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INDUSTRY OUTLOOK

2023 POWERING THE FUTURE: INDIA'S POWER SECTOR OUTLOOK

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Introduction

It is self-evident that power is an integral element of infrastructure. Both studies in development studies and empirical cross-country evidence unmistakably demonstrate that adequate, reliable and quality power is a pre-requisite to the sustained growth and transformation of the Indian economy. One of the basic axioms of India's power industry has been to provide universal access to affordable power in a sustained manner.

India has emerged as a significant player in the global energy economy. Amid the world's efforts to address the issue of climate change, India is dedicated to diminishing its carbon emissions in conformity with the global endeavour to address this issue. India's power sector is one of the most diversified in the world. Sources of power generation range from conventional sources such as coal, lignite, natural gas, oil, hydro and nuclear power, to viable non-conventional sources such as wind, solar, agricultural and domestic waste.



India's strategy for expanding its power sector is in line with the international call for transitioning to environmentally friendly energy production. Accordingly, India is resolutely devoted to decreasing the ratio of emissions to its Gross Domestic Product (GDP) by 45 per cent by 2030, using 2005 as a baseline, and attaining approximately 50 per cent of its total electric power capacity from renewable energy sources by 2030¹.

India stands 4th globally in renewable energy installed capacity (including large hydro), 4th in wind power capacity and 4th in solar power capacity (as per the REN21 Renewables 2022 Global Status Report). Between 2005 and 2022, per capita electricity consumption doubled from 631 units to 1255 units in India, making it the third largest electricity market in the world.² India is the only country among the G20 nations that is on track to achieve the targets under the Paris Agreement. The Paris Agreement came into effect on November 4, 2016, after its minimum threshold was met – 55 countries representing at least 55 per cent of global emissions. This Agreement focused on containing global temperature increases well below 2°C – and if possible 1.5°C – compared with pre-industrial levels.

The country has set an enhanced target at the COP26 of 500 GW of non-fossil fuel-based energy by 2030. This has been a key pledge under the Panchamrit. This is the world's largest expansion plan in renewable energy landscape.

Global Energy Sector Outlook

The global energy sector is still going through a challenging phase. Despite the devastating disruptions caused by the Covid-19 pandemic, the global energy sector recovered well from the slump, and the response to the global energy crisis provided a significant boost to clean energy investment landscape. However, the Russia-Ukraine war exacerbated the global energy crisis, causing volatility in the global fossil fuel market. Amid the rising fossil fuel cost burden, the impact is factoring in several aspects directly and indirectly. This has taken a long toll on the oil and gas supply, resulting in an increase in global household expenditure of between 2.7 per cent and 4.8 per cent.³

In the year 2023, global energy investment is estimated to be around US\$ 2.8 trillion, out of which more than US\$ 1.7 trillion is dedicated to clean energy, including renewable power, nuclear energy, grids, storage, low-emission fuels, efficiency improvements, and end-use renewables and electrification.

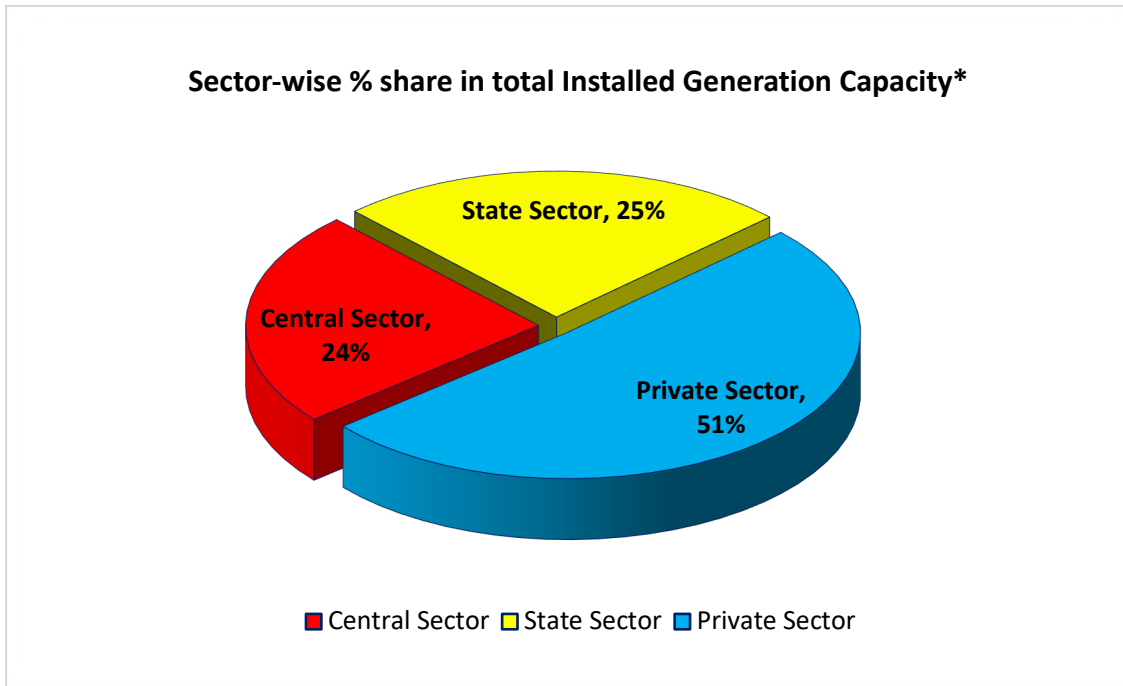
Total Installed Capacity (as on June 30, 2023)

While India's electricity demand rose at a fast clip, going forward, electricity demand is likely to rise at even a faster pace to meet the compelling demands of development and to bring about a discernible improvement in the standard of living of the people. Accordingly, a more of the same approach or business as usual approach is grossly inadequate to facilitate the transformative process of the Indian economy and necessitate massive addition to the installed generating capacity.

Sector wise

The sectoral distribution of the total installed generation capacity in India's power sector is divided as follows: the Central Sector holds 24 per cent, the State Sector holds 25 per cent, and the Private Sector holds the largest share at 51 per cent. The sectoral breakdown signifies the substantial presence of private entities in power generation, along with contributions from both central and state government sectors, reflecting a diverse landscape in India's power generation infrastructure (see Chart 1).

Chart 1: Sector-wise total installed Generation Capacity



*As on June 30, 2023.

Sources: Central Electricity Authority (CEA) | Infomerics Economic Research

Fuel-wise

As of June 30, 2023, the total installed generation capacity, encompassing both fossil and non-fossil fuels, stood at 4,21,902 MW. Fossil fuels constitute 56.4 percent of the total capacity, primarily led by coal at 48.8 percent, while the rest, 7.6 percent, is shared by lignite, gas, and diesel. Non-fossil fuels contribute 43.6 percent to the total capacity, with renewable energy sources (including hydro) accounting for 41.8 percent. The remaining 30.7 percent comprises wind, solar, and other renewable sources (refer to Table 1).

Table 1: Installed Generation Capacity (Fuel-wise) as on June 30, 2023

	Category	Installed Generation Capacity (MW)	% Share in Total
Fossil Fuel	Coal	2,05,895	48.80%
	Lignite	6,620	1.60%
	Gas	24,824	5.90%
	Diesel	589	0.10%
	Total Fossil Fuel:	2,37,929	56.40%
Non-Fossil Fuel	RES (Incl. Hydro)	1,76,493	41.80%
	Hydro	46,850	11.10%
	Wind, Solar & Other RE	1,29,643	30.70%
	Wind	43,773	10.40%
	Solar	70,097	16.60%
	BM Power/Cogen.	10,248	2.40%
	Waste to Energy	566	0.10%
	Small Hydro Power	4,959	1.20%
	Nuclear	7,480	1.80%
Total Non-Fossil Fuel:	1,83,973	43.60%	
	Total Installed Capacity (Fossil Fuel & Non-Fossil Fuel)	4,21,902	100%

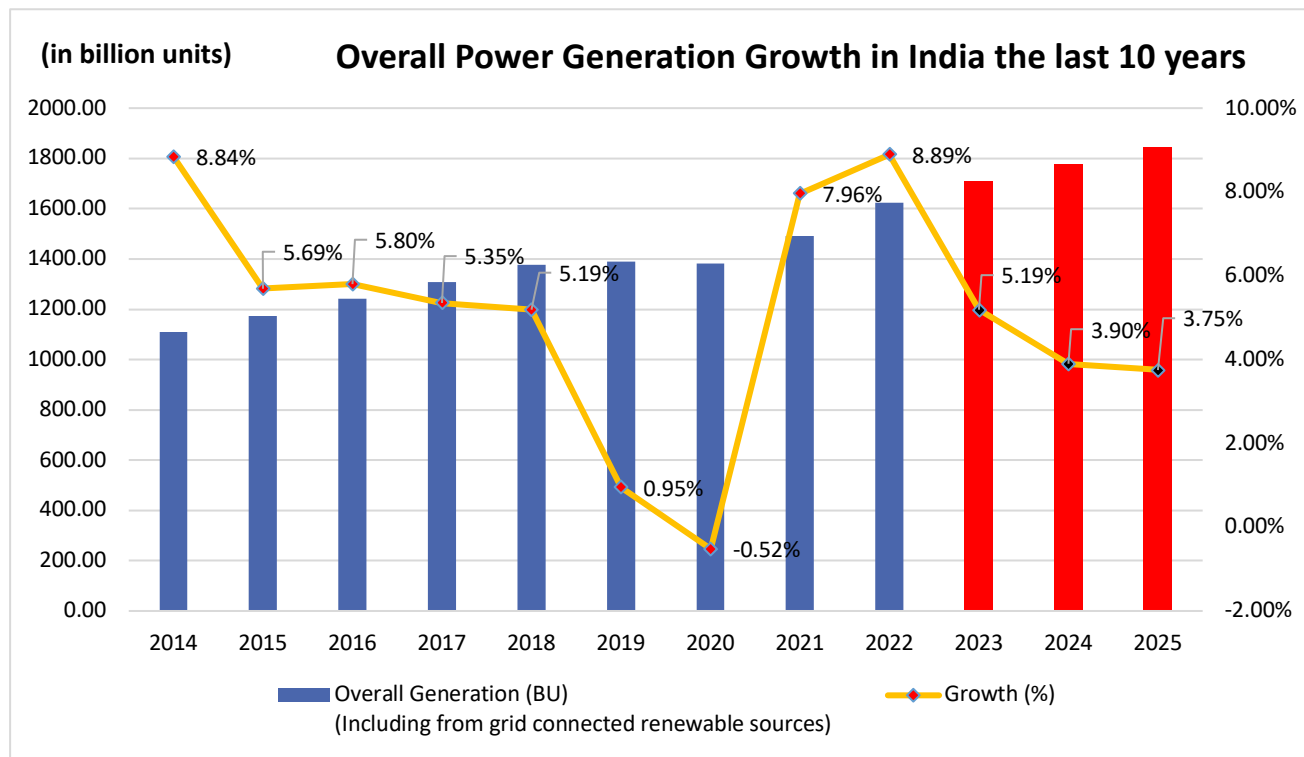
Source: Central Electricity Authority (CEA) | Infomerics Economic Research

The reason of higher percentage of coal-based capacity in the generation capacity mix has been the abundant availability of domestic coal, shorter gestation period and lower capital cost of coal-based plants compared to hydro and nuclear plants.

Performance of Electricity Generation (including RE)

Power generation will continue to surpass the levels observed during the pandemic, thanks to the traction in economic activity across sectors. The power generation during FY22 was 1624.158 BU as compared to 1491.859 BU generated during FY21, recorded an annual growth of about 8.89 per cent. As per the Ministry of Power, the electricity generation target for the FY23 has been fixed at 1750 BU with an annual growth of 7.72 per cent from 1624.158 BU generation in FY22. As per our projection, the electricity generation forecast in FY23 will be at 1708.78 BU falling short of the target in the current year followed by 1775.40 BU and 1842.02 BU in FY24 and FY25 respectively (see Chart 2).

Chart 2: Electricity Generation and Growth Trend in India and Forecast



Note: Forecasts are highlighted in red.

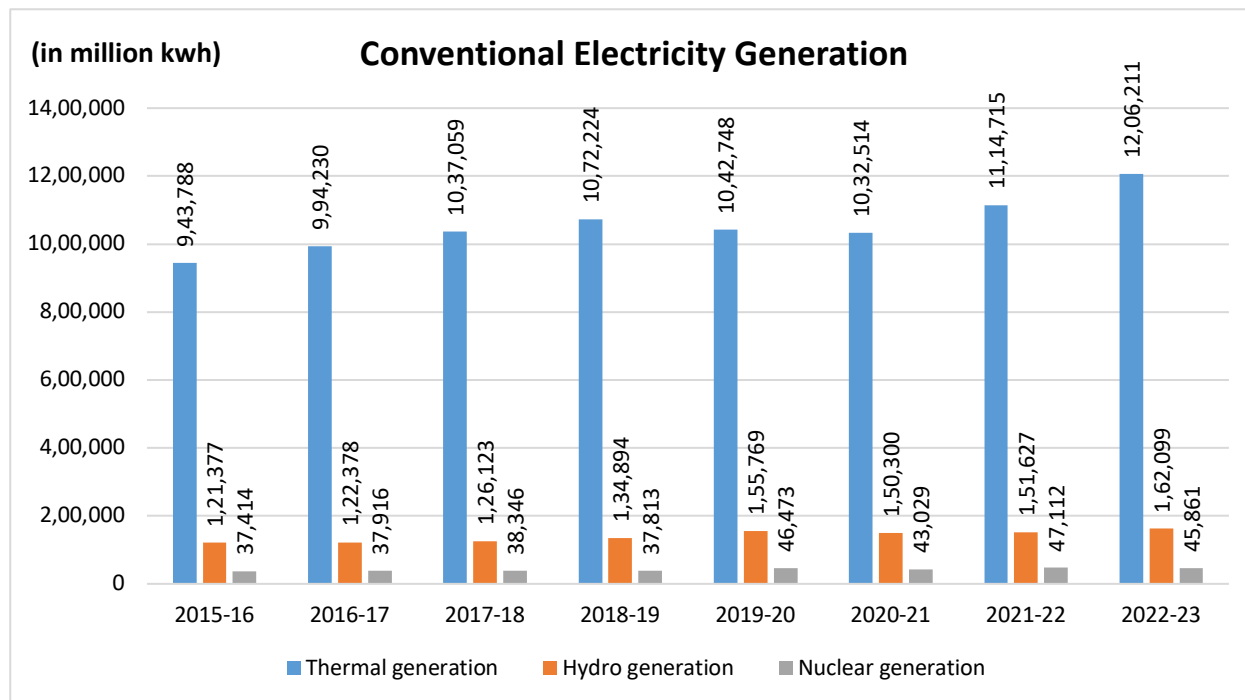
Source: Ministry of Power, GoI | CEA | Infometrics Economic Research

The shortfall in the achievement of the target power generation causes concern. The supply chain disruptions along with delays in execution of power generation projects, shortages, or disruptions in fuel supply such as coal and natural gas impact the operation capacity of power plants, leading to reduced generation.

Electricity Generation from Conventional Sources

Coal is abundant in India. Hence, the thermal generation is the most dominant source of conventional energy generation in India followed by hydro and nuclear. In 2022-23, electricity generation from thermal source accounted for 85 per cent of the total conventional energy generation, hydro generation accounted for 12 per cent, and nuclear generation accounted for 3 per cent (see Chart 3).

Chart 3: Conventional Electricity Generation in India from FY15 to FY23



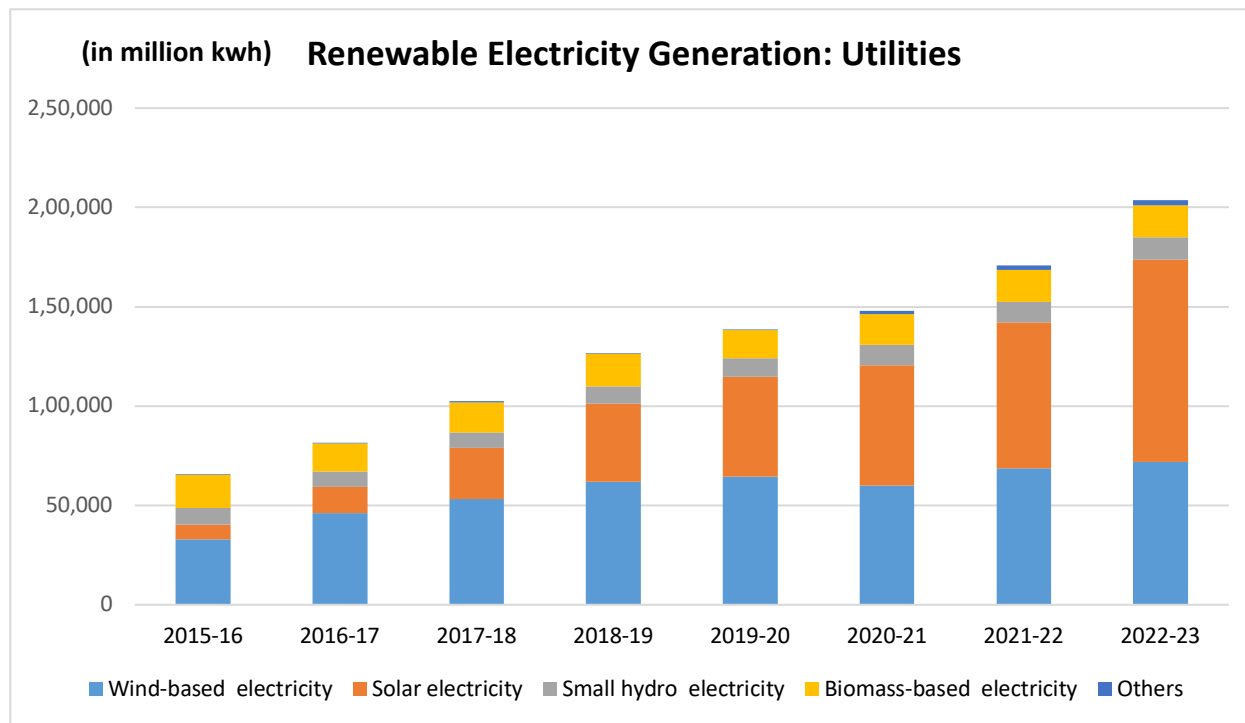
Source: IEC | Infomerics Economic Research

The increase in thermal source of energy generation is mainly due to macro-economic growth and the rising demand for electricity. The government has also been investing in new thermal power plants to meet the growing demand.

Electricity Generation of Renewable Sources

Over the last two decades, there has been a progressive surge in renewable electricity generation in India. Under renewable energy generation sources, there is a significant rise in electricity generation from solar-based and wind-based electricity generation. The solar-based electricity generation accounts for more than half of the total electricity generation from renewable sources followed by wind-based electricity generation. In 2022-23, the contribution of solar-based electricity generation in the total production from renewable energy sources was 50.12 per cent with 102,014 million kwh. This was 11.32 per cent with 7,448 million kwh in 2015-16. The wind-based electricity generation has steadily risen, reaching 71,814 million kwh in 2022-23, while solar electricity generation experienced exceptional growth, soaring to 1,02,014.20 GWh. The small hydro and biomass-based electricity sectors showed moderate expansions, reaching 11,170.10 million kwh and 16,024.50 million kwh, respectively (see Chart 4).

Chart 4: Renewable Electricity Generation: Utilities



Source: Infomerics Economic Research

The period from 2015-16 to 2022-23 witnessed a substantial shift towards cleaner energy sources, leading to a total renewable electricity generation of 2,03,552.20 million kwh in 2022-23 from 65,780.90 million kwh in 2015-16. This indicates India's steadfast and on-going commitment to sustainable energy development.

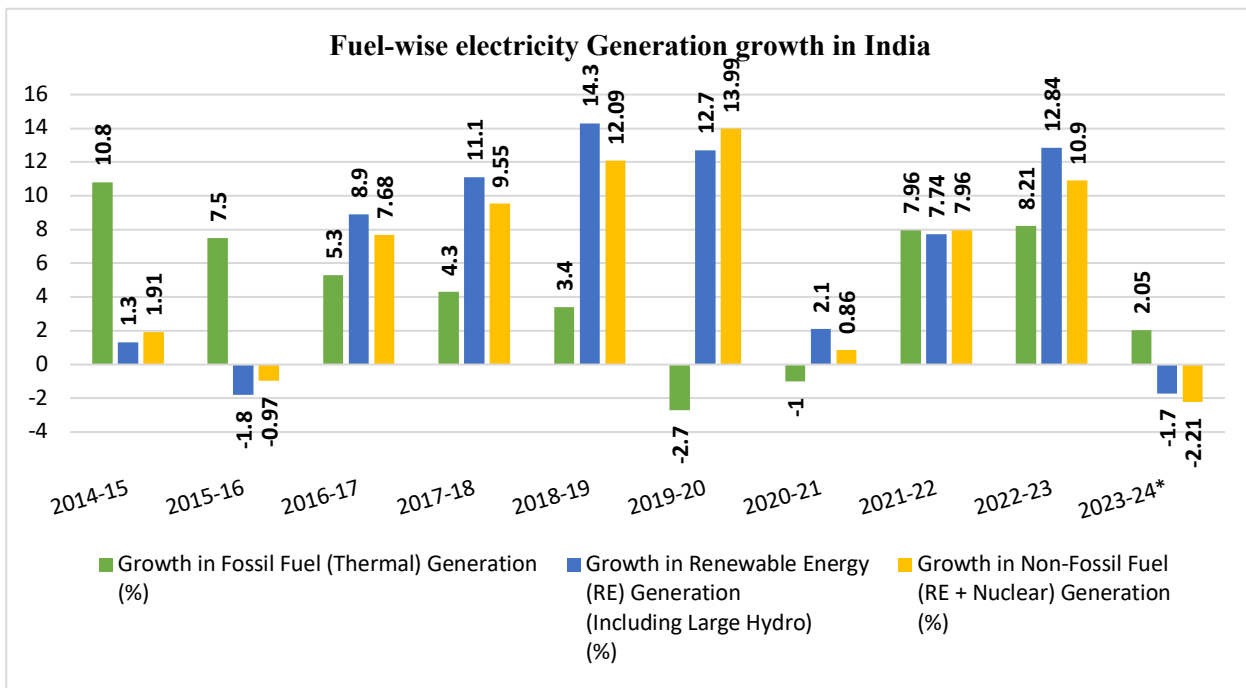
A report titled "Optimal generation capacity mix for the year 2029-30 (Version 2.0)", prepared by the Central Electricity Authority (CEA) projected a total installed capacity in the country of around 777 GW in the year 2030 with a battery energy storage of 41 GW. The projected gross electricity generation (BU) during the year 2029-30 is likely to be 2440 BU comprising of 1363.5 from thermal (Coal, Gas and Lignite, 1076 BU from Non-Fossil Sources (including 212 BU from other REs). The share of Non-Fossil Fuel-based sources is likely to increase to 64 per cent in 2029-30 from the present level of 42 per cent of total installed capacity. Similarly in terms of gross generation, the share of non-fossil fuel sources is going to increase up to 44 per cent in 2029-30 from 25 per cent in 2022-23.⁴

Fuel-wise Electricity Generation Growth

In India, the growth in fossil fuel (thermal) electricity generation has been fluctuating over the years. There was a significant increase in the growth from 2014-15 to 2017-18 but this growth has since decelerated. It has been steadily increasing over the past few years, with the exception of a slight dip in 2020-21 due to the COVID-19 pandemic. But renewable energy (including large hydro) generation showed a generally upward trend, with occasional fluctuations. Non-fossil fuel generation (comprising

renewable energy and nuclear) has consistently grown, indicating a shift towards cleaner energy sources (see Chart 5).

Chart 5: Annual Growth in electricity generation (Fuel-wise) in the last 10 years



*Till July 2023. Source: Infomerics Economic Research

The year 2022-23 witnessed a notable increase in both fossil fuel and renewable energy generation. The given data for the year 2023-24 has been updated until July 2023. The data shows a clear trend toward reducing reliance on fossil fuels and increasing the share of non-fossil fuel sources in India's electricity generation.

Power Supply Position in India

In 2014-15, there was a deficit of 3.57 per cent, indicating that electricity availability fell short of the requirement. Over the subsequent years, the deficit gradually decreased, with deficits of 2.11 per cent, 0.66 per cent, 0.71 per cent, 0.58 per cent, 0.51 per cent, 0.38 per cent, 0.42 per cent, and 0.49 per cent for the years 2015-16 through 2022-23, respectively. The available data suggests a narrowing gap between electricity availability and requirement in India, demonstrating progress in addressing the electricity supply-demand balance, although small deficits persisted in recent years (see Table 2).

Table 2: Demand and Supply of Power in India from 2014-15 to 2022-23

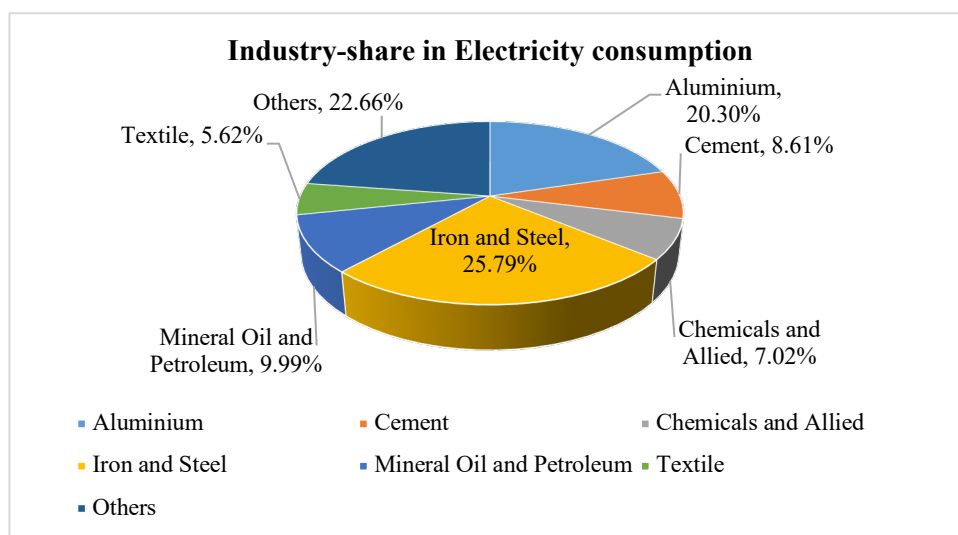
Year	Electricity availability (Million kwh)	Electricity requirement (Million kwh)	Surplus/Deficit (-) (%)	Peak demand (Mw)	Peak met (Mw)	Surplus/Deficit (-) (%)
2014-15	1,030,785	1,068,923	-3.57	148,166	141,160	-4.73
2015-16	1,090,850	1,114,408	-2.11	153,366	148,463	-3.2
2016-17	1,135,703	1,143,302	-0.66	159,542	156,934	-1.63
2017-18	1,203,876	1,212,463	-0.71	164,066	160,752	-2.02
2018-19	1,267,532	1,274,908	-0.58	177,022	175,528	-0.84
2019-20	1,283,701	1,290,282	-0.51	183,804	182,533	-0.69
2020-21	1,270,984	1,275,884	-0.38	190,198	189,395	-0.42
2021-22	1,374,355	1,380,141	-0.42	203,014	200,539	-1.22
2022-23	1,503,322	1,510,660	-0.49	212,762	211,856	-0.43

Source: CMIE | Infomerics Economic Research

Up to May 2023, the power requirement was 2,66,360 million units. Out of this power requirement, 2,66,951 million units of power were available with a deficit of -591 million, i.e., 0.2 per cent deficit. The peak demand of 2,21,370 million units, 2,21,347 million units with -0.01 per cent deficit was met till May in year 2023-24.

In terms of industry-wise consumption of electricity in India, iron and steel industry is the biggest consumer of electricity in India followed by aluminium, mineral oil and petroleum industry. As per the data available for the year 2021-22, iron and steel industry shares 25.79 per cent in total electricity consumption by industries followed by aluminium, mineral oil and petroleum industry respectively 20.30 per cent, 9.99 per cent (see Chart 6).

Chart 6: Industry-wise Consumption of Electricity in India in 2021-22

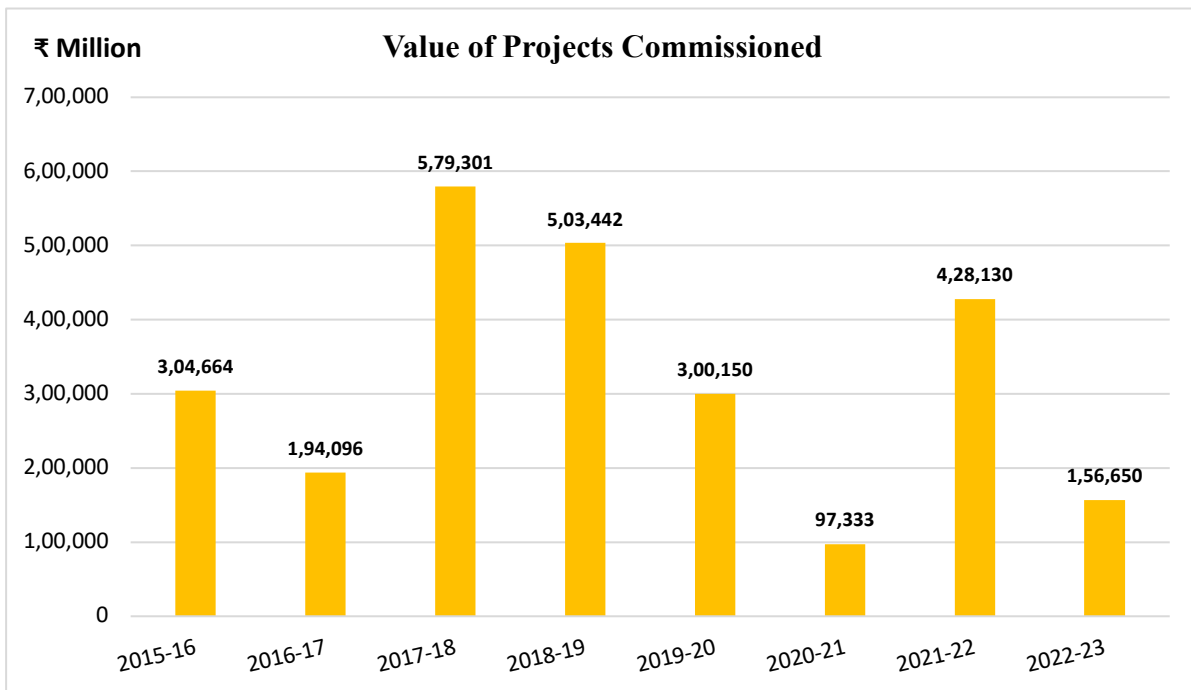


Source: CMIE | Infomerics Economic Research

Investments

As per the National Infrastructure Pipeline 2019-25, energy sector projects accounted for the highest share (24 per cent) out of the total expected capital expenditure of ₹111 lakh crore (US\$ 1.4 trillion). Investments in India's electricity transmission and distribution industry fluctuated from 2015-16 to 2022-23. The highest investment was in 2017-18, with a value of ₹579,301 million. This was followed by the years 2021-22 and 2022-23, with investments of ₹428,130 million and ₹156,650 million respectively (see Chart 7).

Chart 7: Investments in Electricity Transmission and Distribution from 2015-16 to 2022-23



Source: CMIE | Infomerics Economic Research

The value of projects commissioned during the years 2019-20 and 2020-21 was relatively low because of the devastating pandemic characterised by stringent restrictions. During the pandemic, economic activities came to a halt, except for those related to essential goods and services. As the imposition of back-to-back lockdowns significantly reduced industrial and commercial activities in the country, these segments had a considerably declined demand for electricity.

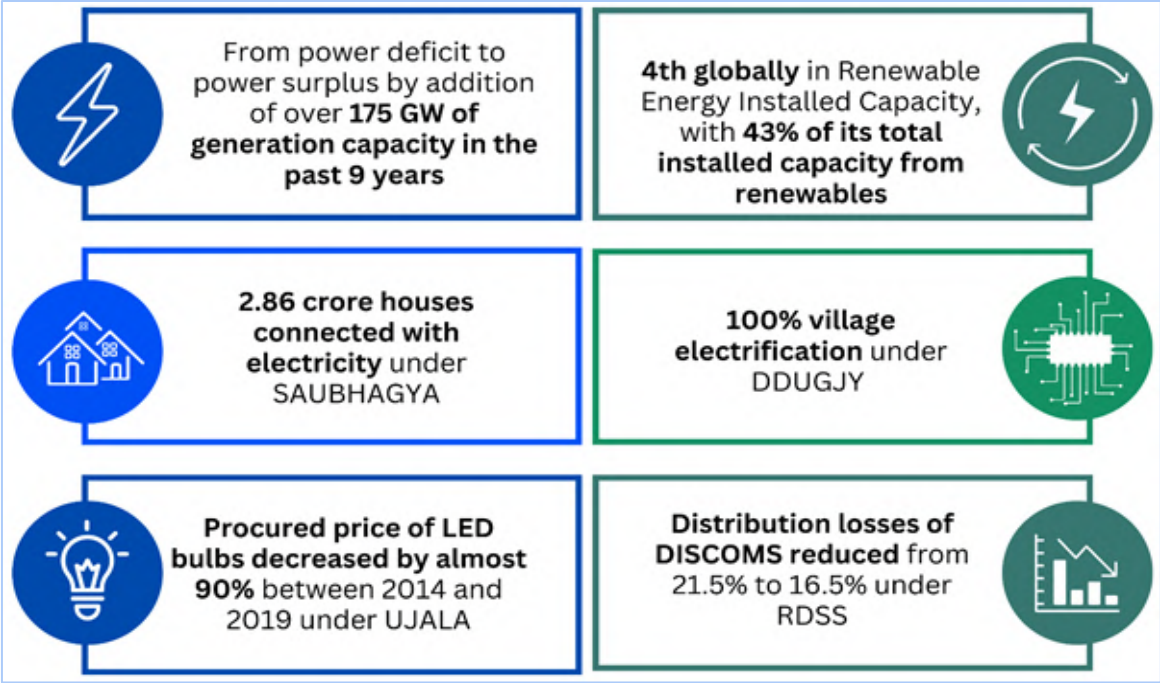
Project completions in the conventional power generation industry improved the power generational capacity in the segment. Recently, the conventional power generation industry is about to breach 7 GW of generation in 2023-24, four-year high in the segment. Power generation companies commissioned 2.2-6.6 GW of new generation capacity in the preceding three years. It is expected that a total of 7.4 GW of new power generation capacity is expected to come on stream during the year ending March 2024. Similarly, in the renewable electricity capacity addition, the segment is also expected to breach 12 GW in 2023-24 which is an all-time high in the segment.⁵

In terms of investments, projects entailing an investment of ₹698.3 billion are expected to come on stream in 2023-24. This is significantly higher compared to projects worth only ₹10.3 billion completed in 2022-23. Project completions in the ongoing year will also be higher compared to 2021-22 when projects worth ₹521.5 billion came on stream. In 2024-25, projects worth another ₹898.5 billion are expected to come on stream.

Institutional Initiatives

In recent years, the Government has launched a slew of initiatives to bring about a paradigm shift from power shortage to power surplus by establishing a single national grid, fortifying the distribution network, and achieving universal household electrification. This is why India's energy industry has experienced a remarkable evolution with the goal of delivering reliable, cost-effective, and environmentally sustainable power to its citizens. In the last decade, substantial progress has been achieved in augmenting electricity production capabilities, extending electricity accessibility, advocating for renewable energy, and introducing forward-thinking policies. In the Union Budget 2022-23, the government allocated ₹ 19,500 crore (US\$ 2.57 billion) for a PLI scheme to boost manufacturing of high-efficiency solar modules. Under the Union Budget 2022-23, the government announced the issuance of sovereign green bonds, as well as conferring infrastructure status to energy storage systems, including grid-scale battery systems. Going forward, the Government of India has put in place a slew of strategic initiatives to drive the growth and structural transformation of the power sector in India (see Figure 1).

Figure 1: Transforming the Power Sector in India



Source: PIB, dated June 8, 2023

Some important planks of Policy Support include allowing 100 per cent FDI in the power sector and well-conceived schemes, such as, Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) and Integrated Power Development Scheme (IPDS). These plans and programmes attempt to provide an impetus to the process of electrification across the country.

An addition of over 175 GW of generation capacity in the past nine years has helped India to transition from a power deficit to a power surplus nation. The country's commitment to renewable energy sources played a pivotal role in making this achieving possible. The remarkable growth of solar and wind energy capacity has cemented India's position as a global leader in renewable energy adoption.

The Government of India has a plan to install 50 GW of renewable energy capacity annually for the next five years from FY2023-24 to FY2027-28. The government has invited bids for the same. The installation of wind energy capacity of at least 10 GW per year will also be included in ISTS (Inter-State Transmission Line) renewable energy capacity. This will boost the Government of India's commitment (COP26) to achieve the goal of 500 GW of installed electricity capacity from non-fossil fuel (Renewable Energy + Nuclear) sources by 2030.⁶

The Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA) initiative is symbolic of success, achieving universal household electrification, covering every village and district in the country. This ambitious program provided electricity connections to 2.86 crore unelectrified households since September 25, 2017, both in rural and urban areas.

To improve the quality and reliability of power supply in rural areas, Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) was launched in 2014. The DDUGJY program achieved 100 per cent village electrification on April 28, 2018, by electrifying 18,374 un-electrified villages, strengthening the distribution network, and ensuring electricity reaches to all parts of rural India.⁷

The government has implemented initiatives like the Restructured Distribution Sector Scheme (RDSS) to enhance the efficiency of power distribution. The RDSS has significantly reduced distribution losses of DISCOMs, from 21.5 per cent in FY 2020-21 to 16.5 per cent in FY 2021-22. These initiatives focus on reducing technical and commercial losses, improving metering, and billing systems, and promoting energy efficiency. The integration of smart grids, advanced metering infrastructure, and demand response mechanisms has enhanced grid stability and allowed consumers to actively manage their energy consumption.

Recently, the Central Electricity Regulatory Commission (CERC), the apex regulator of electricity sector in the country, has issued a staff paper on the proposed power market which would entail a merger of all existing power trading companies into one single marketplace for electricity trading. Market coupling, a popular practice in European electricity market, is a Market-Based Economic Dispatch (MBED) mechanism which will contribute to lowering power tariffs by enhancing the flexibility and liquidity of electricity trading within the country. Currently, there are three power exchanges in India namely, Indian Energy Exchange (IEX), Power Exchange India Limited (PXIL) and Hindustan Power Exchange Limited

(HPX), all are privately owned. IEX is the oldest and the biggest and holds almost a monopoly in day-ahead power trading (almost 90 per cent of the day-ahead spot power trading market). Each power exchange has a different electricity cost structure. With this move, the CERC aims at making a common platform where buy bids and sell bids from all power exchanges in the country will be aggregated and matched to discover a uniform market clearing prices (MCP). In other words, there will be a one price for the electricity that is to be traded at any point of time through these exchanges.⁸

Late Payment Surcharge Rules stipulate that access to their power exchange will be blocked unless prompt payment is made for power drawn from the inter-state transmission system. This effective stand has ensured that current dues are paid. But the legacy debt of discoms remains substantial even though this amount declined steeply. The Power Minister Shri R K Singh pointed out in a written reply in the Lok Sabha that this amount declined from ₹ 1,38,378 crore last year to ₹ 91,061 crore by March 2023.

Production Linked Incentive (PLI) Scheme

In the Union Budget 2022-23, ₹19,500 crore (US\$ 2.57 billion) was allocated for a PLI scheme to boost manufacturing of high-efficiency solar modules. The Union Cabinet approved the introduction of the Production-Linked Incentive (PLI) Scheme in High Efficiency Solar PV Modules for Enhancing India's Manufacturing Capabilities and Enhancing Exports under the Aatmanirbhar Bharat mission can be categorised as:

- The national programme on 'high-efficiency solar PV modules': Tranche 1 - ₹4500 crore (US\$ 550 Mn) Tranche 2 - ₹19,500 crore (US\$ 2.37 Bn). The second phase, launched on September 21, 2022, is expected to build 65 GW of annual manufacturing capacity.
- National Green Hydrogen Mission with an outlay of ₹19,744 crore (US\$ 2.4 Bn) targets 5 MMT annual green hydrogen/ ammonia production by 2030. Investors can place their bids till 7th September 2023 to seek incentives. The scheme focuses on direct employment of about 30,000 and indirect employment of about 1,20,000 persons; import substitution of around ₹17,500 crore every year, and impetus to research & development to achieve higher efficiency in solar PV modules.⁹

Industry Risks and Challenges

The power sector in India is heavily regulated and the DISCOMs lack the autonomy and flexibility to alter prices with rising input cost. The DISCOMs have historically been afflicted with the issues of unmetered consumption, low collection efficiency, and high technical losses due to insufficient capital expenditure on up-gradation of existing infrastructure. This situation was worsened by well over 20 per cent of transmission & distribution losses as compared to 6-11 per cent in the developed countries. Amid highly volatile global energy sector across the globe and changing dynamics of geopolitical setup, India's power sector is facing various challenges. It impacts both consumers and the DISCOM companies.

A proposal of market coupling by CERC is under the discussion and it going to impact the stakeholders in diverse ways. If the proposal of regulatory framework of market coupling by CERC gets implemented, it

may bring a greater market risk to IEX, currently the market leader. The proposed mechanism would probably give a trading edge to the PXIL and HPX but would be major hit to the IEX. This will lead IEX to lose its market to other players, hence it will become a matter of survival for IEX.

India has 2,05,895 MW installed generation capacity depends on coal as a fuel which constitutes around 48.8 per cent of the total installed generation capacity. The coal found in Indian coal reserves has low calorific value of about 4500Kcal/kg and it requires higher amount of coal as compared to the coal India imports. This put a large pressure on the coal reserves. Further, India as a signatory is trying to mitigate the greenhouse gas emission. For this, India is shifting its focus from fossil-based power to more sustainable sources of energy.

Varied challenges in fuel supply include asymmetric contractual provisions, inadequate supply, and poor transport logistics. A preponderance of power plants in India is thermal-based necessitating transportation of coal over the long haul. Such long-haul transportation largely through railways raises delivery costs, thefts and life-cycle energy consumption. Rising energy prices make households more vulnerable to energy poverty, particularly during the cold season. People in energy scarce regions lack access to adequate heating, cooling, lighting, and energy to power appliances. The global energy price spikes after the economics due to Covid-19 outbreak, the Russia-Ukraine war and now the Israeli-Hamas conflict, would increase the number of energy-poor households, i.e., the energy costs account for more than 10 per cent of total expenditures somewhere between 166 million and 538 million people (2.4 per cent to 7.9 per cent of the global population).¹⁰

One of the major concerns with India's power plants under the central sector is that they continuously fall short of the targets for achieving capacity addition. For instance, the central sector's target for capacity addition in the thermal category for 2022-23 was set at 2120 MW, but only 660 MW of capacity addition was achieved in that year. Overall, under the thermal category, the target for capacity addition was 4520 MW, but only 1460 MW of capacity addition was achieved (see Table 3).

Increased energy security and optimal resource utilization is also hampered by the problems of under-procurement of power by states – cancelling out costlier Power Purchase Agreements (PPAs) in favor of newer and cheaper agreements and coordination issues stemming from the involvement of multiple ministries and agencies are currently involved in managing energy-related issues, which presents challenges of coordination and optimal resource utilization, thus undermining efforts to increase energy security.

Table 3: Capacity Addition Target and Achievements for 2022-23

	Thermal		Hydro		Nuclear		RE including SHP		Total	
	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
Central	2120	660	60	0	700	0	NA	0	2880	856
State	2400	800	130	120	NA	NA	NA	196	2530	16126
Private	0	0	0	0	NA	NA	NA	15206	0	15206
Total	4520	1460	190	120	700	0	NA	15402	5410	16982

Source: Ministry of Power, GoI | Infomerics Economic Research

Road Ahead

With the Indian economy gaining traction, surging demand for electricity because of growing population, increasing electrification across sectors, industries and regions and steadily rising per-capita usage, there are immense latent opportunities for the power sector. Concomitantly a major transformation is likely in terms of important aspects, such as, demand growth, energy mix and market operations. The peak power demand in the country reached an all-time high of 240,500 MW in August 2023 and a record low of 82,967 MW in July 2005. But the issues of debt-ridden nature of several electricity and power sector companies, lack of trickle-down payments from the DISCOMS (Power Distribution companies) to the GENCOMS (Power Generation Companies) and the viability of renewable energy companies has historically caused concern in this increasingly important sector. There are also aspects of environmental costs and significantly higher economic costs of renewable energy companies and their relatively small proportion of the energy in comparison to other fossil fuels.

The Government of India is preparing a 'rent a roof' policy for supporting its target of generating 40 GW of power through solar rooftop projects by 2022. It also plans to set up 21 new nuclear power reactors with a total installed capacity of 15,700 MW by 2031. The Central Electricity Authority (CEA) estimates India's power requirement to grow to reach 817 GW by 2030. Also, by 2029-30, CEA estimates that the share of renewable energy generation would increase from 18 per cent to 44 per cent, while that of thermal energy is expected to reduce from 78 per cent to 52 per cent. The government plans to establish a renewable energy capacity of 500 GW by 2030.

In this overarching context, the outlook for India's power sector in 2023-24 is mixed. This outlook is characterized by significant challenges and opportunities. While the sector performed commendably in renewable energy adoption and improving access to electricity, persisting issues, such as, financial stress in distribution companies and the need for grid infrastructure enhancement remain critical concerns. The government's continued commitment to renewable energy targets and policy reforms, coupled with private sector participation, augurs well for a more sustainable and resilient power sector. Future investments will benefit from strong demand fundamentals, policy support and increasing government focus on infrastructure. Heavy investment the private sector would provide tailwinds to this industry.

One of the key challenges facing the sector is the need to reduce its reliance on coal. Coal is currently the dominant fuel source for power generation in India, but it is also a major contributor to air pollution. The government is committed to increasing the share of renewable energy in the country's energy mix, and a number of new policies and initiatives have been introduced to support this goal.

Another challenge confronting the sector is the need to improve the efficiency of the transmission and distribution network. The current network is loss-prone and obsolete, and it needs to be upgraded to meet the surging demand for electricity. The government is investing heavily in smart grid technologies and other initiatives to enhance the efficiency of the network. However, concerted efforts are needed to address existing bottlenecks, ensure reliable accessibility to sufficient electricity together with affordability, and maintain the momentum for a cleaner, more efficient, and accessible energy future by slashing the reliance on dirty fossil fuels and moving toward more environmentally friendly, renewable sources of energy. This is by no means easy but doable. Failure is not an option.

In the ultimate analysis, the crux of the issue lies in the political will. This strong political has led to improved financial health, efficiency, and productivity. But given the magnitude of the task at the end and the byzantine complexity of the underlying issues, the power sector remains a work in progress.

¹ Central Electricity Regulatory Commission, https://cea.nic.in/wp-content/uploads/irp/2023/05/Optimal_mix_report__2029_30_Version_2.0__For_Uploading.pdf

² Renewables 2022 Global Status Report, REN21 Renewables now, <https://www.ren21.net/gsr-2022/>

³ <https://theconversation.com/russia-ukraine-war-has-nearly-doubled-household-energy-costs-worldwide-new-study-200104#:~:text=On%20the%20basis%20of%20a,between%202.7%25%20and%204.8%25.>

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