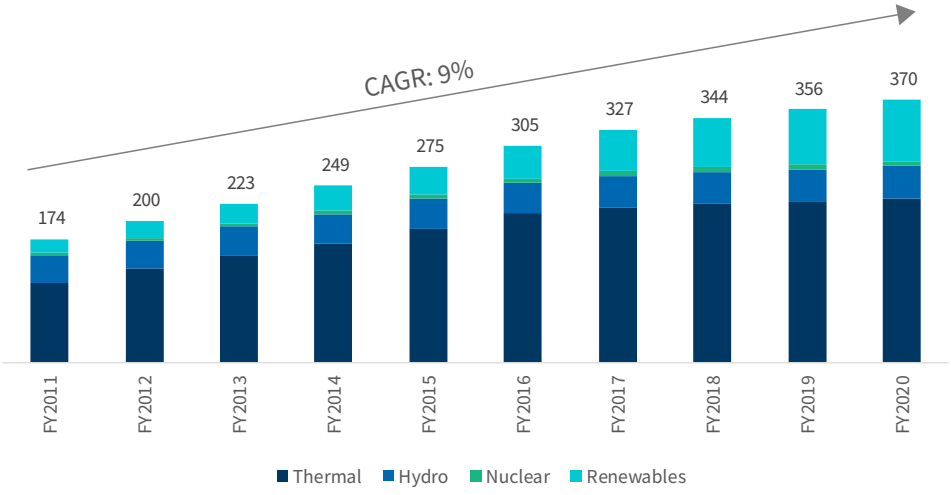
ARTICLE

How and why to value coal-based power plants in 2020

India is the third largest producer and consumer of electricity in the world.[1] The total installed capacity in India has increased from 174 gigawatts ("GW") in fiscal year ("FY") 2011 to 370 GW in FY2020; a compounded annual growth rate ("CAGR") of 9 percent.[2] The growth in installed capacity has led to a reduction in the country's overall power deficit from 8.8 percent in FY2011 to 0.5 percent in FY2020, and subsequently to a projected surplus of 2.7 percent in FY2021.[3]

Figure 1: Installed capacity in India (GW)



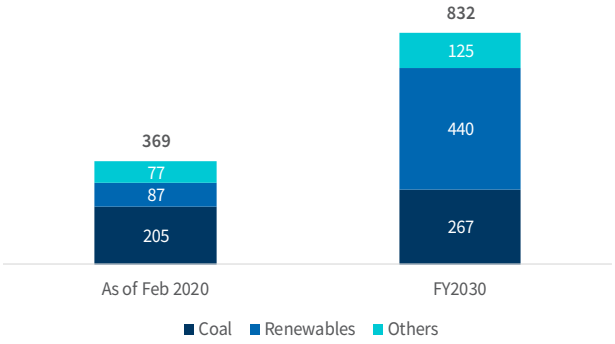
Source: https://powermin.nic.in/en/content/power-sector-glance-all-india; and Report on Short-term Power Market in India FY2019, p4.
Notes: Thermal power sources include coal, lignite, gas and diesel.

1 IBEF Power Sector December 2019.pdf, p3.
2 https://powermin.nic.in/en/content/power-sector-glance-all-india; and Report on Short-term Power Market in India FY2019, p4.
3 Load generation balance report FY2020, p10 and 33 (pdf); and Load generation balance report FY2012, p11 (pdf).

The country's current installed capacity is dominated by coal-based power plants, accounting for about 55 percent (205 GW) of the total capacity.[4] As the shift towards renewable energy gains momentum, the capacity share of coal-based power plants is expected to reduce but nonetheless remain significant at over 30 percent (or 267 GW) in FY2030 (as shown in Figure 2). After taking into account planned retirements of older power plants, India will require an additional 100 GW of new coal-based capacity in the next 10 years to meet its increasing demand.[5,6] Consequently, coal-based generation will remain an integral part of the Indian energy landscape.

Figure 2: Capacity addition in the next 10 years

Total coal-based capacity addition: 60 GW
Planned retirements: 40 to 50 GW
New capacity addition: 100 to 110 GW



Sources: https://powermin.nic.in/en/content/power-sector-glance-all-india; and CEA Optimal Generation Mix report, p14; and IEEFA Seriously Stressed and Stranded report, p3 and 7.

However, for investors, power generation is a risky business. The main sources of risk are the difficulties inherent in valuing power generation assets and the effects of government regulations and actions.

Power generation projects are complex undertakings and require significant time and effort to bring them into production. The process invariably begins with a substantial capital investment in equipment and infrastructure before commercial operations can commence. The construction process can be impacted by delays including on account of factors such as land acquisition and environmental clearances.

On top of that, projects may be prone to volatile commodity price cycles (such as those being seen in the commodities market today) and changes in supply and demand dynamics. Such risks will affect investors' sensitivity to the sector's risks.

Being able to value such assets is critical to both investors and states, whether for the purposes of analysing damages (that may arise from claims being pursued by domestic or foreign investors or for estimating operational losses); ascertaining the value of a power project or company in a transaction; demonstrating feasibility; or preparing capital budgets.

A valuation approach includes a detailed review of available market data, comparable transaction analysis and the construction of an income-based model whenever sufficiently reliable information exists to prepare one. In this article, we look at valuation approaches that might be considered to value power generation assets and projects.

The article is structured as follows:

— First, we briefly describe the value chain of the power sector;

— Second, we review the regulatory and policy landscape in the power sector in India;

— Third, we discuss the current distress impacting the coal-based power generation segment; and

— Fourth, we explain the key value drivers and valuation approaches one might consider to value power generation assets.

4 Includes 7 GW of lignite-based capacity. (Source: https://powermin.nic.in/en/content/power-sector-glance-all-india)
5 CEA Optimal Generation Mix report, p14; and IEEFA Seriously Stressed and Stranded report, pp3 and 7.
6 The estimate of 100 GW is as per the Central Electricity Authority projections prepared in or around February 2019. IEEFA forecasts, prepared in or around December 2019, new additions to be around 70 to 80 GW as of December 2019.

Value chain of the power sector

SEGMENTS	PRODUCTS/STAKEHOLDERS	KEY PLAYERS
Supply of raw materials	Coal, natural gas	Coal India, ONGC, GAIL
Generation	Conventional sources: Coal-based generation and gas based generation Renewable sources: Hydro, solar and wind based generation	NTPC, NHPC, ReNew Power
Transmission	Central level: Inter-state and inter regional networks State level: Intra-state transmission networks	Power Grid Corporation of India
Distribution	Residential, commercial and industrial consumers	MAHAVITARAN, BESCOM, BSES
Power trading	Trading licensees and power exchanges	IEX, PTC India

Figure 3: Value chain of the power sector

In India, coal is used primarily for: electricity generation; as a reducing agent in industries such as steel and sponge iron;[7] and as fuel or raw material in other industries such as cement, fertilisers and chemicals.[8] On an average, around 80 percent of domestically produced coal and 25 percent of imported coal is consumed for power generation.[9,10] The rest is consumed for energy and non-energy purposes described above.

The power sector consists of various vertically integrated activities that form its value chain. These activities can be summarised as: supply of raw materials; generation; transmission; distribution and trading of electricity (illustrated in Figure 3). The figure also lists the major players engaged in the various activities in India.

We explain each activity in summary form below:

— **Supply of raw materials:** Coal and natural gas are the two main commodities used for conventional power generation in India. The government owned entity, Coal India Limited ("CIL"), accounts for over 80 percent of India's domestic coal production. Most power producers typically sign a fuel supply agreement ("FSA") with CIL or one of its subsidiaries to establish a coal linkage to help ensure consistent supply of coal for power generation. In addition, coal can also be procured on a spot or short-term basis through the e-auction market.

— **Generation activities from conventional and renewable sources**:[11] Conventional generation primarily comprises of coal and natural gas-based generation while renewables-based generation includes hydro, solar and wind-based generation. Power generation is a delicensed activity, i.e. a developer may establish, operate and maintain a generating unit without obtaining a licence. The private sector

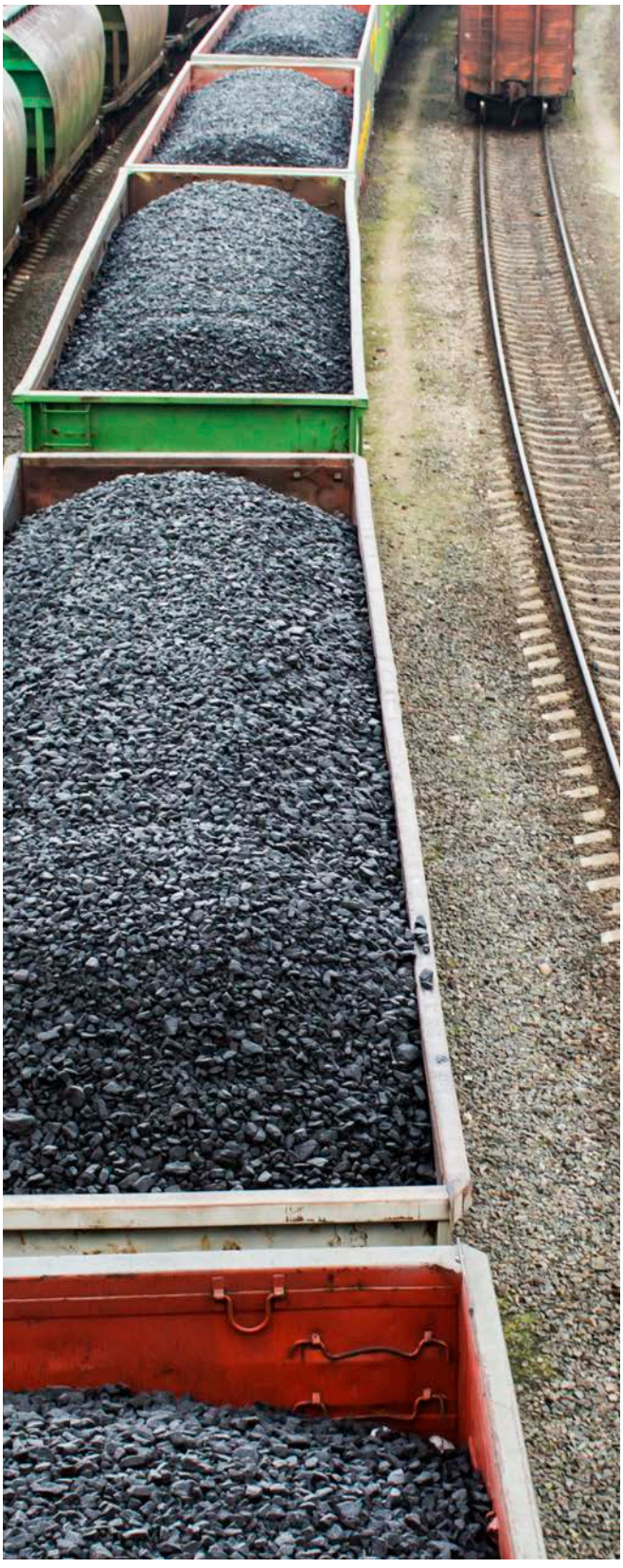
7 Coking coal is used in steel industry whereas non-coking coal is used in sponge iron industry.
8 Includes various pre-project activities based on coal to chemicals initiatives undertaken by the government.
9 Includes coking coal production and imports.
10 Ministry of Power FY2019 annual report, p6; and Ministry of coal FY2020 annual report, p64.
11 Power generation in India also includes atomic energy.

accounted for 47 percent of the total installed capacity in India as at July 2020.[12,13]

— **Transmission activities:** Electricity transmission is a licensed activity and transmission systems are divided into interstate and intra-state transmission networks. The intra-state networks are owned and maintained by state utility companies while inter-state and inter-regional networks are primarily owned and operated by the state-owned Power Grid Corporation of India Limited.

— **Distribution activities:** The distribution segment is responsible for supply of electricity to the final consumers – industrial, commercial and residential – and is principally carried out by state-owned distribution companies ("DISCOM"). The sale and distribution activities are covered by a single licence. DISCOMs purchase power from producers in three forms: under long-term agreements (10 to 25 years), under medium-term arrangements (three to seven years) and/or on a short-term basis (less than one year). For long- and medium-term purchases, DISCOMs enter into power purchase agreements ("PPA") with the generation companies. For short term power purchases, DISCOMs typically use the two established power exchanges – India Energy Exchange Limited or Power Exchange India Limited.

— **Trading:** Trading involves sale of electricity (from generating stations or distribution licensees) to consumers, facilitated by traders such as Power Trading Corporation or the two power exchanges. Trading can be executed as a bilateral transaction between two parties or as a collective transaction involving simultaneous bidding between multiple buyers and sellers.



12 However, the construction of generation facilities is subject to obtaining a number of approvals from the relevant state, central and statutory authorities.

13 https://powermin.nic.in/en/content/power-sector-glance-all-india.

Regulatory landscape

The power sector in India – as in many other countries – is quite regulated. The Electricity Act 2003 consolidated various laws and provisions governing the electricity sector and introduced key reforms which included the delicensing of the majority of generation activities, constituting regulatory commissions at state and central levels and promoting captive generation.[14]

The actors

The Ministry of Power ("MoP") is responsible for formulating, accepting, implementing and reviewing various policies across the power sector. It does so in consultation with various state governments and the Central Electricity Authority ("CEA").[15]

The MoP also publishes the National Tariff Policy with the stated objective of ensuring reliable supply of electricity to consumers at reasonable and competitive rates, creating adequate capacity and maintaining financial strength of the power sectors.[16]

The CEA principally serves as the technical advisory body to the MoP. The CEA's stated objectives include: preparing the National Electricity Plan ("NEP") every five years which covers short term and long term demand forecasts, analysis of capacity addition, fuel choices, funding requirement and availability of technology;[17] specifying technical standards and safety requirements for construction of power plants; specifying grid standards for operation and maintenance of transmission lines; and promoting and assisting in the timely completion of schemes and projects.[18]

14 https://www.lexology.com/library/detail.aspx?g=72d8a27b-af85-4a0e-ab46-dc4928a6d4f9.
15 https://powermin.nic.in/en/content/responsibilities.
16 Ministry of Power notification dated 30 May 2018.
17 National Electricity Plan dated January 2018, p16 (pdf).
18 Ministry of Power FY2019 annual report, p75.

The latest NEP notified in January 2018 aims to increase the share of renewable energy in India, improve efficiency of coal-based generation units and reduce overall CO_2 emissions.[19]

Downstream of the MoP and the CEA are the regulators – Central Electricity Regulatory Commission ("CERC") and the various state electricity regulatory commissions ("SERC"). Their activities include formulation of power tariff setting mechanisms, regulation of tariffs, issuances of licences, adjudicating on disputes in the sector and encouraging investments in the sector.[20]

Pricing

The majority of power is procured in India through long-term PPAs, wherein the tariff is principally set through competitive bidding, or occasionally through the negotiated route.

Under the former, competitive bidding mechanism, the applicable tariff is discovered through a competitive bidding process arranged by the relevant electricity regulatory commission for one or more DISCOMs with the lowest bidder being awarded the contract.

The bid is analysed into two components – a fixed charge and a fuel charge.[21,22] The latter includes cost of the primary fuel (e.g. coal) and secondary fuel (e.g. furnace oil), and is treated as a pass through.[23] The payment of the fuel charge is on an actual basis, i.e., based on the electricity actually produced and dispatched and fuel costs incurred.

The former, is expected to compensate the generation company for its other principal investments and costs such as project cost, operating costs (excluding fuel costs) and a reasonable rate of return on the company's investments.

The fixed charge is revised annually to track, albeit to a lower degree, changes in the Wholesale Price Index.[24] In addition, fixed charge is reduced by a factor of 2 percent per annum to account for depreciation of the generation company's assets. The payment of fixed charge is based on the availability of the plant[25], with incentives (damages) for maintaining higher (lower) availability factors.[26]

Under the latter, negotiated route, the tariff is determined by the relevant regulatory commission based on a number of factors such as return on equity, operating expenses and financing expenses as disclosed by the bidding entities.[27,28]

19 https://uk.practicallaw.thomsonreuters.com/w-012-2860?transitionType=Default&contextData=(sc.Default)&firstPage=true&bhcp=1.
20 https://www.lexology.com/library/detail.aspx?g=72d8a27b-af85-4a0e-ab46-dc4928a6d4f9.
21 As per standard bid documents for design-build-finance-own-operate ("DBFOO") and design-build-finance-operate-transfer ("DBFOT") models, released by the MoP in 2013.
22 There are different types of contracts that have nuances around pricing of power and the obligations of the power producer versus those of the procurer. An extensive review of the such topics is outside the scope of this paper.
23 Fuel charge represents landed cost of fuel and includes cost of fuel, transportation cost, washing cost and other related charges. In addition, pass through of fuel costs is subject to appropriate safeguards based on fuel source, transportation and other parameters.
24 For every 10 percent increase (decrease) in the Wholesale Price Index, fixed charge is increased (decreased) by 3 percent.
25 The availability factor of a power plant is the amount of time that a plant is available to produce electricity over a certain period, divided by the total time in the period.
26 Power plants are required to maintain an availability of at least 90 percent.
27 https://www.lexology.com/library/detail.aspx?g=72d8a27b-af85-4a0e-ab46-dc4928a6d4f9.
28 While the statutory option to procure electricity under the negotiated route still exists, the MoP has directed DISCOMs to procure power only under the competitive bidding route, except for the option of using the negotiated route for hydro power projects up to 2022 and waste to energy projects.

Current situation and distress in the sector

The 37th Standing Committee on Energy report released by the MoP in 2018 identified 34 stressed coal-based power plants, with a cumulative capacity of 40 GW (or 11 percent of India's installed capacity) and total outstanding debt of INR 1.74 lakh crores. Out of the total stressed capacity, 24 GW had been commissioned while 16 GW were under construction.[29] Furthermore, of the former, only 66 percent had concluded PPAs and only 45 percent had domestic coal linkages. The various figures are summarised in the below table.

Table 1: Details on PPAs and coal linkages of stranded assets as on March 2018

Item	MW
Commissioned capacity (MW)	**24,405**
PPA status	
with PPAs	16,129
without PPAs	8,279
Fuel supply status	
Linkage available	11,050
Block allotted but under dispute	3,830
Imported coal	1,800
Linkage required	7,725
Under construction capacity (MW)	**15,725**
Total stressed capacity	**40,130**

Source: 37th Standing Committee on Energy Report, p22.

The distress in the segment is attributed to multiple factors, which we discuss in summary form below.

Growth in capacity has recently outpaced demand. The installed capacity in the country has grown at a CAGR of 9 percent over the period FY2011 to FY2020. Demand has also grown, albeit at a significantly lower rate of 3 percent per annum over the same period. In turn, India's power deficit trend had fallen (and even reversed) more recently.[30]

Lower tariffs from renewable sources have impacted margins. Renewable energy tariffs have witnessed a sharp correction due to the introduction of reverse bidding auctions and reduction in costs of solar modules and wind turbines.[31] For example, solar power price fell by c. 85 percent from INR 17 per kilo watt hour ("kWh") in 2010 to around INR 2.5 per kWh in 2019.[32,33] DISCOMs consequently prefer to enter into new 25-year zero indexation renewable energy PPAs[34], which have tariffs lower than those needed to sustain coal-based power plants.[35]

Increasing financial leverage has adversely impacted the financial performance and position of distribution companies. DISCOMs have witnessed increasing debt levels on account of failure to increase retail electricity prices, provision of subsidies to agriculture sector, high aggregate technical and commercial ("AT&C") losses[36] and flaws in power procurement planning, resulting in losses of around INR 150,000 crores annually.[37] While the Ujjwal DISCOM Assurance Yojna ("UDAY") scheme intended to address this problem, a failure to implement structural changes by state DISCOMs has caused debt levels to increase to pre-UDAY levels. As at March 2020, the aggregate debt of DISCOMs was estimated at INR

29 37th Standing Committee on Energy report, p18.
30 IEEFA Seriously Stressed and Stranded report, p10; Load generation balance reports from FY2011 to FY2020; and Report on Short-term Power Market in India 2018/19, p4.
31 IEEFA Seriously Stressed and Stranded report, p10.
32 https://mercomindia.com/seci-solar-auction-1-2-gw.
33 Acme Solar had entered into a PPA with a bid of INR 2.44 / kWh in May 2017. However, the company unilaterally terminated the PPA in May 2020 owing to issues arising on account of the COVID-19 pandemic (Source: https://www.financialexpress.com/economy/lowest-solar-tariff-project-seeks-ppa-termination/1965876)
34 Zero indexation PPAs refer to contracts where tariffs are not linked to inflation or other indices.
35 IEEFA Seriously Stressed and Stranded report, p5.
36 AT&C losses are a combination of energy losses (which includes technical losses and losses on account of theft and inefficiency in billing) and commercial losses (which includes losses on account of default in payments and inefficiency in collections). (Source: https://npp.gov.in/glossary)
37 Covid-19 - Securing a safe passage for power sector through turbulence: ET EnergyWorld article dated 25 April 2020.

264,000 crores.[38] The deteriorating financial position of DISCOMs has in turn caused delays in payments to power generation companies resulting in further stress in the system.[39]

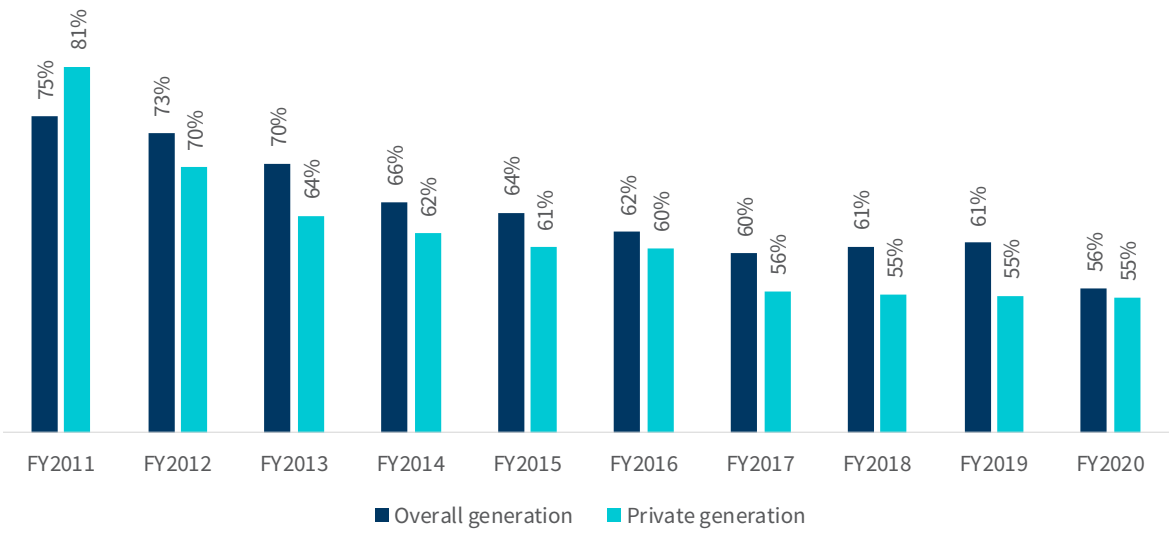
Fuel supply issues have impacted availability of coal for power generation. CIL has been missing its yearly production targets owing to issues relating to environment clearances, flooding during monsoon season, land acquisition and protests from local communities. Constraints in transportation, owing to rail congestion and placement of rakes at mines has also exacerbated the problem.[40,41]

Finally, other factors – exaggerated by the above concerns – have also negatively impacted power generation activities. Such factors include: reluctance of banks and financial institutions to provide additional funding for cost overruns; project management issues and delays; underestimation of the potential risks faced by power generation companies resulting in aggressive tariff bidding; increased costs of compliance for maintaining older power plants on account of revised pollution norms; and concerns and delays around environmental clearances, land acquisition and water stress.

The collective effect of the above factors has caused, and is visible in, the low utilisation rates of coal-based power plants. The overall plant load factor ("PLF") has declined steadily from 75 percent in FY2011 to 56 percent in FY2020, as shown in the chart below. The fall has been sharp particularly in the private sector, where the PLF has declined from over 80 percent in FY2011 to 55 percent in FY2020.[42] Lower PLF has in turn resulted in lower profitability of power plants and loss of incentives available from the CERC and SERCs.[43]

As per the rating agency ICRA, only 10 percent of the 40 GW stressed capacity had been resolved in the period to December 2019. The slow speed of resolution is due to the long lead time needed to achieve a sustainable resolution, limited progress in signing of new long-term PPAs and subdued PLF levels.[44]

Figure 4: PLF of coal-based power plants for the period FY2011 to FY2020



Source: https://powermin.nic.in/en/content/power-sector-glance-all-india.

38 https://www.crisil.com/content/dam/crisil/pr/press-release/2017/12/square-one-discom-debt-to-reach-pre-uday-levels-this-fiscal.pdf.
39 https://economictimes.indiatimes.com/industry/energy/power/discom-dues-to-power-generators-grow-33-during-april-january/articleshow/68279024.cms?from=mdr.
40 IEEFA Seriously Stressed and Stranded report, pp11 and 12; Ministry of Coal annual report FY2019, p64; and Coal Directory 2017/18, p26 (pdf).
41 https://www.business-standard.com/article/companies/ntpc-units-faced-coal-shortage-in-fy17-19-cerc-denies-re-lief-119090201029_1.html.
42 https://powermin.nic.in/en/content/power-sector-glance-all-india.
43 http://www.cercind.gov.in/2019/regulation/Tariff%20Regulations-2019.pdf, p103. In some part, the impact of lower utilisation rates is offset by the payment of fixed charges under the PPAs.
44 https://www.icra.in/Media/OpenMedia?Key=9c863d50-b389-4ccd-ae64-474ef29b9934.

Many of the factors discussed above are systemic and structural in nature and will require a multi-layered, holistic approach for effective and timely resolution. Given the involvement of multiple stakeholders with often conflicting interests, inter-ministerial and coordination between the various levels of the government facilitated by regulators would play an important role in resolving the current crisis.

Recent policies including the introduction of Scheme for Harnessing and Allocating Koyala Transparently in India ("SHAKTI") – to help provide surety of coal supply to private generation companies[45,46] – and the UDAY scheme – to help address the increasing debt burden of the DISCOMs[47] – have shown mixed results.[48]

The government's ambitious target of achieving renewable energy capacity of 175 GW by 2022 and 500 GW by 2030 – as part of the Paris Agreement and related announcements[49] – has also accelerated investments in renewable energy, at the expense of conventional fuels. The policy landscape and regulatory environment in the last few years have accordingly aligned to the broader goal of promoting renewable energy.

Regulations such as the 'must-run' status accorded to renewable generation units requires DISCOMs to continue to procure power from such units even in periods of low overall demand. This, however, often require coal-based plants to run at lower utilisation rates increasing the overall cost of power for DISCOMs. Additionally, higher use of renewable sources compared to conventional ones will require development of low-cost storage solutions. The power from solar and wind generation also needs to be predicted with greater accuracy to ensure grid stability.

The Electricity (Amendment) Bill 2020 introduced in April 2020 seeks to address certain recurring issues related to DISCOMs. The draft bill proposes setting up of the Electricity Contract Enforcement Authority to deal with the issues of non-performance of contracts regarding sale, purchase and transmission of electricity. It also proposes a payment security mechanism wherein no electricity shall be despatched under a contract unless adequate security of payment has been provided by DISCOMs to generators.

This is in line with the Power Ministry's directive in 2019 for creation of letter of credits as a payment security mechanism under the PPAs made between parties. The draft bill also provides a way forward for privatisation of DISCOMs by way of sub-licensing and franchisee models. For example, the sub-licensing model will allow states to select a private company for distribution of electricity.[50] While such measures can have a positive impact on generators, it is equally important to ensure that the changes do not create additional stress for DISCOMs.

Overall, electricity regulation seeks to address complex issues in order to achieve economic and social objectives. Emergent policy goals can sometimes lead to significant departure from the status quo. The collective effect of regulation and policy goals however do impact the financial performance and position of the companies operating in the sector.

45 https://pib.gov.in/newsite/PrintRelease.aspx?relid=170811.
46 https://www.financialexpress.com/economy/shakti-scheme-govt-eases-eligibility-norms-for-plants/1528594.
47 https://www.uday.gov.in/about.php.
48 https://www.thehindubusinessline.com/opinion/coal-auctions-still-far-from-transparent/article29281446.ece; and CRISIL press release dated 6 May 2019 - Square one: DISCOM debt to reach pre-UDAY levels this fiscal.
49 https://climatepolicyinitiative.org/expertise-areas/cop21 and https://ieefa.org/india-ups-renewable-energy-target-to-500gw-by-2030.
50 https://energy.economictimes.indiatimes.com/news/power/the-electricity-amendment-bill-2020-an-overview/75251244; and https://www.cnbctv18.com/energy/electricity-amendment-bill-2020-govt-proposes-electricity-contract-enforcement-authority-5717891.htm.

Valuation of a coal-based power plant

What drives value?

Power generation companies are dependent on the availability and cost of the underlying fuel (e.g. coal) – the single largest cost incurred by the power producers – and the price of the end product (electricity) for their cash flows and value. Power companies usually are price takers, regardless of their size, because the market is so large. Furthermore, power plants have long operational lives, averaging around 25 years. Therefore, the strength and duration of the key agreements such as the PPA and FSA are particularly important drivers of value as they provide visibility on tariffs and fuel costs and how those might evolve over the life of the plant. Most power producers aim to enter into memorandums of agreement or letters of agreement during the construction phase, which are then converted into formal PPAs or FSAs on commissioning. Absent such agreements or expectation of such agreements, risks attaching to the future profits of the power producers might increase.

Other key value drivers of a power plant may include:

1) Construction costs given the large outlay of cash up front – often funded in large part by debt – and the time between the construction phase and generation phase. Projects run a risk of exceeding the planned capital expenditures due to project delays and cost overruns. Cost increases might also impact calculation of fixed charge during the bidding phase. The capital expenditure for a project therefore becomes a key consideration for valuing power plants. The recent infrastructure sector slowdown in India including on account of several defaults have further caused banks to be more cautious for funding future projects;
2) Other operating costs which include operations and maintenance expenses, transmission charges and water costs;
3) Applicable taxes and duties which include income tax, excise duty and goods and services tax paid during the project period; and
4) Project, market and country risks that may affect project's cash flow or the discount rate applied to convert future cash flows to present value. These risks include legal, currency and regulatory risks quite prevalent in emerging markets. For example, regulators have to navigate through multiple constraints to satisfy objectives primarily related to access and low cost of electricity supply, while ensuring high quality and reliability. In recent times, increased focus on environmental and social concerns associated with energy needs have shifted policy directives towards incorporation of cleaner renewable based technologies. Thus, conventional segments like coal-based power generation might be exposed to the risk of introduction of regulations that might impact their profitability.

Valuation approaches

The first step in valuing a power plant is to assess its development state at the date of valuation. Power projects – like other large infrastructure projects – follow a broadly predictable development path, from the identification of project site, to planning and construction, production and, finally, decommissioning.

There are three approaches normally used to value a coal-based power plant: income-based approach, market-based approach and cost-based approach. We discuss these below.

Income-based approach

In valuation theory, after-tax cash flows are of primary importance. The most commonly applied income approach is discounted cash flow ("DCF"), which assesses the value of an asset by reference to the amount, timing and risk of future cash flows. When implementing a DCF method for long-life assets such as power plants, it is customary to follow two main steps:

1) Estimate future cash flows over the economic or operational life of the asset; and
2) Discount the cash flows using a rate that takes into account the riskiness of the cash flows and the time value of money. Then sum those values to arrive at the net present value of the asset.

On 1), for a typical power producer, cash flows are usually estimated by reference to forecasts of revenues less costs, taxes and capital investments.

With respect to revenues, the key inputs include: the tariffs agreed under the PPAs between the power company and DISCOMs or those it expects to earn in the absence of the PPAs from the merchant market,[51] and the projected demand for power in the relevant area served by the producer. Future tariffs will depend on the terms of the PPA (i.e. price escalation clauses and inflation rates) and the expected evolution of the wider merchant market (for example, for spot sales).

Figure 5: Illustration of select value drivers

In general, a power producer will also earn bonuses under CERC regulations for maintaining plant availability of over 90 percent.[52] Additionally, DISCOMs are obliged to pay the fixed costs incurred by the power producer if they fail to purchase power agreed under the PPA.[53] Absence of PPAs might increase future uncertainty around expected revenues – in turn reducing the value of the project. A valuer should carefully consider the impact of such a scenario on the valuation of the power plant.

With respect to costs and investments, the two larger factors include upfront capital expenditure and cost of coal. Upfront investment determines the total cash

51 Alternatively, bilateral trade between producers and consumers (primarily industrial and commercial consumers) can be executed through open access mechanism.
52 Model Power Supply Agreement, p15 (pdf).
53 https://www.business-standard.com/article/economy-policy/power-generators-shut-capacity-as-covid-19-hits-demand-upends-normal-life-120032901062_1.html.

outflow for the company prior to commissioning (and also impacts the calculation of fixed costs under the PPAs). The cost of coal is a function of the source of supply (domestic linkage, e-auction or imported), coal grade and transportation costs.

While domestic coal is cheaper than imported coal, factors such as calorific value of coal and transportation costs also impact the landed cost of coal. Absent any FSA, risk around availability of sufficient coal and the costs of such coal in the future might increase. Additionally, cost of coal is an important consideration for generators selling power in the merchant power market as they might not be able to pass-on all increases in costs.

A valuer should carefully consider the impact of such a scenario on the valuation of the power plant. Other principal operating expenses include operations and maintenance costs, transmission costs, secondary fuel costs, and water costs. Again, higher increases in some of these costs (e.g., beyond those agreed under the PPA) might have a material impact on the valuation of power plant.[54]

On 2), an estimate of an appropriate discount rate is necessary to translate future cash flows into their present value. Such an estimate recognises (i) the time value of money (i.e. an INR today is worth more than an INR certain to be received in a year's time); and (ii) the risk or uncertainty associated with the expected future cash flows (i.e. the possibility that the cash flow is higher or lower than expected). The discount rate that is generally used to discount an asset's expected future cash flows is the weighted average cost of capital ("WACC") of that asset. This is the opportunity cost of capital to the firm.

If the subject asset is under financial distress (for example, as might be the case for certain stranded power plants) or exposed to greater market or country risk (for example, power plants in India are likely to be exposed to more higher risk than those operating in more mature markets like the US), investors often require higher returns to lend or invest money in the asset. This in turn results in a higher WACC and lower value of the asset. A valuer should properly analyse the risks attaching to the future cash flows of the power plant in calculating the appropriate WACC.

54 Conversely, cost efficiencies will have the opposite effect.

Market-based approach

With this approach, the value is inferred from publicly available information about transactions in assets comparable with the subject asset. While each power project or asset may have its own singular characteristics, value data from reasonably similar projects and assets can be used to determine a range of market values for the subject assets – or to reaffirm the reasonableness of value conclusions reached by other methods, including the income-based approach.

When identifying comparable projects or assets, it is necessary to identify companies that share similar economically relevant characteristics to the project or asset that is the subject of the valuation. Economically relevant characteristics are those characteristics that determine the cash flow prospects and risk of the company. Examples of economically relevant characteristics include the geographic location of the asset or terms of the underlying agreements.

Under this approach, a valuer will calculate price multiples implied by trading in shares of the comparable assets and its benchmark measure of performance.

One set of multiples are “profit multiples”, that is, the ratio of observed prices to various accounting measures of profitability. The other set of multiples are “operating multiples”, that is, the ratio of observed prices to various quantitative measures of operations or characteristics of the subject asset. Such measures might include capacity expressed in megawatt (“MW”).

Multiples based on historical transactions are influenced by the economic conditions (coal prices, price of electricity, etc) and circumstances (financial condition of the asset sold, etc) prevailing at the time of those transactions. A valuer should be careful in drawing conclusions from use of such data.

Cost-based approach

In a cost-based approach, the value is based on the principle that a notional purchaser would not spend more on an asset than it would cost to actually construct the asset. Such costs would include the construction costs of the asset. The value calculated this way may in some cases be thought of as a “floor” value, as it would not include any expected future rate of return or cash flows from the investment.

It is sometimes necessary to adjust historical costs incurred to construct the power plant including for any physical, functional and economic obsolescence or depreciation to arrive at the appropriate replacement cost at the date of the valuation of the subject power plant or asset.

One set of multiples are “profit multiples”, that is, the ratio of observed prices to various accounting measures of profitability. The other set of multiples are “operating multiples”, that is, the ratio of observed prices to various quantitative measures of operations or characteristics of the subject asset. Such measures might include capacity expressed in megawatt (“MW”).

Additional considerations

Where appropriate and feasible, it usually preferred to apply more than one approach so that final conclusions can be cross checked. The valuation approaches described above are important, but they do not contain the entirety of the valuation process. There may be other unique issues that must be factored in. For example, a distress sale of a power plant will often attract a lower price than an orderly sale. Similarly, a strategic buyer owning multiple power plants can perhaps assign a higher value to a particular power plant or asset, if it has access to sufficient coal (for example, through captive mines).

The current situation on account of the COVID-19 pandemic might further complicate valuation of coal-based power plants. The power consumption across the country dropped by 25 percent to 30 percent primarily on account of reduced manufacturing activities due to the implementation of a nationwide lockdown.[55] The lower demand might put further stress on existing power plants (particularly those with uncontracted capacities that rely on spot or short-term sales). Similarly, the average unit price (expressed as INR per kWh) based on the Indian Energy Exchange fell to INR 2.15 per kWh in late March, which is cheaper than tariffs signed under majority of the existing PPAs.[56] The situation is more problematic for under-construction power plants: around 30 percent of India's under-construction coal-based capacity is using Chinese equipment.[57] The delay in procurement of machinery might result in time and cost overruns in these projects. Moreover, the central government has also allowed deferment of payment by DISCOMs to power generating companies by up to three months.[58] All these measures might adversely impact the value of power generation companies.

In short, the valuation of a coal-based power plant is a large undertaking. It requires an understanding of the overall dynamics of the power sector, regulatory and policy framework, factors and risks impacting the subject asset including the terms of the underlying agreements and the market in which the asset operates, and deep knowledge of the appropriate valuation standards and methods.

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