

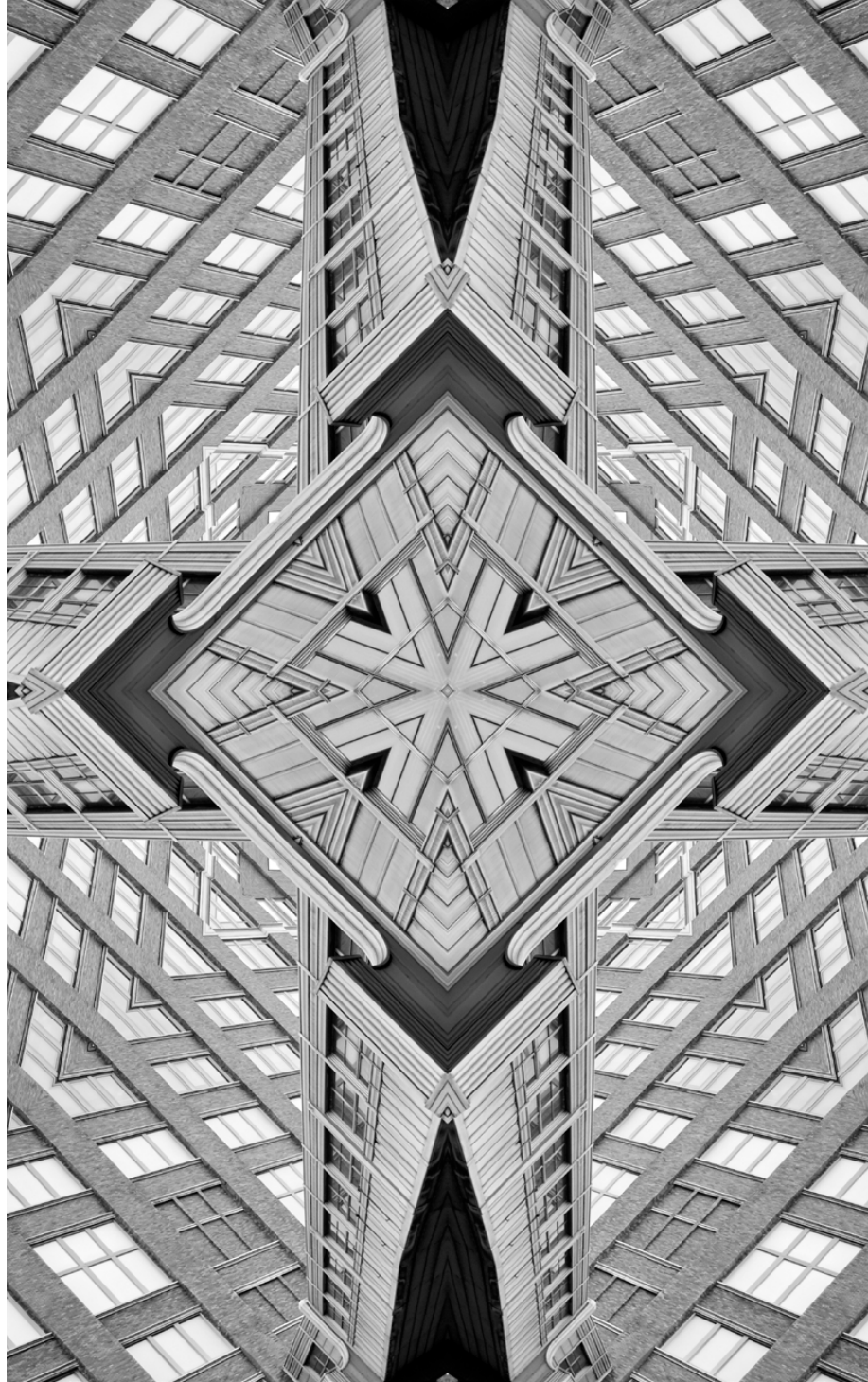
# Issue

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# Brief

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# Promoting Efficiency in Power Generation in India: The Role of Imported-Coal-Based Plants

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## **Abstract**

India is experiencing a surge in power demand owing to an expanding economy. Even as the country has embraced the idea of transitioning to clean renewable energy, its current demand for electricity can only be met by addressing the concerns surrounding coal-fired power plants. The goal of going green might be a medium- to long-term strategy that should be diligently pursued to avoid future crises. In the short term, however, focus should be on making coal-based plants work efficiently; power plants working on imported coal in India are crucial in this regard. This brief analyses the problems hindering the optimum operation of power plants working on imported coal.

Beginning in early 2020, the lockdowns that governments implemented to arrest the pandemic led to the disruption of supply chains across the globe. The sharp reduction in electricity demand, and the associated slowdown in industrial and commercial activity, had a massive impact on the power sector.

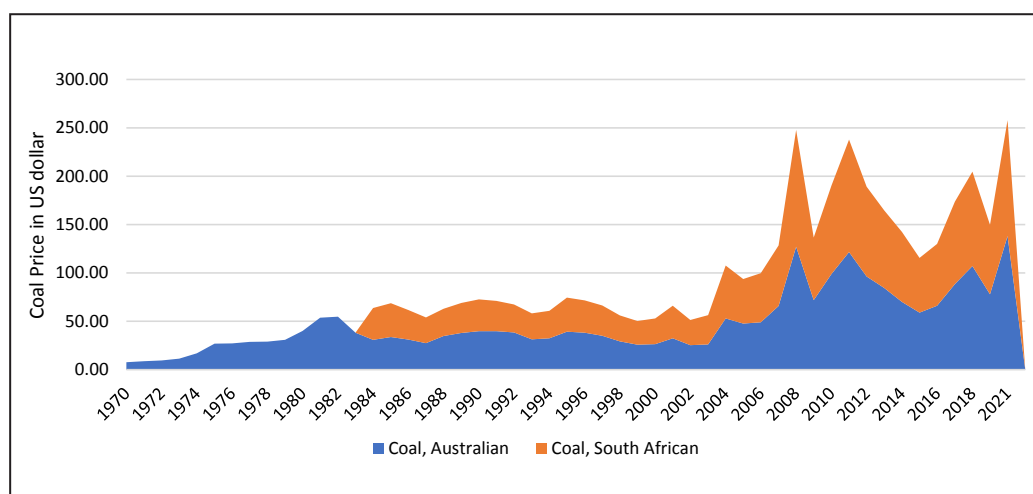
Following the Covid-19 second wave in the middle of 2021, as economies started recovering, there was sudden rise in power demand. Most countries were unable to cope with the surge, leading to outages in countries such as India, China, and the United States (US).<sup>a,1</sup> In February 2022, the eruption of the Russia-Ukraine conflict disrupted the supply of oil and gas, causing a steep increase in gas prices and accentuating the power crisis.<sup>b,2</sup>

This forced many countries to fall back on coal for their energy requirements, raising the price of coal to historic figures. As seen in Figure 1, in 2021, the international price of Australian coal reached a historic high of 138.05 \$/mt, while that of South African coal almost leveled its previous peak in 2008, at 119.84 \$/mt.<sup>3</sup> Prices remain elevated in 2022, with the spot price of coal at Australia's Newcastle port breaching \$ 400 a ton in June 2022.<sup>4</sup>

“As economies started recovering mid-2021, many countries could not cope with the sudden rise in power demand.”

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- a These three big economies are all dependent largely on coal for electricity, and similarly faced spurts in electricity demand as the massive 2021 Covid-19 wave was slowing down.
- b Russia is a major exporter of oil and gas. In 2021, Russian crude and condensate output reached 10.5 million barrels per day, comprising 14 percent of the world's total supply.

**Figure 1**  
**International Coal Price of Australian**  
**and South African Coal (in \$/mt)**

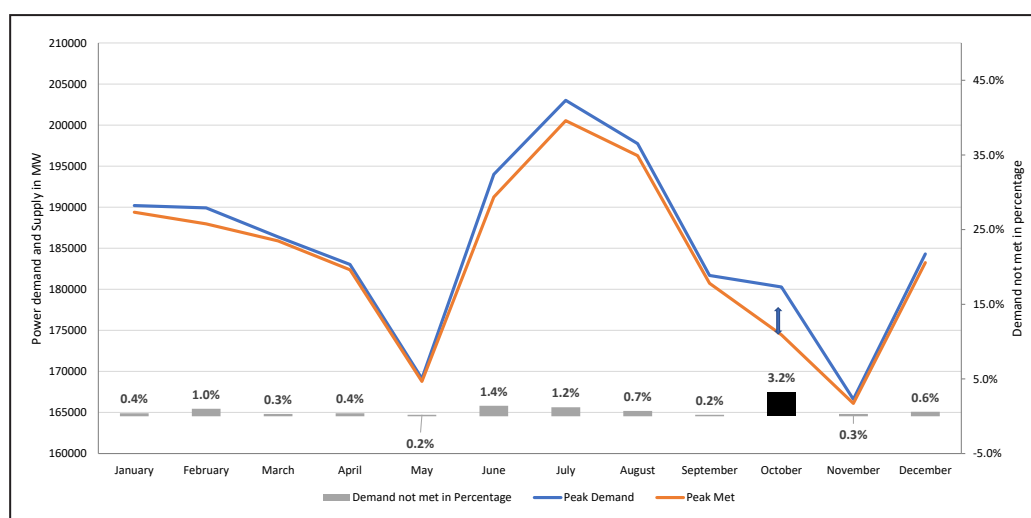


Source: World Bank

India has not been immune to these developments and is suffering gaps in power supply. A number of states across the country are resorting to scheduled 'load-shedding' to meet the increased power demand associated with the revival of the economy and an abnormal surge in temperatures.<sup>c</sup> As shown in Figure 2, peak power demand outpaced peak power supply during the summer period in India.

<sup>c</sup> A 'heat wave' is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season in the North-Western parts of India. It typically occurs between March and June, and in some rare cases even extend till July. See <https://www.ndma.gov.in/Natural-Hazards/Heat-Wave>

## Figure 2 Power Demand and Supply in India (2021)



Source: Power Supply Position Report, Power System Operation Corporation Limited

The continuous increase in demand for electricity post-lockdown has placed massive pressure on the power generation plants, most of which are operating on coal. While geopolitical events led to the disruption of imports, India's domestic coal supply also declined because of the pandemic-induced lockdown and disruptions in coal and gas extraction and transportation from domestic mines on account of heavy rains.<sup>5</sup> In 2020-21, the production of coal dropped to 716 million-tonnes (MT), or 2 percent less than that in 2019-2020.<sup>6</sup> Many gas- and coal-based power plants were forced to operate at less than their optimum capacity. A number of imported-coal-based (ICB) plants also ceased their operations, as they did not have regular supplies of imported coal and incurred huge losses due to the high cost of imported coal and shrinking margins.

Despite Coal India Limited achieving its highest coal production of 777.31 MT (Provisional) in FY 2021-22,<sup>7</sup> the year 2022-23 witnessed disruption in coal supply to the power plants due to lack of availability of required rakes from the Indian Railways (IR) and shortages in explosives required for the blasting of mines to extract coal.<sup>8</sup> It came at a time when India's power demand reached an all-time high of over 210 Gigawatts (GW) (around 1,500 hours) on 9 June 2022, and with no end in sight to the heatwave.<sup>9</sup>

This brief examines the issues and concerns of a category of coal-based plants in India—i.e., imported-coal-based (ICBs). It analyses their present status and the reasons for their deficient performance, and offers policy suggestions to address the challenges they face.

“Geopolitical events disrupted imports; the lockdown led to reduced domestic coal supply; and heavy rains hampered extraction and transportation from domestic mines.”

# Imported-Coal-Based (ICB) Plants in India

After 1991, the Indian government began liberalising the power sector and undertook policy reforms to attract private investment. Since then, a number of private coal-based power plants have come into existence in various parts of the country. One such group of coal-based plants comprises those operating entirely on imported coal. At present, the cumulative capacity of these imported-coal-based (or ICB) plants is around 17,255 megawatts (MW), or more than 8 percent of the country's total coal-based power plant capacity of 210,699.50 MW.<sup>10</sup> At the time of writing this brief, there were 13 ICB plants operating mostly in the coastal regions of the country, with the Mundra Ultra Mega Thermal Power Plant in Gujarat having the highest installed capacity (4,000 MW), followed by Mundra TPS-I&II (2,640 MW), and Mundra TPS-III (1,980 MW), also in Gujarat.

As seen in Table 1, of the total capacity of ICB plants of 17,255 MW, most of them run at less than their full capacity. The average coal stock, based on the normative requirement measured at 85 percent Plant Load Factor (PLF)<sup>d</sup> for many is less than the national average of 39 percent. A low PLF for a power plant indicates that it is not being used to its optimal capacity, resulting in an increase in the per-unit cost of the power produced. Moreover, eight plants with combined capacity of more than 7,000 MW are in the 'critical' category, owing to their low coal stock.

“The total capacity of ICB plants in India is 17,255 MW, but most run at less than optimum.”

<sup>d</sup> The Central Electricity Regulatory Commission defines Plant Load Factor as a percentage of energy sent out by the power plant corresponding to installed capacity in that period.

## Table 1

# Status of Plants Operating on Imported Coal (as of June 2022)

Thermal Power Station	Utility	Capacity (MW)	PLF % (May, 2022)	Requirement for the day @85% PLF (In '000 Tonnes)	Normative Stock Required (In '000 Tonnes)	Stock of Imported Coal in ('000 Tonnes)	% of Actual Stock vis-à-vis Normative Stock	Critical (*) (if stock < 25%)
SALAYA TPP	IPP	1200	0.00%	12.24	318.24	0	0.00%	Critical
TORANGALLU TPS(SBU-I)	IPP	260	87.49%	1.77	45.91	0	0.00%	Critical
TUTICORIN TPP ST-IV	IPP	525	0.00%	5.36	139.23	8	0.00%	Critical
SIMHAPURI TPS	IPP	600	0.00%	6.12	159.12	1.84	1.00%	Critical
THAMMINA-PATNAM TPS	IPP	300	0.00%	4.42	114.85	0.98	1.00%	Critical
MUTHIARA TPP	IPP	1200	16.38%	16.07	417.91	18.87	5.00%	Critical
MUNDRA TPS-III	IPP	1980	19.46%	20.20	525.10	77.15	15.00%	Critical
MUNDRA TPS-I & II	IPP	2640	39.73%	29.13	757.27	133.02	18.00%	Critical
SIKKA REP. TPS	GSECL	500	37.78%	4.94	128.54	61.61	48.00%	Not-Critical
ITPCL TPP	IPP	1200	20.48%	12.94	336.45	200.73	60.00%	Not-Critical
JSW RATNAGIRI TPP	IPP	300	0.00%	3.06	79.56	53.92	68.00%	Not-Critical
UDUPI TPP	IPP	1200	13.07%	10.39	270.04	201.03	74.00%	Not-Critical
MUNDRA UMTTP	IPP	4000	43.51%	32.64	848.56	823	97.00%	Not-Critical
TROMBAY TPS	IPP	750	80.99%	7.76	201.85	200.22	99.00%	Not-Critical
TORANGALLU TPS(SBU-II)	IPP	600	50.66%	5.39	140.23	249.48	178.00%	Not-Critical
<b>Total</b>		<b>17255</b>	<b>29.57%</b>	<b>172.42</b>	<b>4482.85</b>	<b>2029.85</b>	<b>45.00%</b>	<b>8</b>

Source: National Power Portal, CENTRAL ELECTRICITY AUTHORITY, <https://npp.gov.in/publishedReports>

Reasons for critical coal stock/Remarks: Plants required to build up stocks through imports



# Imported-Coal-Based (ICB) Plants in India

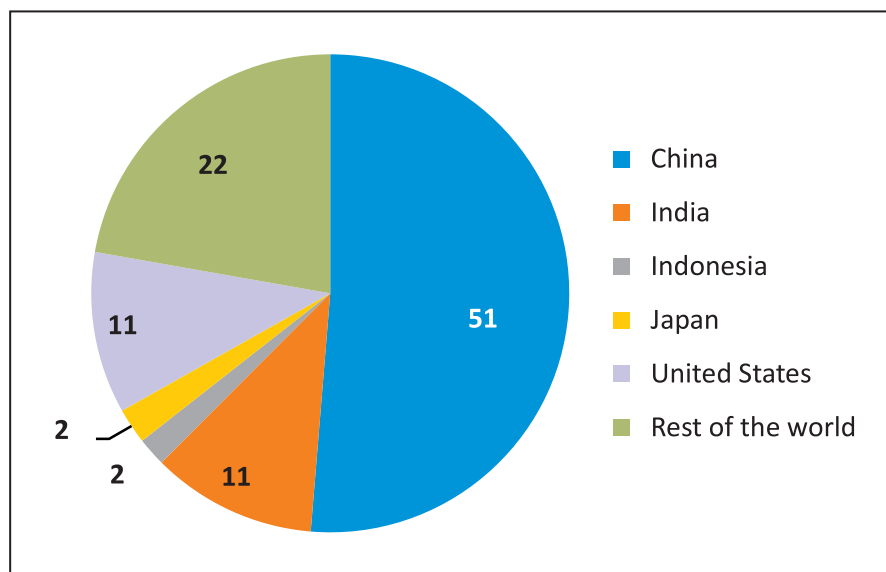
## **The Role of ICBs**

ICB plants help meet the power demand of the southern and west-coast states such as Gujarat and Tamil Nadu. Moreover, some ICB plants such as Mundra UMPP have Power Purchase Agreements (PPAs) with states like Punjab, Haryana, Rajasthan, and Gujarat, helping these states supplement their supply during the power-intensive agriculture sowing season.

Ensuring that these ICB plants remain operational helps relieve the Indian Railways of pressure for additional rakes, as the supply of coal to southern states through railways often involves a high turnaround time. Power supply supplemented through these ICB plants helps optimise the railways rakes and divert them to plants having low coal stocks, especially in the hinterlands. ICB plants also fill the shortages during the monsoon periods, when coal mining operations are disrupted and transportation of coal becomes difficult.

China, India, and the United States own the biggest fleet of coal-based plants in the world: China accounts for 51 percent, and India and the US each make up 11 percent. Countries like Japan and South Korea, meanwhile, despite having no commercially viable coal reserves, are among the largest consumers of coal for power generation and are dependent on imports.

**Figure 3**  
**Coal-Fired Power Capacity, Select Countries, Global Share (%) as of June 2022**



Source: Global Energy Monitor

According to the International Energy Agency (IEA), global power generation from coal increased by nine percent in 2021<sup>11</sup> and is expected to remain elevated due to the ongoing Russia-Ukraine conflict. Many European countries are likewise leaning toward coal for electricity generation as a result of gas supply disruptions. There seems to be a global shift towards coal-based power generation primarily because of ongoing geo-political developments and rising energy demand.

**Table 2**  
**Additional Coal-Fired Power Capacity, Select Countries (2021)**

Country	New Coal-fired Power Capacity in 2021 (MW)	As % of global coal-fired power
China	25,237	56
India	6,445	14
Indonesia	2,790	6
Japan	1,830	4
South Africa	1,595	4
Vietnam	2,400	5
World	44,975	100
India and China	31,682	70
Outside India and China	13,293	30
Outside China	19,738	44

Source: Global Energy Monitor

Note: China, India, and the US own the biggest fleet of coal-based plants in the world. Japan, despite having no commercially viable coal reserves, is among the largest consumers of coal for power generation and is dependent on imports. Indonesia, for its part, is the major source of coal imports for India. Vietnam was among the major emerging economies in East Asia to have made substantial capacity addition in coal based plants in 2021.

As seen in Table 2, China added 25.2 GW of new coal-based power capacity in 2021, accounting for 56 percent of global additions that year—the highest in the world.<sup>12</sup> It was the result of the relaxation on restrictions on new coal plant permits, and increased lending to big coal-intensive projects.<sup>13</sup>

## Supply Bottlenecks and Financial Constraints

**I**CB power plants are facing chronic supply-side bottlenecks and financial constraints, thereby hindering their ability to operate at optimum capacity. As the price of imported coal rose to an all-time high due to reasons mentioned earlier in this brief, the input costs for ICB plants increased, and their margins came down. Compounding their challenges are the huge dues from distribution companies (discoms) to the power generating companies. Indeed, the situation is precarious as many ICB plants are finding it difficult to finance even their working capital needs, as investment in general in the coal-based power generation is becoming scarce. They also have to compete with alternative, renewable energy which is acquiring financing, especially from the private sector, at highly competitive prices.

Notably, significant proportions of funding for coal-based plants in India come from government-owned non-banking finance companies such as the Power Finance Corporation (PFC), Rural Electrification Corporation (REC), and Life Insurance Corporation (LIC); commercial banks have stayed away. All these have put severe strain on the functioning of ICB plants, with some of them eventually going bankrupt. Of the total 17,500 MW plant capacity across ICB plants in India, 2,500 MW were undergoing proceedings before the National Company Law Tribunal (NCLT) for their inability to repay their debts.<sup>14</sup> The depreciation of the Rupee in recent months has made the import of coal even more expensive for these power plants, raising their operating costs. Interest rates are also increasing, making the already scarce credit to ICBs even costlier.

Acknowledging the constraints being faced by the ICB plants, the Government of India (GoI) decided in 2022 to refinance the plants.<sup>15</sup> The Ministry of Power (MoP) has requested the Reserve Bank of India (RBI) to open a separate window for these plants to enable them to finance their working capital requirements.<sup>16</sup>

## Impact of Coal Imports on India's Balance of Payments

In the past few years, the GoI has attempted to reduce the country's dependency on imported coal and meet the energy requirements through coal from domestic mines. As a result, India's imports of non-coking coal used in the power sector, fell by a good 60.87 percent from 58.09 MT during the period April-January 2021 to 22.73 MT in April-January 2022.<sup>17</sup> More recently, however, rising power demand amidst constrained availability of domestic coal has made the strategy untenable. It was with this realisation that the importation of coal was made duty-free by the government in 2022<sup>18</sup> for both blending purpose in the Domestic Coal-Based (DCB) power plants and for use exclusively for ICB plants.

# Issues and Challenges Faced by ICB Plants

Reviving imported-coal-based plants will help meet the growing energy needs of India. While these imports will impact India's current accounts as global prices of coal increase, the country's impressive export performance in both Merchandise and Services sectors will mitigate the pressure. Besides, one of the reasons for excess pressure on coal-based plants, are non-operational gas-based plants. Therefore, to the extent imported coal is to replace the gas imports, there will not be any additional import burden.

It also worth mentioning that diesel generator (DG) sets—which are costlier and polluting—have long been used as backup in power outages. The cost of generation for a DG set can range from INR 16 per unit to INR 40 per unit<sup>19</sup> far higher compared to that of ICB plants. Moreover, imported diesel puts greater burden on the country's trade balance than coal.

This brief argues that ICB plants can supplement efforts for ensuring uninterrupted power supply during the unprecedented high demand for power the country is currently facing, which even renewable sources such as solar and wind cannot guarantee in the short run. Solar power, for example, is prone to vagaries of climate.<sup>20</sup>

## **Risk of Increased Cost of Imported Coal**

The government has difficult choices to make in the absence of alternatives to coal-based power and, at the same time, amidst lack of capacity to replace imported coal with domestic sources to meet excess demand. As power plants have a limited capacity to absorb the high cost of imported coal, the choice is to either go powerless or buy power from the power exchange.<sup>e</sup> While going without power is not worth considering, purchasing power from the power exchange is even more prohibitive than importing coal. According to estimates, NTPC's fuel cost will go up to INR 7-8 per kilowatt hour from importing coal, thereby increasing power tariffs by 50-70 paise per unit for the consumer. This, however, will still be less than the cost of power purchased from the power exchange.<sup>21</sup> Due to the present pressure of the electricity supply and high demand, the power exchange was witnessing high clearing price, and thus the Central Electricity Regulatory Commission (CERC) was forced to put a price cap on the power exchange and further has to extend it till September 2022.<sup>22</sup>

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e A Power Exchange is a platform on which power is transacted i.e., bought and sold. There are two power exchanges in India: Indian Energy Exchange Limited (IEX) and Power Exchange of India Limited (PXIL).

# Issues and Challenges Faced by ICB Plants

High imported coal price will ultimately lead to some increase in the final electricity price. However, such pass-through, if done in a transparent and prudent manner, may be less burdensome and could face less resistance. Towards this end, an understanding has been reached between certain states to remove the ceiling on imported coal—this will aid the State government and ICB plant operators to avoid disputes and will ensure that the pass-through of coal cost is done properly. This will reduce the excess burden of the increase in cost resulting from high global coal prices on the plant operators.<sup>23,24</sup> It will provide a clear market signal to ICB plants and enable them to undertake short- and long-term risk mitigation strategies.

## Managing Volatility in International Markets

To deal with the volatility in global coal prices, ICB power plants must disclose their future coal needs in consultation with the Ministry of Power so that planning can be done and possible causes of volatility can be addressed in advance. ICB plants, in turn, can address specific risks by undertaking systematic importation of coal throughout the year in suitable quantities and explore the option of long-term contracts for the supply of coal, as well as the acquisition of coal mines overseas to hedge against price volatility risks.


On the policy front, ICB plants should diversify their sources of imported coal to manage volatility. At present, Indian ICB plants import half of their coal needs from Indonesia, for reasons of both proximity and price. Yet, such an approach leaves the plants vulnerable to country-specific risks. Indeed, in January 2022, Indonesia imposed a ban on the export of coal, putting at risk the power supply to states such as Gujarat, Andhra Pradesh, Karnataka, and Tamil Nadu, where these ICB plants are located, as well as other states having Power Purchasing Agreements (PPAs) with them.<sup>25</sup> According to conservative assessments by the Institute of Energy Economics and Financial Analysis, this would imply a risk of losing an estimated 45 billion units (BU) of annual generation at 65-percent plant load factor.<sup>26</sup>

Moreover, during times of geo-political crises or tensions, trade routes could get blocked, making it necessary to guard against dependency on a single source. In this regard, India's diplomatic missions in coal-exporting countries can be required to provide information in anticipation of any crucial policy changes likely to emerge in the source country that can have consequences on its coal imports, or of any looming geo-political crisis that can affect future shipments. This can rightfully be made a part of India's energy diplomacy.

**A**midst rising energy demand and a declared commitment to provide electricity to all, India must explore all possible options for power generation. While the government is keen for the country to transition to clean energy, coal-based power generation will continue to be a mainstay of India's energy basket, at least for the medium term. According to the Central Electricity Authority, India's reliance on coal for power generation is expected to fall from 53 percent of installed capacity in 2021 to 33 percent in 2030. In this regard, ICB plants will form an integral element during this transition and therefore should remain operational.

This brief has argued that ICB plants have certain features that make them useful in meeting India's energy demand. First, the specific coal consumption of these plants is low, implying that they generate more energy per unit of coal. Second, the plants are designed to operate on imported coal, which has higher gross calorific value than what is available domestically. Domestically produced coal have high ash content and a low calorific value, raising operational, transport and maintenance costs. Thus, the same quantity of imported coal produces more energy, compared to domestic coal. Being located mostly on the coasts, ICB plants also give additional benefits in reducing the reliance on the Indian Railways, as these can be fed directly by sea.

India must address the working capital requirement of its ICB plants. The rising costs of inputs faced by ICB plants, on account of high international coal prices, are putting extreme pressure on them even as high interest rates hamper their financial planning. In a situation where private and banking institutions are not as keen to invest in coal-based ventures, finding adequate working capital is becoming onerous for ICB plants.

According to the International Energy Agency (IEA),<sup>27</sup> India is likely to witness the highest rise in energy demand over the next 20 years. While the country has embraced the idea of clean renewable energy on a global stage, its current demand for electricity can only be met by addressing the concerns surrounding coal-fired power plants. The goal of going green might be a medium- to long-term strategy that should be diligently pursued to avoid future crises. In the short term, however, focus should be on making coal-based plants work efficiently; ICB plants are crucial in this regard. 

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# Endnotes

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