

# Energy Transition In Asia-Pacific: A Marathon, Not a Sprint

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*Energy transition is firmly underway in key Asia-Pacific markets, but the pace and degree will vary*



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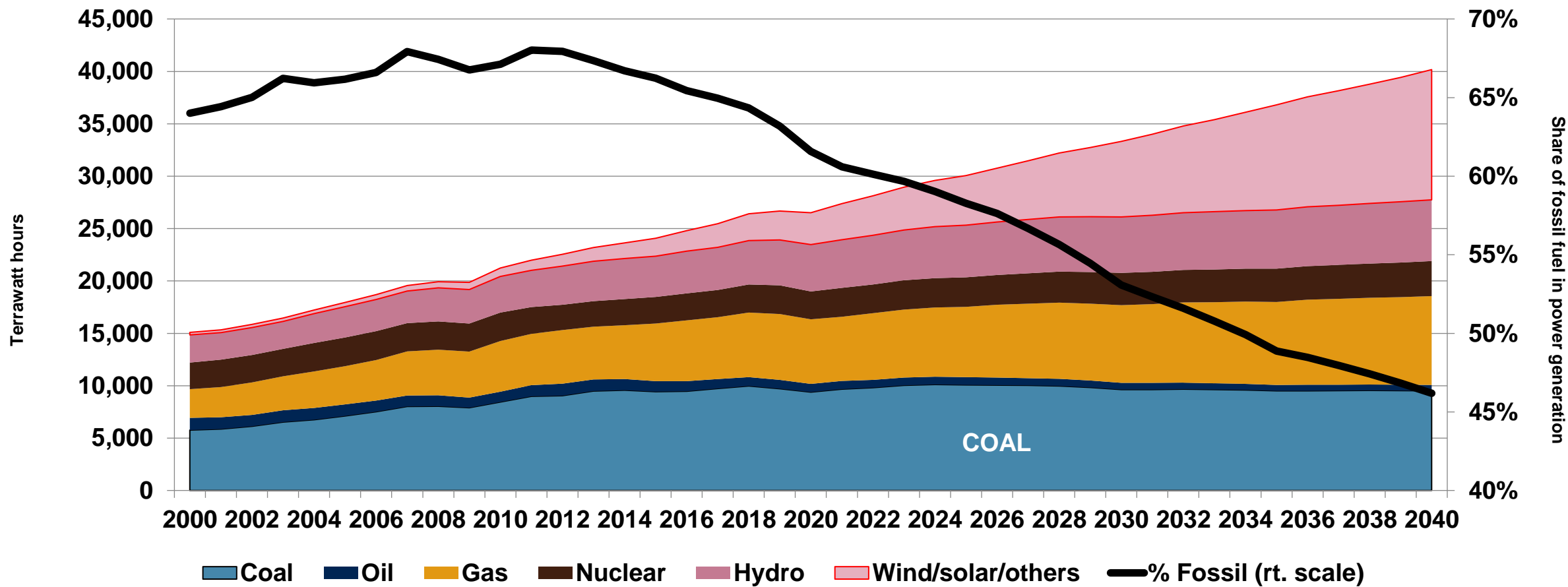
**S&P Global**  
Ratings

# APAC Energy Transition: Renewables Rise, But Coal Still Thrives

- **Generation Mix:** High dependence on fossil fuels (above 60% of the generation mix) and growing demand will keep coal relevant in Asia Pacific markets such as China and India for the next one to three decades. China may under-promise and over-deliver on renewables targets; India may over-promise and under-deliver.
- **Capacity Additions:** Renewables will continue to increase their share rising to over 40% of generation mix by 2040. 2030 seems to be the key inflection point, when most markets will stop adding new coal plants.
- **Policies:** Most markets have supportive policies for renewables (even with removal of subsidies) but limited policies to discourage coal. Carbon pricing may evolve (like in China's emissions trading scheme) and speed up transition.
- **Economics:** Cost of energy from competitive renewable power compared to that from coal, and cost-efficient storage solutions to provide base load power will be crucial for success.
- **Credit Impact:** Regulated utilities may benefit from protected returns, but unregulated independent power producers (IPPs) and new carbon policies will put credit pressure on fossil fuel players. Renewables companies may strengthen their business profile while remaining leveraged.

# Fossil Fuels Peak In 2030

Share of fossil fuel in global generation capacity may dip to below 50% by 2040 from 60% in 2020

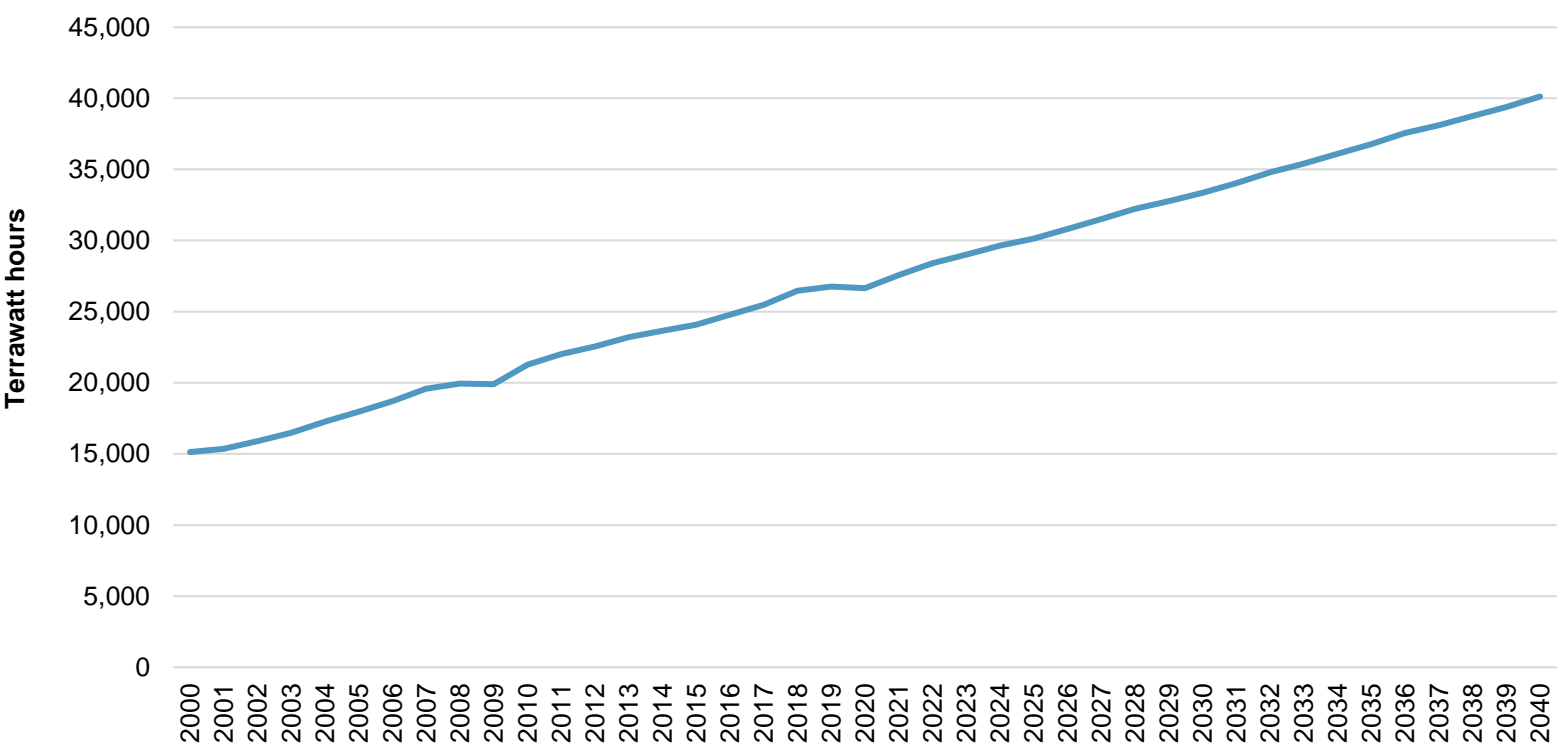


Source: S&P Global Platts Analytics, Global Integrated Energy Model.

# Higher Power Demand In Emerging Markets

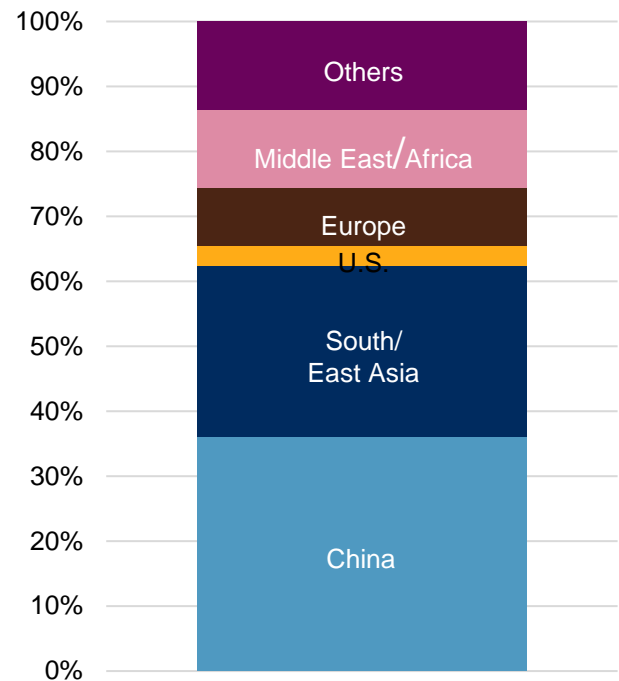
Electrification and growing access to power will drive 50% growth over the next 20 years

Global Power Demand



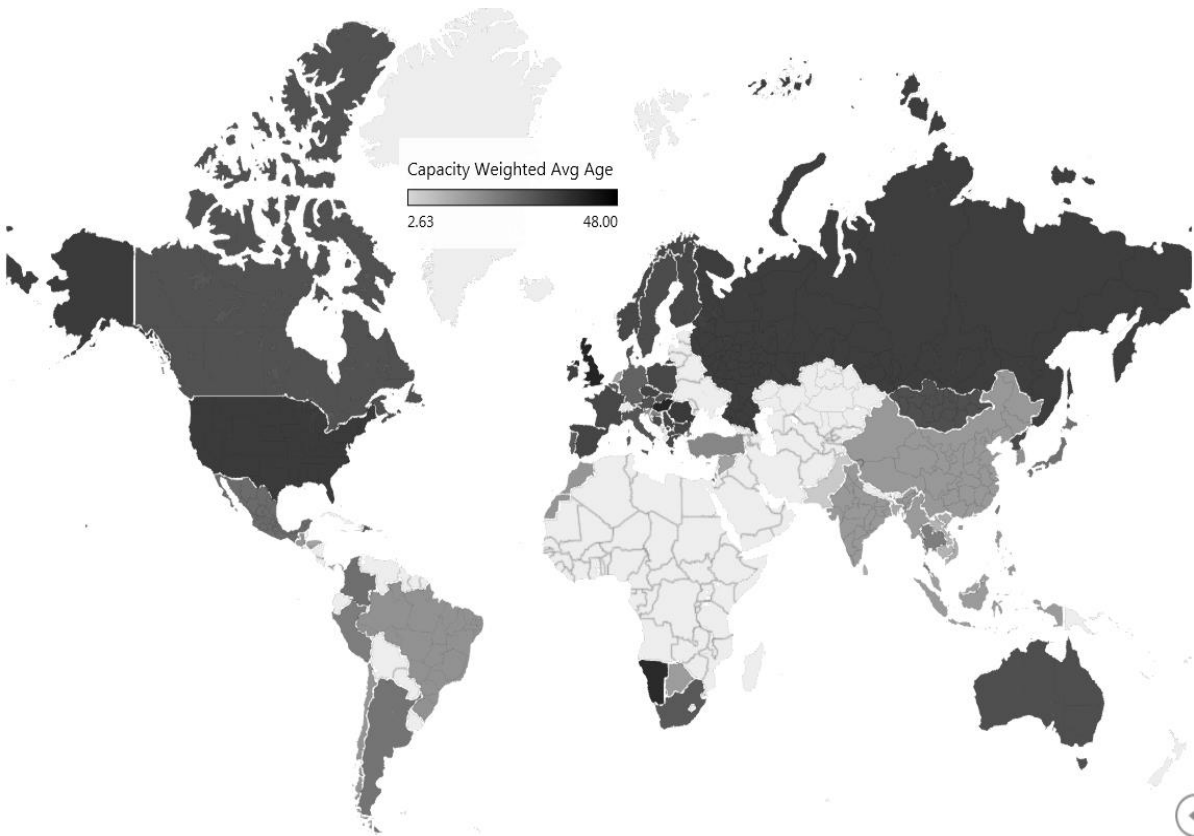
Source: S&P Global Platts Analytics.

Demand Growth By Region  
In 2020-2040

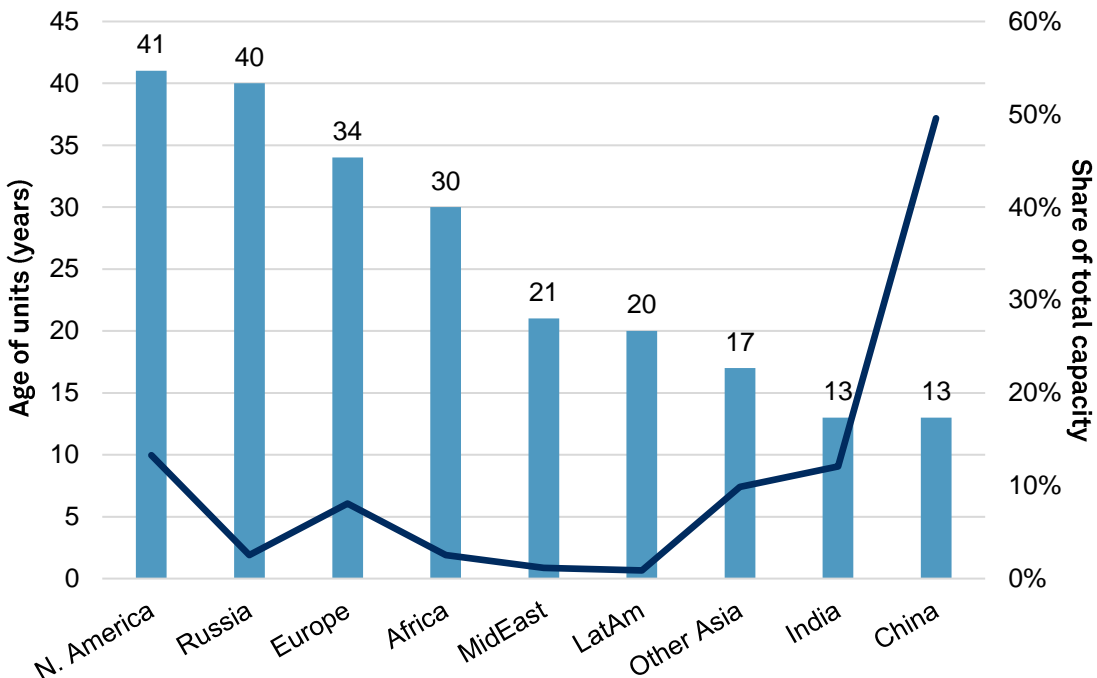


# China, India's Young Coal Fleet Could Go The Distance

China's < 15 years coal capacity accounts for more than 50% of the global operational coal capacity



Capacity Weighted Average Coal Plant Age

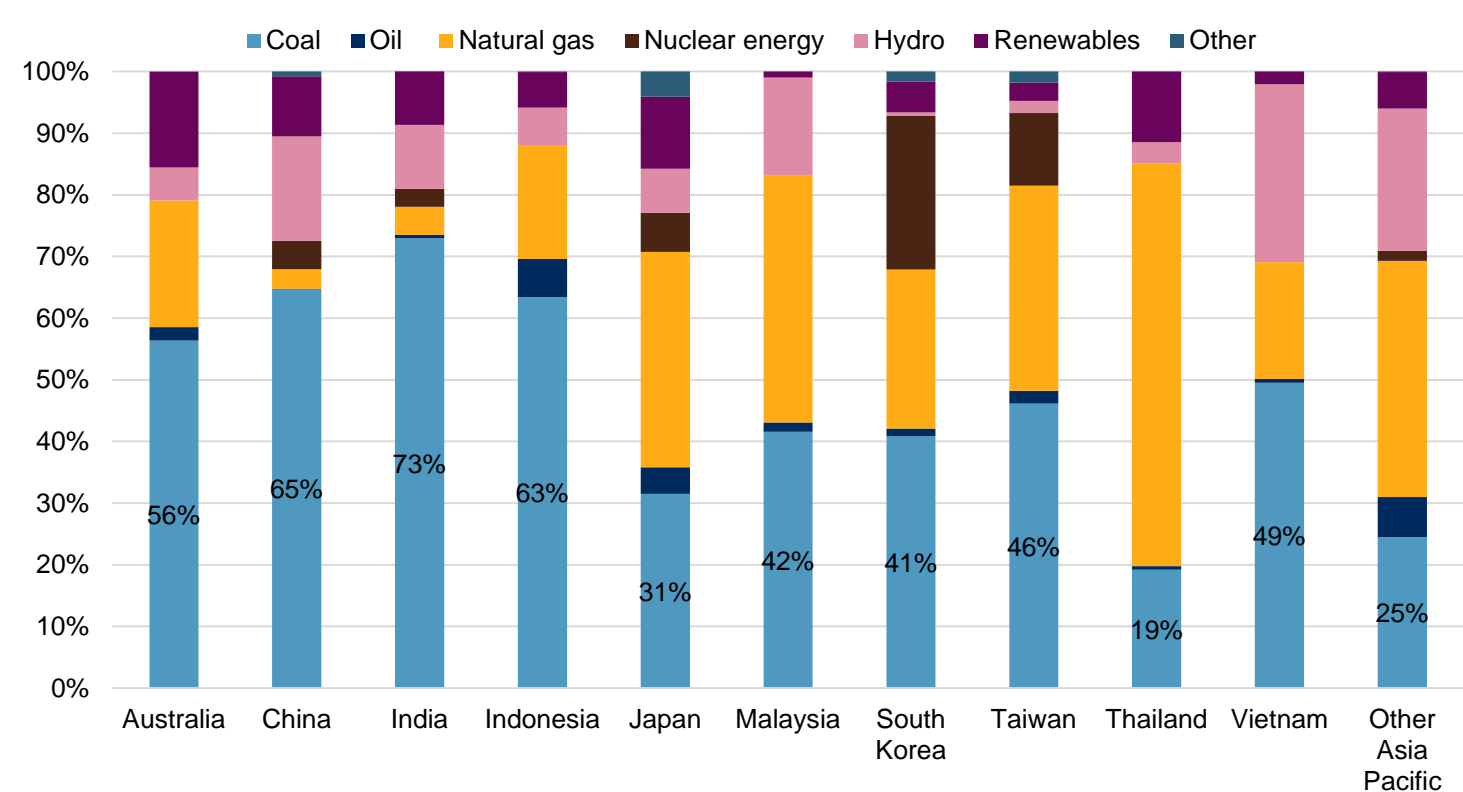


Source: Platts Analytics. Market Intelligence World Electric Power Plant database. S&P Global Platts Analytics, Global Integrated Energy Model.

# APAC Has Heavy Reliance On Fossil Fuel

Still-high dependence on coal-fired generation compared to the U.S. and Europe means displacement will likely take time

Electricity Generation By Source (2019)



- The power generation mix in APAC is in stark contrast to that in the U.S. and Europe (about 25% from coal).
- Coal-fired generation is the base load in most Asian countries; some nations have heavy gas use.
- The coal fleet is relatively young in Asia and will continue to play a big role.
- New coal plants are still under construction in some Asian markets.

Source: IEA, World Bank Data.

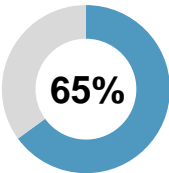
# APAC Has Less Ambitious Short-Term Energy Transition Targets

Energy policy target

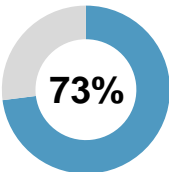
Share of coal in total power generation in 2020



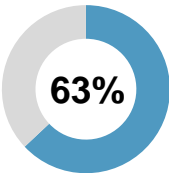
**China (Mainland):**  
Carbon net emission to peak before 2030, be zero by 2060



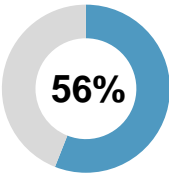
**India:**  
450 gigawatt from renewables by 2030, 60% of capacity



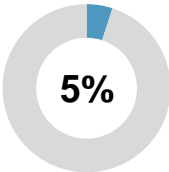
**Indonesia:**  
23% generation from renewables by 2028



**Australia:**  
Carbon net emission at 26%-28% below 2005 level by 2030



**New Zealand:**  
100% renewable power by 2030



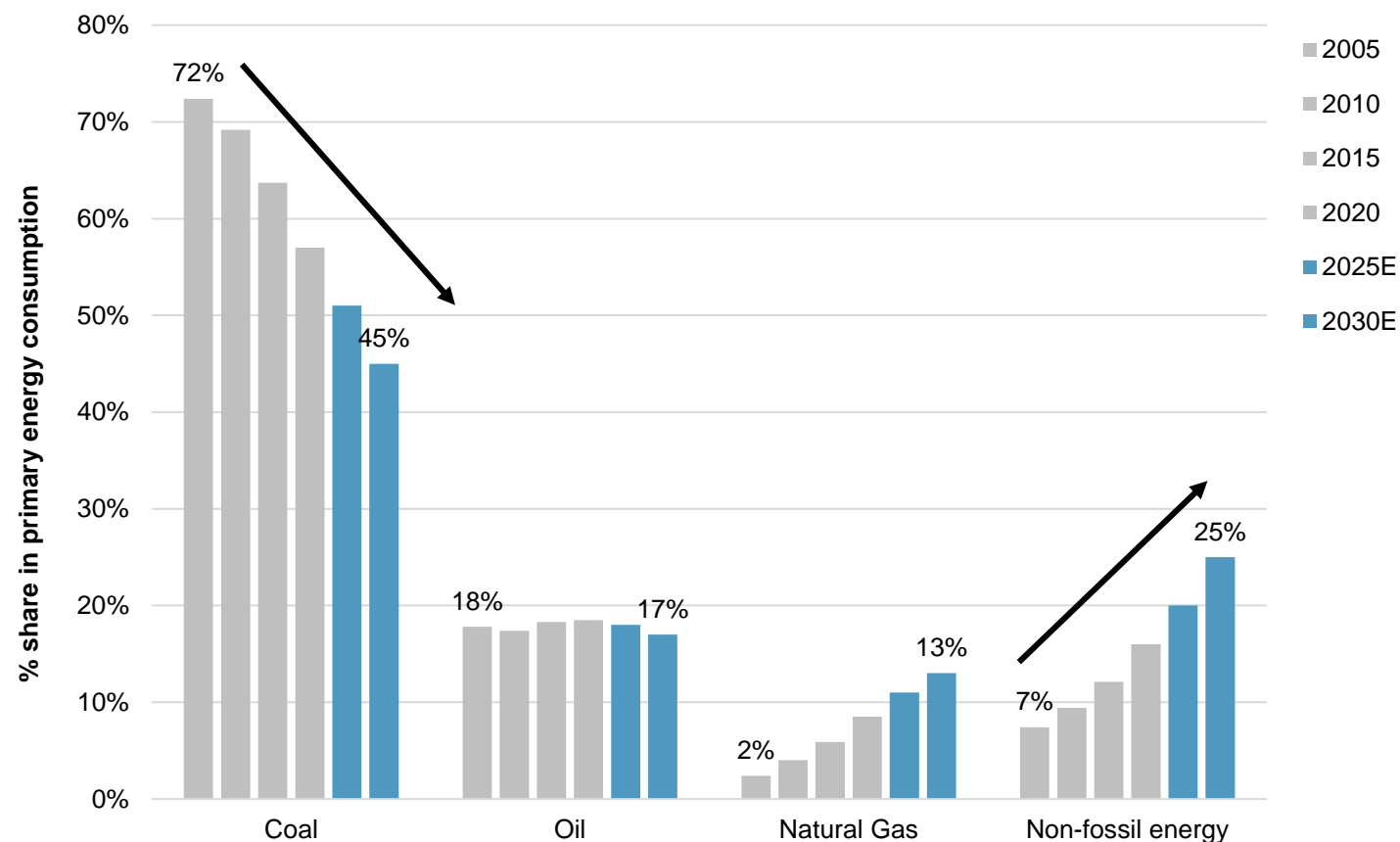
Source: IEA, World Bank, S&P Global Ratings.

# **China:** **Ambitious Pledge, Cautious Plans...**



# China | Target To Be Carbon Neutral By 2060

China raised the targeted share of non-fossil fuel in energy mix by 2030 to 25% from 20% previously



E—Estimate. Source: BP Statistical Review of World Energy, Institute of Climate Change and Sustainable Development, Tsinghua University 2020, China 14<sup>th</sup> Five Year Plan, S&P Global Ratings.

- China's pledge of peaking emission by 2030, and carbon neutrality by 2060, is bold, given the country is the largest emitter and is likely to have continued moderate growth in energy demand.
- China has met / exceeded its energy and climate-related targets.
- It raised its 2030 target of non-fossil fuel in primary energy mix to 25% from 20%.
- Share of coal, the dominant source of primary energy, is likely to decline to 45% by 2030, from over 70% in 2005.

# China | Unambitious Targets Over 2021-2025

- China hasn't set an absolute carbon emission cap yet, causing confusion over its action plans in this regard.
- Its target of energy and carbon intensity per unit of GDP over 2021-2025 (14<sup>th</sup> Five Year Plan) is unambitious, following the same path as in the previous five years.
- Energy security is a top consideration for policymakers when mapping out economic and energy plans.
- China may under-promise and over-deliver its energy and climate-related targets as seen in the past.

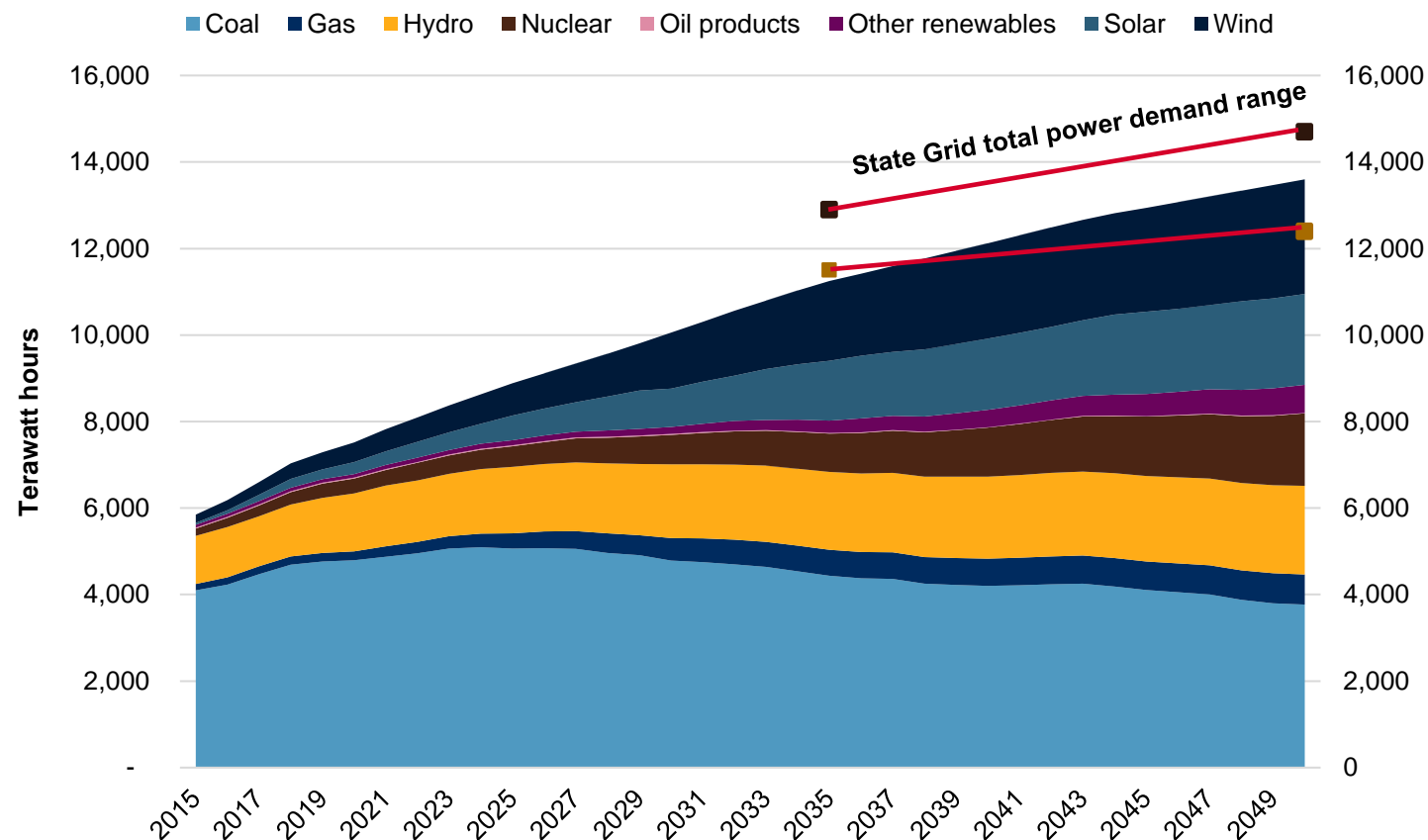
	12th Plan 2011-2015		13th Plan 2016-2020		14th Plan 2021-2025	15th Plan 2026-2030
<b><u>China's key energy and climate-related targets</u></b>	Target	Outcome	Target	Outcome	Target	Target
Energy consumption per unit of GDP	- 16%	- 18%	- 15%	- 13.7%	- 13.5%	N.A.
CO2 emission per unit of GDP	- 17%	- 20%	- 18%	- 18.4%	- 18%	N.A.
Share of non-fossil fuel in primary energy	11.4%	12.0%	15.0%	16.0%	20.0%	25.0%
Coal-fired power capacity (GW)	960	880	< 1,100	1,080	N.A.	N.A.
Wind & solar power capacity (GW)	121	1,74	320	530	N.A.	>= 1,200
Solar power capacity (GW)	21	43	110	250	N.A.	N.A.
Wind power capacity (GW)	100	131	210	280	N.A.	N.A.
Comprehensive domestic energy production capacity (billion tones of coal equivalent)	-		-		> 4.6	N.A.

GW—Gigawatt. Source: China 12<sup>th</sup> -14<sup>th</sup> Five Year Plan, S&P Global Ratings.

# China | Power System Transition May Accelerate In Late 2020s

Increased use of wind and solar power will dent coal's share in the power mix

## China's Forecast Generation Mix



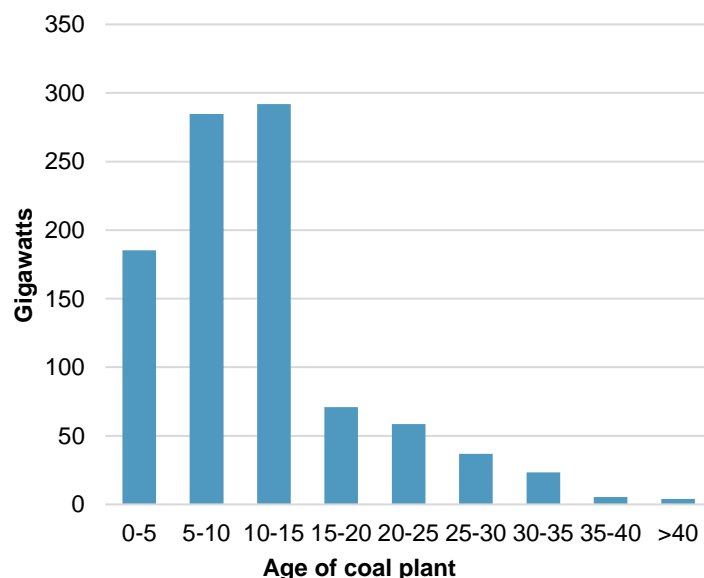
Source: S&P Global Platts Analytics, Future Energy Outlooks.

- Power sector decarbonation is key to China's energy transition.
- Share of coal in generation mix will trend down, after declining to 60.8% in 2020. According to S&P Global Platts Analytics, gas power will still see new build of 5-8 GW/year, prioritized for heating / industrial use.
- Wind and solar will grow faster than other fuels under policy push, market preference, and technology breakthrough.
- Nuclear power development will be steady for safety considerations, applying China's self-developed reactor technology. Hydro power will see limited growth for resource constraint.

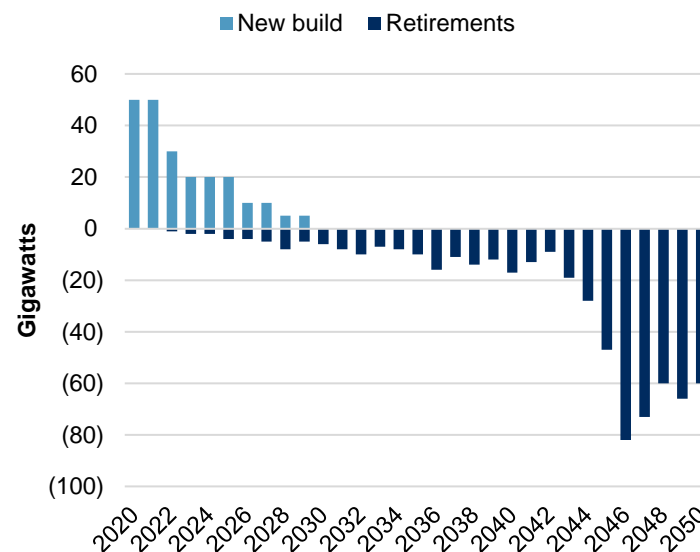
# China | Coal Phase-Out Set To Be A Slow Burn

- Despite coal's declining share in the energy mix, its capacity and generation may continue to increase. 150GW coal plants will be built in the next decade, according to Platts Analytics. No coal capacity addition likely post 2030.
- No sign that China will speed up decommissioning of coal power. Vast majority of plants will not retire until 2040.
- Clean use and overhaul for increasing flexibility in adjusting output will be key focus areas.

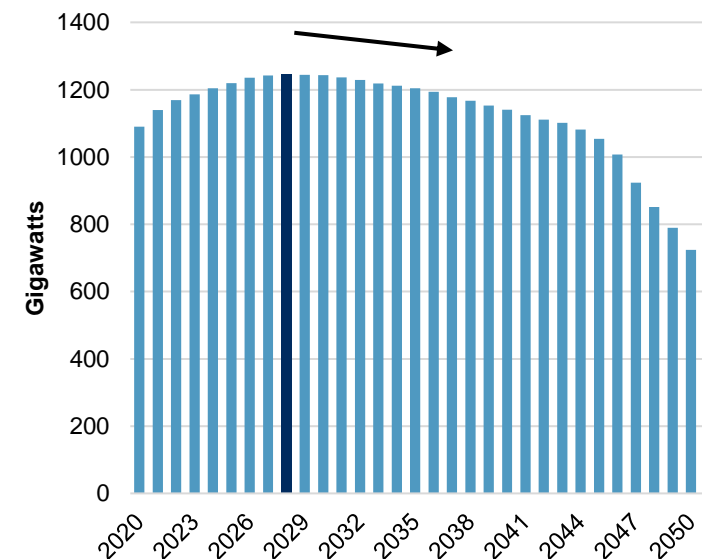
## About 80% Of Operating Coal Capacity Is Under 15 Years Old



## Coal Plants Will Continue To Be Built Until 2030



## Coal Plants' Capacity Is Set To Peak In 2028



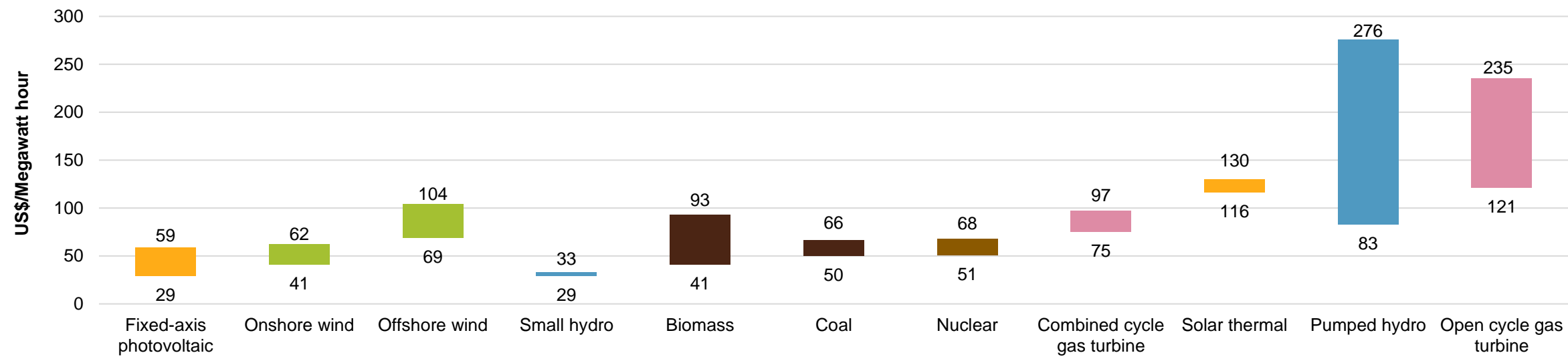
Source: S&P Global Platts Analytics, Future Energy Outlooks

# China | Long-Term Competitiveness Of Renewables Is Not Proven

- Growth of wind and solar power may slow down after the subsidy is phased out from 2021, but the momentum may pick up after 2023. We expect total capacity of wind and solar to exceed the government target of at least 1,200 GW by 2030 (vs 2020: 530GW).
- All-in costs (or system costs) of renewables are still high due to additional costs associated with long-distance power transmission to load centers, and intermittency-induced disturbance of renewables to grids.
- Long-term competitiveness of renewables is subject to a significant decline in cost of efficient battery storage, grid infrastructure enhancement to adapt to large-scale renewables connection and transmission, and lower land acquisition costs, etc.

## Solar And Wind Power Have Become Cheaper Despite Still-High All-In Costs

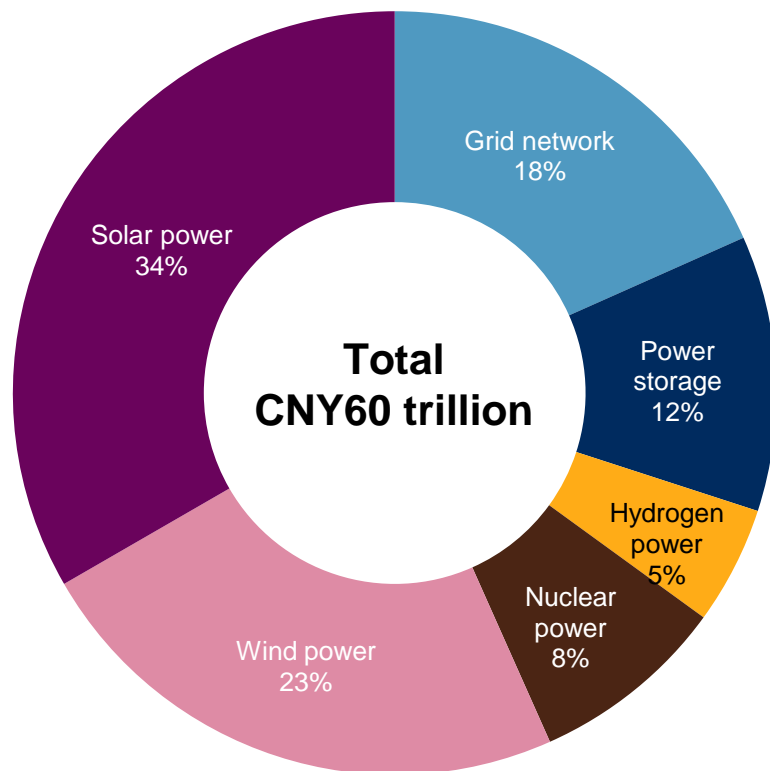
Levelized cost of electricity ranges by energy source in China (1H2020)



Source: Bloomberg New Energy Finance (BNEF), 1H 2020 LCOE Update, 2020.

# China | Massive Funding Need To Decarbonize Power System

Over half of investment to decarbonize China's power system will be deployed for solar and wind power development (until 2060)



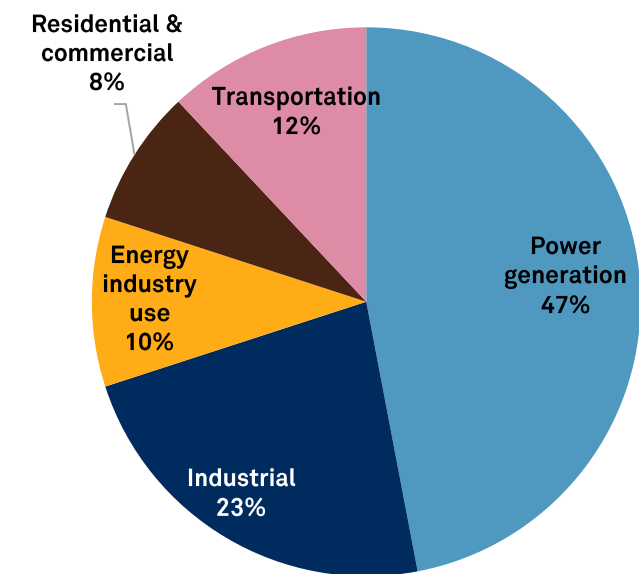
- Chinese Yuan Renminbi (CNY) 60 trillion (or US\$9.2 trillion) is needed until 2060 to decarbonize China's power sector, according to a recent study by investment bank CICC.
- Banks will still be the dominant capital providers to fund China's energy transition; but more funding sources, such as securitization and project finance, should be developed.
- Green bonds, including the thematic carbon neutral bonds, are likely to break the record of issuances this year.

Sources: China International Capital Corp. Ltd. (CICC), S&P Global Ratings.

# China | Steady Start To National ETS Market

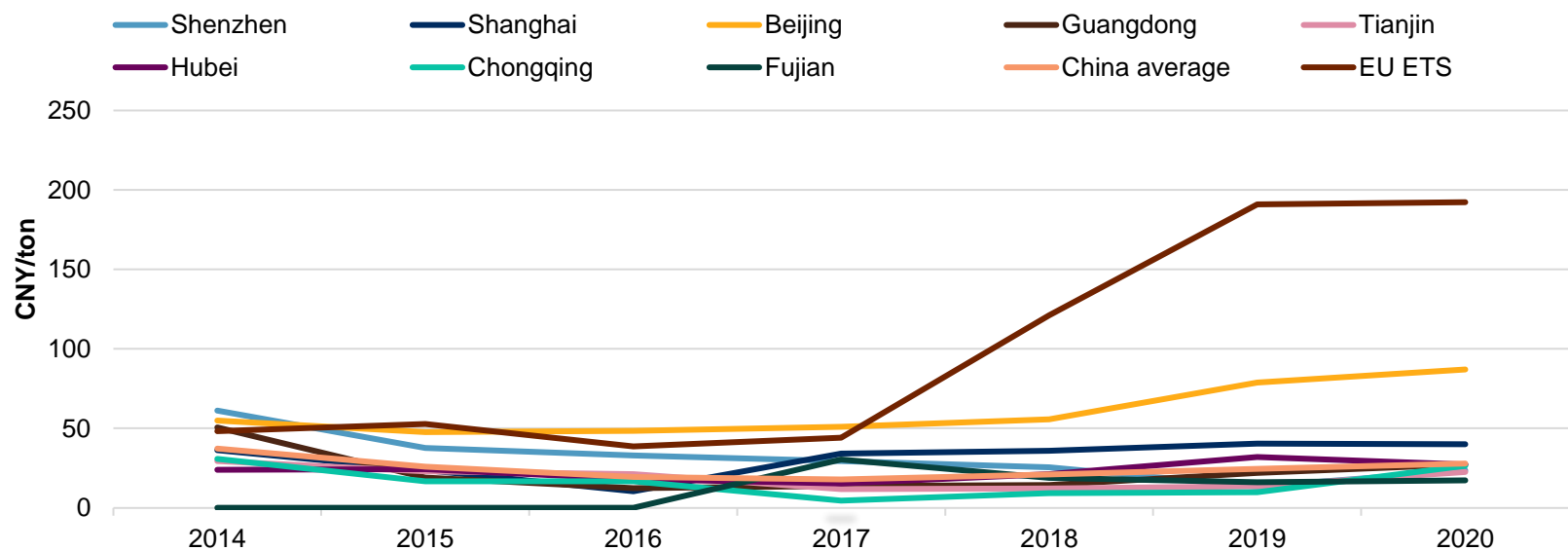
- The unified national carbon emissions trading system (ETS) will commence trading in 2021 and will likely become the world's largest. This is a cap-and-trade program with the cap still to be determined.
- The first batch of entities include 2,225 thermal power companies (IPPs). We expect a limited near-term impact on IPPs, given initial generous carbon credit allocations. However, allocations should become tighter, pushing up carbon prices.
- A liquid ETS market with high carbon prices will press emitters to reduce the costs of purchasing carbon credits.

Power Sector Dominates CO2 Emissions (2020)



Sources: S&P Global Platts Analytics, Global Integrated Energy Model

Carbon Prices In China's Pilot Regional ETS Markets



Sources: WIND, Bloomberg, EEX, S&P Global Ratings.

# China | Policy Risks Add Disturbance To Power Market

## **Policy intervention in power pricing**

- China's power market is mixed with regulated and unregulated factors. This is despite a move toward market-based power prices.
- Cost burden of coal power in energy transition, such as for purchasing carbon credits, may be passed through due to policy intervention. Ancillary service of coal power, such as load regulation, are not properly priced.

## **Inconsistent policy execution**

- Some local governments do not execute supportive policies/measures for renewable energy, such as in feed-in-tariffs and minimum facility utilization hours, for various reasons.
- Policies issued by different ministries of the central government or the same ministry at different points in time may not be well-coordinated or consistent.

## **Prolonged subsidy delay**

- Long overdue subsidy receivables have caused significant working capital issues and even liquidity stress for renewable energy developers, reducing their investment returns and pushing up leverage.
- Subsidy arrears are estimated at over 300 billion (or US\$46 billion) at the end of 2019. This would grow if not addressed.



# China | Credit Implications Are Mixed

**China's power sector is dominated by state-owned IPP groups, which generally have a large coal power portfolio.**

- Regulation risk, profitability and cash flow volatility of coal power companies are increasing amid energy transition and power market de-regulation.
- Near-term risk of coal power is still dominated by fluctuation in fuel prices and power demand.
- Carbon prices will likely not be a major threat to IPPs because their coal power units are young and use advanced technology with lower emissions; moreover, carbon credit allocation will not tighten much over the next 2-3 years.

**State-owned IPP groups to also drive power sector transition.**

- Top five Chinese IPP groups have announced schemes for carbon emission to peak by 2025 or earlier.
- They have aggressive plans to grow renewable energy capacities over 2021-2025.
- Significant capital spending on renewables will further elevate their already-high leverage.
- Returns and cash flow from new wind and solar power capacities from 2021 will be normalized and largely stable; however, an older portfolio still suffers from subsidy delay.

**Funding access is good for state-owned IPPs.**

- Financing for renewables projects are likely to improve under the support of state-owned financial institutions and capital market.

# **India:** **Coal Is Dead, Long Live Coal!**

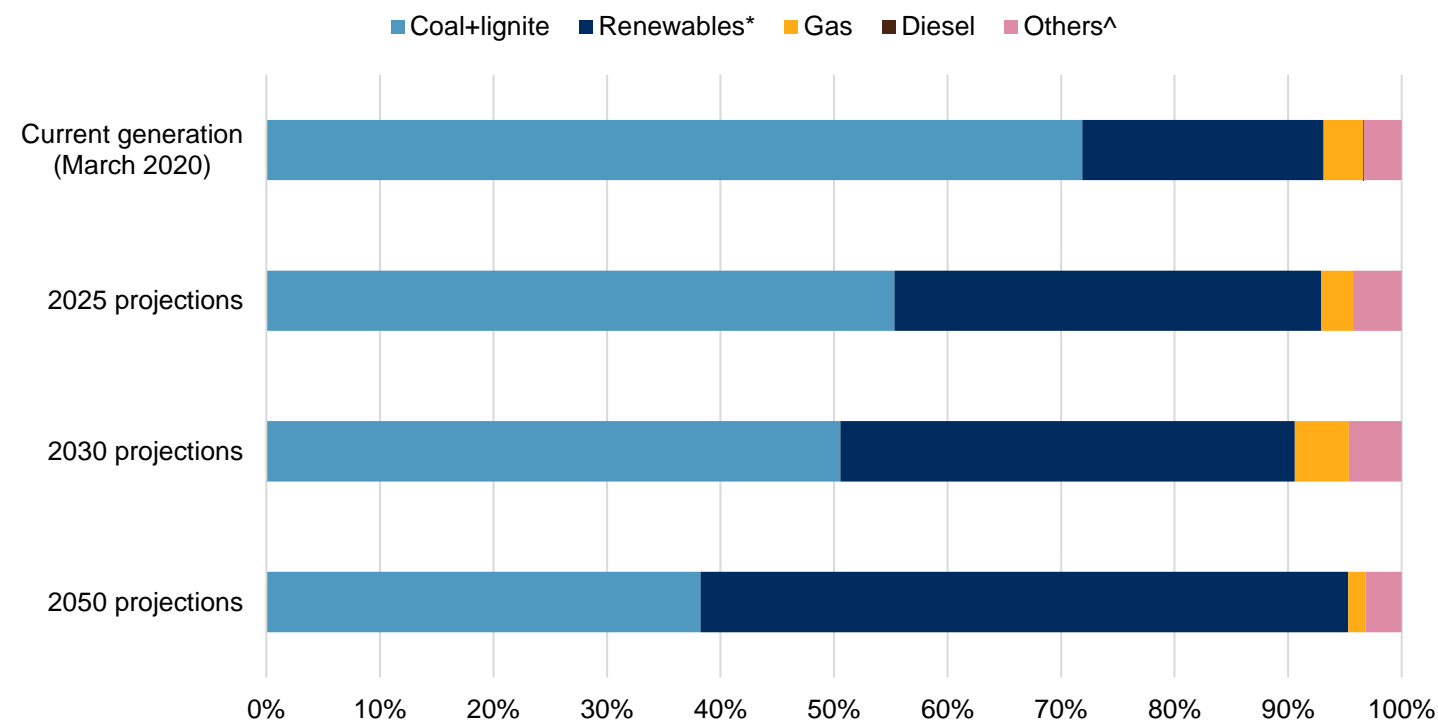
# Overview | Renewables Grow Faster; Coal To Dominate Till 2030

- **Capacity Addition:** New coal plants continue to be built until 2030; renewables' addition to be more than 2x for coal.
- **Generation Mix:** Coal to contribute more than 50% by 2030 (down from 70% in 2020).
- **Coal Generation:** To be more than 2x of 2020 level by 2050; young coal fleet will help meet higher energy demand.
- **Cheaper Renewables:** Economics rather than emissions will be key drivers of energy transition.
- **Heavy Investments:** Over US\$500 billion investments likely in renewables over next 10 years. Targets may be missed.
- **“Greenium”:** Funding access and cost differentiation will widen, with aversion to coal and a rush for green finance.
- **Policies:** Absent carbon pricing, policies and merit order will increase environment, social, governance risks.
- **Mixed Credit Impact:** Business position may strengthen for renewables companies, but leverage will remain high.

# Generation Mix | Coal's Obituary Not Due Until 2050

Growth in renewables is set to outpace that in fossil fuels

## Projected Evolution Of India's Generation Mix

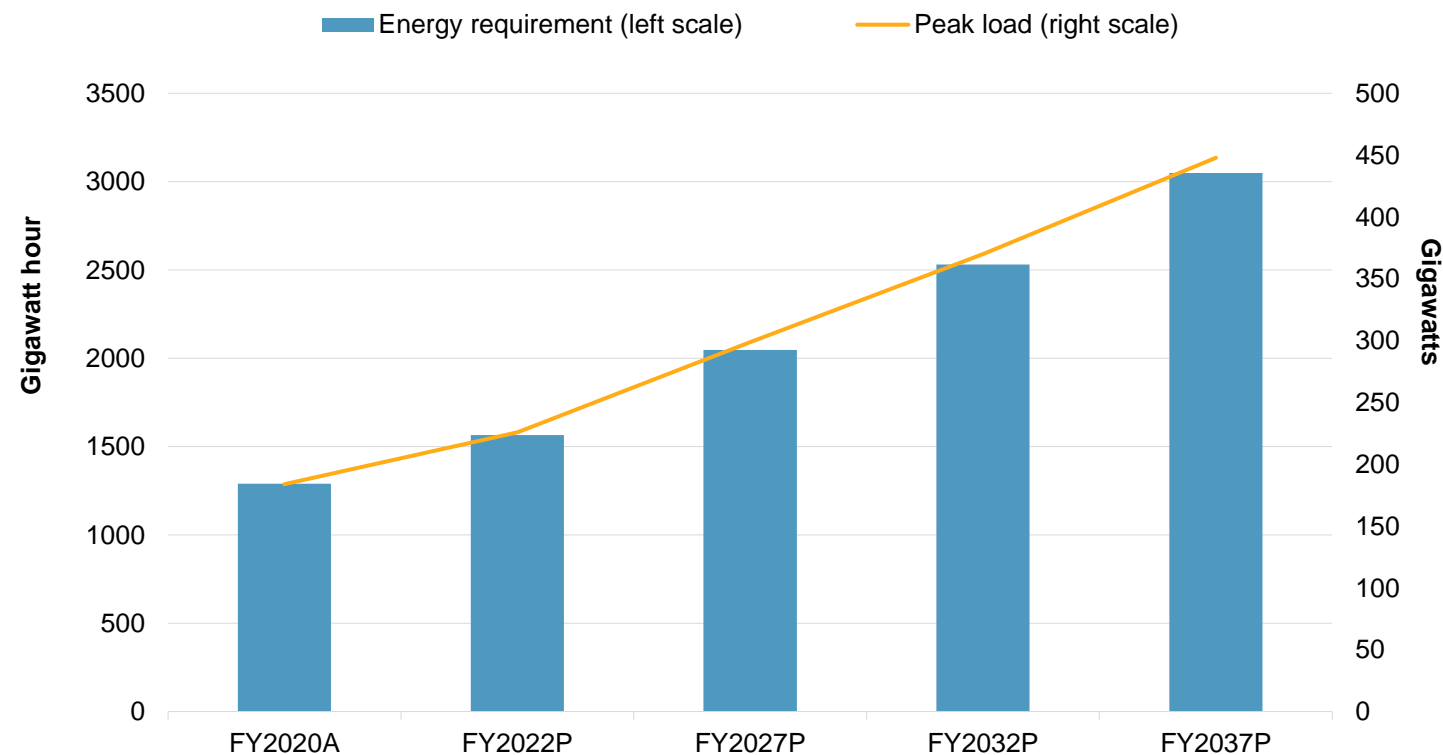


*\*Includes hydro, solar, wind. ^Mainly nuclear and biomass. Source: CEA January 2020, EIA International Energy Outlook November 2019.*

- Coal generation will drop from about 70% now. But it will stay above 50% by 2030.
- Increase in generation with a young coal-fleet (65% capacity is less than 10 years old) and higher utilization.
- India to fall short of its targeted 175 gigawatts renewables capacity by 2022.
- Target is for renewables to reach 50% of generation by 2050.

# Demand | Growing Energy Needs Will Be A Driver

Peak load demand and energy requirements in India are likely to rise in tandem



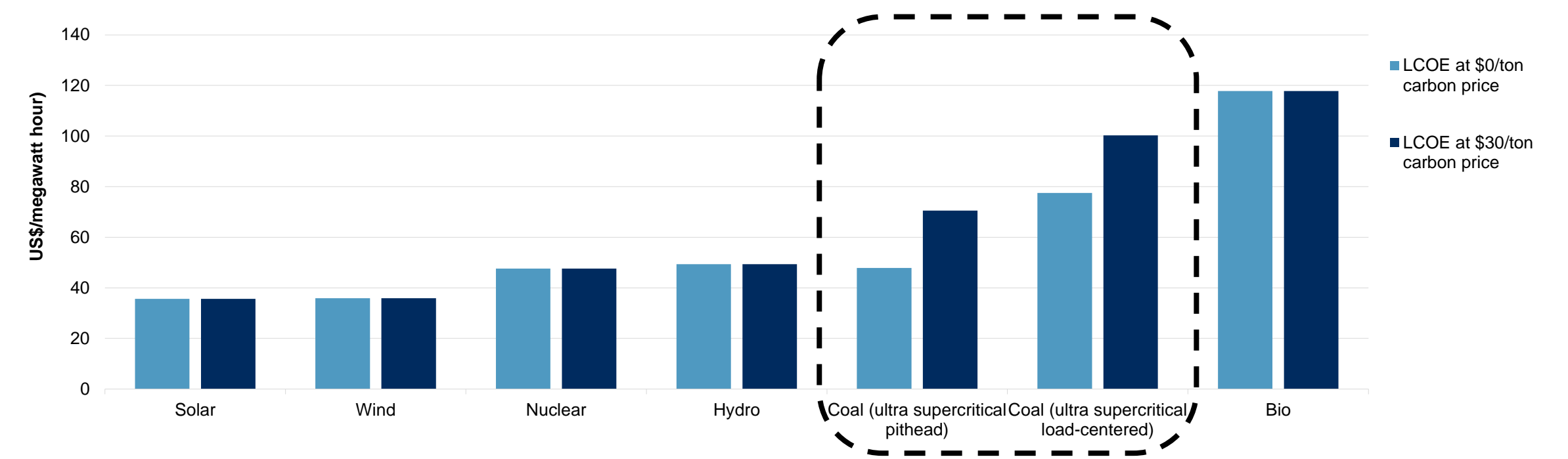
- Growing economy and rising population will increase power demand by over 4% CAGR.
- Capacity additions will be required to cater to the higher demand.
- Existing blackouts, brownouts, and need for more reliable power indicate need for further investments.

FY--Fiscal year ending March 31. A—Actuals. P--Projected. Source: NTPC presentation August 2020.

# Economics | Cheaper Renewables Will Drive Energy Transition

India’s low levelized cost of electricity generation (LCOE) for renewables will help clean-energy push

- Renewables remain competitive even with zero carbon price, making a compelling case for energy transition.
- Even some new hybrid/round-the-clock renewable projects for base/peak load power can compete with coal.

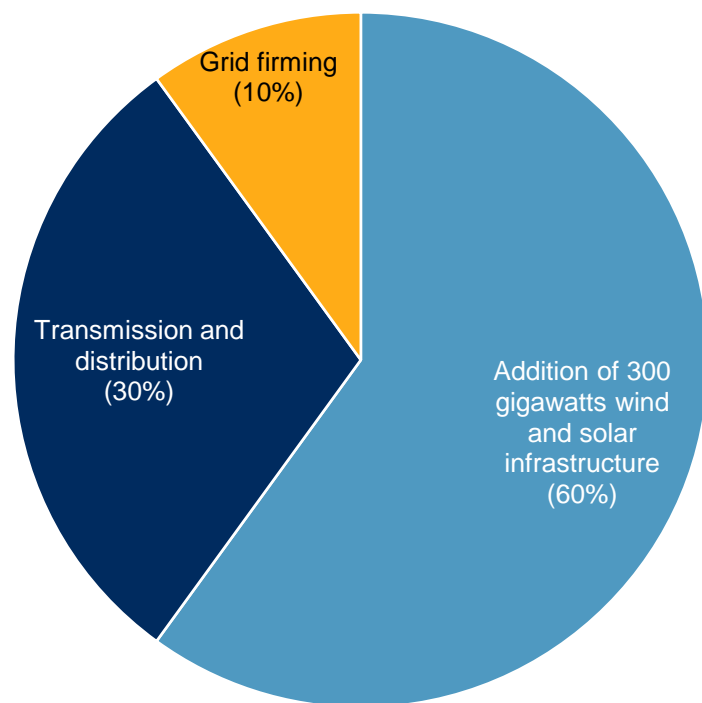


Other Assumptions: 7% discount rate.Source: IEA Levelized Cost of Electricity Calculator, December 2020.

# Investments | Capital Expenditure Will Remain Elevated

Electricity generation from renewables is set to rise substantially in the next 10 years

## Investment Breakdown



Source: IEEFA, February 2021.

- US\$500 billion in renewable investments likely over 10 years
- Investments will be led by the private sector
- Domestic solar manufacturing capabilities may receive some support (not factored in investments)
- Higher import duties on Chinese panel may delay rollout, affect costs
- India will make progress, but reaching targets by set timelines may be difficult.
- Success of new round the clock power technology, storage the key

# Credit Implications | Mixed

## Renewables Companies

## Fossil Fuel Players

Business Position

Strengthen with scale and diversity

Weaken, with lower merit orders

Operating Cash Flows

Grow but volatility will vary based on contracts

Protected for regulated utilities

Capital expenditure

Elevated

Taper but offset by acquisitions of renewables

Funding

Stronger access, lower costs

Restricted access, higher cost

Credit Metrics

High leverage, with Debt/EBITDA > 6x

Deleveraging likely from about 5x Debt/EBITDA now



# **Indonesia:** **Cheaper Coal, Restrictive Policies To Delay Transition**

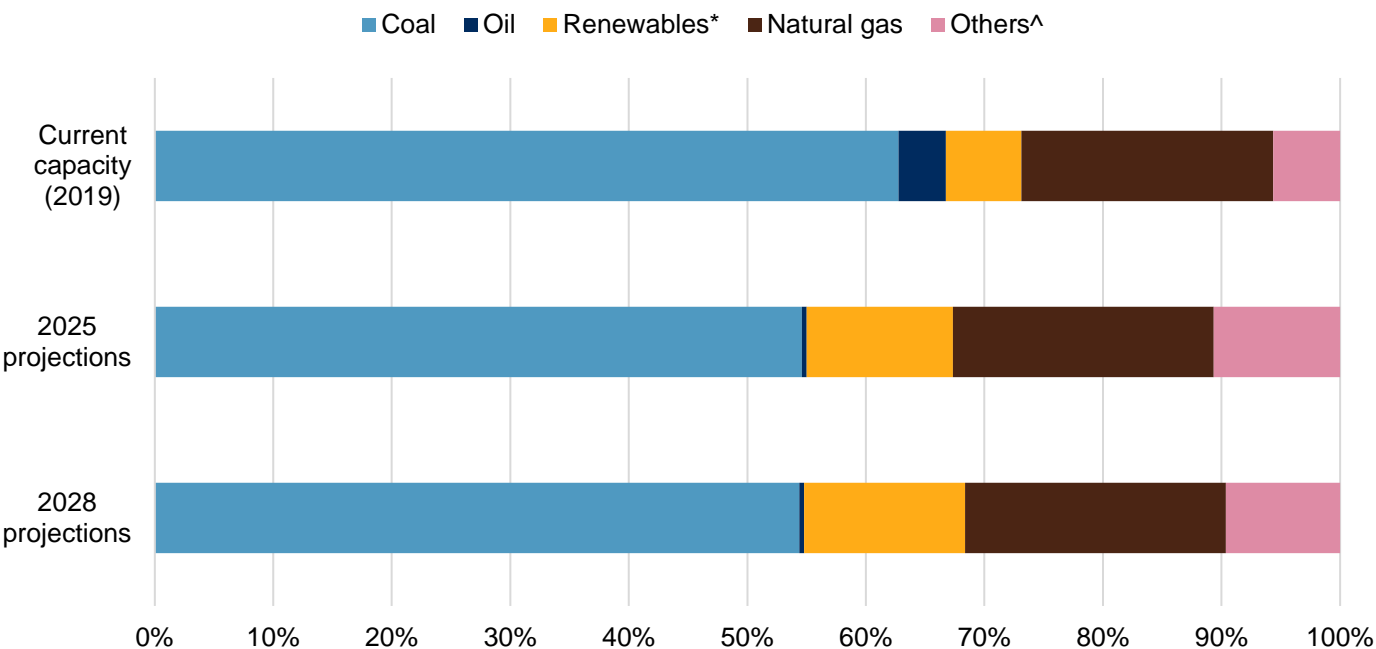
# Overview | No Clear Path To Decarbonizing

- **Energy Mix:** Coal and natural gas will maintain 75% share of generation mix until 2028, with coal at more than 50%.
- **Coal:** Availability of high-quality coal domestically at low costs to delay energy transition.
- **Emissions:** CO<sub>2</sub> emissions will continue to rise due to overdependence on fossil fuel.
- **Investments:** Likely to taper as the country achieves 100% electrification and focus shifts to network strengthening. Total investments in renewables to be US\$41 billion until 2025.
- **Policies:** Renewables face policy disadvantage, with a need to be at least 15% cheaper than domestic grid prices.
- **Credit Impact:** Subsidized electricity and lack of transition measures to increase environment, social, and governance risks, and funding costs for fossil fuel majors such as Perusahaan Perseroan (Persero) PT Perusahaan Listrik Negara.

# Generation Mix--High Fossil Fuel Dependence To Continue

Little success is likely in Indonesia's efforts to reduce reliance on fossil fuel

Target Evolution Of Indonesia's Generation Mix



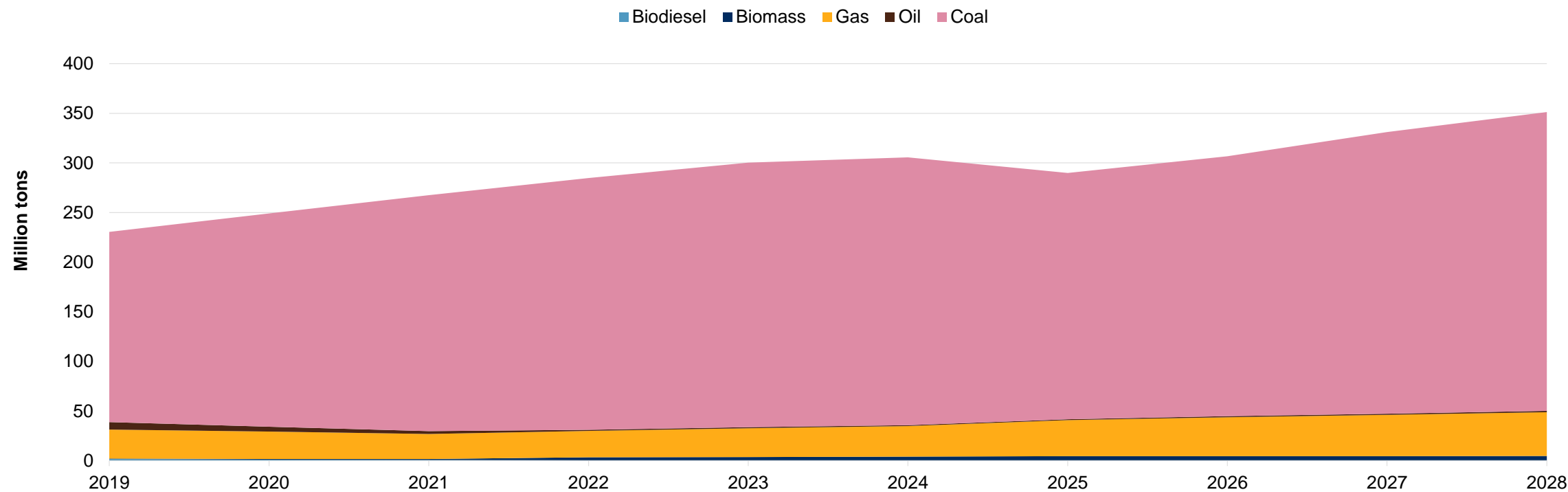
- Coal will account for more than 50% of generation by 2028 and together with natural gas together dominate the energy mix with more than 75% contribution.
- Indonesia, as an archipelago, will continue to target 100% electrification and grid strengthening.
- Growing economy and population will further support growth in energy demand to 1.7x by 2028.

*\*Includes hydro, solar, wind. ^Mainly geothermal and biomass. Source: RUPTL 2019-2028.*

# Environment--Emissions Are Unlikely To Reduce

Carbon dioxide emissions could rise as Indonesia prioritizes electrification over transitioning to renewables

Contribution To Carbon Dioxide Emissions By Fuel Type From 2019-2028

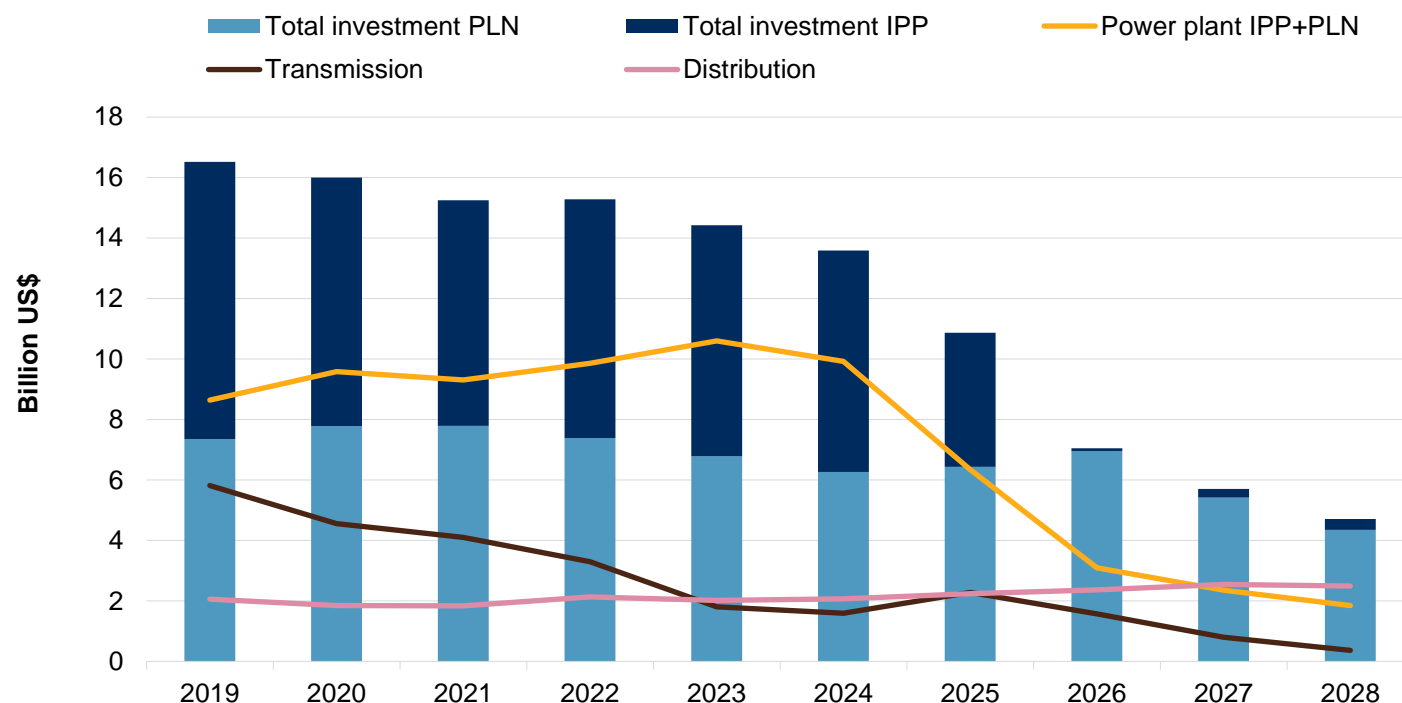


Source: Perusahaan Perseroan (Persero) PT Perusahaan Listrik Negara

# Investments – A Decline Is On The Cards With Maturing Network

Investments expected to fall in line with lower capacity additions over time

## Breakdown Of Investments By PLN And IPPs



Source: Perusahaan Perseroan (Persero) PT Perusahaan Listrik Negara.

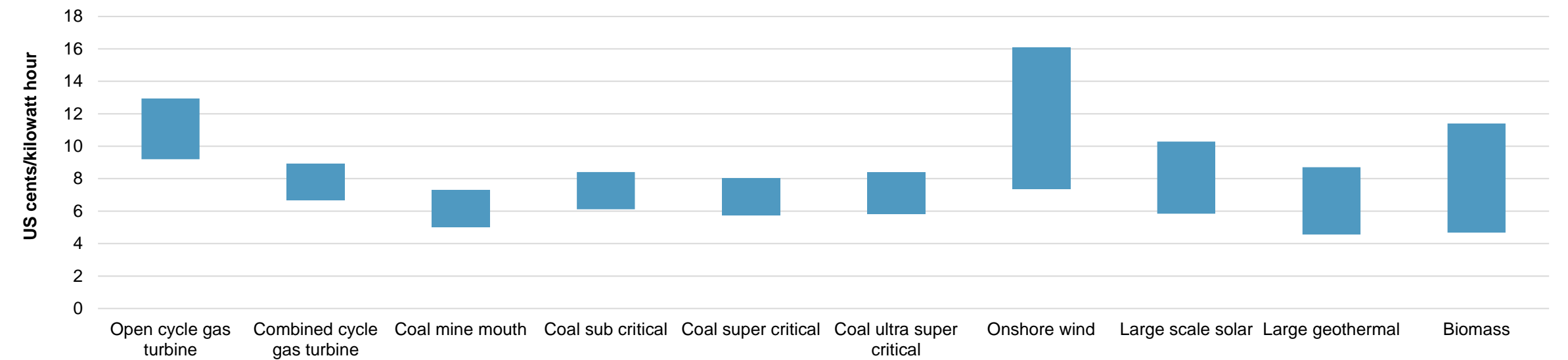
- Investments remain heavily dependent on Perusahaan Perseroan (Persero) PT Perusahaan Listrik Negara (PLN).
- Investments by independent power producers (IPPs) may undershoot.
- Investments on renewables to be about US\$41billion by 2025 to reach 17.4 gigawatts of renewables capacity.
- High dependence on geothermal energy to drive investments in renewables.

# Economics--Cheaper Coal, Policies Will Delay Energy Transition

Levelised cost of electricity generation (LCOE) of fossil fuels and traditional sources of energy remains key to a switch to renewables

- Coal is cost competitive and such benefits will delay energy transition.
- Subsidized electricity prices make adoption of higher-cost renewables more challenging.
- Policy requirement for renewables to have 85% cost of current grid prices is a big hindrance.

LCOE Ranges By Energy Source In Indonesia



Source: Institute for Essential Services Reform (IESR), Agora Energiewende, 2019.

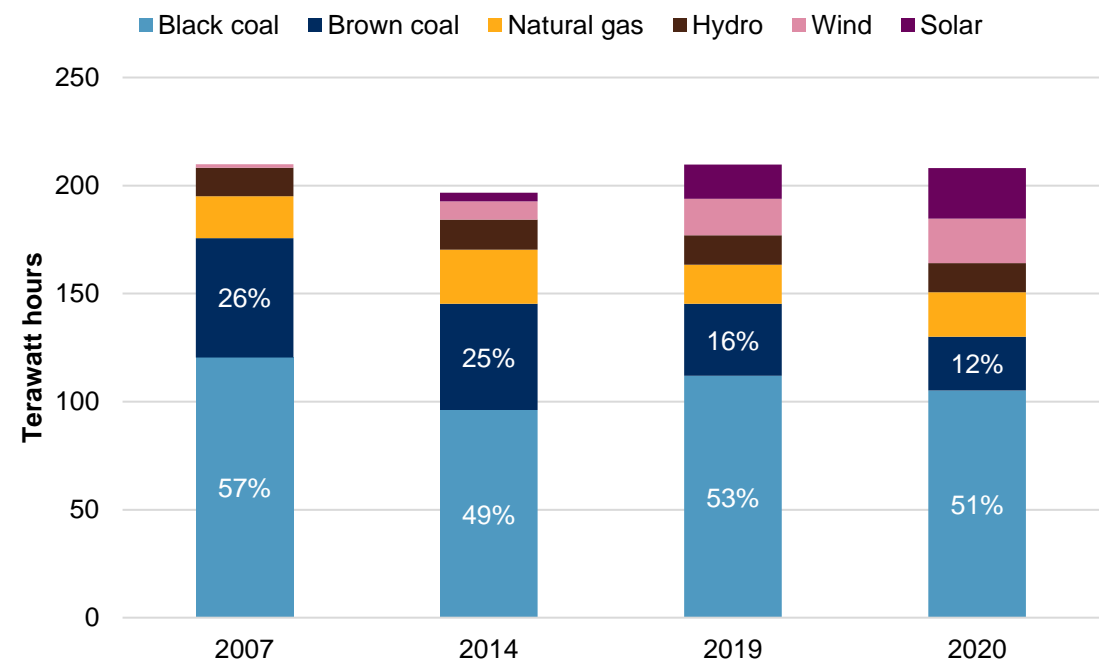
# Australia And New Zealand

## Contrasting Developments

# Australia Generation Mix: Cautious Transition Likely

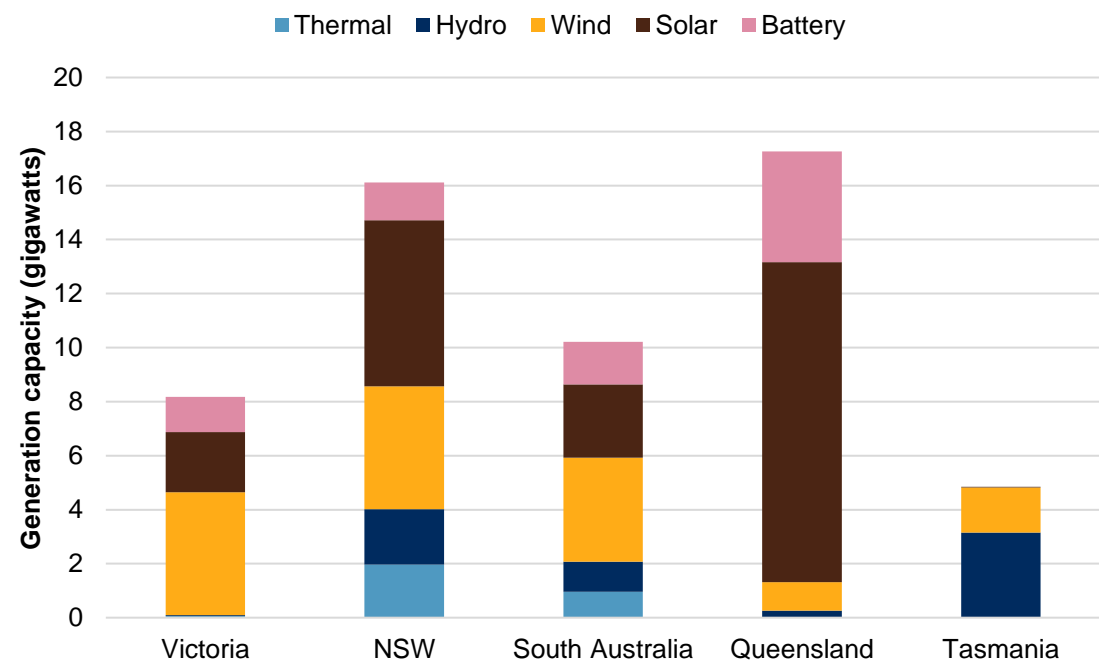
- Coal accounts for a high proportion of generation in the National Electricity Market (NEM).
- Proposed projects are mainly solar and wind, many with battery combination (excludes roof top solar)

Current Electricity Generation By Fuel Source



Source: AEMO, AER, CE.

Proposed New Generation Projects Across NEM



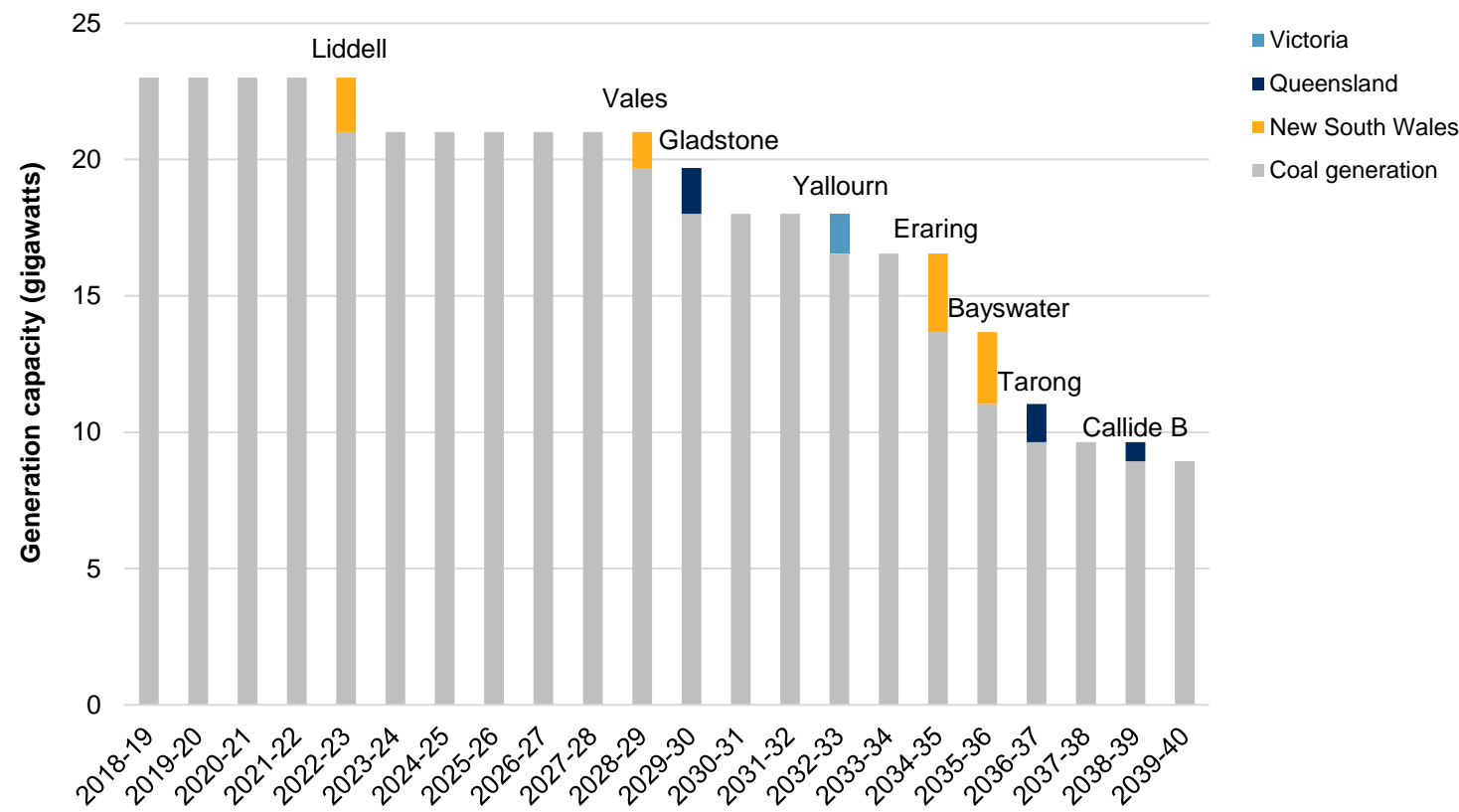
Source: AEMO 2020.



# Australia – Retirement Of Coal Plants Will Accelerate

## Market and system planning reforms could help the transition

Australia's coal-fired generation fleet's operating life is aging

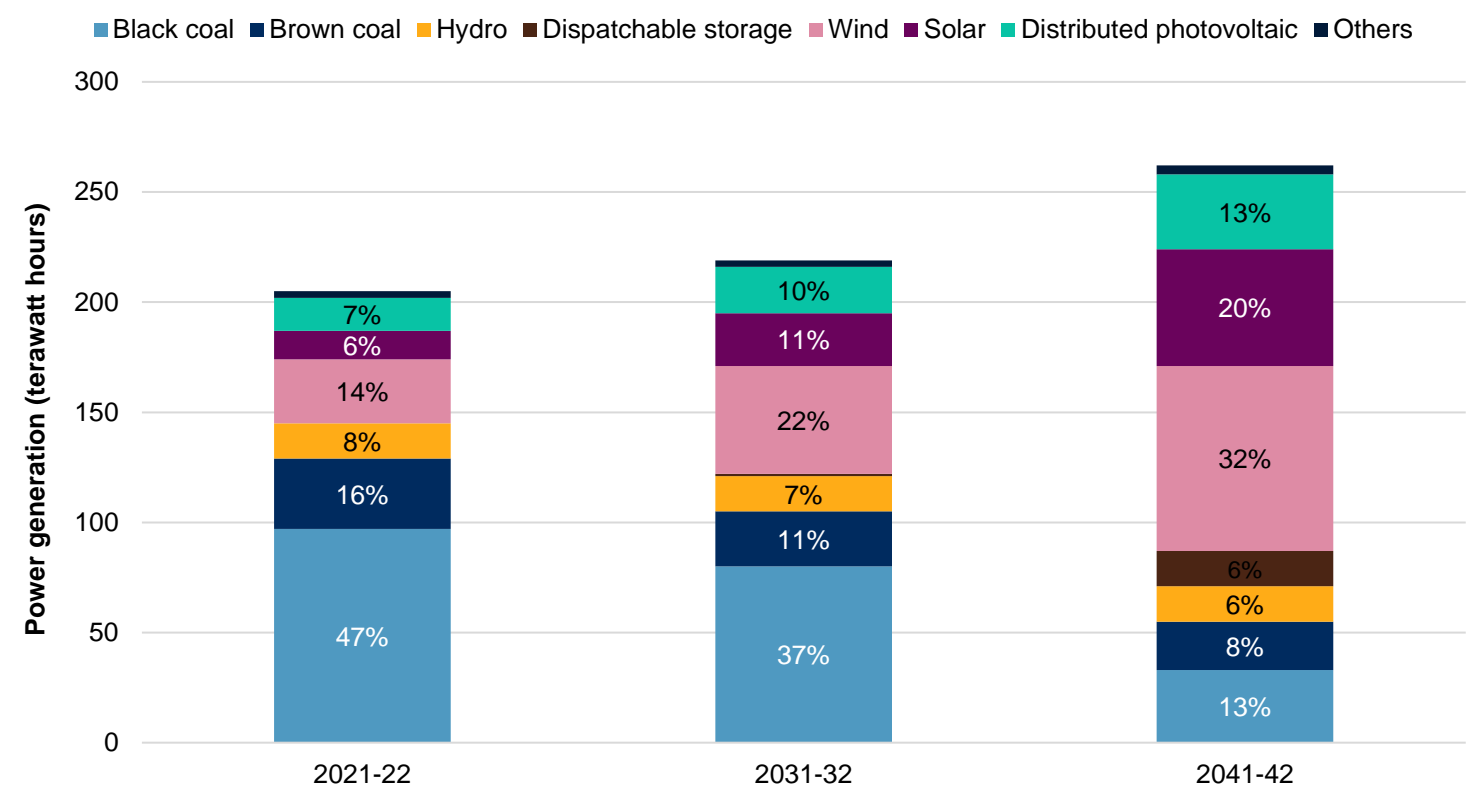


Source: AER 2019.

- Profitability of coal plants is reducing since early 2019, with strong growth in renewables depressing power prices.
- Coal fleet will retire much faster than scheduled; with phased retirement for some as early as 2028 (Yallourn)
- Heightened challenge for market operator and governments to ensure system stability and reliability.
- Closure will bring forward site remediation obligations for fossil fuel generators.

# Australia: Technology To Power Transition

## Changes In Technology Will Dictate Timing Of Billion-dollar Investment In Networks

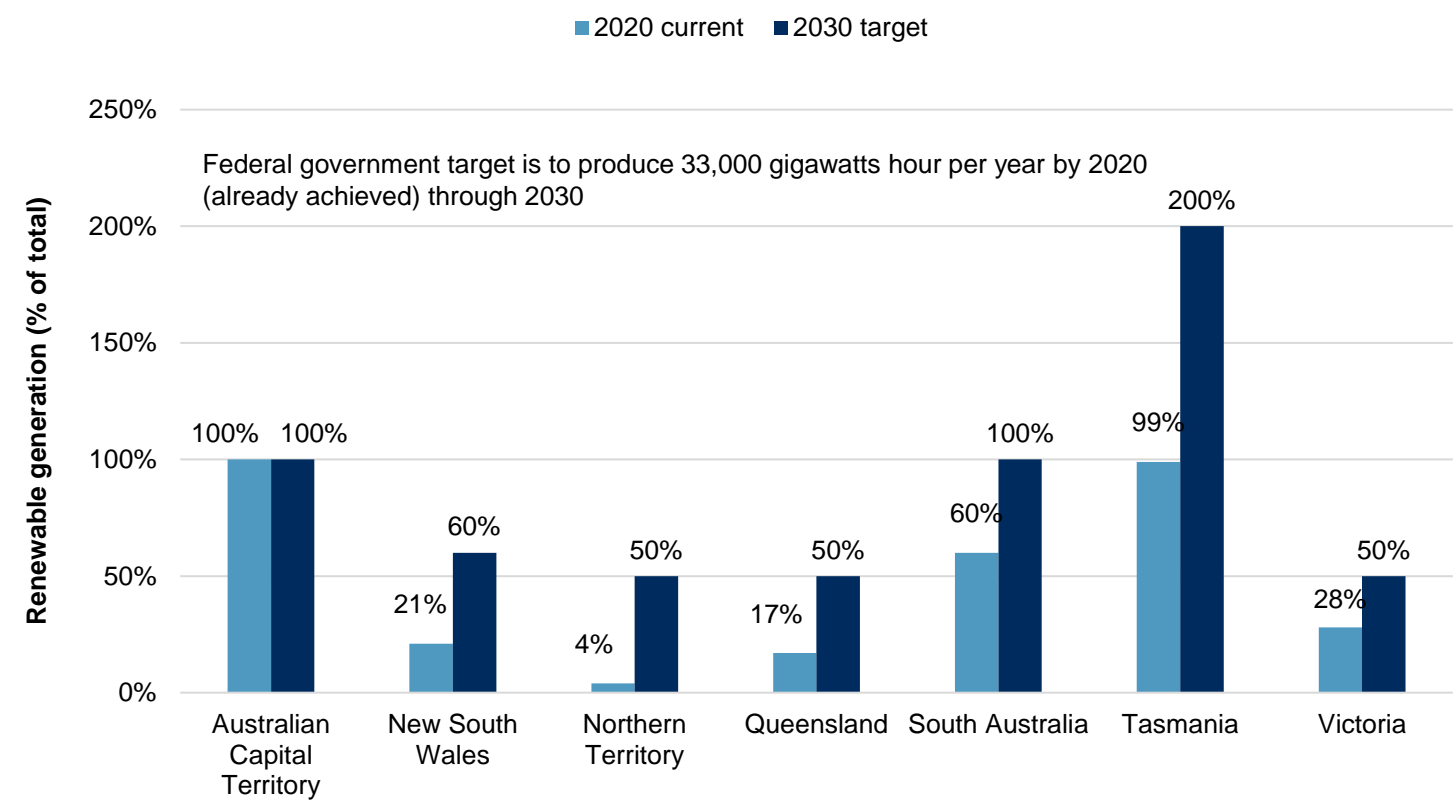


Source: AEMO 2020 ISP.

- Outcome will be dynamic and subject to technological developments and costs.
- 2030-2040 is likely to see rapid change; with share of coal power reducing
- Need and pace for network investments will vary; but will it keep pace?
- 18 major network projects across the eastern market by 2040; three by 2026, and seven by mid-2030.
- Gas likely to remain a bridge fuel.

# Australia: Slack Policies Hurt Investments

## Current State Policies On Renewable Targets



- Absent and unclear long-term federal policies have hit economic investments and planning.
- This has led to varied state-based policies.
- Poor policy co-ordination and targeted goals affected new investments, reforms, and pace of network investments.
- Will network constraint become Achilles's heel for the transition pathway?
- Investor sentiment in renewables are at risk because network issues have hit a few large projects over the past two years.

Source: Clean Energy Councils 2021 Annual Report.

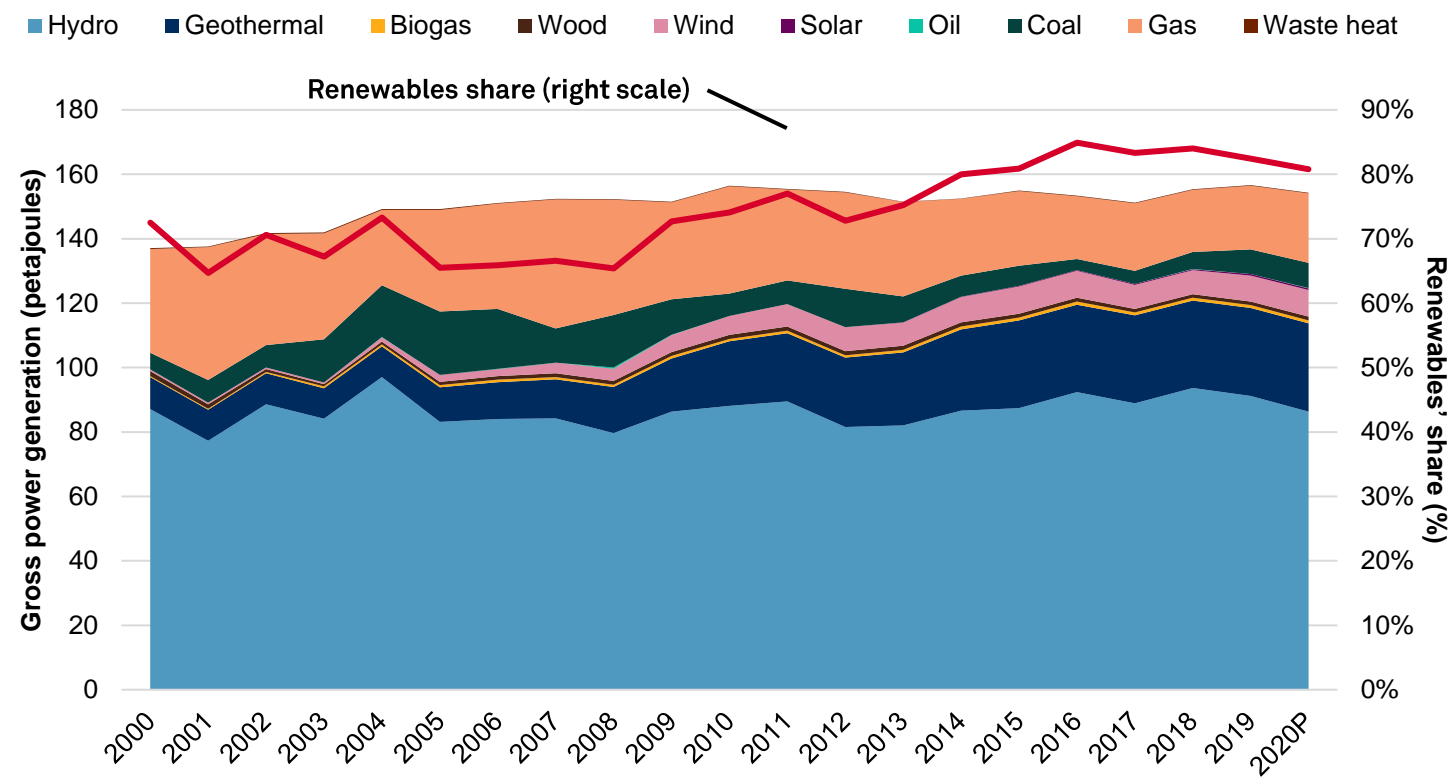
# Australia: Some Pain And Some Opportunities

- Cash flow pain for integrated generation companies-retailers because renewables have curbed on power prices
  - More risk to coal-based generators, but a diversified portfolio may reduce the pain.
  - Portfolio of main players is likely to look quite different in a few years.
- Gas to remain a bridge fuel to support the transition;
  - Forecast gas shortage and escalating costs can affect profitability.
- Curtailments due to network constraints is a key risk for investments in renewables.
- Billion-dollar network projects are needed to support renewables. Will regulatory approvals and risk-returns be fast and supportive? Could cost to end consumers increase despite lower power prices?
- Hydrogen is not currently in the scenarios; but it will be a likely contender over the next decade, subject to costs and economics. Various pilot projects are being funded and tested.

# New Zealand: Rising Share of Renewables

New Zealand is comparable to Scandinavian countries due to its hydro plants; supplemented with Geothermal

Power generation mix in New Zealand



P—Provisional. Source: New Zealand Ministry of Business, Innovation and Employment.

- Target net zero carbon emission by 2050
- Lift Renewable energy to 95% by 2025 and 100% by 2030
- Operative emissions trading scheme to meet policy targets
- Variable hydrology is a risk; but managed by a portfolio of geothermal plants
- New geothermal and wind projects underway will slowly displace the thermal units mainly for reliability needs.

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# Related Research

- China's Climate Ambition, Restrained By Supply Security, April 19, 2021
- The Energy Transition And The Diverging Credit Path For European Utilities, Feb 16, 2021
- Energy Transition | How Far Off Is The Hydrogen Economy?
- The Energy Transition And COVID-19: A Pivotal Moment For Climate Policies And Energy Companies

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