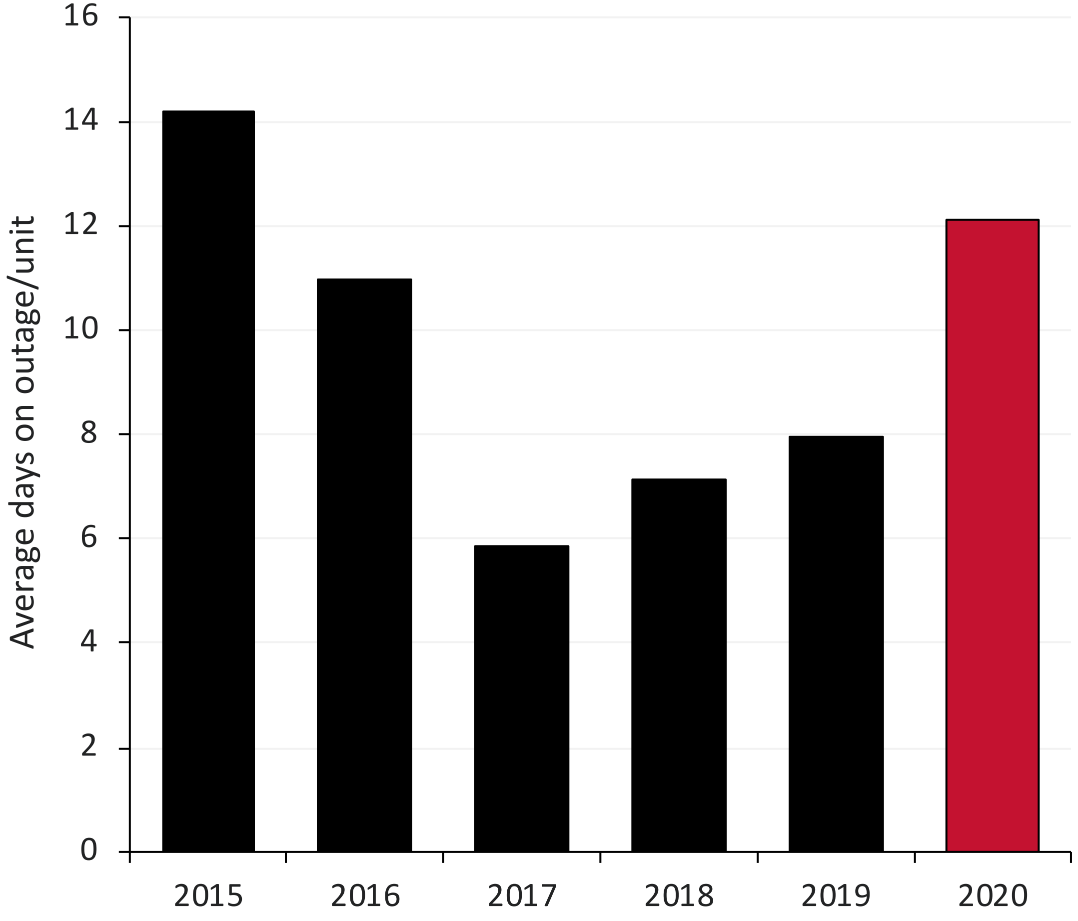
Lowest Q1 coal-fired generation since 2015

Reduced coal and GPG across the day

Change in supply – Q1 2020 versus Q1 2019 by time of day

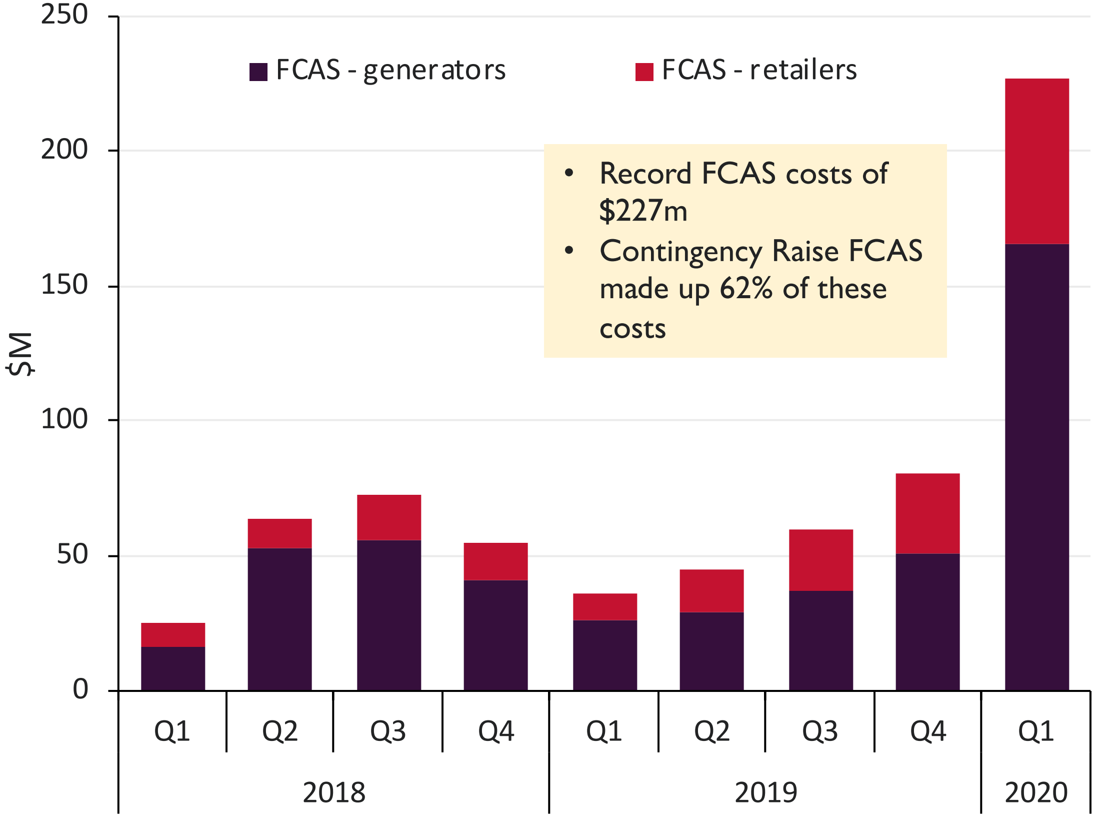


Highest level of Q1 unit outages since 2015 (mostly in Feb and Mar)



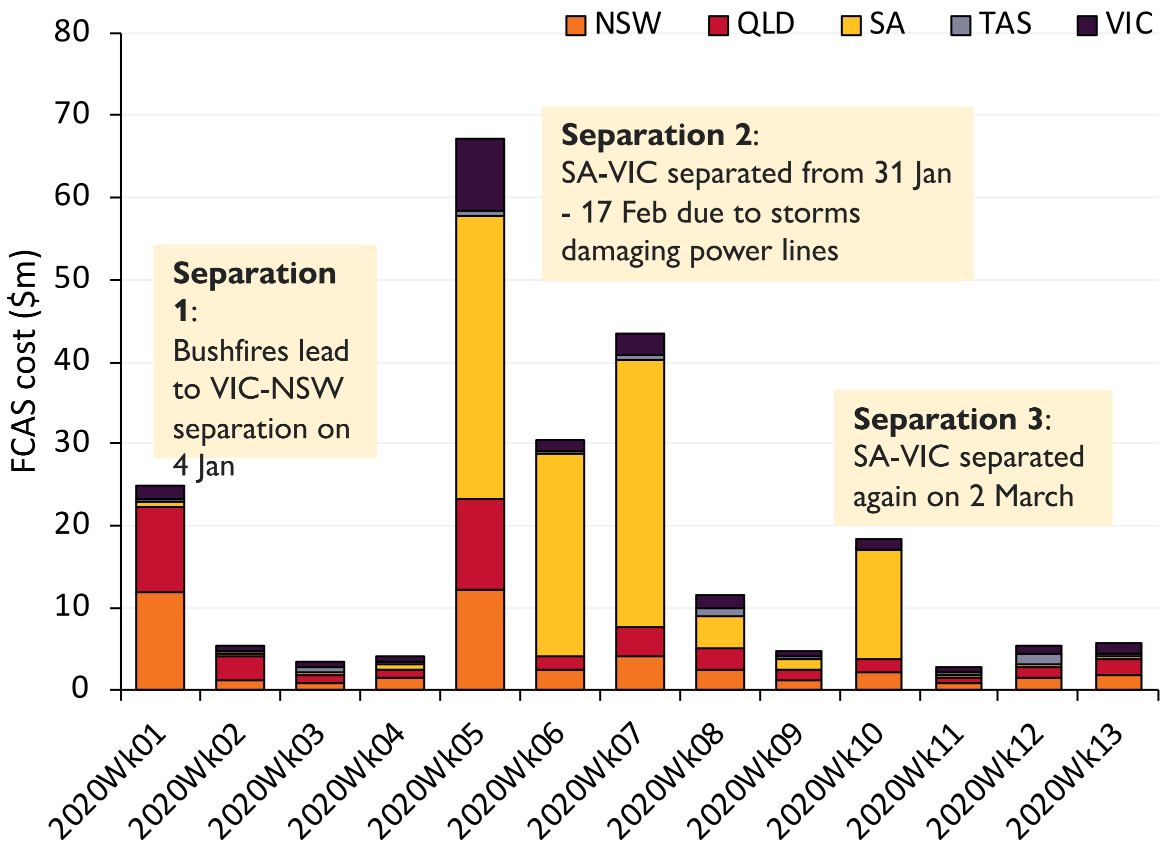
Major separation events drive record FCAS costs

NEM FCAS costs increase to record levels



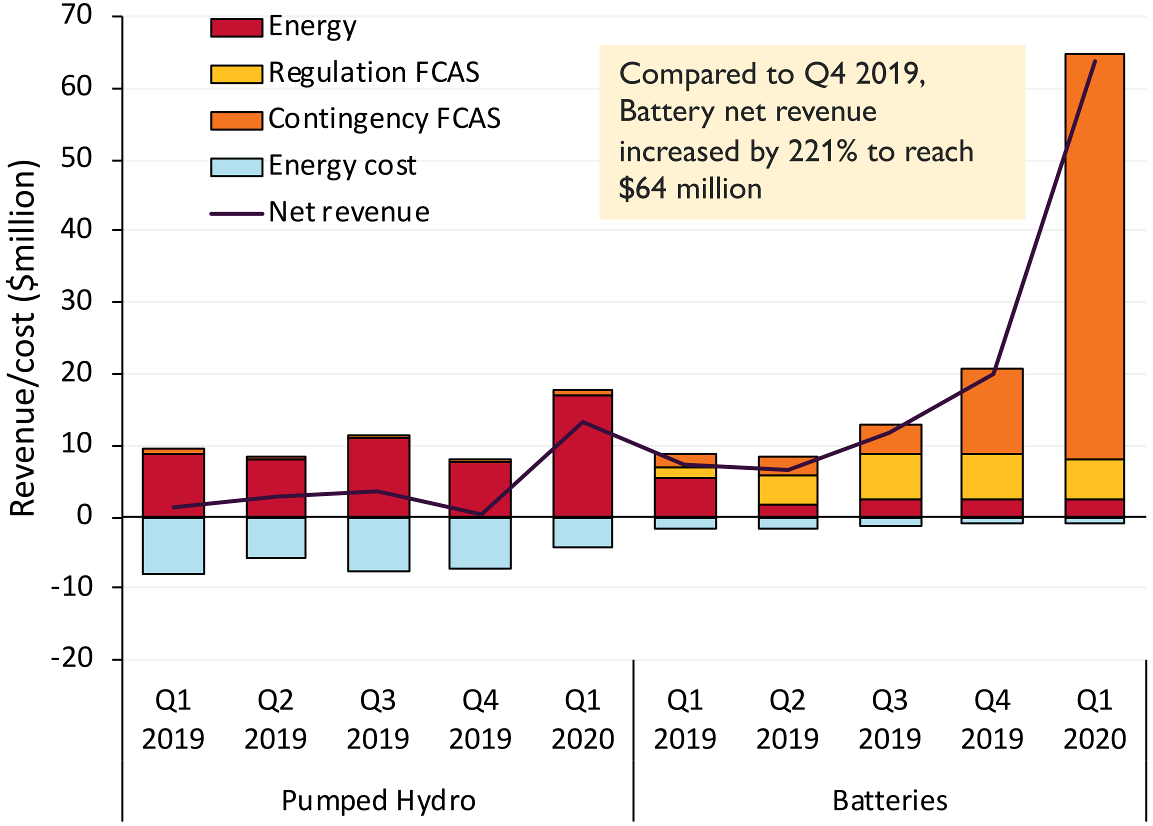
Separation events drive record FCAS costs

Weekly FCAS costs in Q1 2020

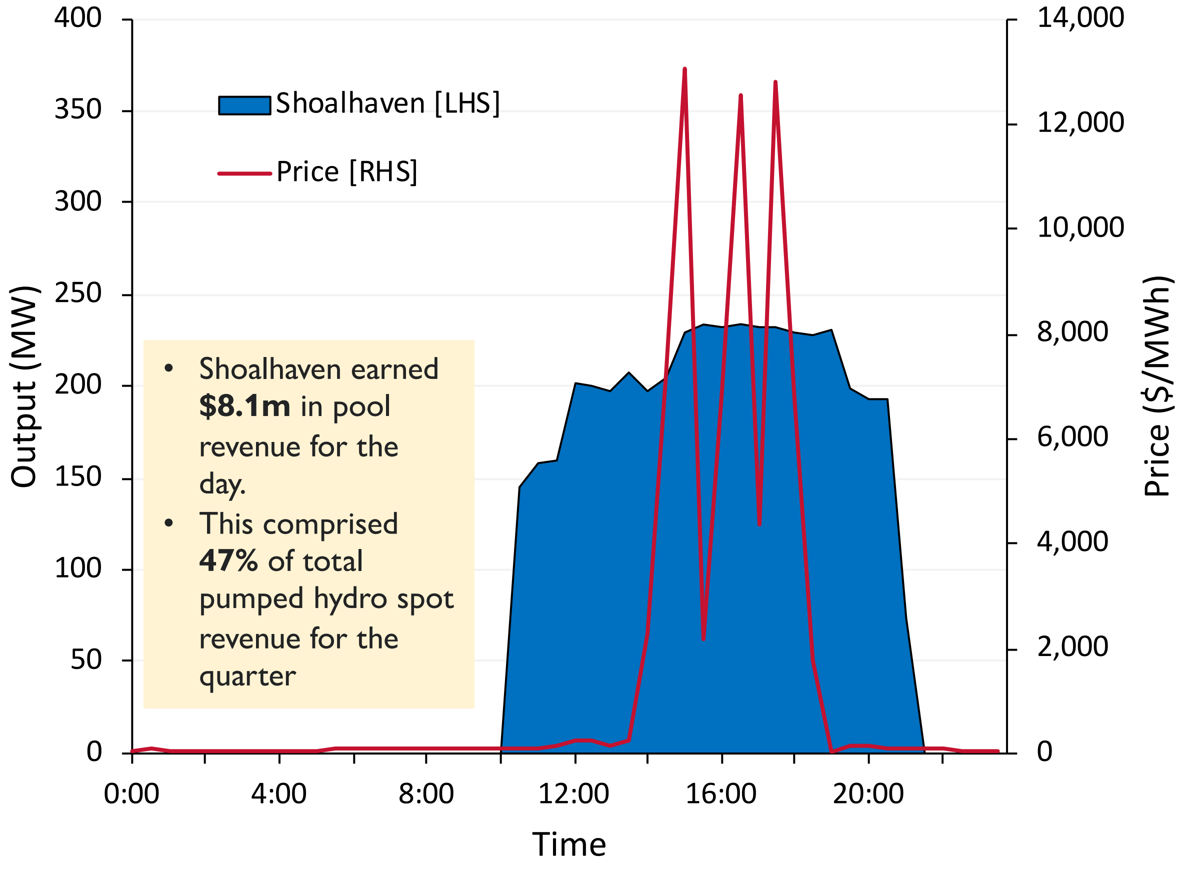


Separation events drive record storage revenues

Storage revenue sources by storage technology

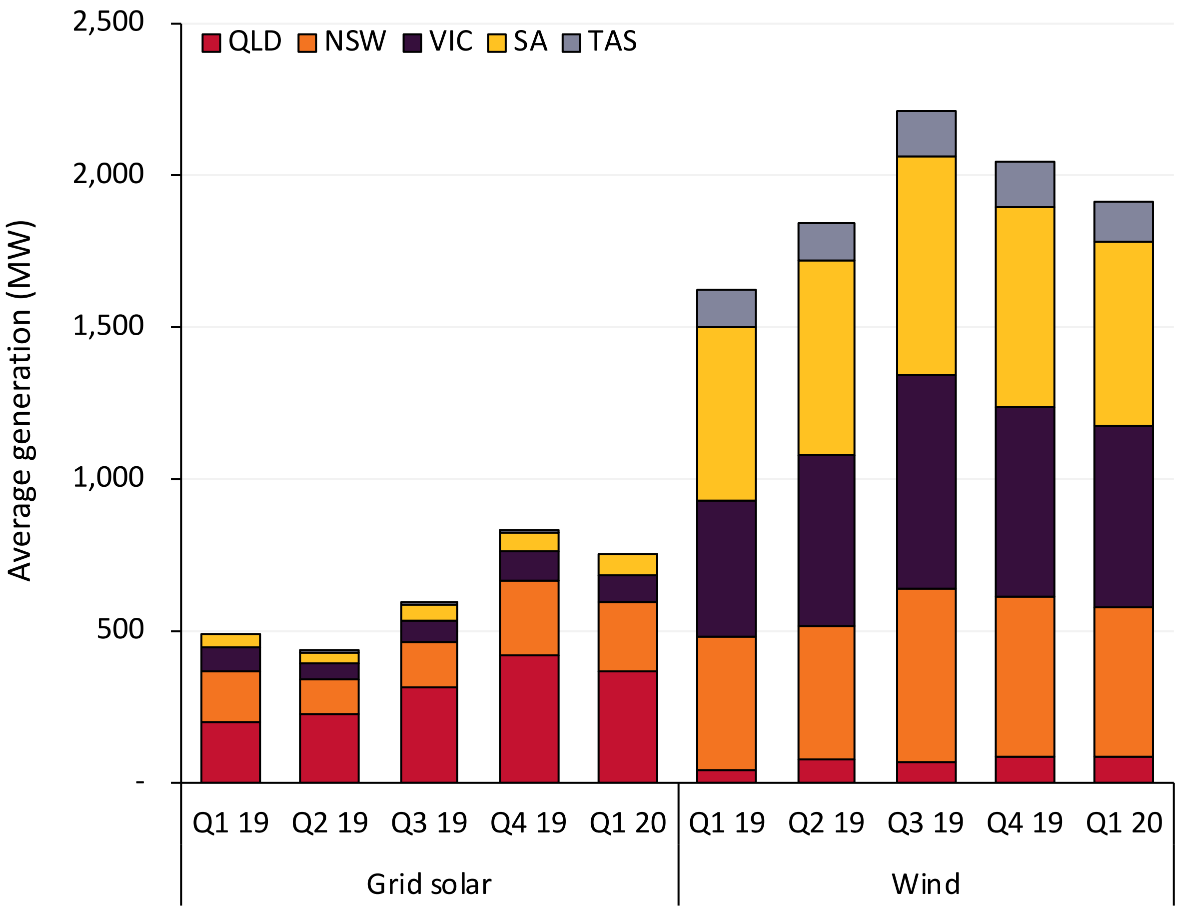


Shoalhaven generated at high levels during an extended price spike (31 Jan 2020)



VRE curtailment at high levels in Q1

Higher levels of grid-scale VRE driven by ramping up of recently installed capacity



South Australian separation leads to record NEM VRE curtailment