Is coal still king in South East Asia?

Dr. Bikal Pokharel, Principal Analyst, Asia Power & Renewables, Wood Mackenzie

14 December 2017

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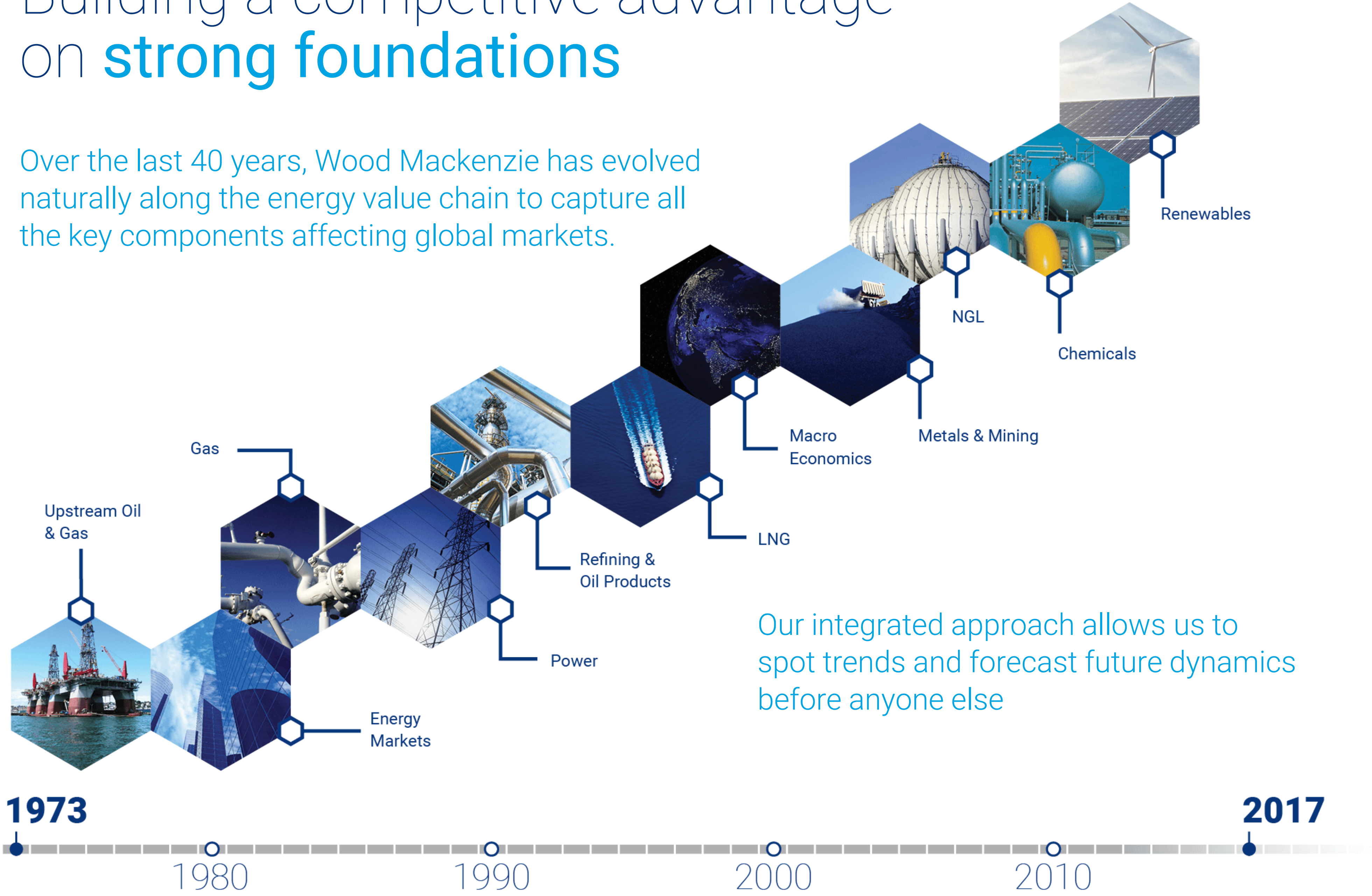

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At a glance

Coal is the most economical source of fuel. Renewables competition with gas depends on gas prices

Solar and battery start to compete with gas-fired plants at lower gas prices. Coal continue to be the most economical option

Solar starts to compete with coal at base load and battery can take over peak load

2017

2025

2035

Coal's dominance in South East Asia will continue for 10 years or more

Agenda

Capacity and generation mix

Can South East Asia get away from coal – how fast?

Current tariff comparisons and policy

Does the current tariff provide incentive for renewables as yet?

LCOE of various technologies

How does the cost compare as the cost of renewables decline rapidly?

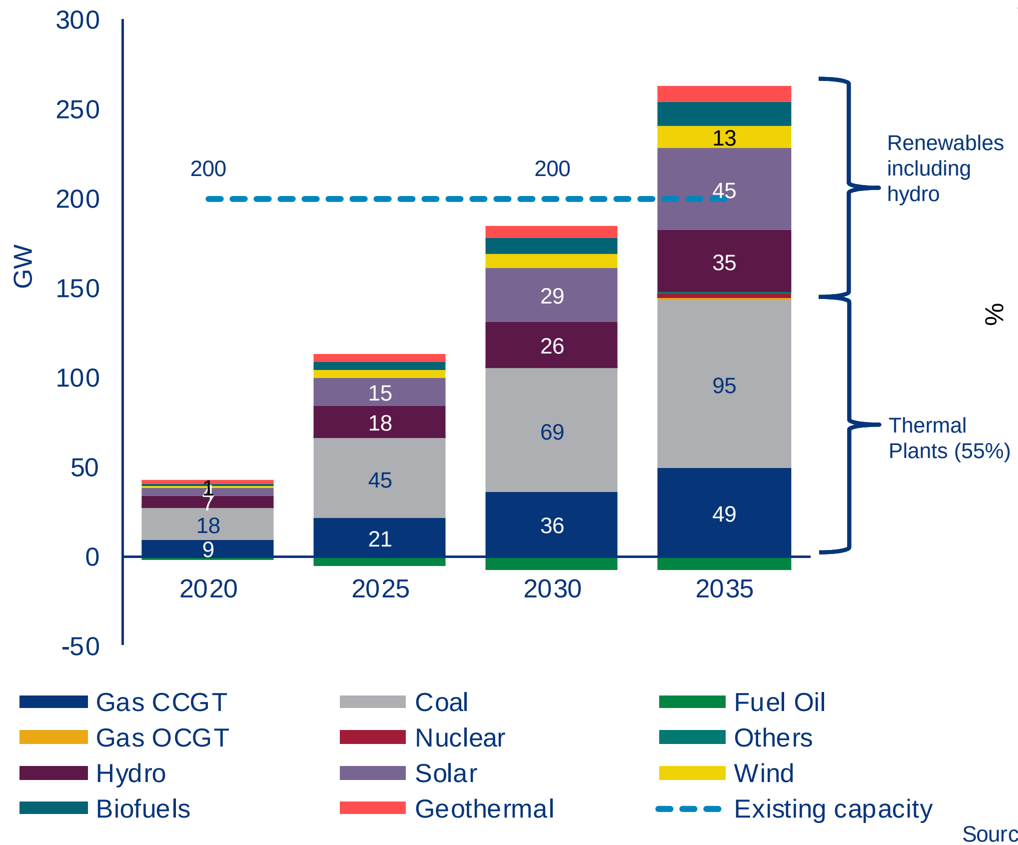
South East Asia power demand is expected grow at 5% in the next decade

Source: Wood Mackenzie

Total capacity in South East Asia will double in the next 15 years with equal share from coal and renewables in 2030

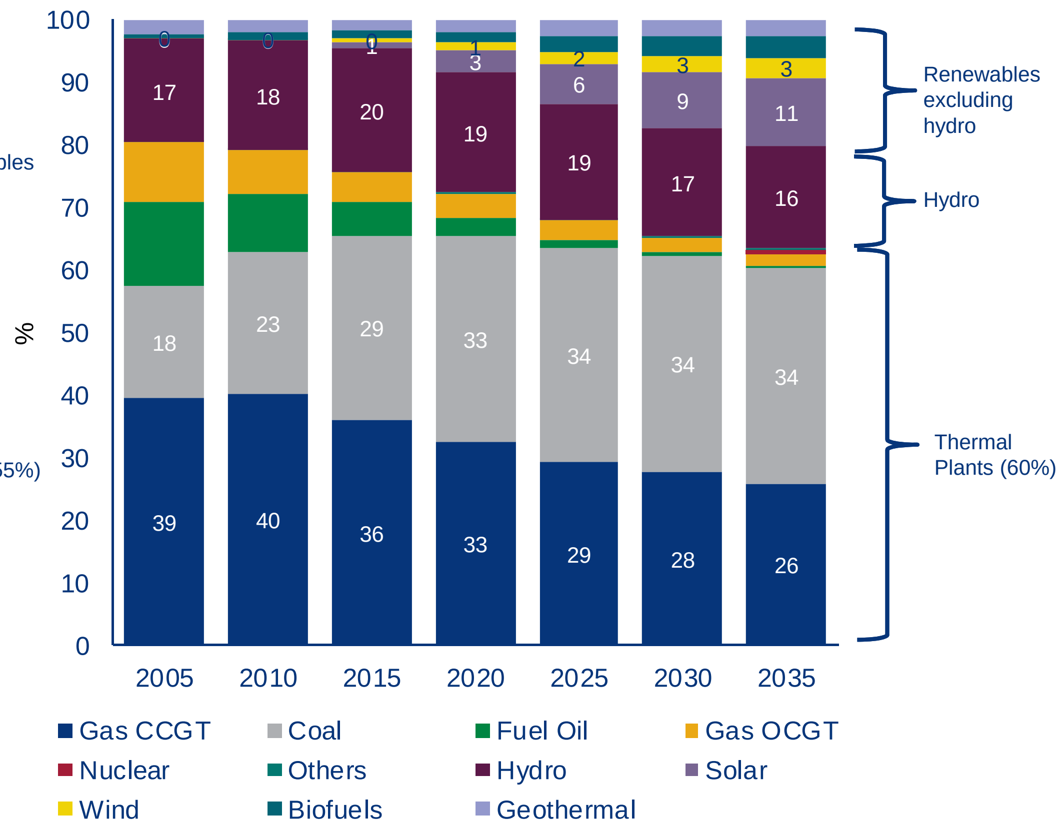
- Share of thermal plants marginally decrease but with declining domestic piped gas supply led by decline in Thailand and Indonesia, attractiveness of gas-fired plants have declined
- Coal is displacing gas at base load and the trend is expected to continue

Incremental capacity growth by technology



Source: Wood Mackenzie

Capacity mix by technology

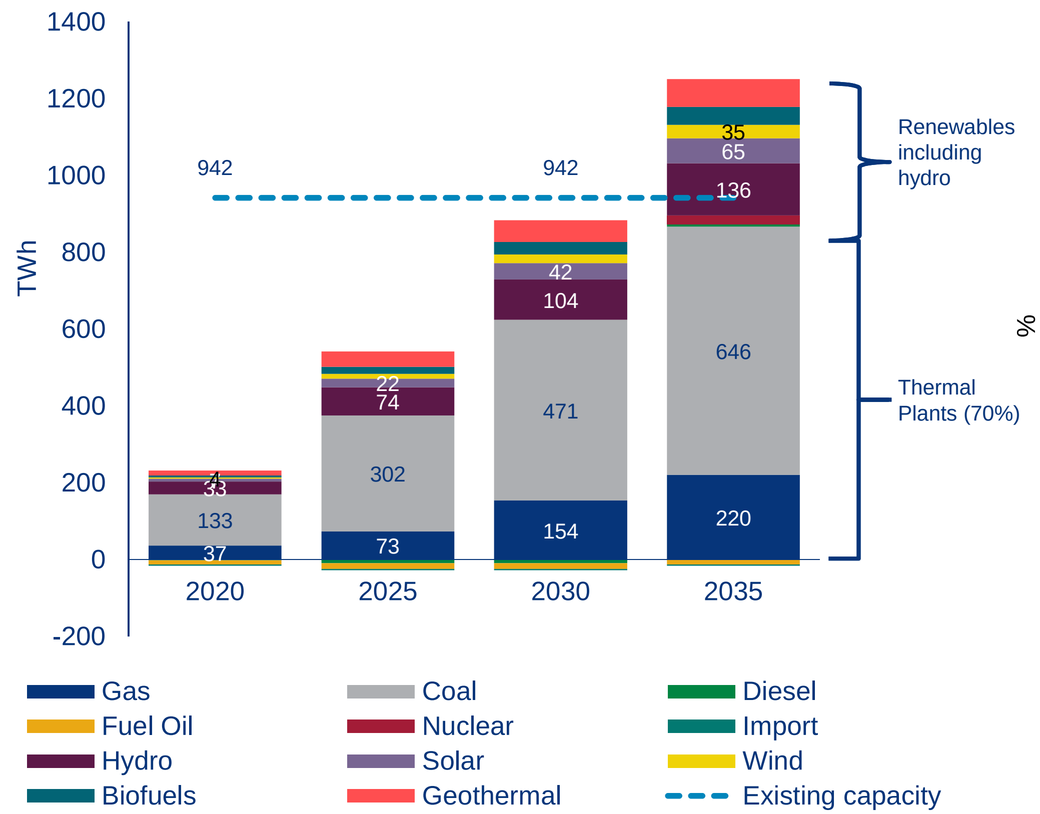


Source: Wood Mackenzie

…however share of generation from coal will be higher by two-folds than that of renewables in 2030

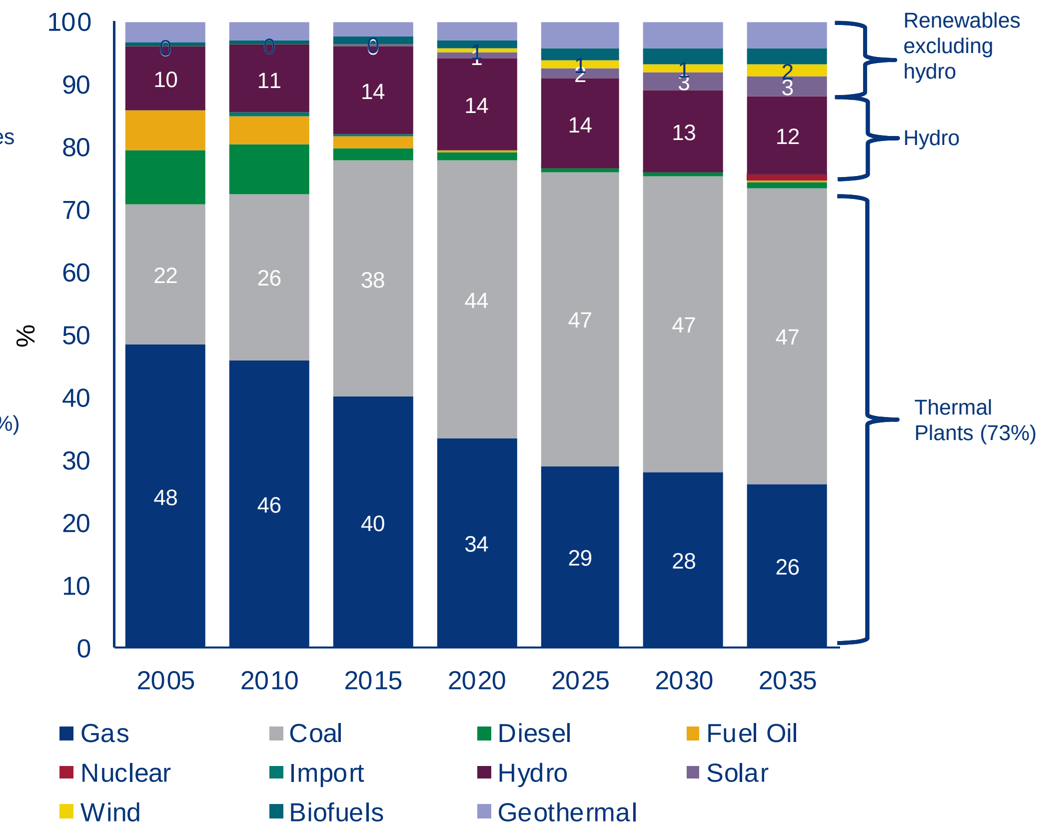
- Share or renewables with hydro increases from 19% to 24% whereas share of non-hydro renewables increase from 5% to 11% by 2030

Incremental generation growth by fuel



Source: Wood Mackenzie

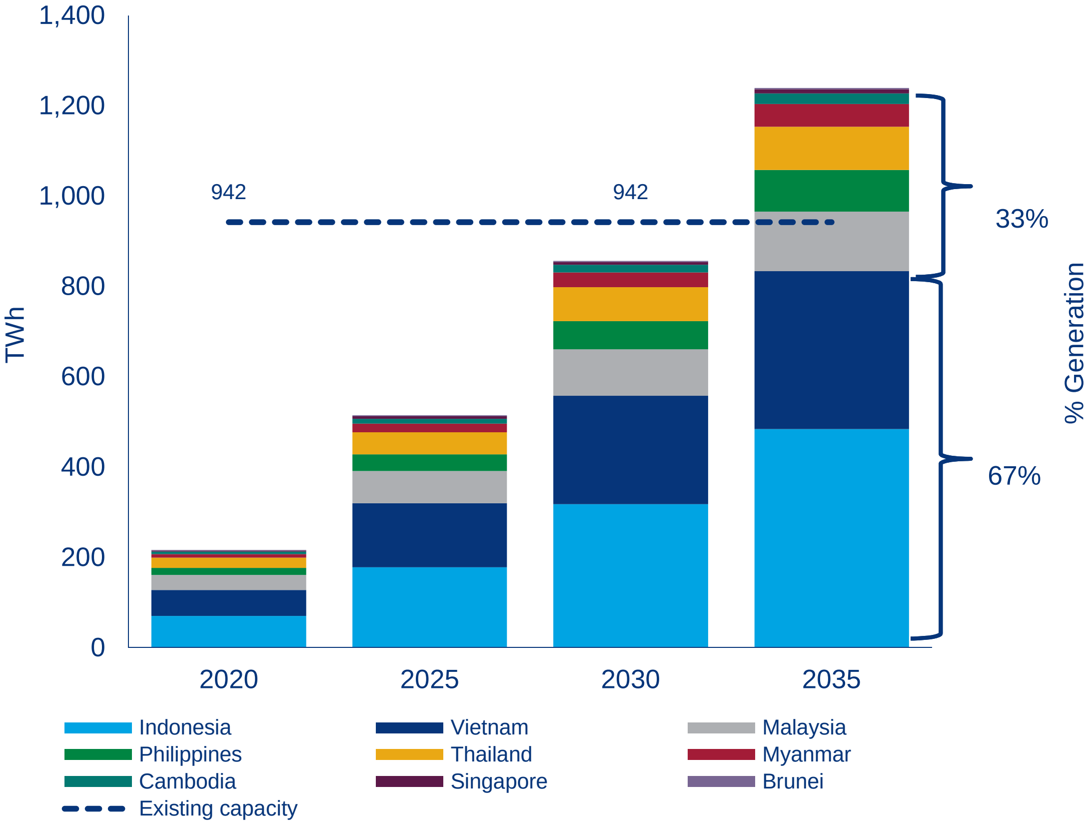
Generation mix by fuel



Source: Wood Mackenzie

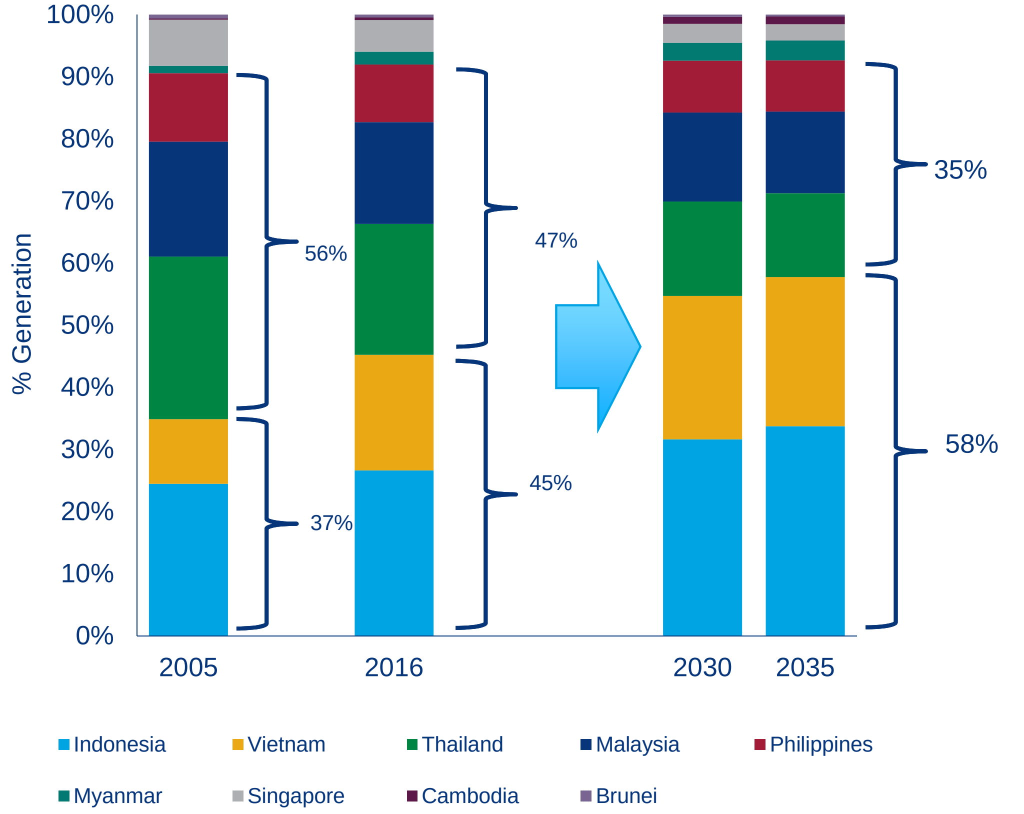
Indonesia and Vietnam contributes to 67% of the incremental generation growth in the next 20 years

Incremental generation growth by country



Source: Wood Mackenzie

Generation mix by country

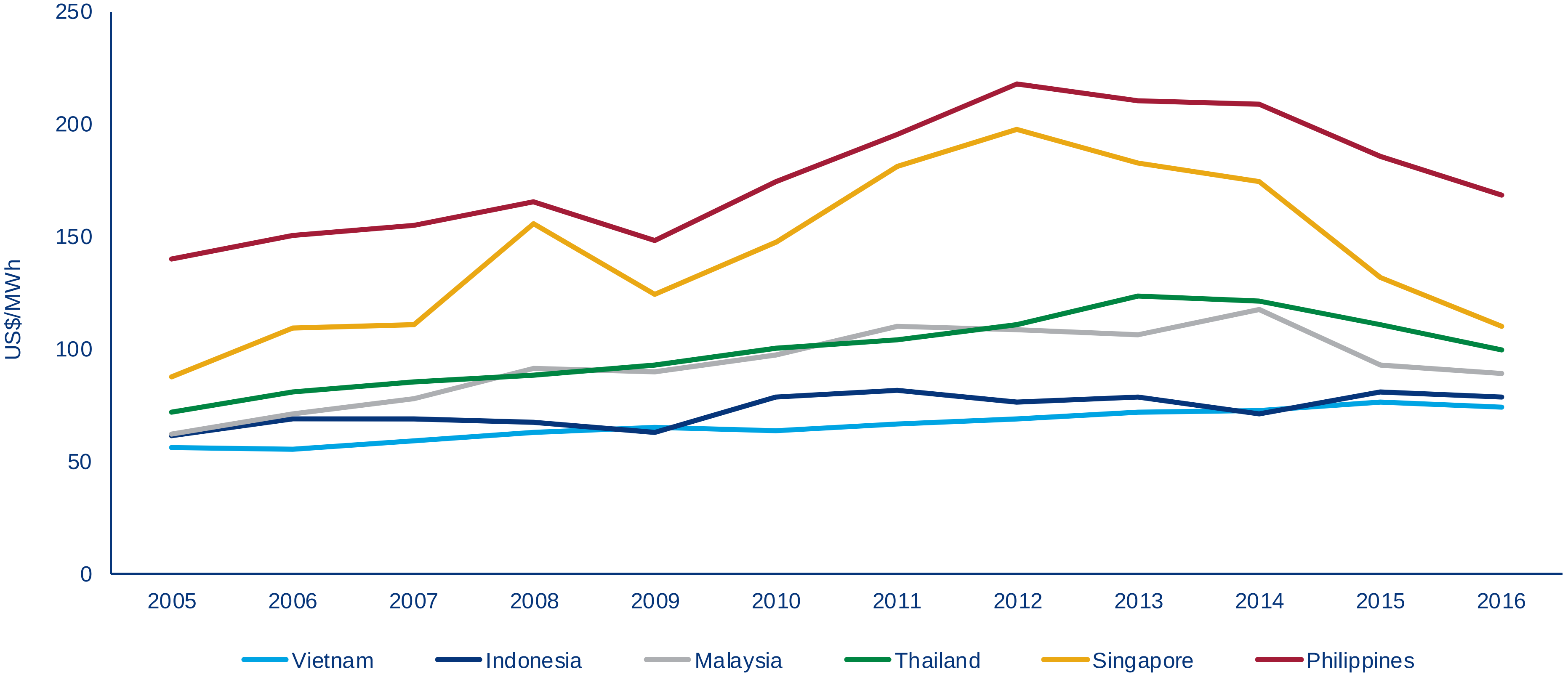


Source: Wood Mackenzie

Power tariffs vary significantly across the various markets and hence the attractiveness of renewables vary as well

Power tariffs in the Philippines have been consistently higher than Vietnam and Indonesia by more than two-folds

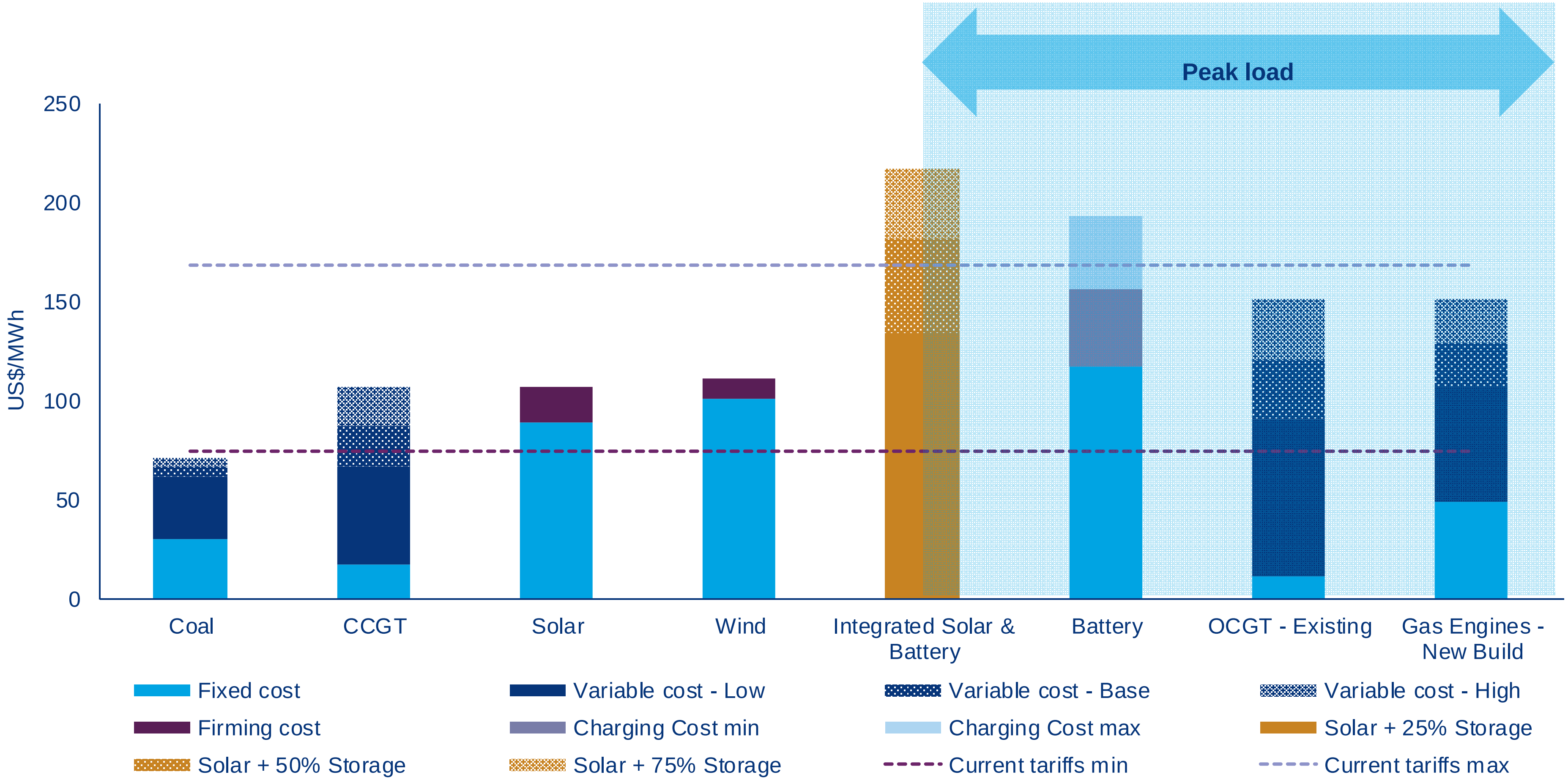
Average power tariffs in major South East Asian countries



Source: Wood Mackenzie

Renewables and battery in South East Asia are still a costlier option compared to the conventional plants for both baseload and peaking operations

2017 LCOE by technology

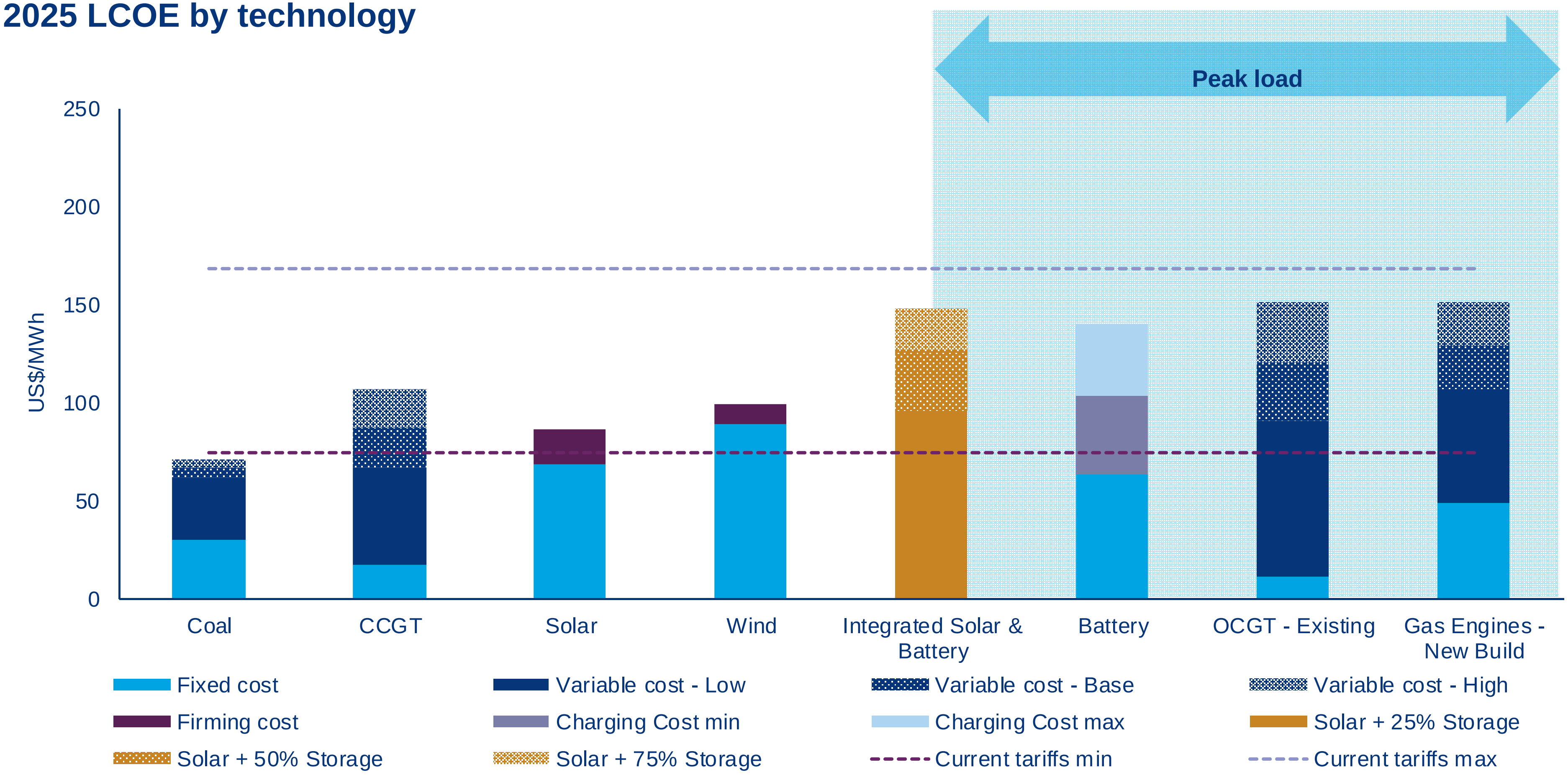


Source: Wood Mackenzie, GTM, MAKE

By 2025, Renewables starts to compete with gas at baseload but coal continue to be the most economical option for baseload

Batteries but with charging from coal plants can replace peaking gas plants;

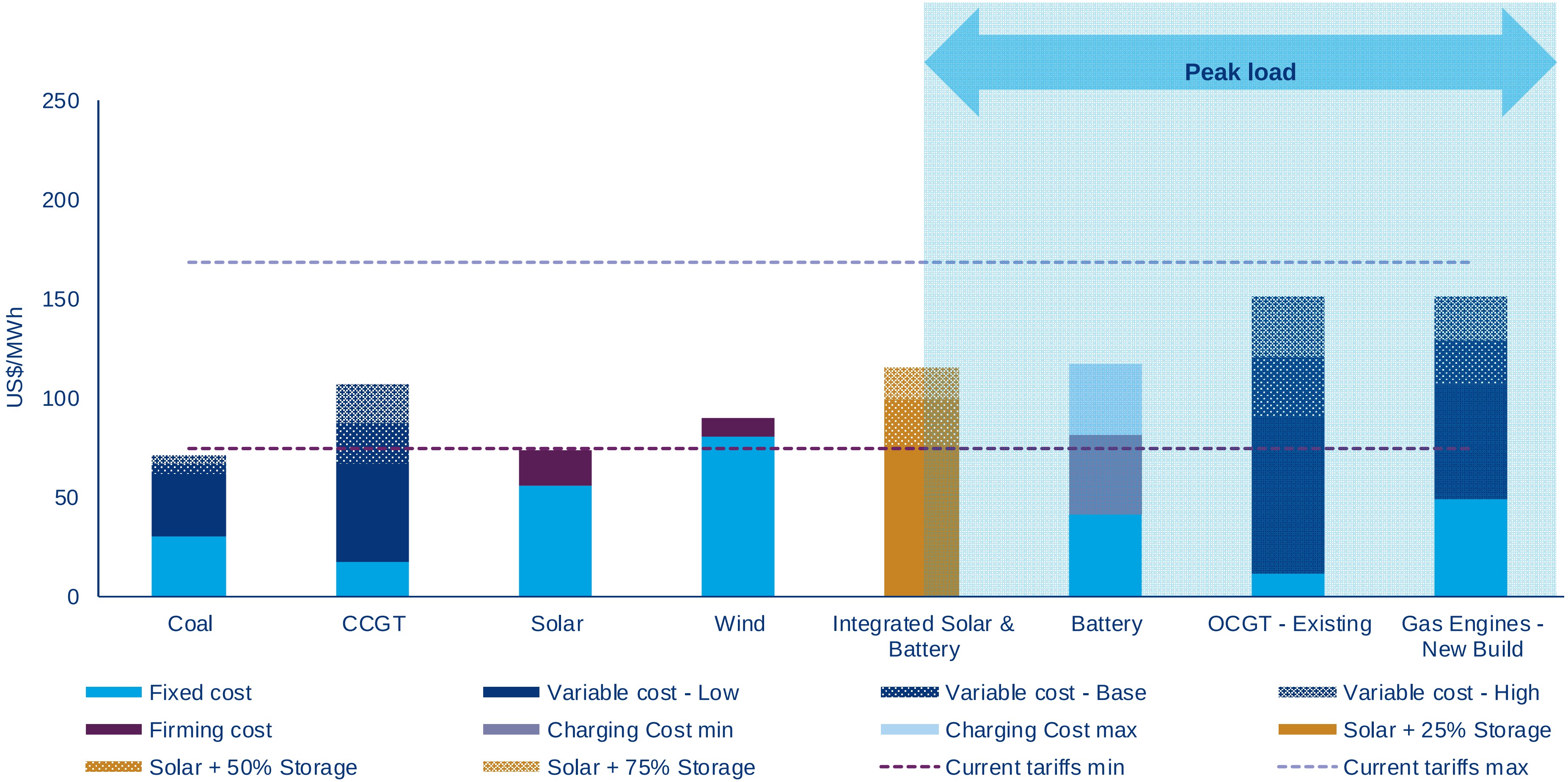
2025 LCOE by technology



Source: Wood Mackenzie, GTM, MAKE

Solar starts to compete with coal at baseload; Battery can replace gas at peak load

2035 LCOE by technology



Source: Wood Mackenzie, GTM, MAKE

Conclusions

- Coal will continue to dominate the developing economies in South East Asia for the next decade or so (provided coal financing do not cease)

- Based on the LCOE forecasts, coal will continue to be the cheapest source of generation for the next 15 years or more and hence the investment decisions made in regulated and developing markets to meet the increasing demand will lean towards coal (in absence of carbon price).

- Incentives will continue to drive solar growth in the SE Asian markets as the extent of renewables growth need to factor in affordability.

- However, by 2025, solar starts to compete with combined cycle gas plants at baseload and battery starts to compete with open cycle gas plants for peak load. Hence the pace of renewables growth will likely accelerate.

- By 2035, solar starts to become the cheapest source of generation for baseload operation.

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Outlook for Singapore's Electricity Market

Towards a Fully Liberalised Market in 2018

Dr. Bikal Pokharel, Principal Analyst, Asia Power & Renewables, Wood Mackenzie

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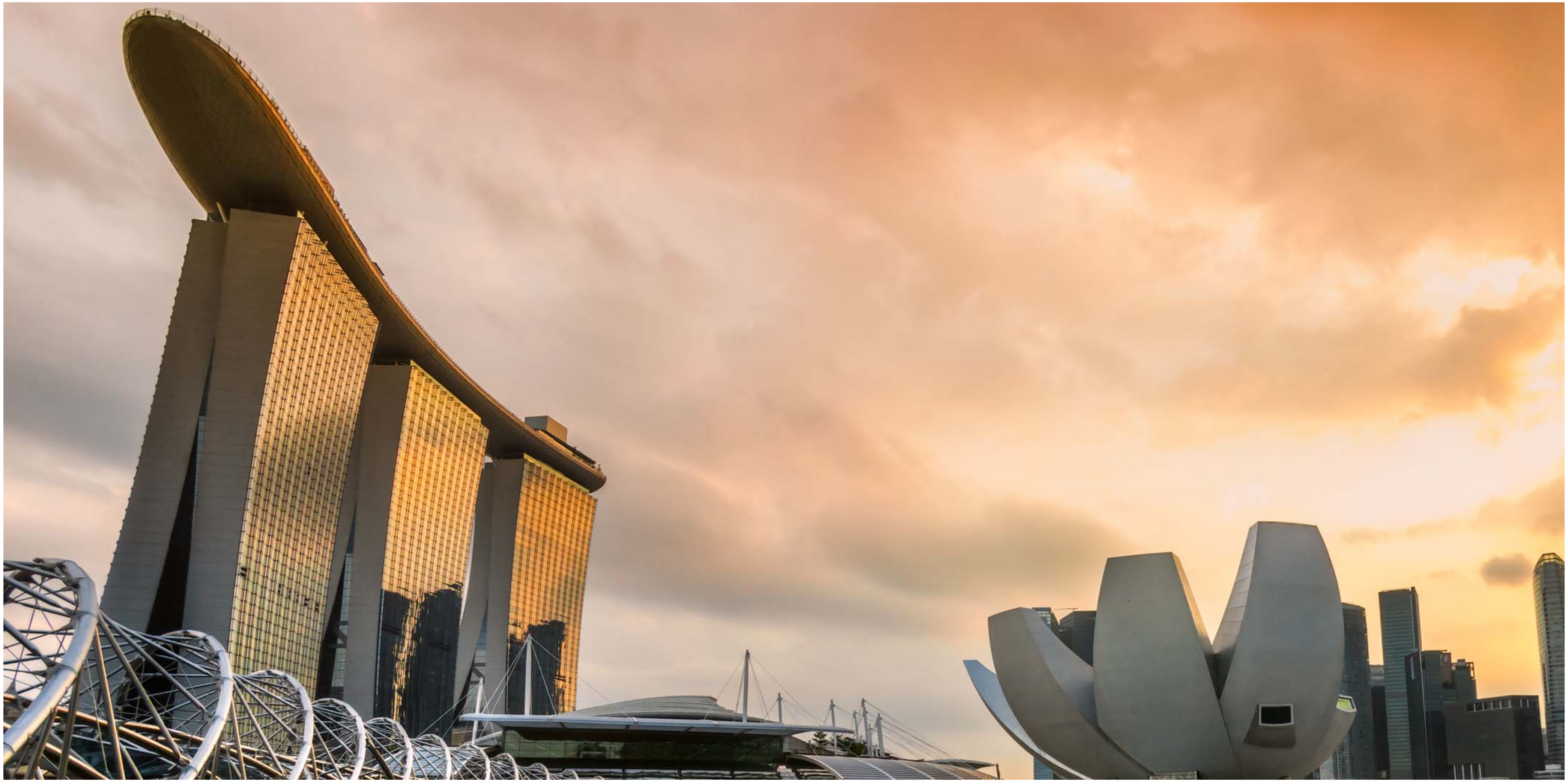
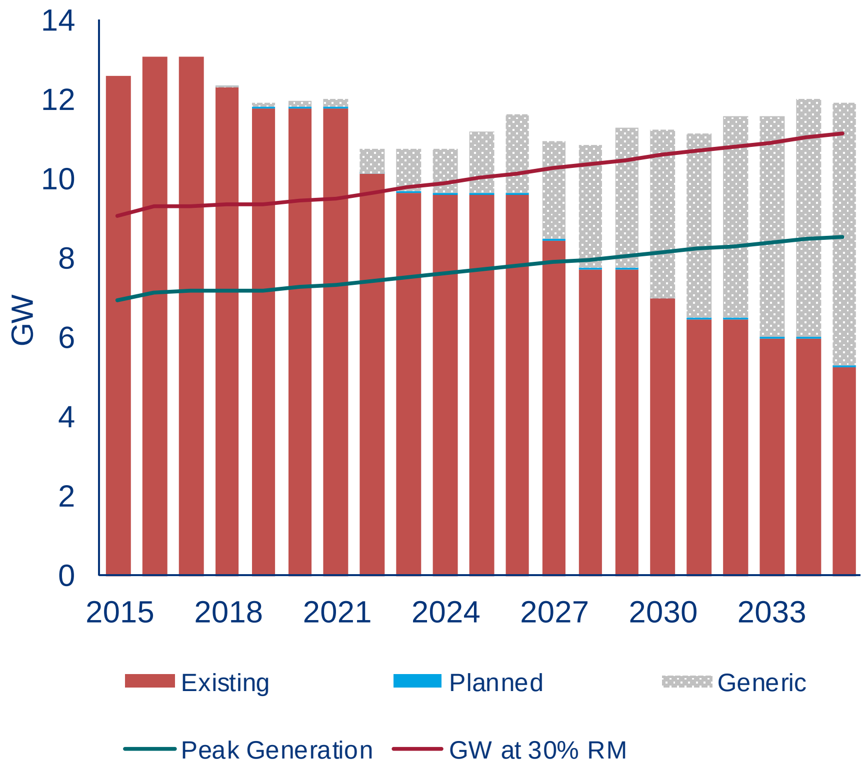


Full retail contestability needs a continuous assessment of the possible outcomes

Current reserve margin stands close to 85%

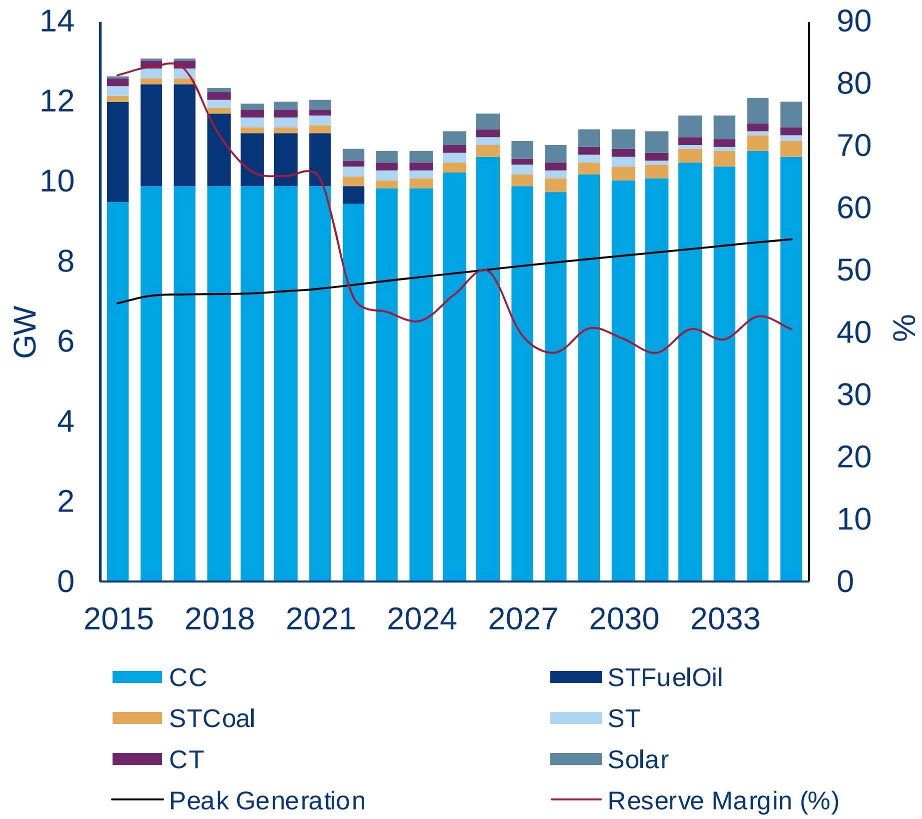
COP21: Singapore has committed to emission reduction by 36% from 2005 levels by 2030. Replacement of fuel oil generation by gas from 2005 to 2014, further replacement of fuel oil by gas plants in future and solar contribution to grid should be enough to meet this target

Existing and planned capacity with peak load



Source: Wood Mackenzie

Available capacity by plant type with peak demand

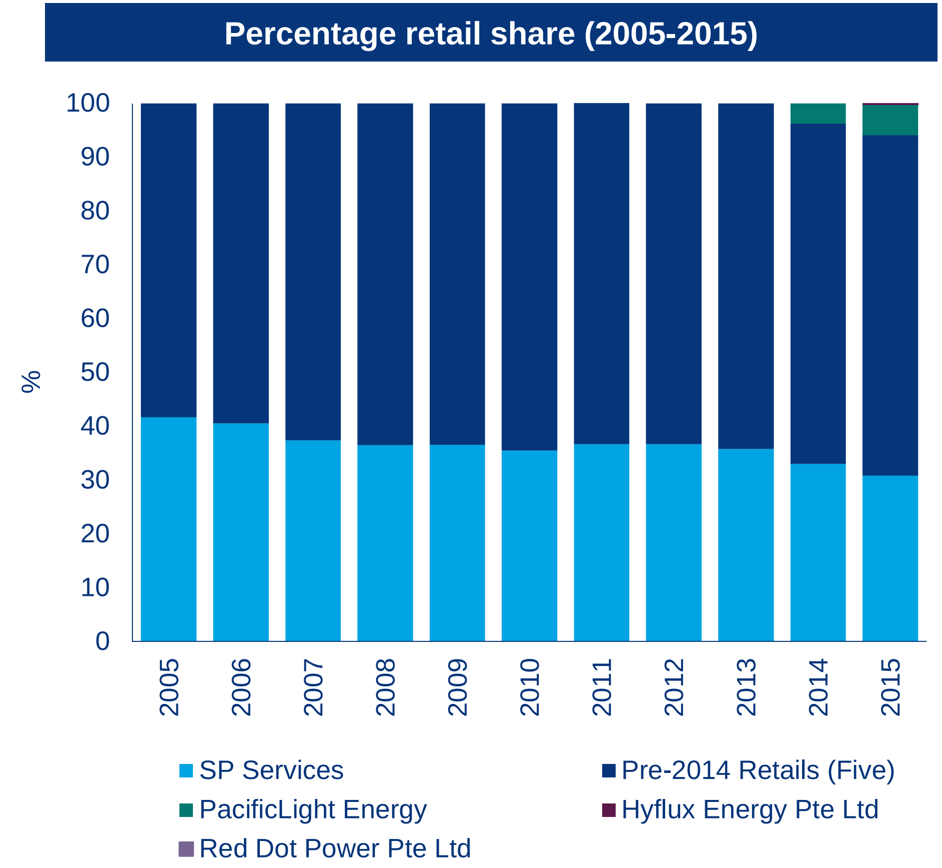


Source: Wood Mackenzie

Significant interest in retail following the introduction of Electricity Futures in 2015

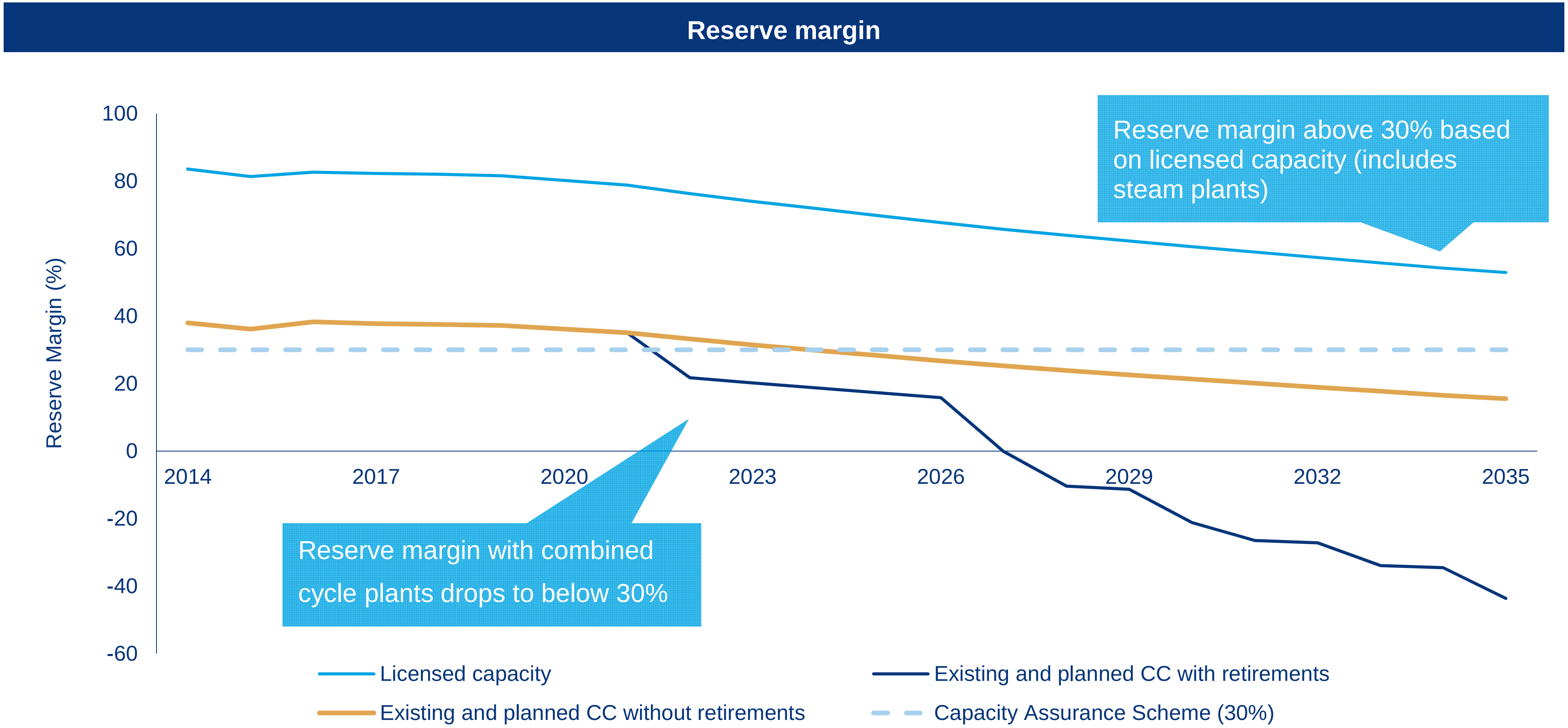
Electricity retailers have more than doubled in the last couple of years

	Number of retailers
Pre 2014	5
2015	9
Today	25



Source: EMA, Wood Mackenzie

Current licensed capacity is enough to keep the reserve margin above 30% for the next 20 years

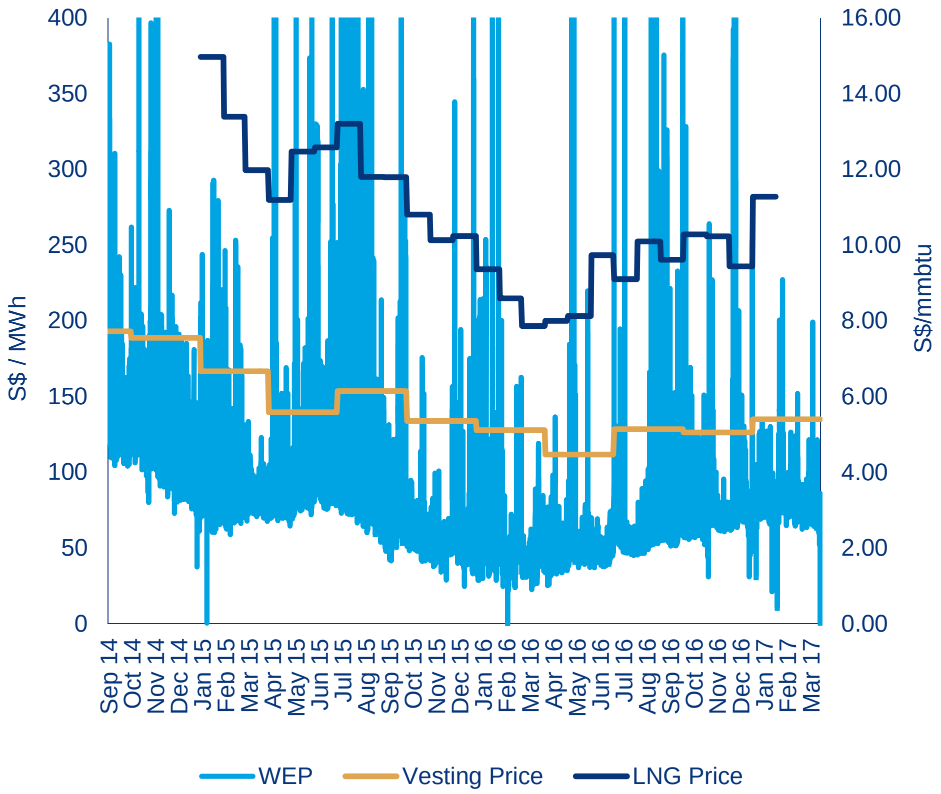


Source: Wood Mackenzie

Low electricity prices are not sustainable for Gencos

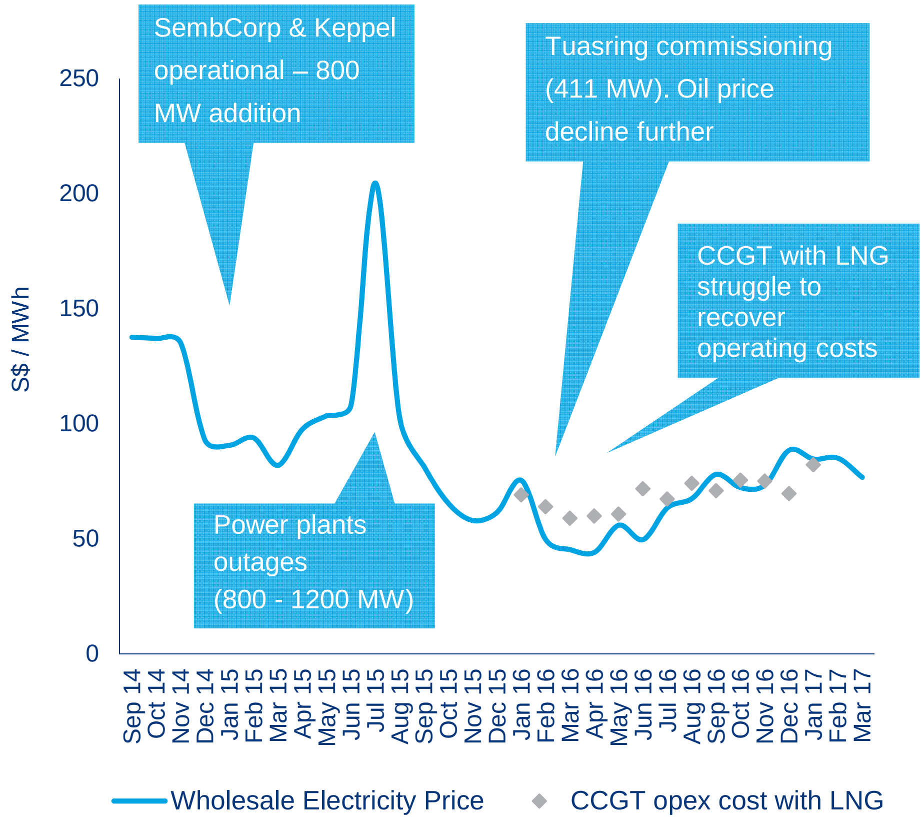
Losing retail consumers will make it even more challenging for the incumbent players

WEP, Vesting Price and LNG Price



Source: EMC, Wood Mackenzie

Wholesale prices at operating cost level

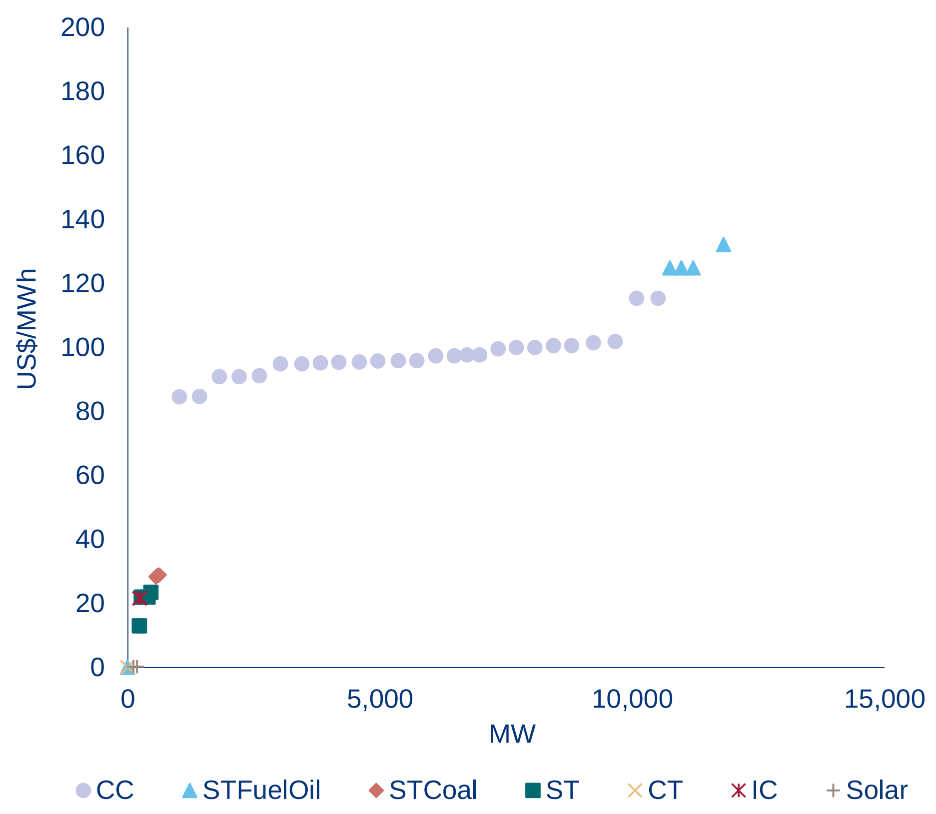


Source: EMC, Wood Mackenzie

The price outlook continues to remain depressed in future

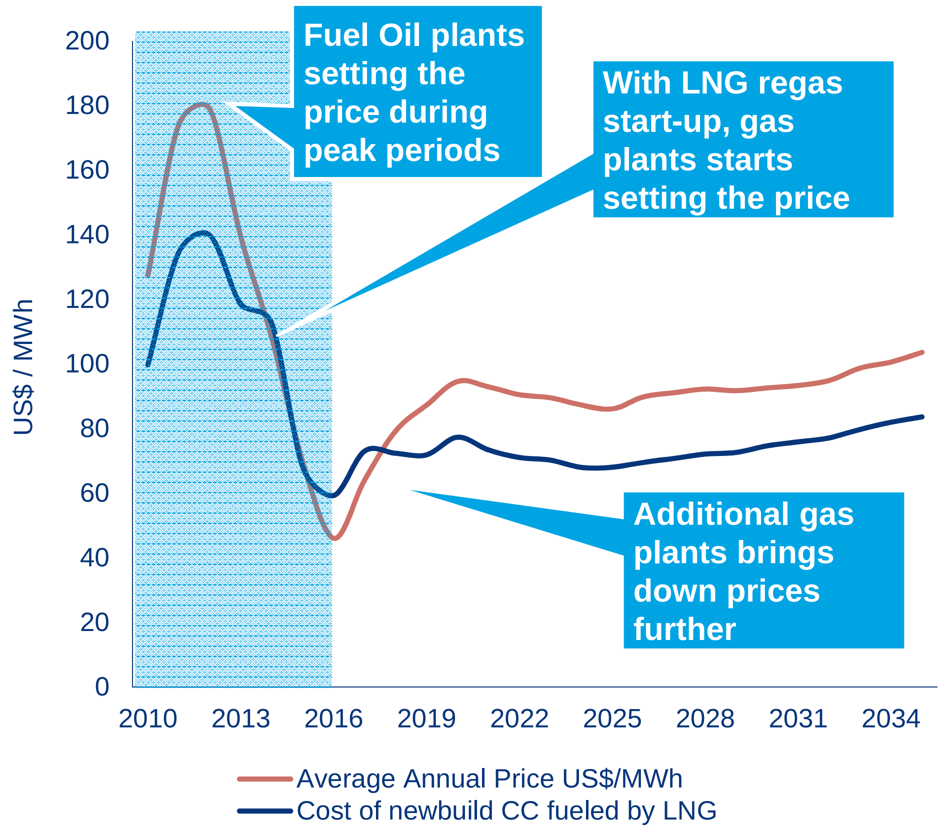
A flat short run marginal cost indicates that flatter wholesale prices will continue

Merit Order (2020)



Source: Wood Mackenzie

Annual average power price forecast



Source: Wood Mackenzie

Expectation of a competitive retail market

Increased competition - retail providers would have to attract consumers to choose them – incentives, promotions etc

Lower rates - something everyone will appreciate!

Flexible plans

Reliable service - system security still with the system operator

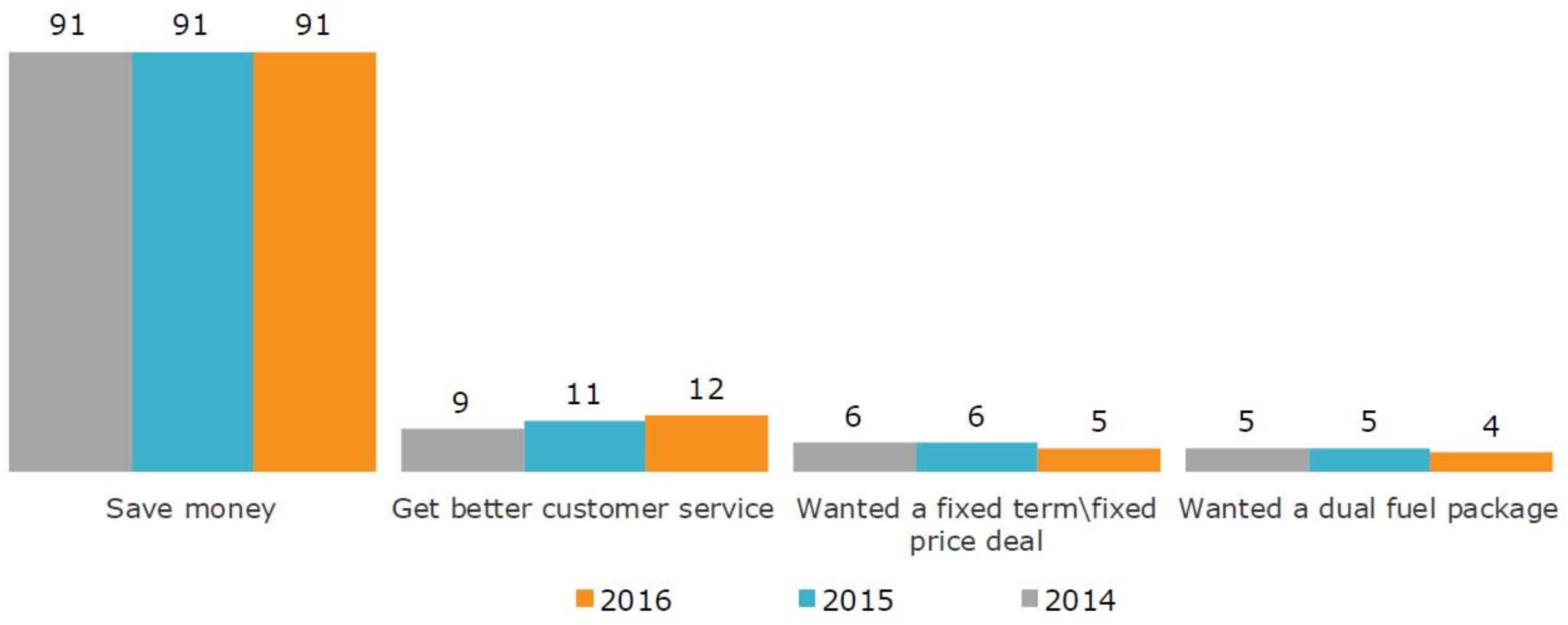
Enablers and barriers to consumer engagement

Source : https://www.ofgem.gov.uk

Price is the key motivator when switching

A survey in the UK suggested that on average ~ £300 of savings per year (£25 or S$45 per month) are needed to make it worth changing supplier or tariff

Motivators to retail switching (UK)

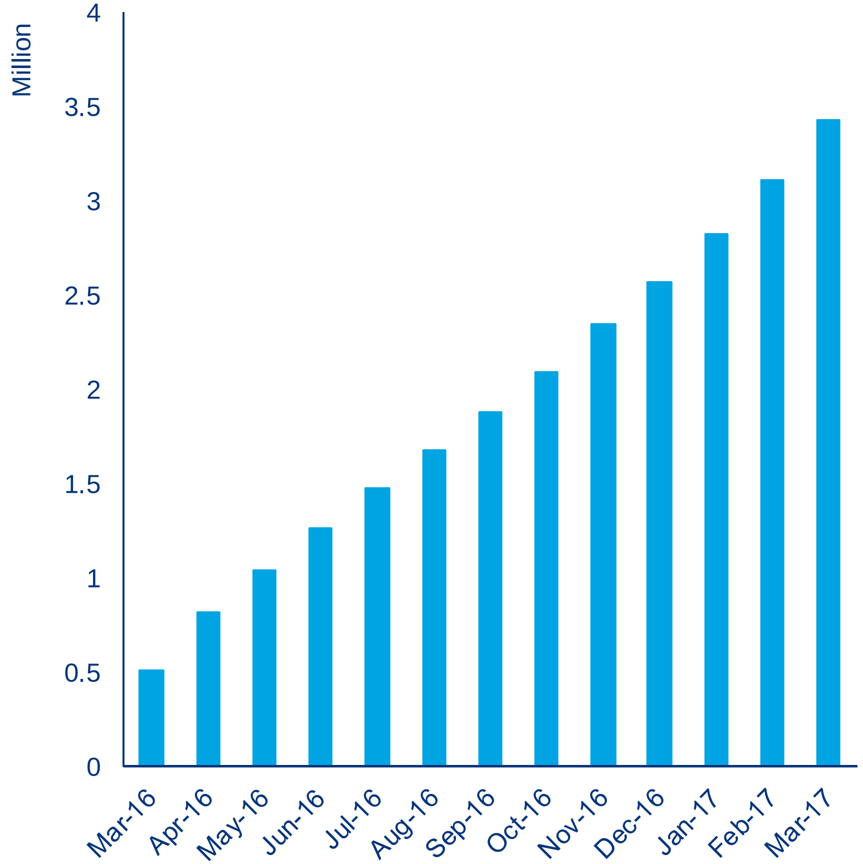


Source : https://www.ofgem.gov.uk

Switching rates are an important indicator but not necessarily the only measure of success

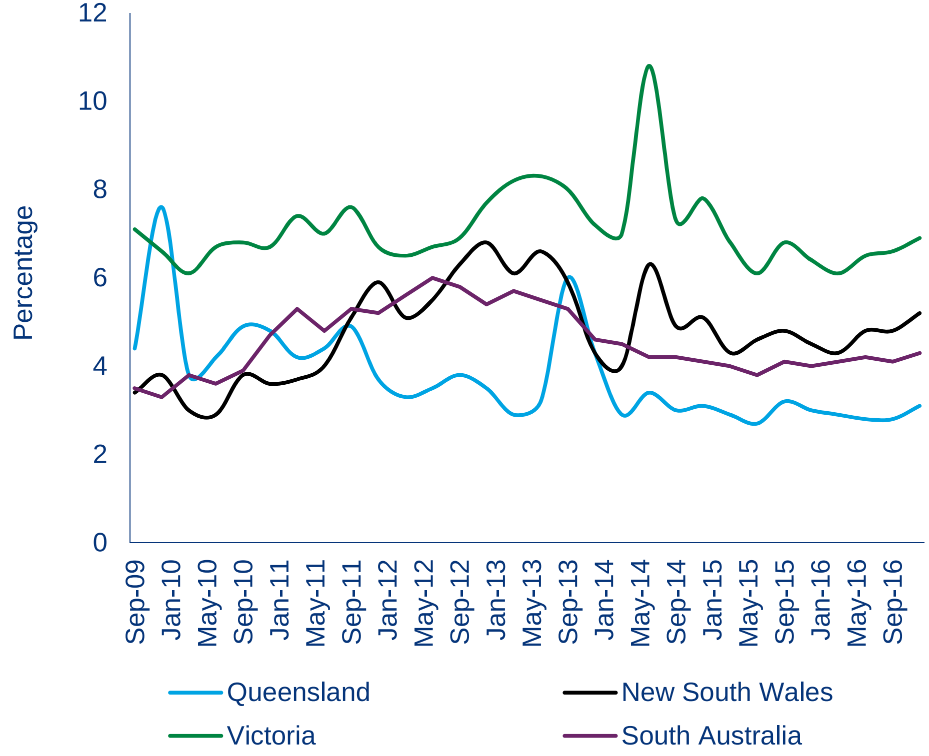
Access to price comparisons & online accounts are necessary to engage consumers

Japan switching rates (April 2016 to March 2017)



Source: Wood Mackenzie

Australia switching rates (2016)



Source: AEMO

Default retail providers have been used to encourage switching in Texas

- Default service price might have to be much higher than Wholesale Electricity Prices (WEP) to induce consumer switching (comparable prices may not work – **Massachusetts** experience)

- **Texas** success came from the price differentials – default service prices were much higher)

Increased competition comes with challenges

Declining firm demand

- With demand uncertainty, longer term contracts will be difficult
- Short-term hedging activities

Product differentiation

- 100% renewables
- Discount on regulated tariffs
- Bundling with gas retails, cable network providers, telecom
- Pricing incentives – fixed, variables, S-curve

A strong political commitment to reform is necessary

- Unexpected problem will require major or minor refinements
- Solution should not undermine the expected competiveness of the market

Key takeaways

Amidst depressed prices, sustainability is becoming an issue for Gencos and full retail contestability can bring further challenges

Switching rates are an important indicator but not necessarily the measure of success of retail competition

Ease of access to information and price deals will be key to engaging consumers and success of the full retail contestability

Product differentiation would be necessary for the retail providers to remain competitive

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- Bikal leads the power market research for Asia Pacific. He is a seasoned power and renewables analyst with an established track record of research and consulting in market modeling, inter-fuel analysis, generation planning, cost analysis and bidding strategies. He has been with Wood Mackenzie since 2007.

- Prior to Wood Mackenzie, he was a power market specialist at PowerSeraya, a local power generation company in Singapore.

- Bikal holds a PhD in Power Engineering from Nanyang Technological University, Singapore with specialisation on the aspects of generation planning in competitive electricity markets.

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