

The Book Value and Future Perspective of Coal Power Plants in India

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Overview

Member countries of the United Nations Framework Convention on Climate Change (UNFCCC) agreed on the phase-down of unabated coal power plants at the Conference of the Parties-26 (COP26). Before reaching an agreement, India and other developing countries requested to change the sentence from the initially proposed “phase out” to “phase down.” India depends on coal-based power for 89% of its power generation capacity. Currently, approximately 600 coal power plants are operating in India. Besides, 73% of coal power is of the subcritical type, which is considered low-efficiency.

Table 1 Current capacity of power generation In India

	Capacity in MW	% of Total
Thermal	234,728	61.4
Hydro	46,209	12.1
Nuclear	6,780	1.8
Renewable Energy Sources	94,434	24.7
Total	382,151	100.0

Source: CEA “All India Installed Capacity of Power Stations As on 31.03.2021”

Table 2. Details of thermal power plants

	Coal	Gas	Diesel	Total
Number of units	602	240	21	863
Capacity in MW	209,294	24,924	510	234,728

Note: Coal contains Lignite.

Number of coal units by generation type: sub-critical (522), super-c (78), ultra-S-c (2)

Thus, the immediate phase-out of coal power plants seems challenging for India. This study investigates the effect of phase-out from the perspective of book value and prospects of coal power generation by calculating several assumptions.

Methods

We examined all coal power plants in India using data from Central Electricity Authority (CEA). We estimated the construction cost (acquisition cost) of the coal power plants to calculate the book value. Table 4 presents the construction costs, which were calculated using the data of “Assumptions for Estimation of Cost for Projects” in the National Electric Plan 2018 and 2012. According to the Companies Act 2013 (India Corporate Law), the statutory durable years (depreciation period) for thermal power generation plants is stipulated as 40 years. We used these data to calculate the total construction cost and the book value of coal power plants. The calculation of depreciation does not consider non-depreciable assets such as land.

However, CEA issued a note that it will explore the possibility of retiring/replacing coal/lignite-based thermal power plants that are 25 years or older and inefficient. Thus, we calculated the total number of operating plants and capacity in 2030 in the case of retirement 25 years old and 2030, 2040, and 2050 in the case of 40 years old.

Results

Table 3 Construction Cost and Book Value as of 31.03.2021

Number of units	Capacity in MW	Construction Cost	Book Value
602	209,294	INR1,279,092 Crore (19,189 billion yen)	INR893,721 Crore (13,404 Billion yen)

Note: 1 Rupee = 1.5 Japanese Yen. (INR 1 Crore = 0.15 billion yen) , 1 Crore = 10 million

Table 3 shows the total construction cost and current book value. According to our estimation, the total book value was JPY-13-trillion. Japan has approximately 60 coal power plants (excluding private power stations) generating power for the public, and the estimated total current book value of Japanese coal power is 1 trillion yen (Hori, 2022).

One of the reasons for the Indian book value seeming excessive could be the difference in statutory durable years in the two countries. In Japan, statutory durable years are stipulated as 15 years for machinery and 38 years for buildings, besides the coal power plants were built during the past 20–30 years. Thus, the book value in Japan is estimated to be small.

Table 4 Book value as of FY2030

	Number of units	Capacity in MW	Construction Cost INR Crore (billion yen)	Book Value INR Crore (billion yen)
Plants listed in operation as on 31.03.2021	602	209,294	1,279,092 (19,189)	609,899 (9,145)
Plant in operation in the first half of 2021	1 ※1	800	6,080 (91)	4,636 (70)
Plants under construction that are expected to be in operation by 2030	46 ※2	31,115	287,814 (4,318)	233,824 (3,508)
Total	649	241,209	1,572,986 (23,598)	848,359 (12,723)

Source: ※1 CEA “Tentative Thermal Capacity Addition Target/Achievement for the FY 2021-2022 as of 30.09.2021”

※2 CEA “Thermal Power Projects under construction as of 30.09.2021”

Case 1	471	203,001	1,341,845 (20,131)	827,910 (12,420)
Case 2	414	187,886	1,251,155 (18,770)	803,662 (12,056)

Note: Case 1: Based on the “List of Projects considered for Retirement” proposed in the National Electricity Plan 2018 by CEA, all proposed phaseout plants (as of August 2017) will be abolished.

Case 2: All plants that attain the age of 25 years (NEP 2018) on FY2030 will retire.

Even in 2030, the total book value of Indian coal power plants remains high (Table 4). If all coal power plants older than 25 years (Case 2 in Figure 4) are retired, the total capacity of coal power stations will decrease by 9% only.

Table 5 Estimation of Book value of retiring plants that shall reach 40 years old.

	Number of units	Capacity in MW	Construction Cost INR Crore (billion yen)	Book Value INR Crore (billion yen)
FY2030	526	215,999	1,421,720 (21,329)	839,540 (12,594)
FY2040	446	196,396	1,304,105 (19,565)	506,466 (7,597)
FY2050	335	161,806	1,096,565 (16,451)	210,752 (3,160)

Table 5 shows the estimated book value in 2030, 2040, and 2050, when all plants attaining 40 years of age will retire. These figures indicate that 162 GW of coal power plants will be operational in 2050.

Conclusions

We estimated the book value of coal power plants in India and found that, currently, it is INR 893 Crore (13 trillion yen, 116 billion US dollars). Utility companies would have to prepare sinking funds if they were compelled to phase out coal power plants in the early days. Therefore, retiring coal power plants in India in the early phase requires appropriate financial measures.

However, in the case of the retirement of 40 years old power plants, the estimated capacity of coal power plants in 2050 is 163 GW. As India announced its carbon neutrality in 2070, researchers determined future Indian power capacity toward net-zero 2070 (Singh and Sidhu, 2021; Ahluwalia M.S. and Patel U, 2021). Singh and Sidhu (2021) estimated the capacity of coal power in 2050 to be 165 GW, similar to the estimated capacity of this study. It implies that the assumption of retirement at 40 years coincides with the 2070 net-zero plan.

References

- Ahluwalia M.S. and Patel U. (2021) Getting to Net Zero An approach for India at Cop-26, CSEP.
Hori S. (2022) The effect on future power strategy by the book value of existing power plant, JSER 2022.
Singh V.P. and Sidhu G. (2021) Investment Sizing India’s 2070 Net-Zero Target CEEW.