VALUATION OF A COAL-BASED POWER PLANT

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The Perspective

Modern life is unimaginable without electricity. It lights houses, buildings, and streets; provides domestic and industrial heat; and powers most equipment and machinery used in homes, offices and factories. Coal is the most abundant source of electricity worldwide, currently providing more than 36% of global electricity. Coal-fuelled power plants account for nearly one-quarter of the electricity.

Coal is key to alleviating energy poverty. Approximately 860 million people across the globe currently live without access to electricity. Nearly 2.6 billion people do not have clean cooking facilities. The problem is spread across the developing world, but it is particularly severe in sub-Saharan Africa and developing Asia, which together account for 95% of people in energy poverty. Without a commitment to achieve universal energy access, it has been estimated that by 2030 there will be an additional 1.5 million premature deaths per year caused by household pollution from burning wood and dung and through a lack of basic sanitation and healthcare.

Life expectancy, educational attainment and income all correlate with per capita electricity use, and more of the world's electricity is fueled by coal than any other source.

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:

(a). Estimate future cash flows over the economic or operational life of the asset; and

(b). 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 (a), 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, 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).

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 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.

Conversely, cost efficiencies will have the opposite effect. On 2), an estimate of an appropriate discount rate is necessary to translate future cash flows into their present value. Such an estimate recognizes

(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.

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.

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. 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.

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. 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 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.

Several modelling tools capture market fundamentals using high quality inputs in all types of valuations.

• Virtual Dispatch Models against Recent/Futures Prices: We use our PSO model to dispatch a specific unit against energy and ancillary service price forecasts. We are also able to model the unit dispatch against both day-ahead and real-time prices, which captures a valuable revenue stream that many dispatch models do not account for. The model outputs the expected plant operations and revenues over the modeled time period. We typically develop the energy and ancillary service price series inputs using both recent historical and future settlement prices and accounting for any known shifts in market fundamentals.

• **Nodal** Market Simulation Models: We employ several nodal market simulations tools for asset valuations to simulate the long-term impacts of