

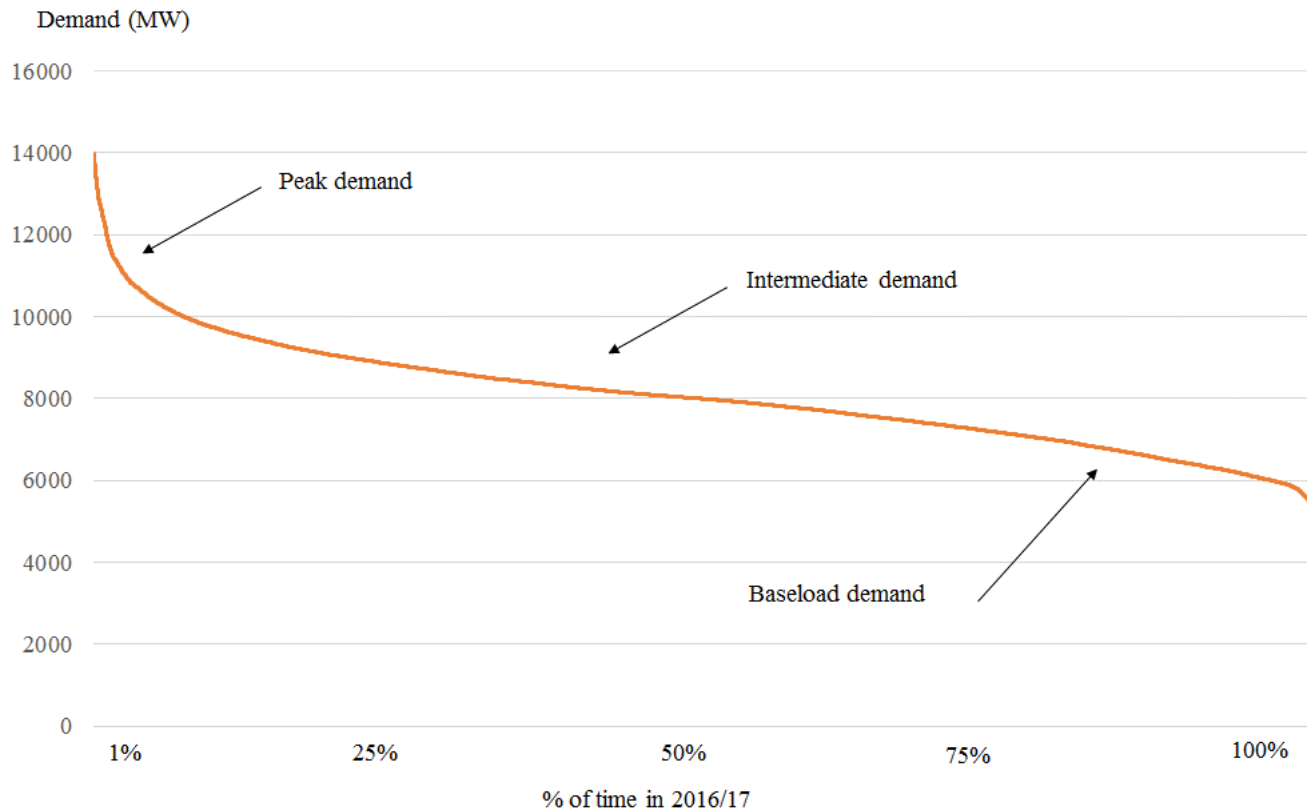
Electricity production and consumption in NSW

Tim Nelson, Chief Economist, AGL Energy



What does demand look like in NSW?

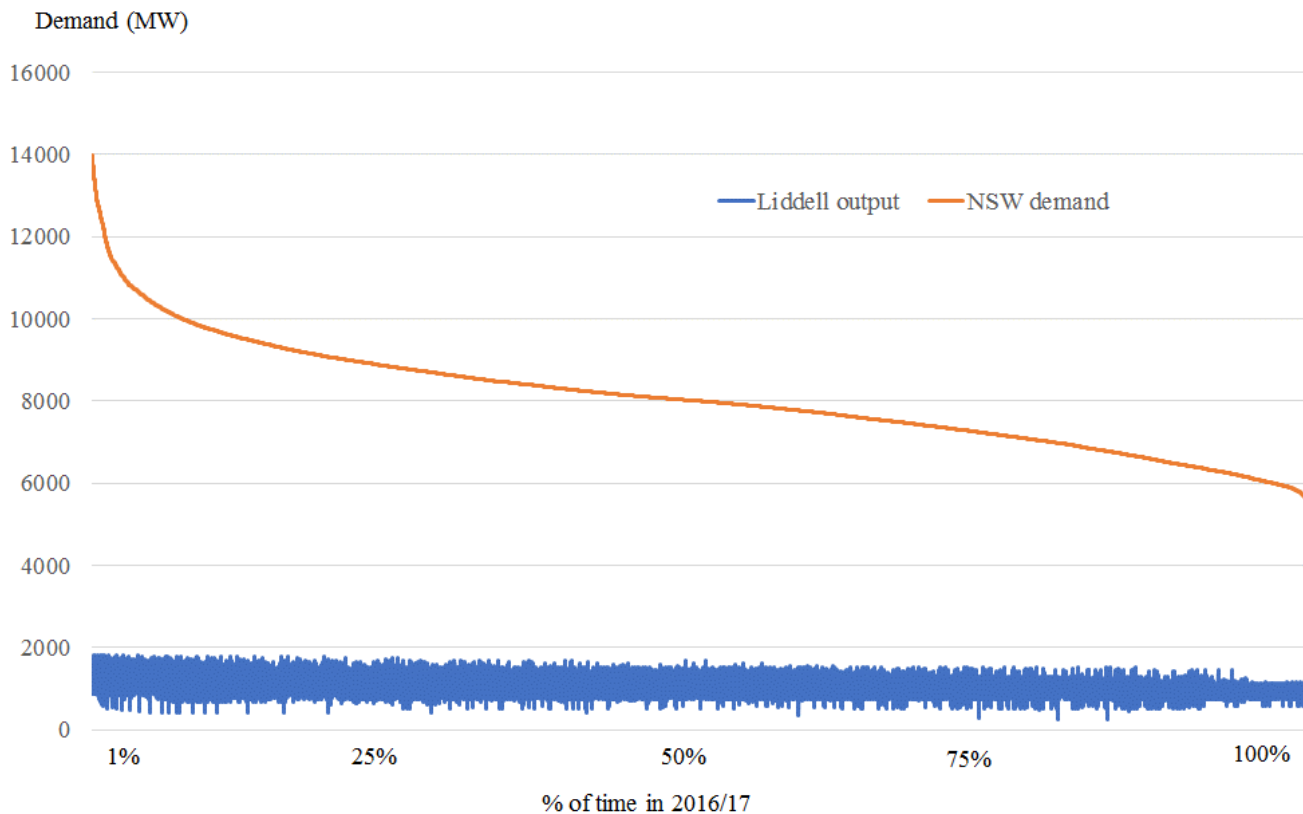
Three broad types of demand: baseload, intermediate and peaking



Source: AEMO

What does demand look like in NSW?

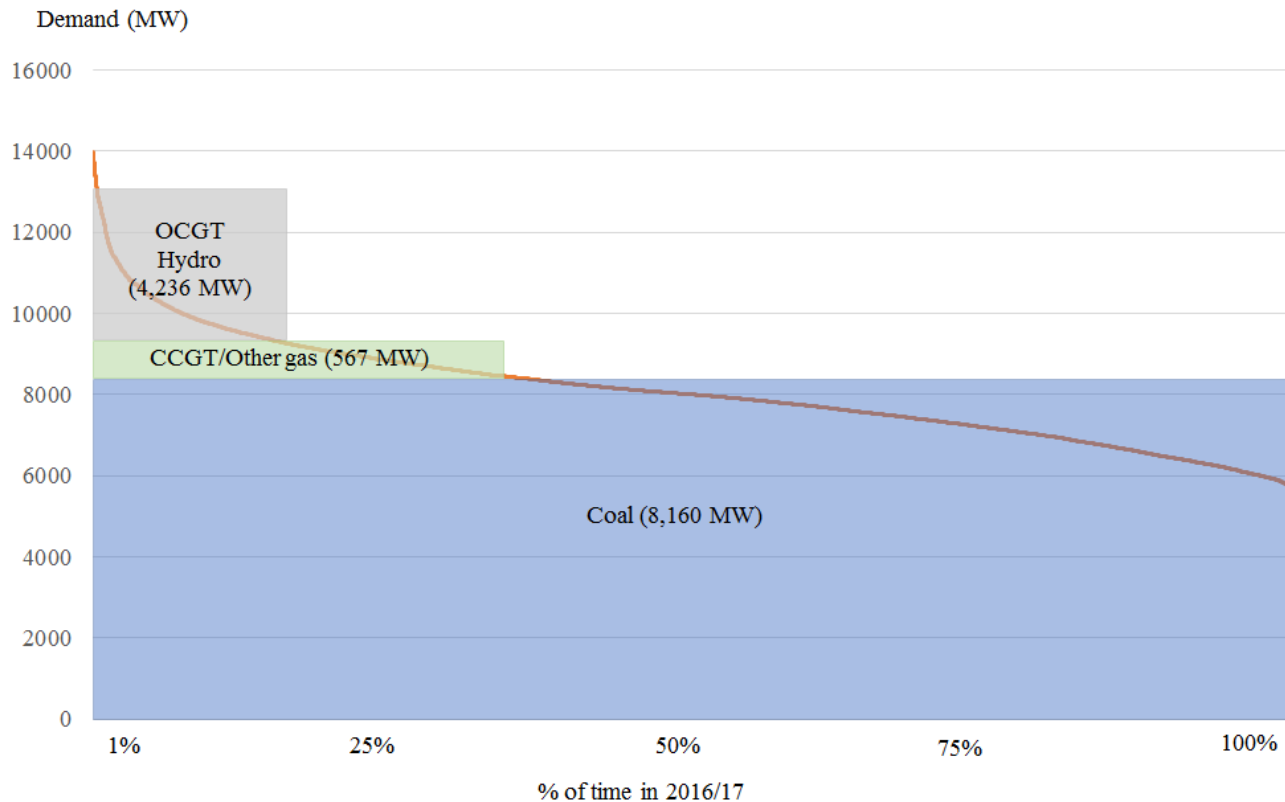
How does Liddell contribute to meeting demand



Source: AEMO

Existing 'firm' supply to meet demand

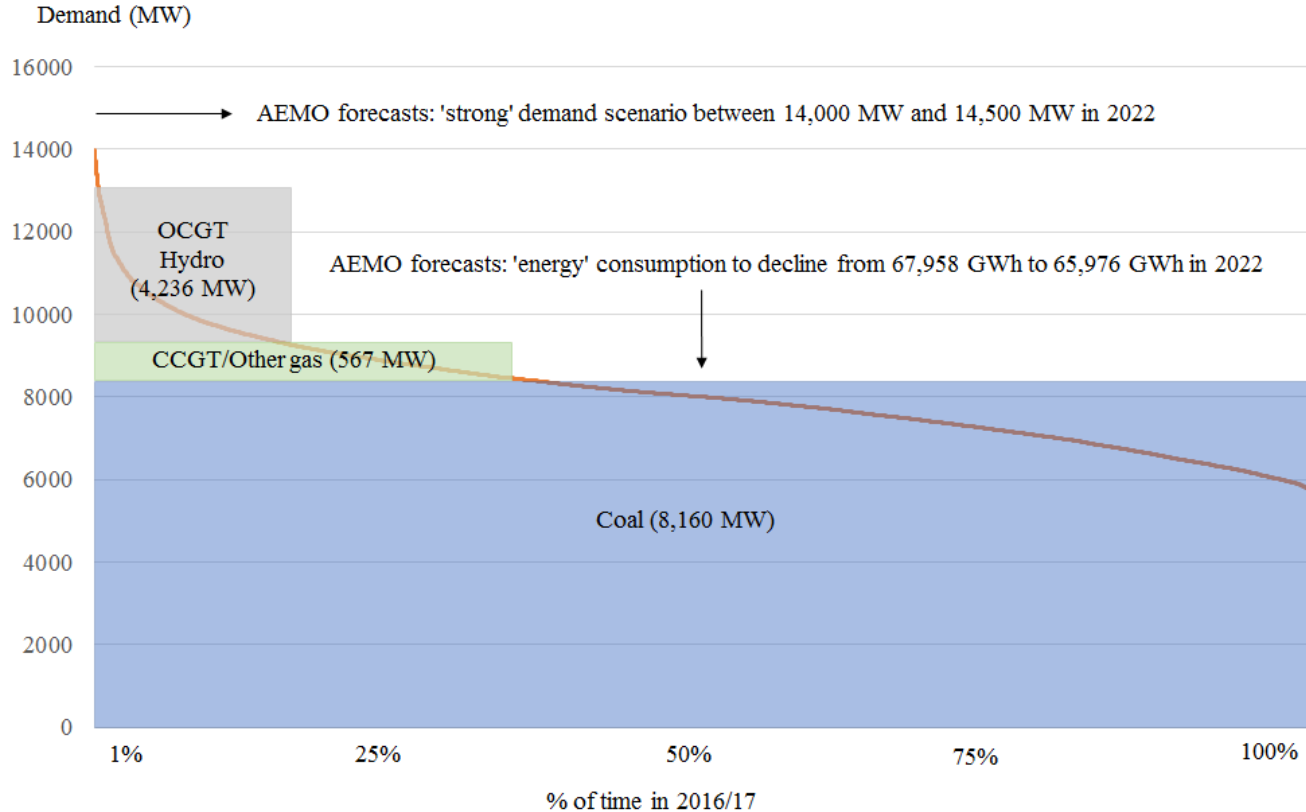
Without Liddell, existing 'baseload' and 'intermediate' plant is adequate but more peaking plant is required



Source: AEMO

Existing 'firm' supply to meet demand

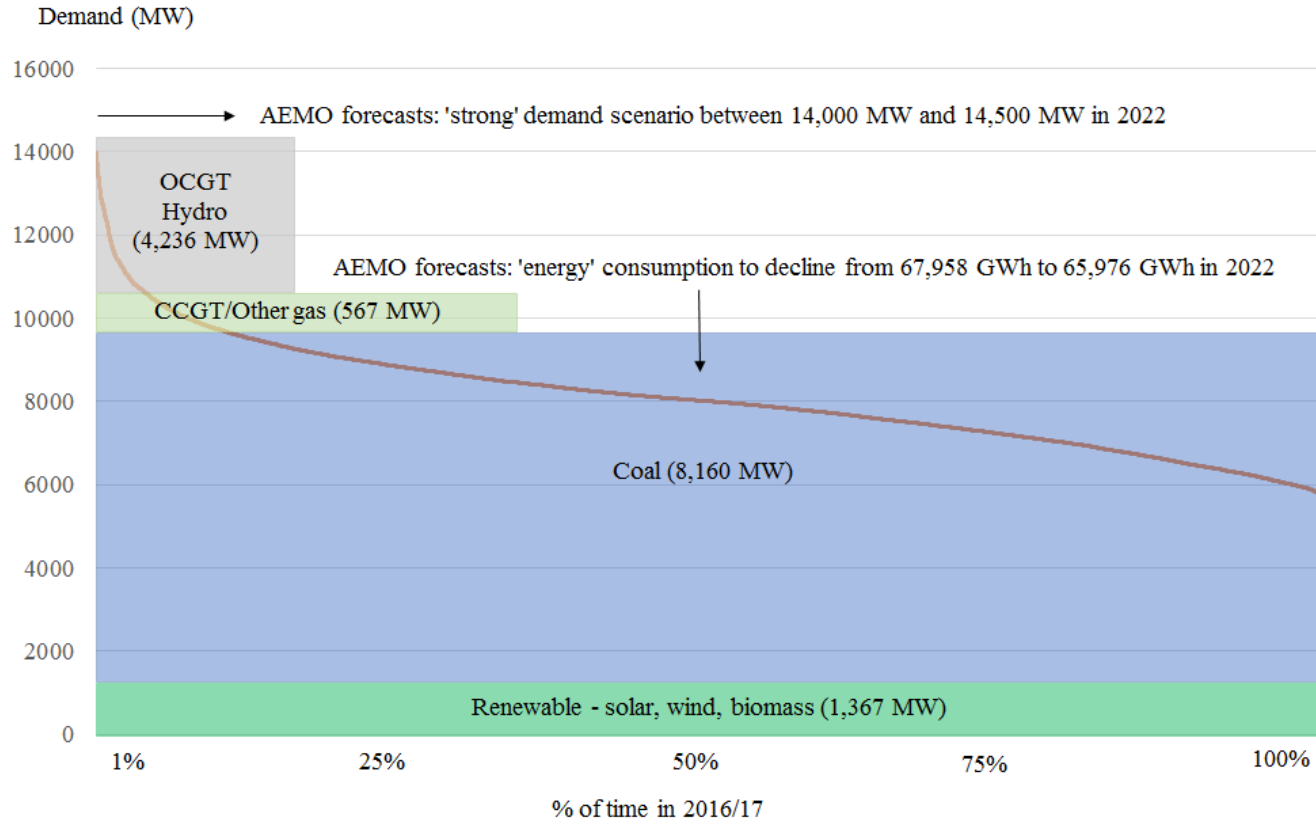
With peak demand growth and underlying consumption declining, still mainly a requirement for 'peaking' capacity



Source: AEMO

And then there is renewable energy

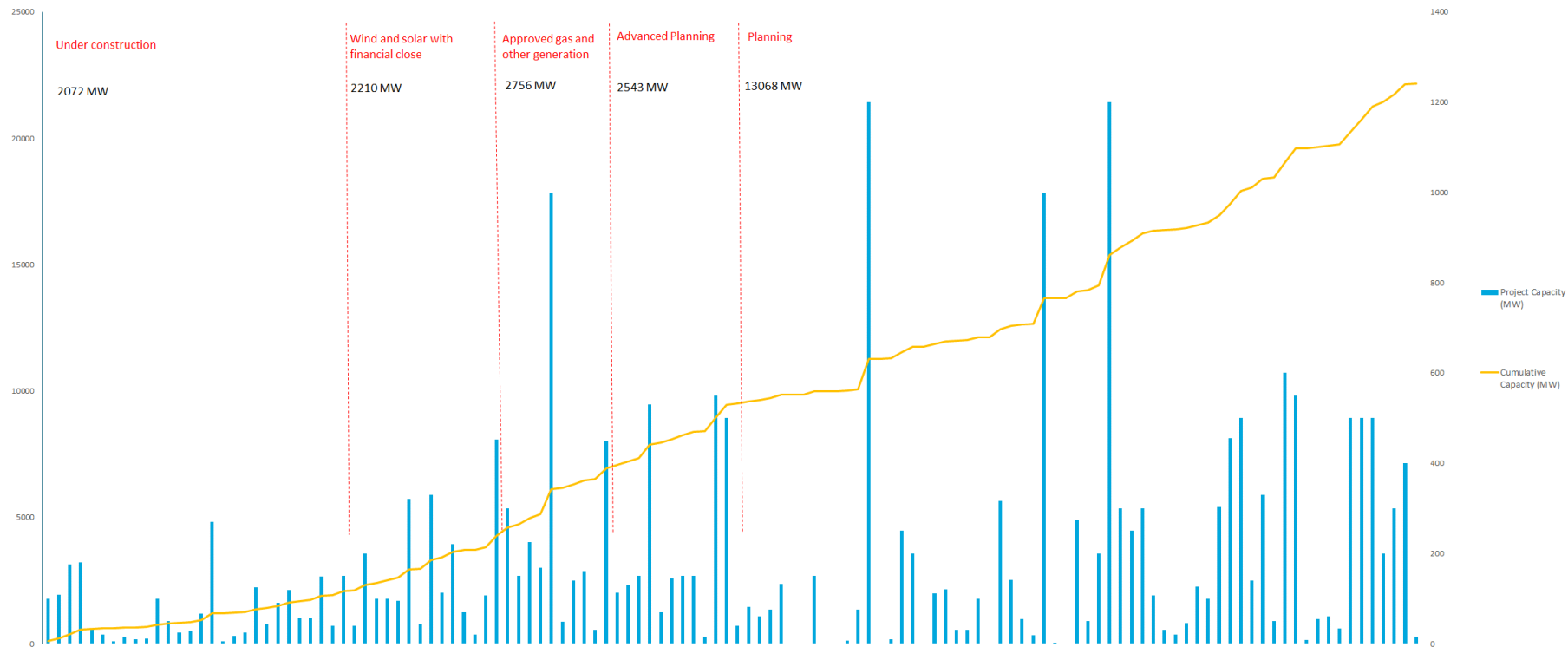
Renewable energy is not 'firm' but still provides energy (in a market with declining *energy* consumption)



Source: AEMO

How much new supply is being built?

Significant amount of new supply is being built with material number of projects also 'shovel ready'



Source: Compiled from industry announcements

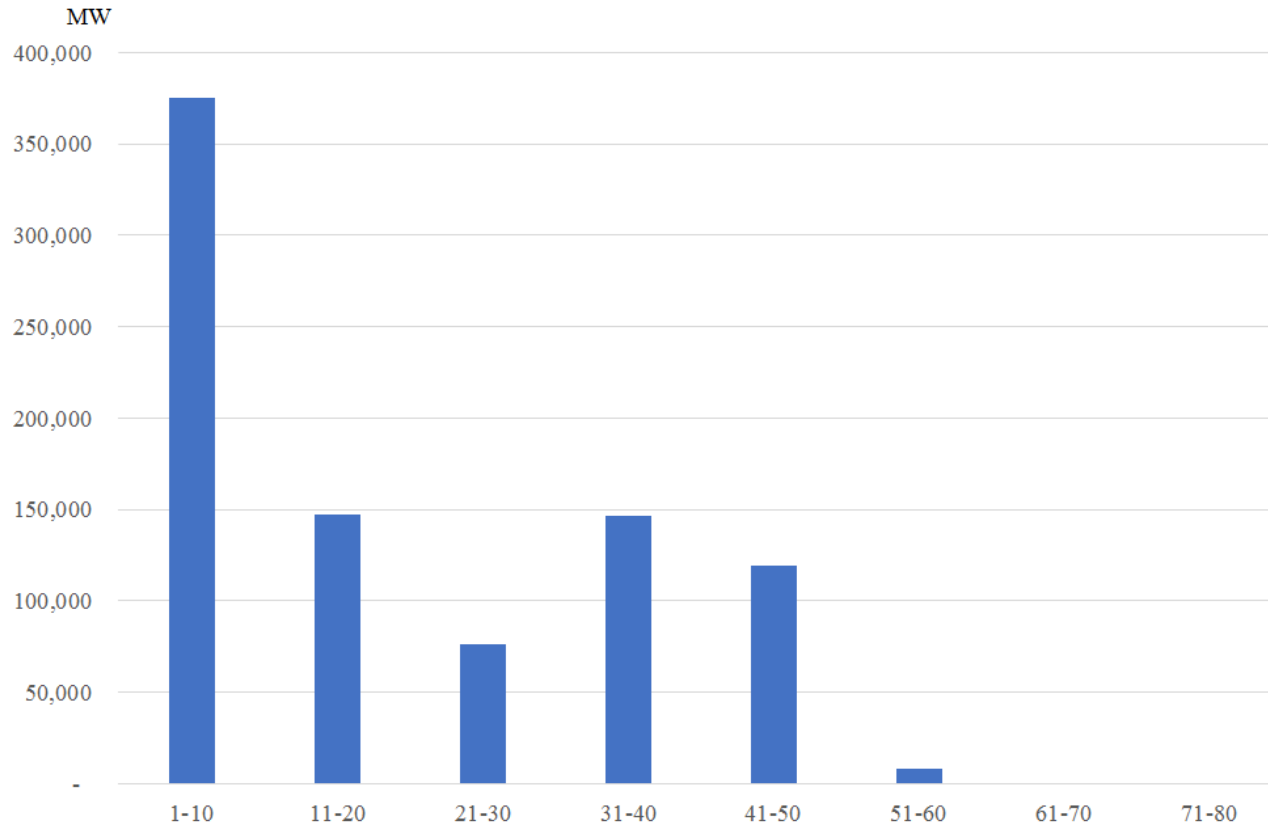
Some other things

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Not many power stations operate beyond 50th year

Internationally, only 1% of power stations in operation are older than 50 years



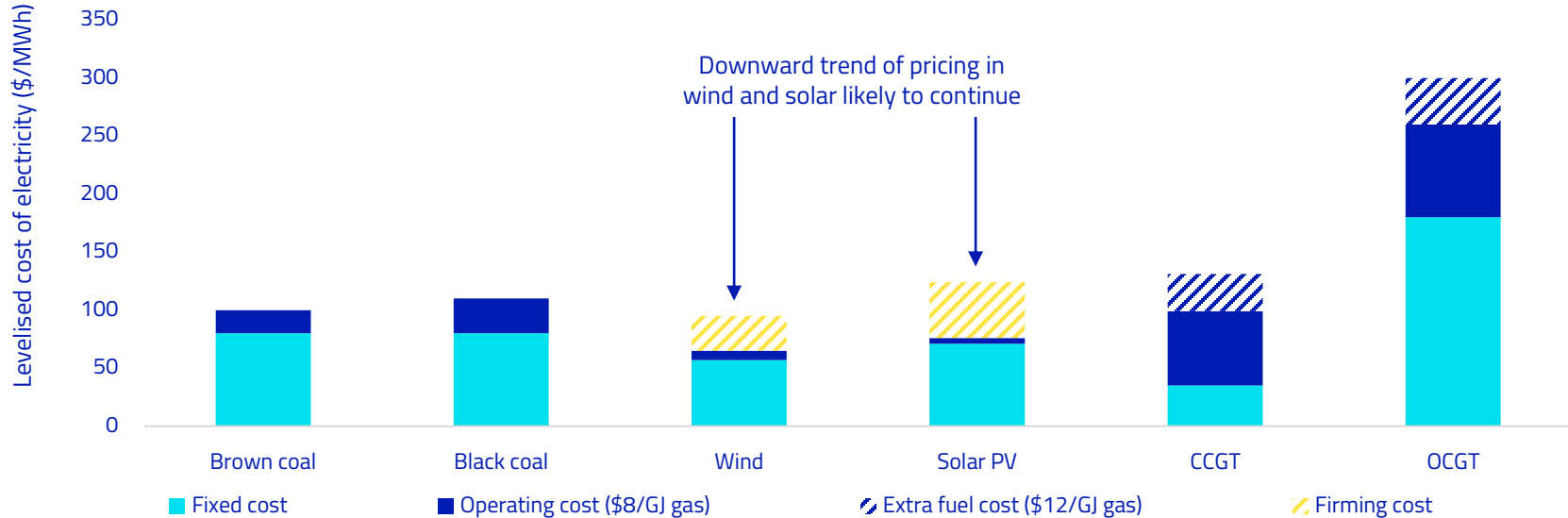
Source: EPRI (2017) –
excludes China and Russia

Cost of building and operating power stations

Renewables are increasingly cost-competitive with traditional 'thermal' sources such as coal and gas



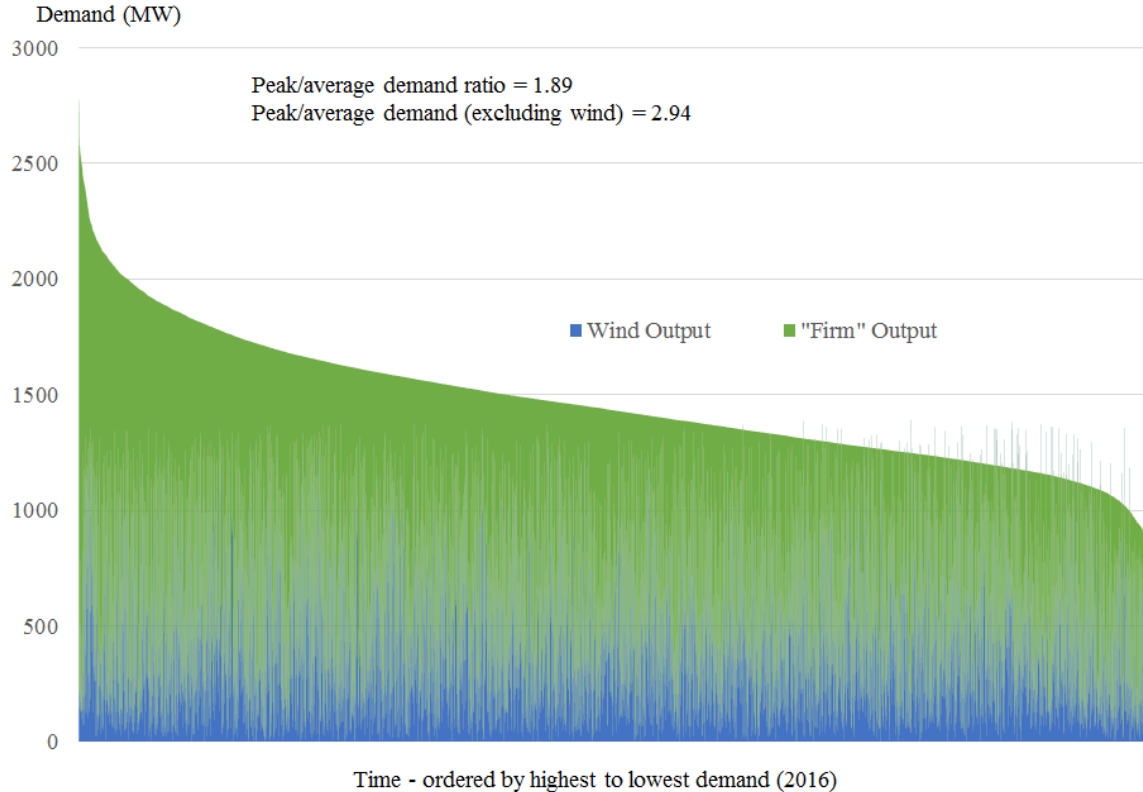
Implied cost of new generation



Source: AGL estimates; assumes capacity factors of 40% for wind, 25% for solar, 75% for CCGT and 10% for OCGT; heat rates of 8 for CCGT and 10 for OCGT.

Renewables have the lowest cost of 'energy'

But being 'variable' in nature requires investment in 'lower capacity factor' capital stock (e.g. hydro, OCGT)



Source: Nelson et al (2017)

Dispatchable and flexible

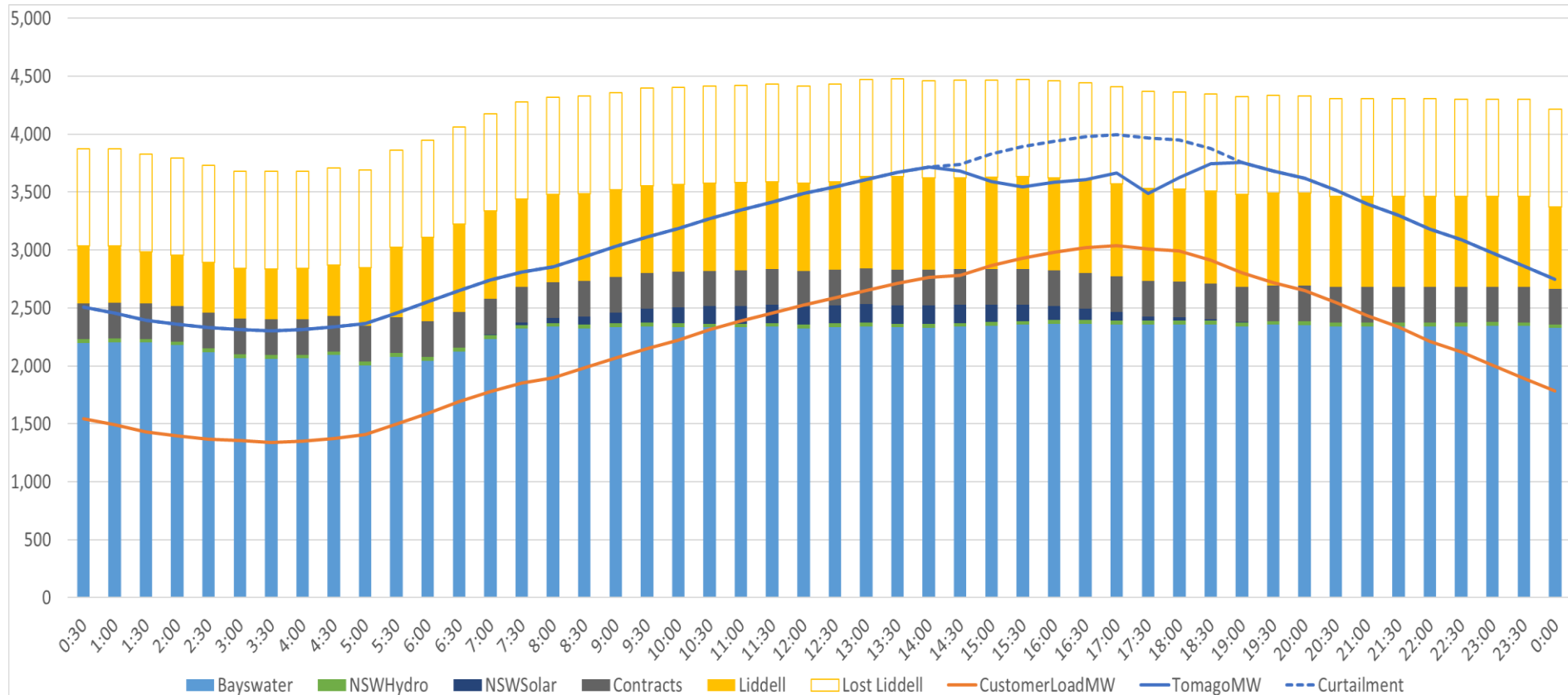
Not all dispatchable plant is also flexible



1. Renewable energy provides the lowest *long-run marginal cost* of 'energy'
2. But as renewables begin production, they require complementary firm 'capacity'
3. In the short-term, existing coal-fired units can provide some 'flex'
4. But while dispatchable, coal is not as 'flexible' as gas or hydro
5. In the medium-term, an 'optimal plant mix' is likely to transition to gas-fired peaking units and demand response
6. Gas-fired peaking units provide 'capacity' but not significant volumes of 'energy'
7. In the long-term, renewable energy is likely to be complemented by pumped hydro and battery storage to allow energy to be consumed at times when it is needed

Liddell and summer 2016/17

Liddell was unavailable during the peak demand event – capacity is ‘dispatchable’ but not ‘flexible’



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