

# New Coal-fired Power Plants in India: Reality or Just Numbers?

## *New Coal Capacity Additions Face Major Stranded Asset Risk*

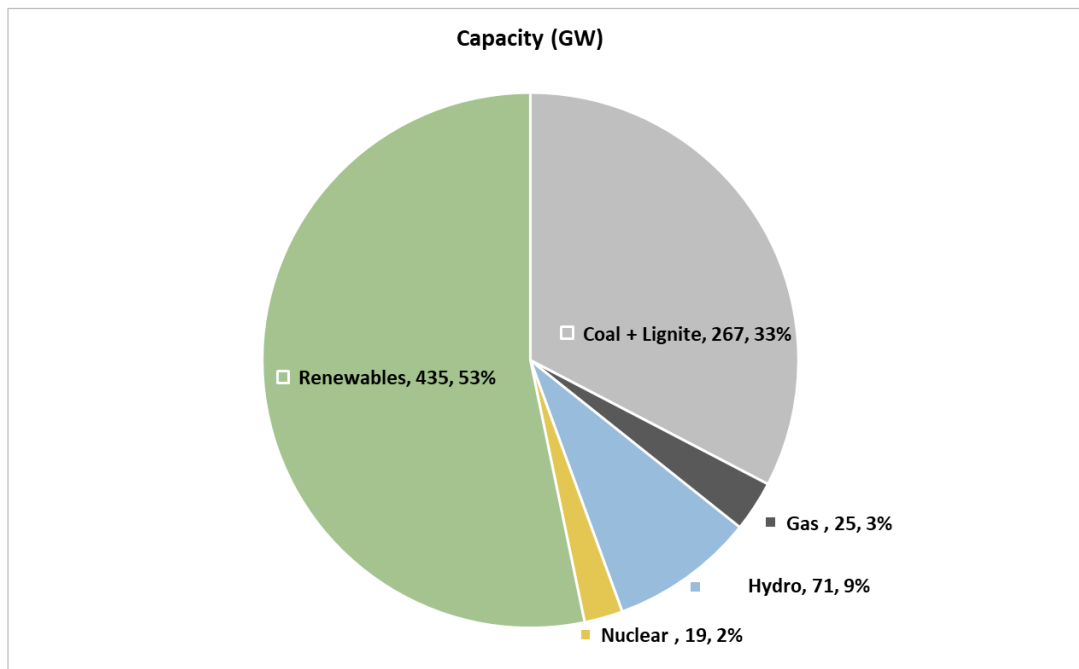
### Introduction

India has a total of 209.2 gigawatts (GW) of coal-fired capacity (including lignite) as of March 2021. This forms 55% of the total installed capacity and 71% of the total power generation.

India's new draft National Electricity Policy<sup>1</sup> mentions the addition of new coal-fired capacity into the generation mix, although it does not provide details of the amount of capacity to be added. However, in the past few years various government studies have provided projections for India's power generation mix.

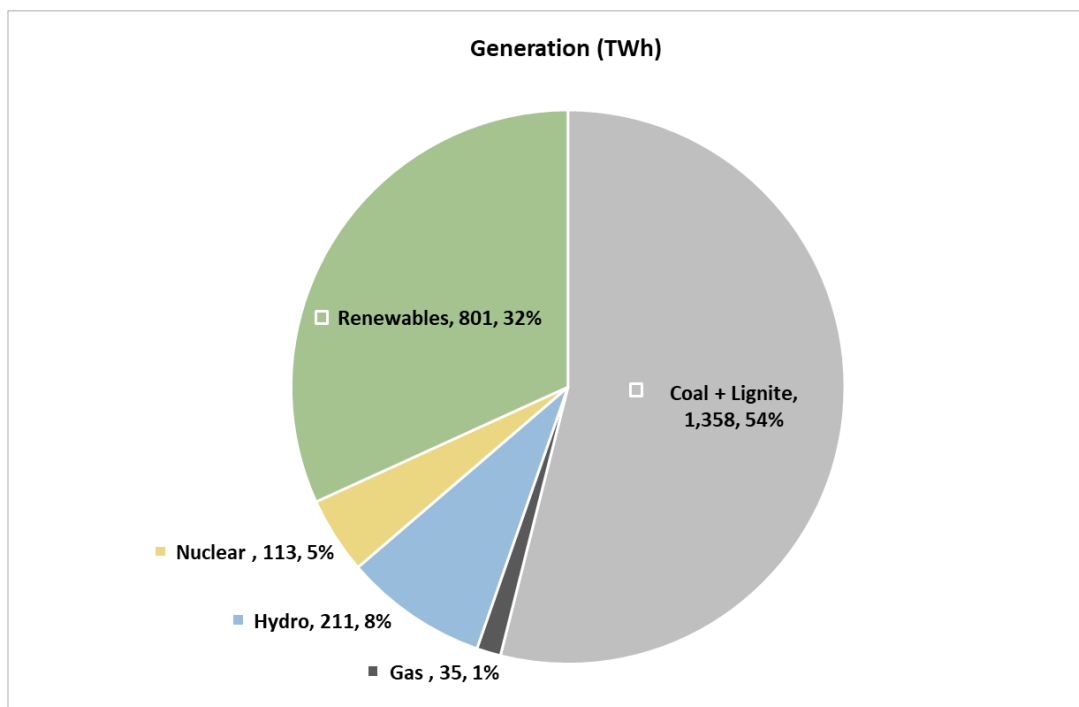
The Central Electricity Authority's (CEA) January 2020 report on optimal generation mix projects India's total coal-fired capacity to be 267GW by the end of FY2029/30 and to form 33% of the total capacity and 54% of the total generation.<sup>2</sup>

**Figure 1: CEA's Projected Capacity & Generation Mix by FY2029/30**



<sup>1</sup> Ministry of Power. Inviting suggestions on draft NEP 2021. April 2021.

<sup>2</sup> CEA. Report on Optimal Generation Capacity Mix For FY2029/30. January 2020.



Source: CEA.

Note 1: Hydro includes ~11GW pumped hydro generation capacity.

Note 2: CEA also models battery storage capacity of 27GW/108MWh by 2030.

Reaching the CEA's optimal generation mix projection of 267GW of coal-fired capacity by FY2029/30 would require 58GW of new capacity additions in the coming 9 years—roughly 6.4GW annually.

According to Global Energy Monitor's Global Coal Plant Tracker's (GCPT) data from January 2021, there was 36.6GW of coal-fired capacity under construction. Of which, 3.5GW was commissioned in the last quarter FY2020/21 (January to March)—leaving 33.1GW of coal-fired capacity now under construction.

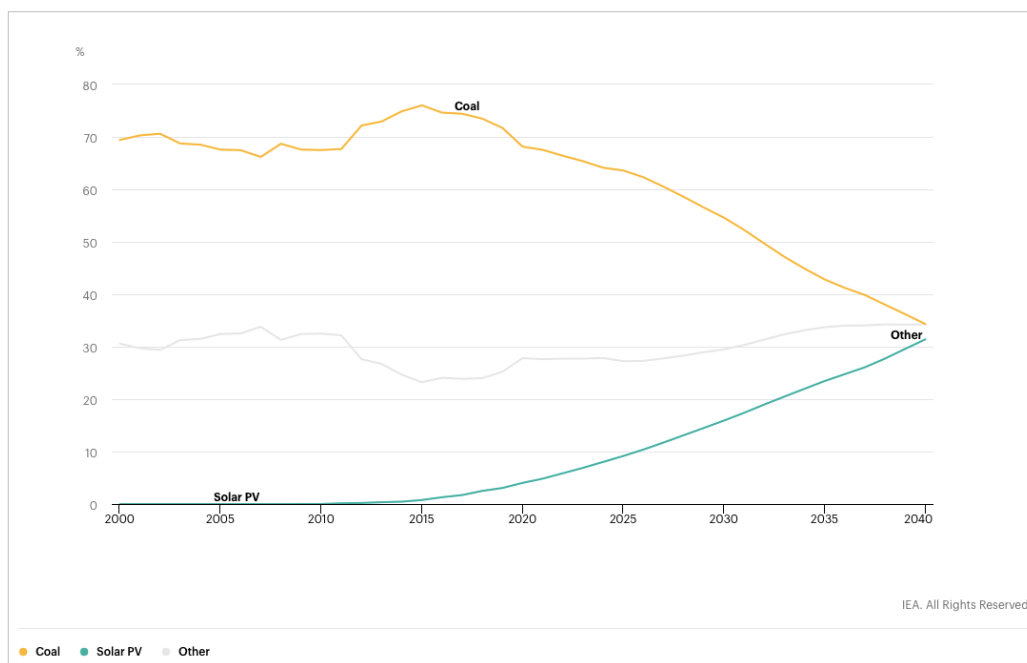
In this note we review and discuss the viability of these under-construction coal-fired power plants and evaluate the associated stranded asset risk in building additional coal-fired capacity in India's electricity system.

### 'Peak Coal' in India Before 2025

The International Energy Agency (IEA) in its latest India Energy Outlook 2021 projected a rapid decline in coal's share of Indian power generation by 2040. It suggests that coal's current 68% share (calendar year 2020) will drop to 34% by 2040, whilst solar will gain a 31% market share up from 4% as of 2020 (refer to Figure 2).<sup>3</sup>

<sup>3</sup> IEA. *India Energy Outlook 2021*. February 2021.

Figure 2: Coal vs Solar: Share in India's Power Generation 2010-2040



Source: IEA.

Both the IEA and IEEFA see coal-fired power generation in India peaking before 2025. Further, the IEA's analysis<sup>4</sup> suggests that an accelerated surge in India's clean energy investment could see it peak sooner.

The growth in India's renewable energy capacity has slowed down in the last two years due to the ongoing COVID-19 pandemic and various short-term policy headwinds in the sector. However, with market economics in favour of ultra-low cost renewables, we believe the sector could attract increasing amounts of domestic and global capital when the pandemic subsides.

### Coal Capacity Growth at Snail's Pace

If the last four years are any indication, 58GW of new coal-fired capacity additions – net of closures – are highly improbable given the continued financial and operational stress in India's coal-fired power sector.<sup>5</sup> In the four years to FY2020/21 India added 5GW, 3.4GW, 4.3GW and 4.1GW of net new coal-fired capacity annually.

A flattening of electricity demand growth for two consecutive years (0.5% in FY2019/20 and -0.3% in FY2020/21)<sup>6</sup> has been another impediment to the performance of the existing coal-fired generation fleet. Utilisation rates have remained unsustainably low at below 60% for the last four years. Adding more

<sup>4</sup> IEA. [India Energy Outlook 2021](#). February 2021.

<sup>5</sup> IEEFA. [Seriously Stressed and Stranded](#). December 2019.

<sup>6</sup> POSOCO .

base-load capacity will further cannibalise the utilisation rates of the existing coal-fired generation fleet.

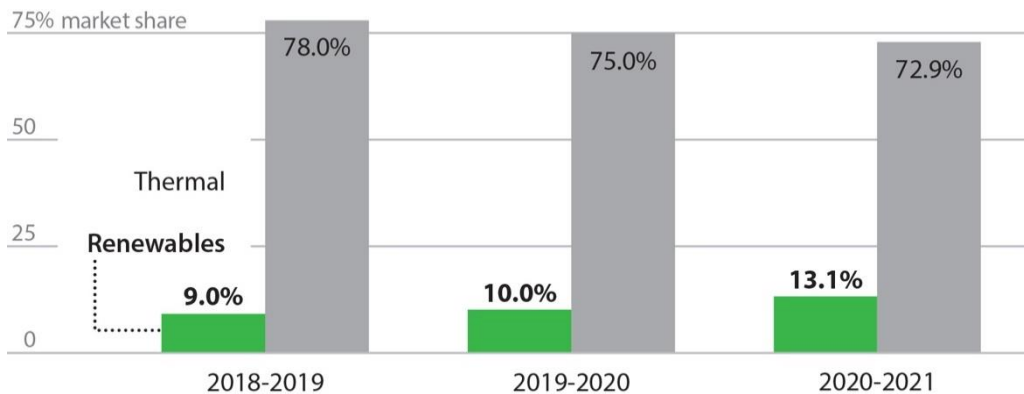
Moreover, availability of ultra-low cost renewables in the range of Rs1.99-2.36/kWh (US\$27-31/MWh) versus domestic coal-fired tariffs of Rs3.50-5.00/kWh means that renewables will absorb a significant share of the incremental demand. In FY2021, the decline in electricity demand impacted coal the most. Coal and lignite year-on-year (YoY) generation was down by 1.1% and 17.5% respectively, whilst YoY variable renewable energy generation was up 3.3%.<sup>7</sup>

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incremental demand.**

**Figure 3: Coal vs Renewables Market Share FY2018/19 – FY2020/21**

**India's Energy Mix Sees Gains in Renewables**

Renewables eat into market share of coal-fired generation.



Sources: CEA, Carbon Copy, GEM, IEEFA estimates.

Figure 3 illustrates the continuing shift in India's generation mix with renewables steadily gaining market from the coal-fired generation fleet. (Please note that the generation shares are based on fiscal year data).

In the European Union, renewables have already overtaken thermal power generation. During the 2020 calendar year, renewables formed 39% of the EU's total generation overtaking thermal power generation at 38%.<sup>8</sup>

There is increasing discussion about whether India should commit to a net zero emissions target by 2050 following carbon neutrality pledges by China, South Korea, Japan, Canada, Chile, Spain and the European Union (EU) and others. A study by

<sup>7</sup> Carbon Copy.

<sup>8</sup> EMBER. [Europe's Power Sector in 2020](#).

CEEW suggests that India needs a 55-fold increase in its renewable energy capacity to achieve a 2050 net zero target.<sup>9</sup>

### Reviewing India’s Coal-fired Capacity Pipeline

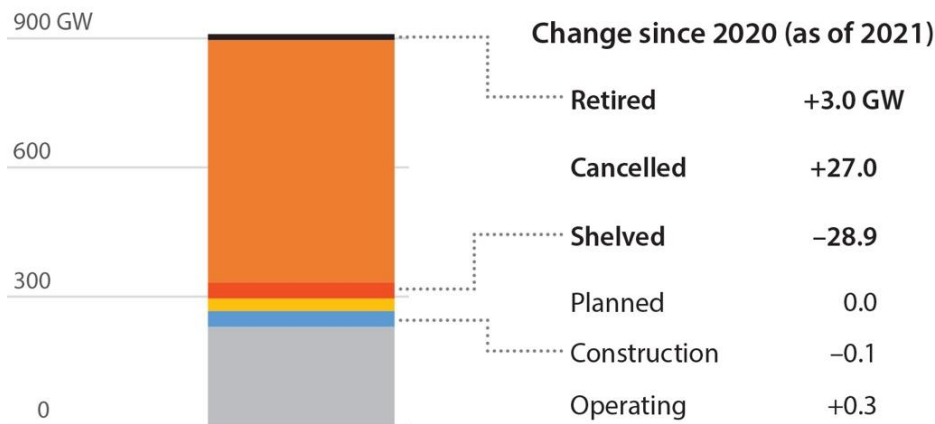
According to Global Energy Monitor’s (GEM) data no new Indian coal-fired power plants were announced in the last 12 months. Moreover, there has been no movement in the 29.3GW of pre-construction (announced + pre-permitted + permitted) project pipeline in the last 12 months.

This is an indication of the lack of availability of financing for new coal-fired power projects and/or demand for additional power by Discoms. The continued financial distress in India’s power distribution sector makes thermal power purchase agreements (PPAs) even more unbankable, absent long-delayed distribution sector reforms.

**There is a lack of financing for new coal power projects and demand for additional power.**

**Figure 4: India’s Coal-Fired Power Project Pipeline**

Coal project cancellations grow and future projects decline.



Source: Global Energy Monitor.

Note: GEM’s data also accounts for some of the above 30MW captive capacity.

<sup>9</sup> CEEW. [Renewables in Electricity Must Increase 55-fold for India to Achieve Net-zero Emissions by 2050](#): CEEW. March 2021.

GEM's data shows more than 601GW of coal-fired power projects have been cancelled in the last decade in India.

With the persisting structural issues in India's coal-fired power sector there is no appetite from international or domestic investors, apart from state-owned Power Finance Corporation (PFC) and Rural Electrification Corporation (REC),<sup>10</sup> to risk capital in a sector that continues to carry US\$40-60 billion of non-performing assets.

Recently, the G7 nations, along with several other EU countries, agreed to stop financing international coal power projects by the end of this year.<sup>11</sup> While the G7 announcement does not have any direct implications for India as international financing for coal-fired power projects has already dried up, it is another indication that the world is increasingly serious about reaching the Paris Agreement target of limiting global warming to 1.5-2.0°C – particularly because it follows a significant ratcheting up of ambition, led by the U.S. under President Biden and China, Japan and Korea.

### *33GW of Additional Under-Performing Assets*

According to GEM's data, there is 33.1GW of coal-fired capacity currently under construction (see Table 1). NTPC and NLC India Ltd (NLCIL), both Government of India-owned entities, have 11.7GW of capacity under construction.

In the last three fiscal years NTPC has commissioned a total of 9GW (2.6GW in FY2018/19, 2.8GW in FY2019/20 and 3.6GW in FY2020/21) and retired 1.2GW of end-of-life capacity during the same period.

In September 2020, the Indian government-owned thermal behemoth, NTPC, announced that it will not be pursuing any new greenfield development of coal-fired power projects.<sup>12</sup>

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On the other hand, NTPC has a target of installing 32GW of renewable energy capacity by 2032. It currently owns 1.3GW of solar and wind capacity with another 2.4GW under development. NTPC also has a mega plan to build a 5GW solar-plus-wind hybrid renewable energy park in the Kutch region of Gujarat. NTPC has reportedly identified a suitable area of land for the project.<sup>13</sup>

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<sup>10</sup> IEEFA. [India's Power Finance Corporation Continues to Fund Non-Performing Coal Assets](#). April 2020.

<sup>11</sup> Financial Times. [G7 agrees to stop overseas funding of coal to limit global warming](#). 21 May 2021.

<sup>12</sup> ET Energy World. [NTPC stops land acquisition for greenfield coal-based power projects](#). 27 September 2020.

<sup>13</sup> Financial Express. [NTPC to set up 5,000-MW ultra mega solar park in Gujarat, Rajasthan](#). 20 August 2020.

Similarly, the lignite mining giant, NLCIL, with 1.4GW of solar capacity is now transitioning towards a cleaner, low-cost generation fleet.

NTPC and NLCIL are two of the largest government-owned power sector entities. Their ambitious move away from coal is reflective of the country's desire to rapidly transition to a cleaner and cheaper domestic oriented energy economy.

**Table 1: Proponents of India's Under Construction Coal-fired Plants**

Proponent	Capacity (MW)	% of Total
NTPC	9,670	29%
NLC	1,980	6%
State Genco	16,190	49%
Tamil Nadu	5,700	
Telangana	4,270	
Uttar Pradesh	3,960	
Andhra Pradesh	1,600	
Rajasthan	660	
Private	5,245	16%
<b>Total</b>	<b>33,085</b>	<b>100%</b>

Source: Global Energy Monitor, CEA, IEEFA.

### *State Gencos Sponsoring Stranded Assets*

State-owned power generation companies sponsor half of the coal-fired capacity currently under construction. Andhra Pradesh, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh's state generation companies collectively have 16.2GW of coal-fired capacity under construction.

The power supply deficits in these states have dramatically reduced over the last few years. Table 2 lists the power supply positions of the states in which these coal-fired projects are under construction. Apart from Jharkhand, no states have power supply deficits of more than 1%.

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**Table 2: Power Supply Positions in FY2020/21**

State	Supply deficit (%)	Peak supply deficit (%)
Tamil Nadu	0.0%	0.0%
Jharkhand	2.3%	1.7%
Uttar Pradesh	0.8%	0.2%
Telangana	0.0%	0.0%
Bihar	0.4%	1.0%
Chhattisgarh	0.0%	0.0%
Andhra Pradesh	0.0%	0.0%
Odisha	0.0%	0.0%
Rajasthan	0.1%	0.0%

Source: CEA.

In the absence of any material power demand growth, addition of new inflexible base-load capacity will add to the Discoms' burden of fixed capacity charge payments. In our report from August 2020, we highlighted that capacity charges to thermal power plants are one of the biggest contributing factors to the Indian power distribution sector's troubled financial position.<sup>14</sup>

We review two of the projects sponsored by state power generation companies.

### **TANGEDCO's 1.6GW Uppur Thermal Power Plant**

Construction of the Rs12,772 crore (US\$1.7bn) Uppur thermal power project began in July 2016. After a long delay of three years, Tamil Nadu Generation and Distribution Corporation Ltd's (TANGEDCO) website suggests that the power plant will be commissioned in FY2022/23.<sup>15</sup> We expect massive cost overruns on this project due to the delays relative to the contracted gestation period of three years with the engineering, procurement and construction (EPC) contractor, BHEL. A higher tariff will be necessary to obtain a viable return on investment for TANGEDCO which reported a loss of Rs11,964 crore (~US\$1.6bn) in FY2019/20 and Rs12,623 crore (~US\$1.7bn) in FY 2018/19,<sup>16</sup> particularly if this project suffers the same ongoing underutilisation rate of capacity consistently seen by all Indian coal power plants on average in recent years.

### **NTPC's 1.6GW Telangana Super Thermal Power Plant**

NTPC's 1.6GW under-construction power plant is co-located with the operational 2.4GW Ramagundam power plant. The second phase of an additional 2.4GW was shelved due to the long delay in commencing construction of the first phase of the

<sup>14</sup> IEEFA. [The Curious Case of India's Discoms](#). August 2020.

<sup>15</sup> TANGEDCO.

<sup>16</sup> TANGEDCO Financials.



project. Construction on this project began in August 2020.<sup>17</sup>

The power project has been allocated a coal-linkage from a coal mine that is 950km away from the project site. We estimate a tariff increase of Rs1.28/kWh is required solely to cover the additional cost for transporting coal via railway from a mine located at a distance of more than 900km compared to a coal minemouth plant.

Compared to renewables with practically zero marginal generation costs, coal-fired generation with inflationary coal and coal transportation costs is a significantly expensive option for Discoms.

The Commercial and Industrial (C&I) segment is gradually moving to either rooftop solar for captive generation or entering corporate renewable energy PPAs through the open access route. With their most cash-rich and high-paying customers moving off the grid, the Discoms will find it harder to support legacy high power procurement costs. This will result in increased reliance on state-sponsored subsidies.

### *Exiting Earlier Will Be Cheaper*

In IEEFA's view, the state power generation companies should walk away from projects in which construction has not materially progressed to avoid a fully constructed yet idle stranded asset.

Installing new coal-fired capacity will prove economically viable only if it is to replace end-of-life, polluting power plants with outdated combustion technology, and even then only if there is a sufficient plant flexibility to deliver power into periods of peak demand, and if the time-of-day pricing is sufficient to incentivise this lower utilisation higher value strategy.

A number of states such as Maharashtra, Chhattisgarh and Gujarat have announced that they will not pursue new coal-fired power project development.<sup>18 19</sup>

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### *Conclusion*

Coal will remain a significant but waning part of India's power generation mix for decades to come. In IEEFA's view, the capacity requirement for coal needs to be revised. Projecting India's future generation mix requires taking account of the

<sup>17</sup> The Hindu. [NTPC asked to defer phase-II of Telangana power plant](#). 19 May 2019.

<sup>18</sup> QZ. [One of India's largest coal-mining states says it will not build new coal power plants](#). 16 September 2019.

<sup>19</sup> Carbon Copy. [No New Coal Plants For Gujarat, Chhattisgarh](#). 17 September 2019.

financial viability of coal-fired power, based on the ongoing stress in the sector as well as its impact on the state-owned Discoms.

We model that India will continue to add 2-3GW of net new coal-fired capacity annually for another 5-10 years, subject to financing remaining available, which in turn is conditional upon operational viability at a sufficiently high tariff to deliver a return on, and return of, capital. For existing coal plants, the long-delayed enforcement of emissions regulation for coal-fired power plants is likely to be implemented soon. The environment ministry recently extended the timelines for coal-fired power plants to be environmentally compliant to 2024, with plants allowed to meet the deadline in a phased manner depending on their location.

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Plants with space constraints to incorporate emissions control equipment will have to be retired, as noted in the National Electricity Plan 2018. Also, plants that need to be retrofitted to implement emissions control systems are not financially viable and will therefore become candidates for retirement as they will rank lower in the merit dispatch order due to their expensive tariffs. This could accelerate the pace of retirement of end-of-life coal-fired power plants to above the average 2GW annually seen in the last few years, except FY2020/21.

Base-load capacity is becoming an increasingly irrelevant phenomena in modern electricity systems across the globe. India should take advantage of the falling cost of renewables plus rising viability of battery storage, which can provide clean grid-firming, to meet the incremental power demand.

Accelerating India's renewable energy capacity commissioning is critical to support faster electrification of transportation (electric vehicles) and other industries. Ultra-low cost renewables would also enable development of a green hydrogen economy to strengthen India's long-term objective of energy security.

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## About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. [www.ieefa.org](http://www.ieefa.org)

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