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INDUSTRY OUTLOOK

POWER SECTOR IN INDIA: NEW EMERGING OPPORTUNITIES AND CHALLENGES

20 May 2022

Introduction

"I have seen the future and it is very much like the present, only longer" - Kehlog Albran

Global growth and inflation have been imperiled by surging commodity prices post Russia Ukraine war, fragile real incomes and disrupted trade and energy lines. Muted European growth, scarce wheat, vegetable oils, some metals and electronic components and evolving Chinese Covid situation weaken global growth. The global economy has been severely impacted by decelerating growth and accelerating inflation.

The IMF has demonstrated that the economic impact of Ukraine war flows through three main channels:

1. Higher prices for commodities, viz., energy, grains and metals and accelerating inflation.
2. Disrupted trade, supply chains and remittances in neighboring countries and surge in refugees.
3. Reduced business confidence and higher investor uncertainty is certain to impact asset prices.

These are testing times with unbounded uncertainty all around us necessitating all round care and caution.



In this overarching macro-economic and global scenario, energy, which is a pre-requisite to a country's economic development, has acquired centre-stage both for considerations of economic growth and distributive equity. Energy has a catalytic role in the operation of an economy as it significantly influences the production of goods and services. The overall development of an economy is, inter-alia, a function of meeting the needs of India's growing economy, providing reliable, affordable, secure, and sustainable energy.

Power sector in India has 395 GW (Giga Watt) installed generation capacity, 203 GW peak power requirement, 11 per cent installed capacity CAGR (2011-2020) and 67 per cent required hydropower capacity. The private sector with 48.50 per cent has the largest installed generation capacity followed by Central sector (24.90 per cent) and State sector (26.70 per cent) (See Table 1). Fossil fuel has still higher installation, generating 2,35,929 Mega Watt (MW) electricity constituting nearly 60 per cent of the total installed generation capacity.

Table 1: Installed Generation Capacity (As on 31st January 2022)

Sector	Mega Watt (MW)	% of total
Central Sector	98,327	24.90%
State Sector	1,05,314	26.70%
Private Sector	1,91,434	48.50%
Total	3,95,075	100.00%
Category	Installed Generation Capacity (MW)	% of share in total
Fossil Fuel		
Coal	2,03,900	51.60%
Lignite	6,620	1.70%
Gas	24,900	6.30%
Diesel	510	0.10%
Total Fossil Fuel	2,35,929	59.70%
Non-Fossil Fuel		
Renewable energy share in electricity (RES) (Incl. Hydro)	1,52,366	38.50%
Hydro	46,512	11.80%
Wind, Solar & Other RE	1,05,854	26.80%
Wind	40,101	10.20%
Solar	50,304	12.70%
BM Power/Cogen	10,176	2.60%
Waste to Energy	434	0.10%
Small Hydro Power	4,840	1.20%
Nuclear	6,780	1.70%
Total Non-Fossil Fuel	1,59,146	40.30%
Total Installed Capacity (Fossil Fuel & Non-Fossil Fuel)	3,95,075	100%

Source: Central Electricity Authority (CEA)

The private sector is generating about half of the total installed generation capacity with 1,91,434 MW of electricity followed by State sector (1,05,314 MW) and Central sector (98,327 MW) constitute 26.70 per cent and 24.90 per cent respectively.

Table 2: All India Region-wise Installed Capacity

S. No.	Region	THERMAL					NUCLEAR	HYDRO	RES @ MNRE
		COAL	LIGNITE	GAS	DIESEL	TOTAL			
1	NR	56067	1580	5781	0	63429	1620	20434	24974
2	WR	73716	1400	10806	0	85923	1840	7563	32616
3	SR	45700	3640	6492	434	56265	3320	11820	46554
4	ER	27646	0	100	0	27746	0	4764	1724
5	NER	770	0	1720	36	2526	0	1944	469
6	ISLANDS	0	0	0	40	40	0	0	38
	ALL INDIA	203899	6620	24899	510	235929	6780	46525	106375

As on 28th February 2022 (All figures in MW)

NR – Northern Region, WR – Western Region, SR – Southern Region, ER – Eastern Region, NER – North-eastern Region

Sources: Data from CEA website and POSOCO,

https://posoco.in/download/monthly_report_february_2022/?wpdmdl=43693

In terms of regional installed capacity, most of the regions have thermal and non-renewable energy sources. Out of the total installed capacity of 395 GW, coal-based has 203 GW installed capacity alone (see Table 2). Out of the total All India demand, 80 per cent is met by the coal, oil, and solid biomass. However, energy use in India has doubled since 2000. Accordingly, India needs to shift from non-fossil fuel sources of generating electricity to renewable sources of energy in view of the rising energy intensity of development, the heightened consciousness of sustainable development in general and climate change in particular. Therefore, universal access to power for India is a guiding principle focusing on the twin goals of ensuring 24x7 adequate and reliable energy access and simultaneously focusing on the transition of clean energy by reducing the country's dependence on fossil-based energy and moving to cleaner and renewable energy sources.

Growth Pattern of the Power Sector

India is the third largest producer and the third largest consumer of electricity in the world. With increasing population, demand for electricity is rising at a fast clip and India has improved its power generation capacity over the years. India has added more than 500 billion units until FY22 from FY10. The power generation capacity rose from 808.498 billion units (BU) in 2009-10 to 1,381.827 BU in 2019-20 (see Table 3).

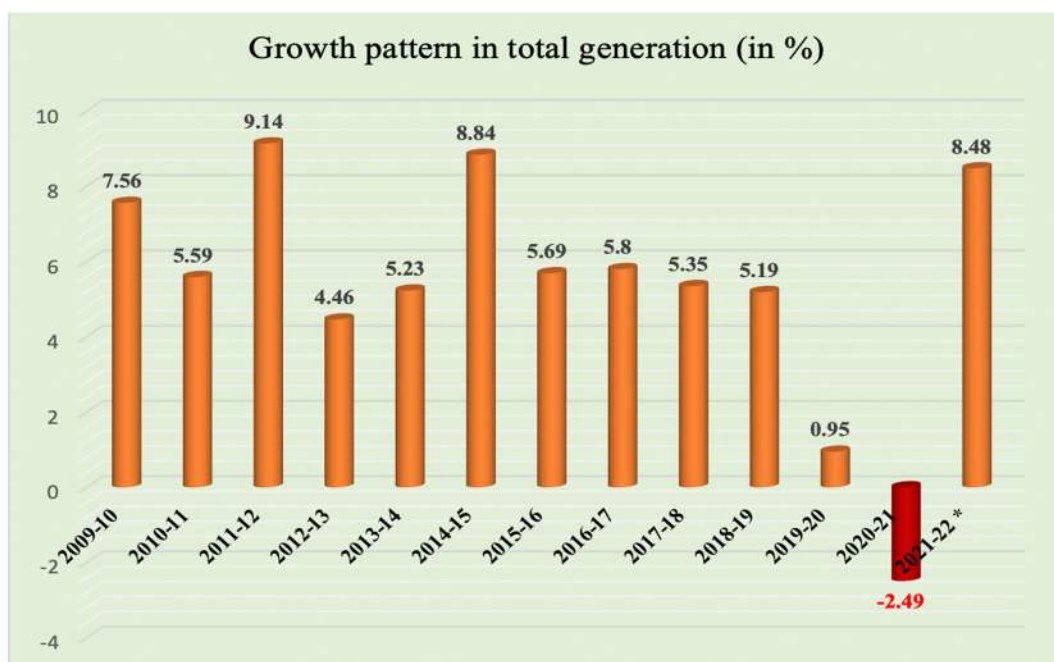
Table 3: Total generation and growth over previous year in the country during 2009-10 to 2021-22

Year	Total Generation (Including Renewable Sources) (BU)	% of growth
2009-10	808.498	7.56
2010-11	850.387	5.59
2011-12	928.113	9.14
2012-13	969.506	4.46
2013-14	1,020.20	5.23
2014-15	1,110.39	8.84
2015-16	1,173.60	5.69
2016-17	1,241.69	5.8
2017-18	1,308.15	5.35
2018-19	1,376.10	5.19
2019-20	1,389.10	0.95
2020-21	1,381.83	-2.49
2021-22 *	1,234.298	8.48

*Upto January 2022 (Provisional)
Source: CEA

During FY20 and FY19, the growth of electricity generation was lower than the previous financial years because of the impact of COVID-19 (see Chart 1). According to the International Energy Agency (IEA), the electricity demand dipped quickly across Europe and India with stringent confinement measures but steadily recovered as measures gradually softened.[1] Quick recovery in electricity demand was visible during FY21 as the recovery from COVID-19 pandemic was faster and stronger in India than EU countries.

Chart 1: Growth of Total Electricity Generation (Including Renewable Sources) (in %)



*Upto January 2022 (Provisional) Source: CEA

However, the electricity generation target of thermal, hydro, nuclear and Bhutan import for the year 2021-22 was fixed at 1356 billion unit (BU), i.e., growth of around 9.83 per cent over actual generation of 1234.608 BU for the previous year (2020-21). The generation from these categories during FY21 was 1234.608 BU as compared to 1250.784 BU generated during FY20, representing a negative growth of about 1.29 per cent. The electricity generation target of conventional sources for the year 2021-22 was fixed at 1356 BU comprising of 1155.200 BU Thermal; 149.544 BU Hydro; 43.020 Nuclear; and 8.236 BU import from Bhutan.

The electricity energy generation from renewable energy sources (solar, wind, hydro, and bio power) increased significantly from 193.5 BU during 2013-14 to 306.3 BU during 2020-21 showing the CAGR of 6.8 per cent. Presently India is importing 1.5 GW hydropower from Bhutan and exporting around 500 MW to Pakistan, 120-150 MW to Nepal and around 500 MW to Bangladesh. In addition, India is on course to connect the whole nation into a single grid by strengthening the distribution system and achieving universal household electrification.[2] Out of the total global demand since 2000, India is responsible for more than 10 per cent rise in the global energy demand whereas in per capita terms, energy demand in India grew by more than 60 per cent in the same period. In terms of solar energy, the installed capacity of solar energy in India has increased remarkably from 2.63 GW in March 2014 to 49 GW in December 2021.

Chart 2: Installed Solar Energy Capacity in India: 2006-2020



Sources: Our World in Data and PIB,

<https://static.pib.gov.in/WriteReadData/specificdocs/documents/2022/mar/doc20223321901.pdf>

India is taking strategic initiatives to transform the nation from power deficit to power surplus nation. Some institutional initiatives are listed below.

Institutional Initiatives

All States and Union Territories (UTs) have signed memorandum of understanding (MoUs) with the Central Government to ensure 24x7 power supply to all households, industrial and commercial consumers, and adequate supply of power to agricultural consumers. For seamless transfer of power from resource centric regions to load centric regions, the government has installed stronger National Grid with more than the adequate power generation capacity to meet peak demand of electricity. Markedly different power rates at different points of time for generators and consumers could conceivably make a difference and help to manage the situation adroitly.

As per the Ministry of Power, Government of India, the availability of power in rural areas was about 12:30 hours in a day in 2015, which improved to 21:09 hours and in urban areas, it rose to 23:41 hours. This has also led to shift from the conventional to sustainable sources power. This resulted into significant reduction in the consumption of kerosene from 892 crore litres in 2014-15 to 204 crore litres in 2020-21.

To achieve the goal of making universal access of household to electricity through electrifying every household of each village in the country, the Government of India launched SAUBHGAYA scheme - the Pradhan Mantri Sahaj Bijli Har Ghar Yojana in October 2017. Since launch of the scheme, a total of 2.817 crore households have been electrified, which was characterized as the fastest expansion of access anywhere in the world in the history of power sector by the IEA. The other developments under the scheme are as follows:

Table 4: Major developments under SAUBHGAYA scheme

New Sub-stations	2,831
Sub-stations Upgraded	2,940
11KV HT Lines	2,02,528 ckm*
33KV & 66KV HT Lines	29,039
LT Lines	5,30,501 ckm
Feeder Segregation	1,22,123 ckm
Distribution Transformers	6,80,143
Consumer Meters	2,37,42,224

*ckm: circuit kilo meters

The objective of universal access significantly stressed the power sector. The total outlay of ₹32,867 crore was during the period of FY08 – FY14, which increased by more 150 per cent to ₹82,257 during FY15 – FY21.

With the goal of making power more affordable with lesser cost, the government of India has directed the power generation companies to switch coal from less efficient units to more efficient units, leading to lower generation costs and ultimately lesser cost of electricity for the consumers. This has resulted in a saving of at least ₹1,400 crore per annum.

The Ministry of Finance in its Union Budget 2022-23 announced inclusion of the data centres and energy storage systems comprising dense charging infrastructure and grid-scale battery systems in the harmonised category of infrastructure sub-sectors. This will help firms in the power sector to access long-term institutional funds on better terms and cheaper foreign currency fund through the external commercial borrowing route. In the Union Budget 2022-23, an allocation of ₹3365 crore was made for the solar power sector, including both grid-interactive and off-grid projects. This marks a 29 per cent increase over the previous year budget of ₹2606 crore.

An additional allocation of ₹1,900 crore was announced under the existing PLI scheme in the Union Budget 2022-23 for manufacturing high efficiency solar photo voltaic modules. This allocation was made to boost the domestic manufacturing to achieve the goal of 280 GW of installed solar capacity by 2030. In view of this target of the Indian Government, the Government of United Kingdom, in November 2021, decided to invest US\$ 1.2 billion (nearly ₹920 crore) through public and private investments in green projects and renewable energy in India to support the India's target of 450 GW of renewable energy by 2030.

Earlier in November 2021, the government had already announced its focus on increasing the funding under the PLI scheme for domestic solar cells and module manufacturing to ₹24,000 crore from the existing ₹4,500 crore to make India an exporting nation.

As a part of the government's overall market borrowings in 2022-23, sovereign Green Bonds will be issued for mobilizing resources for green infrastructure. The proceeds will be deployed in public sector projects which help in reducing the carbon intensity of the economy.[3] The Parliamentary Standing Committee recommended increasing the loan limit for the renewable energy sector under priority sector lending, which currently has a limit of ₹30 crore.

The government approved 23 Inter State Transmission System Projects (ISTS) with an estimated cost of ₹15,893 crore in December 2021 to augment the seamless transmission of power from power surplus regions to power deficit regions. Under the projects, there will 13 sub-projects with an estimated cost of ₹14766 to be developed under Tariff Based Competitive Bidding, and 10 projects with an estimated cost of ₹1127 crore to be developed under Regulated Tariff Mechanism.[4]



Various schemes like Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY), Ujwal DISCOM Assurance Yojana (UDAY), and Integrated Power Development Scheme (IPDS) are currently on with the objective of providing electricity connection to every household of the country.

Industry Risk

There was an enduring impact of COVID-19 pandemic on energy demand with COVID-19 disrupting India's energy use. There was an estimated fall of about 5 per cent in India's primary energy demand recorded in FY20 as compared to the FY19 levels due to restriction on mobility and reduction in economic activities. Investment in energy sector was also hit by the pandemic and a fall of 15 per cent in FY20, weakened financial health of companies specifically the power distribution companies in India across the sector.[5] The exacerbated geo-political dynamics, climate change, supply logistic issues, geopolitical tensions, protracted growth slowdown, weak inter-ministerial coordination and lapses in the poor functioning of the power distribution companies made for a deleterious mix. It has, however, to be realized that lack of reliable power severely dampens sustained industrial growth, investment and economic competitiveness.

Data from the Union Ministry of Coal revealed that this year the production by Coal India Ltd rose by 23 per cent, from Singareni Collieries Company Ltd by 34.2 per cent and from captive mines by 40 per cent. Despite this higher production, there was a stockpile crunch at the coal-based thermal power plants because of the over once in a century heat-wave and the attendant spike in demand (201 gigawatts in April 2022), the ongoing Russia-Ukraine war and, as revealed by the Centre for Science and Environment (CSE), idle 3,367 MW coal power capacity.

Further, 15,472 MW capacity was grossly under-utilized as they generated less than 50 per cent of planned generation; and another 44,976 MW generated 50-80 per cent of its planned output. To worsen matters, most of the power generation was from old, inefficient coal-fired thermal power units, while the more efficient units (less than 20 years old) were underutilized because of a conspicuous absence of long-term PPAs with the discoms and/or established coal linkages.



India is the third-largest global emitter of CO₂, despite low per capita CO₂ emissions. The carbon intensity of its power sector exceeds the global average. Further, particulate matter emissions are a major contributor to air pollution, which has emerged as one of India's most sensitive social and environmental issues. In 2019, there were well over one million premature deaths related to ambient and household air pollution. This is going to be a big challenge for the policy makers making it necessary to shift their focus to most efficient and sustainable energy sources. Strategic measures include

- (i) improving the efficiency of supply and consumption of energy;
- (ii) expanding the proportion of natural gas, and hydropower in the fuel mix; and
- (iii) reducing energy intensity in the transport sector.

India faces the twin dilemma of co-existence of shortage and abundance in several parts of its energy system. Despite the fact that India has the fifth-largest coal reserves in the world, India continues to rely overwhelmingly on imports of coal. While India is a major centre for global oil refining, the country is largely dependent on imported crude oil. The issue of interrupted electricity supply and the power outage for long significantly cause commercial and technical losses at the distribution level. The required level of infrastructure coupled with pricing constraints constitutes some major issues, which the power sector is grappling with today.

To be sure, it is not always easy to forecast demand with precision and accuracy. But the unacceptable situation this year poses some fundamental questions about the inherent flaws and infirmities in the methodology and modelling of the different growth scenarios of the Indian economy in general and the power sector in particular over the medium-term with assured and uninterrupted supply of power and the ability and willingness of State Regulatory Commissions to subject them to the stringent test of practicality, trend analysis and robustness.

India has achieved significant progress in terms of electricity access in the last two decades. Progress in this area reflects India's steady efforts in a major policy push. In the last one decade, India has provided electricity to nearly 50 million new users every year, equal to the entire population of Spain. This has been a significant achievement so far in global energy space in recent times. The issue of reliability is, however, also a major concern for India.

Emerging Contours

An unusually hot March and April with temperatures exceeding 40 degrees C severely dented the process of development in the country. The hottest March in 122 years with intensifying demand to irrigate farms and run air conditioners in homes, acute power outages across States with coal used for 70 per cent power generation and intensified economic activities with the ebbing of the Covid-19 pandemic have caused not just concern but also alarm. The fault lines are real and worrisome.

No wonder, then, with the demand for electricity far outstripping the supply of electricity, the issue of coal usage, despite Coal India recording coal production of 622 million tonne in FY 22 vis-à-vis 607 million tonne in FY 21, acquired center-stage. India's current daily power deficit rose sharply from the average of 0.3 per cent to 1 per cent with the dreaded possibility of rising even further.

Given the paucity of options, most States, including Punjab, Tamil Nadu, Andhra Pradesh, Telangana, Odisha and Bihar, were forced to resort to power cuts, ranging from two hours to eight hours to meet the widening demand-supply chasm.

Currently, India is facing continued heat-wave that has led to rapid rise in the energy demand in States, such as, Punjab, Uttar Pradesh, Maharashtra, Haryana, and Andhra Pradesh. The northern states are witnessing power cuts amid low coal stocks. Over 150 thermal power plants have coal shortage problem and coal stock position of 173 powers plant stood at the sub-optimal level of 21.93 million tonnes (MT), which is less than the regulatory requirement of 66.32 MT as on April 21, 2022. But the power demand rose rapidly from 106.6 BU in 2019 to 124.2 BU in 2021 and further to 132 BU in 2022. [6]

This unsavory power scarcity situation, which was marked by severe disruptions of life, work, business and industry, was brought about by several forces and factors. Contextually significant factors include:

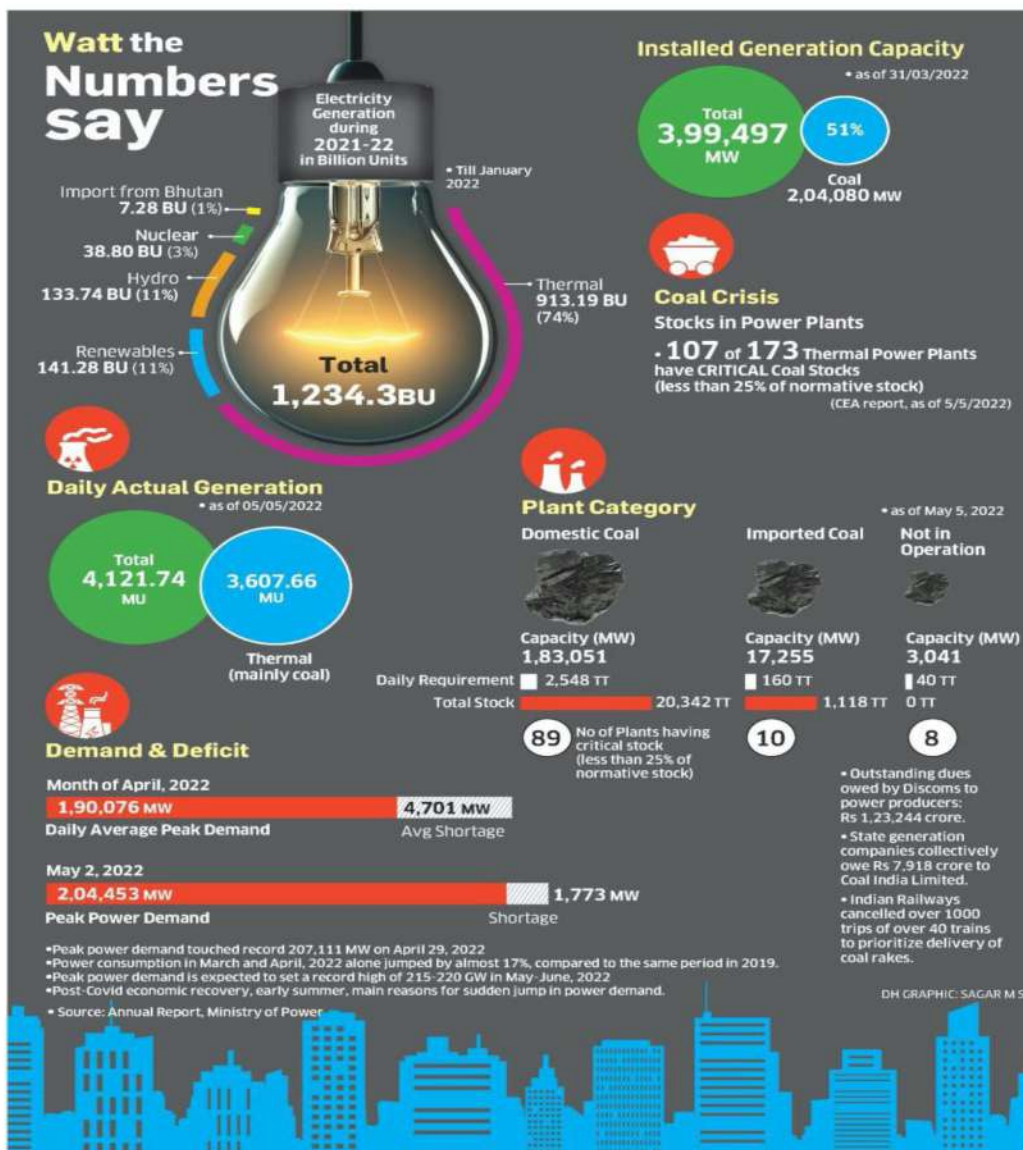
Heavy concentration on coal for power generation with most thermal power plants characterized by low stocks (with stocks in several power plants falling to merely 8 days of stocks in thermal power stations in many states against the 17-26 days required),

☒ The reluctance of the states to purchase coal from the international market because of elevated prices of about \$140 per tonne (e-auction price for Coal India for fuel grades G7 and G8 rose by almost 300 per cent to ₹13,500/kg, which is still much cheaper than the landed cost of imported coal at ₹17,000-18,000/kg)

☒ Leading to reduced import of coal for blending from 37 million tonnes in FY 16 exacerbating pressure on domestic coal

☒ And finally, the disruption in the supply chain in the aftermath of the Ukraine war, which heightened energy insecurity and thus escalated the demand for coal in Europe.

Hence, the government directed power producers owned by it — NTPC and Damodar Valley Corporation — to procure 10 per cent of their coal requirements through imports.



India has been hit by a double whammy with power consumption in March and April rising by nearly 17 per cent vis-à-vis the corresponding period in 2019 and global coal prices surging by 40 per cent and consequently India's imports falling to a two-year low. The gravity of the situation is starkly reflected in the Central Electricity Authority's (CEA's) report on coal stock on May 5, 2022. This Report[7] underscored that out of 173 thermal power plants, 107 plants had critically low stock of coal. Should this scenario of severe coal stock shortages persist, the possibility of stagflation in India in the not too distant future cannot be ruled out.

The Union Power Minister R K Singh, however, held that the problem of outages did not stem merely from shortage of coal but fundamentally because of non-payment of dues to Coal India Limited (CIL) (with state generation companies collectively owing a whopping ₹ 7,918 crore to CIL), delay in lifting coal, and "improper planning" by the states.[8] The States, however, blamed the Centre for low coal supply. There seems to be a fair measure of agreement that the inability and unwillingness of some power plants to lift coal stems from working capital scantiness because of delayed payment by DISCOMS. Since Coal India and the Railways do not extend credit to the gencos liberally, the gencos are unable to lift much coal despite a fall in their stocks below the prescribed level of 10 days.

Average coal stocks at the state-run power plants are of around 12 days or 25 MT at present against the Central Electricity Authority (CEA)-mandated normative requirement of 26 days for pithead plants and 17 days for other units. Supplies from CIL to the power sector were at an all-time high 540 MTs in FY22, which was 98.5 per cent of the pro-rated demand the CEA projected.

Coal Minister Pralhad Joshi's take [9] was "as of 25 April, 21.55 MT of coal stock is available with thermal power plants - almost 9-9.5 days of stock available with thermal power plants. This stock is replenished on a day-to-day basis. With Coal India together, we've around 72.5 mn tons in stock. According to me, there is no need to panic. Govt is monitoring the situation on a day-to-day basis, hourly basis. We will supply the required coal to the country".

Rising Outstanding Dues of Discoms to Gencos

There has been a steady progression in demand for power with demand rising from 106.6 BU per month in 2019 to 124.2 billion units per month in 2021 and again to 132 BU in 2022. It has sometimes been suggested-perhaps not unjustifiably-that despite the availability of electricity in power exchange and sufficient coal stocks, the state electricity distribution companies and state power generating companies, are unable to buy it because of their precarious financial condition.

This thesis can be substantiated by the fact that total outstanding dues owed by electricity distribution companies (DISCOMS) to power producers increased by 17.3 per cent year-on-year to ₹1,23,244 crore in April 2022.[10] DISCOMS cumulatively owed ₹1,05,029 crore to power generation firms in April 2021, according to portal PRAAPTI (Payment Ratification and Analysis in Power procurement for bringing Transparency in Invoicing of generators). Sequentially also, total dues in April 2022 rose from ₹ 1,17,390 crore in March 2022. The PRAAPTI portal was launched in May 2018 to bring in transparency in power purchase transactions between generators and DISCOMS.

In April 2022, the total overdue amount, which was not cleared even after 45 days of grace period offered by generators, stood at ₹1,04,885 crore as against ₹84,376 crore in the corresponding month a year ago. The overdue amount stood at ₹1,03,331 crore in March 2022. Power producers give 45 days to DISCOMS to pay bills for electricity supply. Subsequently, outstanding dues become overdue and generators charge penal interest on that in most cases.

The Centre had given some relief to discoms for paying dues to gencos in view of the COVID-19-induced lockdown. The government had also waived penal charges for the late payment of dues. In May 2020, the government had announced ₹90,000-crore liquidity infusion for discoms under which these utilities got loans at economical rates from Power Finance Corporation (PFC) and REC Ltd. to help gencos remain to tide over the crisis. Later, the liquidity infusion package was increased to ₹1.2 lakh crore and further to ₹1.35 lakh crore.

Discoms in Rajasthan, Uttar Pradesh, Jammu and Kashmir, Telangana, Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Jharkhand, and Tamil Nadu account for the major portion of dues to gencos in April.

Overdues of independent power producers amounted to 55.86 per cent of the total overdue of ₹1,06,902 crore of discoms. The proportion of central PSU gencos in the overdue was 22.35 per cent. Among the central public sector gencos, NTPC alone has an overdue amount of ₹ 5,072.82 crore, followed by NPCIL - Kundankulam Nuclear Power Plant at ₹3,419.78 crore and DVC at ₹3,398.57 crore in May 2022. Among private generators, discoms owe the highest overdue amount of ₹25,284.67 crore to Adani Power, followed by KSK Mahanadi Power Company Ltd at ₹ 5,324.32 crore and Bajaj Group-owned Lalitpur Power Generation Company at ₹ 5,308.29 crore. The overdue of renewable energy producers stood at ₹ 20,127.16 crore in May 2022.

Indian Railways Coal Transportation

Indian Railways coal transportation grew by 20.4 per cent to 653 million tonnes in FY 22. Coal loading to power sector rose by 32 per cent between September 21 & March 22. But the plummeting coal stocks in the thermal power plants raised the specter of blackouts across states. This is why the Indian Railways cancelled over 1,000 trips of 40 trains to facilitate the movement of coal from pit heads to power plants across the country. Given the distinct possibility of surging demand for electricity, the Union Ministry of Power ordered all imported coal power plants ordered to operate at full capacity as power demand has surged almost 20 percent in energy terms.

The government ordered, “all imported coal-based power plants shall operate and generate power to their full capacity. Where the imported coal-based plant is under NCLT, the Resolution Professional shall take steps to make it functional”, invoking Section 11 of the Electricity Act, 2003. Prioritisation and monitoring, reduced transit time of coal laden trains and transition time of coal to power plants, dispatching almost 2 million tonnes (MT) of fossil fuel every day to the power sector by various modes, including railways, roadways and rail-cum-road (RCR) mode and an offer 16.7 MT coal to power generation companies with an option to lift this quantity in RCR mode to augment stock helped to contain the impending crisis.

With the unfolding power crisis, all states and gencos based on domestic coal have been directed to import at least 10 per cent of their requirement of coal for blending.[11] The Power Ministry explained “the demand for power has gone up by almost 20% in energy terms. The supply of domestic coal has increased but the increase in the supply is not sufficient to meet the increased demand for power. This is leading to load shedding in different areas. Because of the mismatch between the daily consumption of coal for power generation and the daily receipt of coal at the power plant, the stocks of coal at the power plant have been declining at a worrisome rate”.

The plants were directed to first supply power to power purchase agreement (PPA) holders and sell surplus to power exchanges. If generators/group cos own coal mines abroad, mining profit is to be set off to extent of shareholding. PPA holders shall pay generating co on weekly basis, either at benchmark rate or mutually negotiated rate, it added. If DISCOMS/States are unable to buy power, either way, it will be sold in power exchanges.

In terms of Section 11 of the Electricity Act, in the event of extraordinary circumstances, the government can ask generating companies to operate and maintain their generating stations in accordance with its directions. “Extraordinary circumstances” means circumstances arising out of threat to security of the State, public order or a natural calamity or such other circumstances arising in the public interest. An appropriate commission may offset the adverse financial impact of such directions.

Given reduced domestic coal supplies over the last six months, coal import dependency of the power sector is expected to increase moderately in the near term with cost implications for the independent power producers and for the distribution utilities because of higher international coal prices. The share of coal imports in consumption by the Indian power sector declined to about 4 per cent in the first 11 months of FY22 against about 8 per cent in FY21, amid the increase in international coal price level by more than 140 per cent.

A target of all India coal production of 1.2 Billion Tonne upto the year 2023-24 has been fixed.[12] The action plan for achievement of this ambitious target includes commercial auction of coal on revenue share mechanism; allowed sale of excess coal production; rolling auction; and single window clearance.

Sustainable Development

Sustainable development is a broad area, which includes poverty, inequality, inter-generational equity, bio diversity, management of forest and ecologically fragile areas, renewable energy, and climate change. In simple terms, this concept stresses that the interests of the present generation must be balanced with the interests of the future generation. A basic element of the overarching concept of sustainable development is the sharper focus on the mechanism of clean energy development. Hence attempts must be made to strengthen the relationship between business and environment and to provide sign posting to businesses.

Cleaner production (CP), which is the continuous application of an integrated preventive environmental strategy to processes and products to reduce risks to human beings and the environment, can promote the control and management of industrial waste. Cleaner production leads to financial benefits through energy savings, waste reduction, waste conservation and higher-quality-output. Consequently, most industries could reduce the consumption of resources by 10-15 per cent with more efficient production processes and therefore better bottom lines. Major cleaner production technologies relate to source reduction; recycling and reuse; and product reformulation or modification.

Source reduction implies i) good housekeeping and ii) process change - input material change - better process control - equipment modification- technology change. Recycling and reuse involves on-site recovery/reuse; and creation of useful by-products. Product reformulation or modification comprises input material change; equipment modifications; and process modification. Firms, however, are reluctant to install cleaner technologies because of the difficulty in accessing finance, the high cost of investment vis-à-vis perceived benefit in some cases and insufficient mechanisms in terms of regulations and monitoring and enforcement measures to push firms to internalize the environmental cost. There is thus a considerable potential to move 'upstream' to cleaner process technologies and materials with proper incentivization.

Energy practices adopted in the industrial sector vary widely. But the fault lines of the conventional process and pattern of development are real and worrisome. Hence, the impact of industrial waste on the environment necessitates ever-higher standards for waste minimization ranging from good operating practices to modification of the production process through assistance for pre-competitive eco-friendly industrial research and to induce business to agree on benchmarks and targets for each of major energy-using industries. This requires adoption of technologies and best practice techniques for environmental benefits among industrial units, preferably technologies for energy efficiency in industrial units through

(i) support for the rehabilitation of thermal power plants, for

(ii) enhancing the efficiency of power transmission and distribution through loss reduction and smarter grids, and for

(iii) increasing demand for energy efficiency investments in micro, small and medium enterprise (MSMEs) clusters and to enhance their capacity to access commercial finance.

The Government of India has promised to reduce its carbon emissions by 45 per cent by 2030 as an integral element of its commitment to address climate change in COP21. It is expected that the National Gas Grid will ensure availability and accessibility of natural gas but there are issues of heightened geopolitical dynamics, market dynamics and volatility of international and national gas prices. Towards this end, the PM Gati Shakti National Master Plan for Multi-modal Connectivity marks an important initiative.

The Way Forward

Where do we go from here? India's power and energy sector has huge potential to grow as the economy is gaining traction, the growth process seems here to stay and the acceleration of the inexorable forces of industrialisation and urbanisation. The India Energy Outlook 2021, a special report published by IEA in its World Energy Outlook series, brought into focus that India is likely to experience the largest increase in energy demand of any country worldwide over the next 20 years as its economy continues to develop and brings greater prosperity to its citizens. [13]

While India has surplus installed power generation capacity, it is struggling to maintain the required pace of energy supply to meet the rising energy demand. Such chronic situation of energy crisis and unreliable supplies may imperil the process and pattern of India's economic growth. Fluctuations in the delivery and the price of the energy have a cascading effect on the growth process itself.

The power crisis of October 2021 was ominous with a power shortage of 1.1 per cent but it shot up to 1.4 per cent in April 2022. The situation is steadily deteriorating with states like Andhra Pradesh, Maharashtra, Gujarat, Punjab, Jharkhand, and Haryana facing power cuts ranging from 3 to 8.7 per cent necessitating coordinated and concerted measures with a sense of urgency by all stake-holders, including the government to maintain the regulatory requirement of the inventory of deficient thermal power plants to prevent a crisis.

Natural gas and modern renewable sources of energy have become increasingly important and were least affected by the effects of the Covid-19 pandemic in 2020. The rise of solar PV has been spectacular; the resource potential is huge, and policy support and technology cost reductions have quickly made it the cheapest option for new power generation. India is purposefully moving towards the achievement of the goal set by Intergovernmental Panel on Climate Change (IPCC).

- India's non-fossil fuel-based capacity met the 40 per cent target under its nationally determined contribution (NDC) at COP 21.
- India's solar energy capacity up from 2.63 GW to 49 GW in last 7 years India pushes for One Sun, One World, One Grid (OSOWOG).

Considered in a proper historical and comparative perspective, the provision of electricity has increased significantly over the years. But weak institutions and utility governance hamper the sector's financial performance with issues of accountability; operational efficiency; customer service; transmission to state level transmission institutions because of extensive losses, leakages and pilferages; and cost recovery from tariffs taking a huge and grossly unacceptable hit.

This kind of a short-sighted myopic policy based on other than economic considerations vitiates the investment environment for the private sector and severely debilitates even the process of maintenance and expansion of the network. Such developments unmistakably bring out the compelling necessity of regulatory independence, greater competence, and a much higher degree of accountability all along the line for a discernible and sustained transformation of the ground realities.

Much higher storage capacity of Discoms is certainly needed. But there has to be undivided attention on the pursuit of large-scale grid storage to achieve the avowed objective of creating 500 GW on non-fossil fuel capacity, including 450 GW of renewable energy sources. This is, by no means easy, but certainly doable. "

ENDNOTES

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