



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

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Overview

- UNFCCC agreed on the phase-down of unabated coal power plants at the 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 55% of its power generation capacity. Currently, approximately 600 coal power plants are operating in India. Besides, 73% of coal power capacity is of the subcritical type, which is considered low-efficiency.

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

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)

Methods

- We estimated the construction cost (acquisition cost) of the coal power plants to calculate the book value. We use 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.

Results

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(as of 12.2021), 1Crore=10 million

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”

Estimation of future book value

- 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.

Estimation of Book value of retiring plants that shall reach 25 years old.

CEA retirement list	471	203,001	1,341,845 (20,131)	827,910 (12,420)
25year retirement	414	187,886	1,251,155 (18,770)	803,662 (12,056)

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

25 year retirement case: All plants that attain the age of 25 years (NEP 2018) on FY2030 will retire.

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)

Consideration: cost

- 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).
- World Bank (2021) estimated decommissioning cost in India is estimated US \$58k/MW. Among them, employee cost(i.e., US\$35.15 million), associated with employees (US\$7.11 million), overheads (US\$24.14 million),and O&M expenses (US\$3.90 million) are major cost.

Financial gap

- Singh et al.(2021) mentioned that under 2070 net zero scenario, 172 billion US\$/year needs to be invested in power sector, and gap between the total necessary investments and what are available is 95 billion US\$ annually.

Consideration: Estimated capacity

- In the case of the retirement of 40 years old power plants, the estimated capacity of coal power plants in 2050 is 163 GW.
- Singh and Sidhu (2021) estimated the capacity of coal power in 2050 to be 165 GW.

Power GW	2020	2040	2050	2070
solar	40	540	1689	5631
wind	38	211	558	1793
coal	202	336	169	0
other	66	119	195	330
total	346	1205	2611	7753

Early retire?

- Ahluwalia and Patel (2021),
by citing Global Coal Plant Tracker,
Thermal power plants in 2050 nearly 200GW.
- Yang and Urpelainen (2019):
Reducing the lifespan from 40 to 30 years can
decrease cumulative CO2 emissions by
approximately 12 Gtons.
- Kumar and Jain (2021)
Sacrifice 3.5% electricity production amounting
to 1,702 million US\$ of revenue loss in 5 years.

Conclusion

- 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.
- As India announced its carbon neutrality in 2070, Singh and Sidhu (2021) estimated the capacity of coal power in 2050 to be 165 GW, similar to the estimated capacity of this study, under the assumption of retirement at 40 years. However the possibility of early retirement should be considered to further reduction of GHG emission.

Thank you for your attention

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