

CREDENCE CAPITAL

(Investment Club of IIM Lucknow)

Power Sector Report – September 2021



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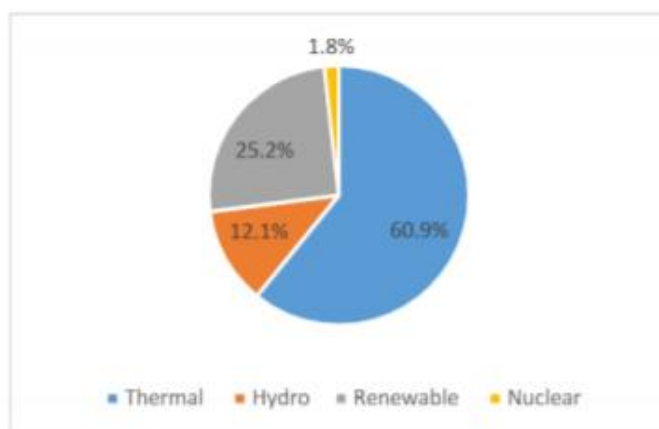
Overview

For sustained economic growth of a country, development of the infrastructure of electricity is a major requirement. Power generation, transmission and distribution forms a crucial sector for the socio-economic development and welfare of nations.

Economic growth at a sustainable rate continues to drive electricity demand of the India. Increased focus on rural electrification, urbanization and industrial growth have been major components of this demand. The Government of India (GoI) has been focussing on providing power to the remote locations which has led to increased capacity addition within the country. The focus on “Power for all” has accelerated the capacity addition. At the same time, the competitive intensity is increasing at both the market and supply sides (fuel, logistics, finances, and manpower).

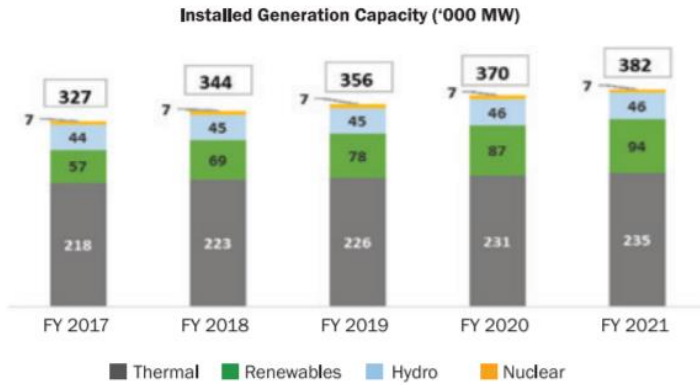
India’s power sector is one of the most diversified in the world. Sources of power generation range from conventional sources such as coal, lignite, natural gas, oil, hydro and nuclear power to viable non-conventional sources such as wind, solar, and agricultural and domestic waste. The total installed capacity increased at ~8% between FY10 and FY20.

Total Installed Capacity as on 31 July 2021		
Sector	MW	% of total
Central Government	97,637	25%
State Government	1,03,876	27%
Private Sector	1,85,376	48%
Total	3,86,888	100%
Type of Fuel	MW	% of total
Thermal	2,34,858	61%
Coal	2,02,805	53%
Lignite	6,620	2%
Gas	24,924	7%
Diesel	510	0%
Hydro	46,367	12%
Nuclear	6,780	2%
Renewable Energy	98,883	25%
Total	3,86,888	100%



Source: Ministry of Power

Majority of India’s installed capacity for power generation is from Thermal with Coal based power plants forming the main fuel source. However, GoI has been aiming for an increase in renewable power generation and taken measures in this direction. The Covid-19 pandemic provided a major push as well. From April 2015 to February 2021, India has added 117.9 GW of power generation capacity, including 64.5 GW of conventional source and 53.4 GW from renewable sources.



With installed power capacity reaching 382 GW in FY21 and 386.89 GW as of July, 2021, India is now the 3rd largest producer and consumer of electricity in the world. The country also has the 5th largest installed capacity in the world. India is ranked 5th in wind power, 5th in solar power and 4th in renewable power installed capacity as of 2019. However, the per capita consumption still remains lower than most countries.

Value Chain of Industry

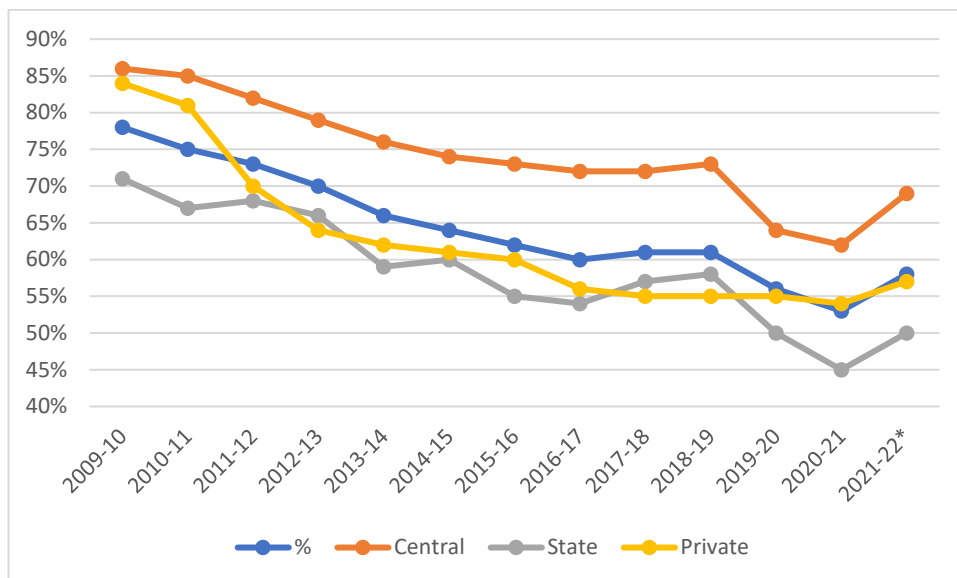


1. Generation – The first stage of the power sector value chain is the generation of power.

Thermal (coal) being the major source of power generation. The generation process involves using mined coal in boiler operations which converts coal to steam which is ultimately used to generate electricity. The generated electricity is transmitted to substations then which sometimes lead to auxiliary loss. Some of the major companies producing thermal power in India are NTPC, Adani Power and JSW Energy.

Plant Load Factor as a percentage of energy sent out by the power plant corresponding to installed capacity in that period. It is measure of the power plant's capacity utilisation. **Formula = Total units generated / Total unit generation of installed capacity**

PLF % (Coal & Lignite based)				
Year	%	Central	State	Private
2009-10	78%	86%	71%	84%
2010-11	75%	85%	67%	81%
2011-12	73%	82%	68%	70%
2012-13	70%	79%	66%	64%
2013-14	66%	76%	59%	62%
2014-15	64%	74%	60%	61%
2015-16	62%	73%	55%	60%
2016-17	60%	72%	54%	56%
2017-18	61%	72%	57%	55%
2018-19	61%	73%	58%	55%
2019-20	56%	64%	50%	55%
2020-21	53%	62%	45%	54%
2021-22*	58%	69%	50%	57%



*Upto July 2021

Although demand for power has grown at only CAGR 5.5% over the last 10 years, installed capacity has grown at a higher CAGR 8.6% over the same period. This has led to reduction in the PLF at which power plants are operating in India. The coal-based plants are specifically impacted due increasing shift to renewable sources of energy. In general, a low PLF hampers the profitability of a plant as it increases the per unit cost of power produced. Factors affecting PLF –

- Quality and cost of coal
- Operational efficiency
- Auxiliary consumption
- Generation requirement and purchase agreements
- Significant capacity addition in the period

In the solar power generation process, solar rays and captures the energy and converts it into electricity. Solar farms require large areas of plain surface with preferable evenness in the ground. States of

Karnataka, Telangana, Rajasthan, Andhra Pradesh and Gujarat have the major solar farms in India. Some of the largest companies producing solar power in India are Tata Solar and ReNew Power.

In the wind power generation process, wind is used to provide the mechanical power through the wind blades to rotate the wind turbines and the generators to turn the energy into electricity. Locations situated at a height usually are preferred for setting up of wind mills. Tamil Nadu, Gujarat and Maharashtra are the major states producing wind power in India. Suzlon Energy is one of the biggest wind power generators in the country.

In the hydro power generation process, fast flowing water is used to move turbine, harnessing the energy to generate electricity. India has the fifth largest hydropower capacity in the world. The biggest hydroelectric projects in India are located in Uttarakhand, Maharashtra and Andhra Pradesh. NHPC is one of the largest hydropower generating companies in India.

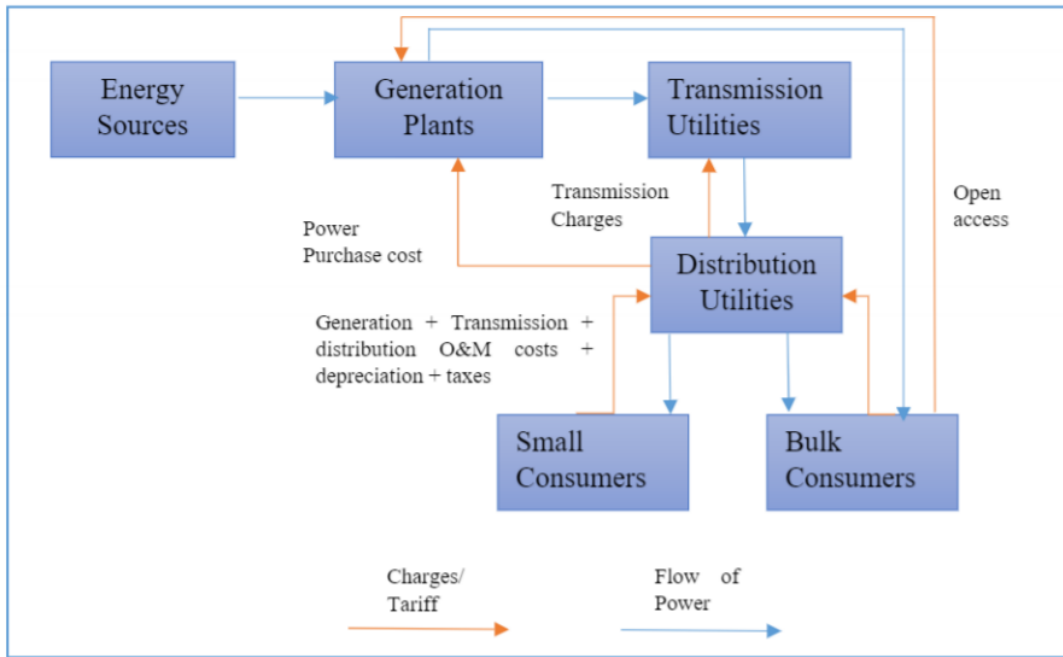
2. Transmission – Transmission is the process of delivering generated electricity - usually over long distances to the distribution grid located in populated areas. It facilitates the transmission from the power generation source to the electricity consumption areas. Transformers convert the low voltage electricity into high voltage for efficient transportation and the transmission lines carry them over long distances. India has a connection of transmission lines known as the Grid. About 50% of the power transmitted across the country is through the Power Grid Corporation.

3. Distribution – The final step in the value chain, it forms the retail distribution arm of the electricity to homes, offices and factory usage. It involves transmission of electricity from the substations to end customers. While the distribution segment is majorly carried out by the state-run distribution companies (discoms), there has been an increasing participation of private players with presence in Ahmedabad, Kolkata, Delhi and Mumbai.

4. Power Trading – Apart from being a utility, power can also be a commodity that is sold in the open market. The participants comprise of state electricity boards, power producers, traders and open access consumers. Power exchanges were set up in 2008 in India.

There are currently 2 power exchanges operating in India – the Indian Energy Exchange Limited (IEX) and Power Exchange of India Limited. The Indian Energy Exchange Limited (IEX) is the first and largest energy exchange in India providing a nationwide, automated trading platform for physical delivery of electricity and energy certificates.

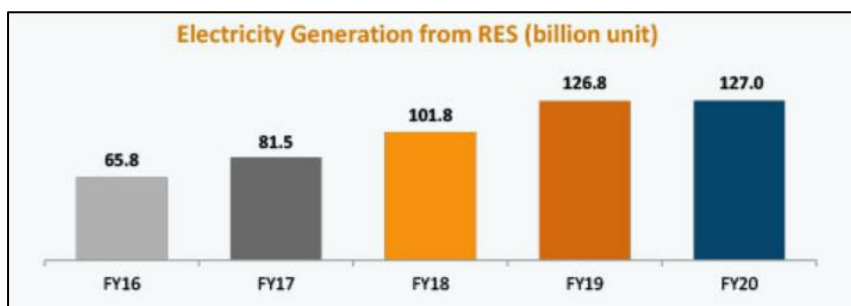
These exchange platform enables efficient price discovery and increases the accessibility and transparency of the power market in India while also enhancing the speed and efficiency of trade execution. Power exchanges allow people to purchase electricity at cheaper rates during peak time demand. They benefit open access consumers belong to various industries such as metal, food processing, textile, cement, ceramic, chemicals, automobiles, information technology industries, institutional, housing and real estate and commercial entities.



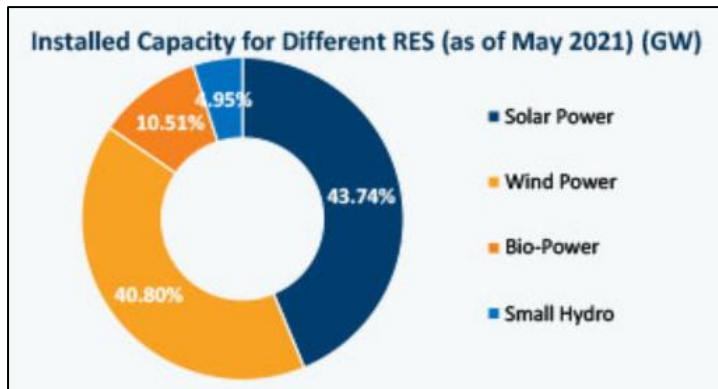
Source: CARE Research

Renewables:

Increasing awareness regarding climate change and several destructive economic events such as oil spills and nuclear disasters have pushed governments across the world to migrate towards renewable sources of energy. As per the British Business Energy, India ranks 3rd on the renewable energy investments and plans. The Indian renewable energy market is very diversified and can be segmented into Hydroelectricity, Wind, Solar, Biomass and Geothermal. The renewable power generation has grown ~17% CAGR between FY16 and FY20, owing the government’s commitment to increase clean energy use and undertaking various large-scale projects. In terms of revenue, the CAGR was ~10%.



In June 2021, the PMO announced that the renewable capacity of India increased 250% between 2014 and 2021. As of July 2021, India had ~98 GW of renewable energy capacity, representing 25% of the total capacity. The segmentation is as follows:



While conventional generation continues to constitute the majority, renewable generation share in total generation is increasing every quarter. Renewable sources received the status of ‘Must Run’ during the 5MFY21 and thus their total contribution increased to 11.8% of the total generation as compared to 10.6% /10.8% in the same period of FY19 /FY20. A major reason behind the ‘must run’ status was due to the fact that the renewable plant operations can’t be shut at will. Further, early and above-normal monsoons have resulted in better hydro generation compared to previous years.

Green certificates are tradable commodities that certify that certain amount of electricity has been generated using renewable energy sources. These certificates do not impact the generation of electricity but only distribution.

Major companies:

- **Tata Solar** is the largest integrated solar power player in the country. It has already installed more than 375MW of rooftop solar projects and continues to expand further.
- **Adani Green** manages both wind and solar projects with an overall capacity of more than 5000MW. In May 2021, it acquired SB Energy Holdings solidifying its position in the market.
- **Suzlon Energy** has the largest installed capacity in wind energy in India with a capacity of 846MW. Its value chain spans across the life of wind energy project – from manufacturing wind turbine generators to providing allied services

Future Prospects:

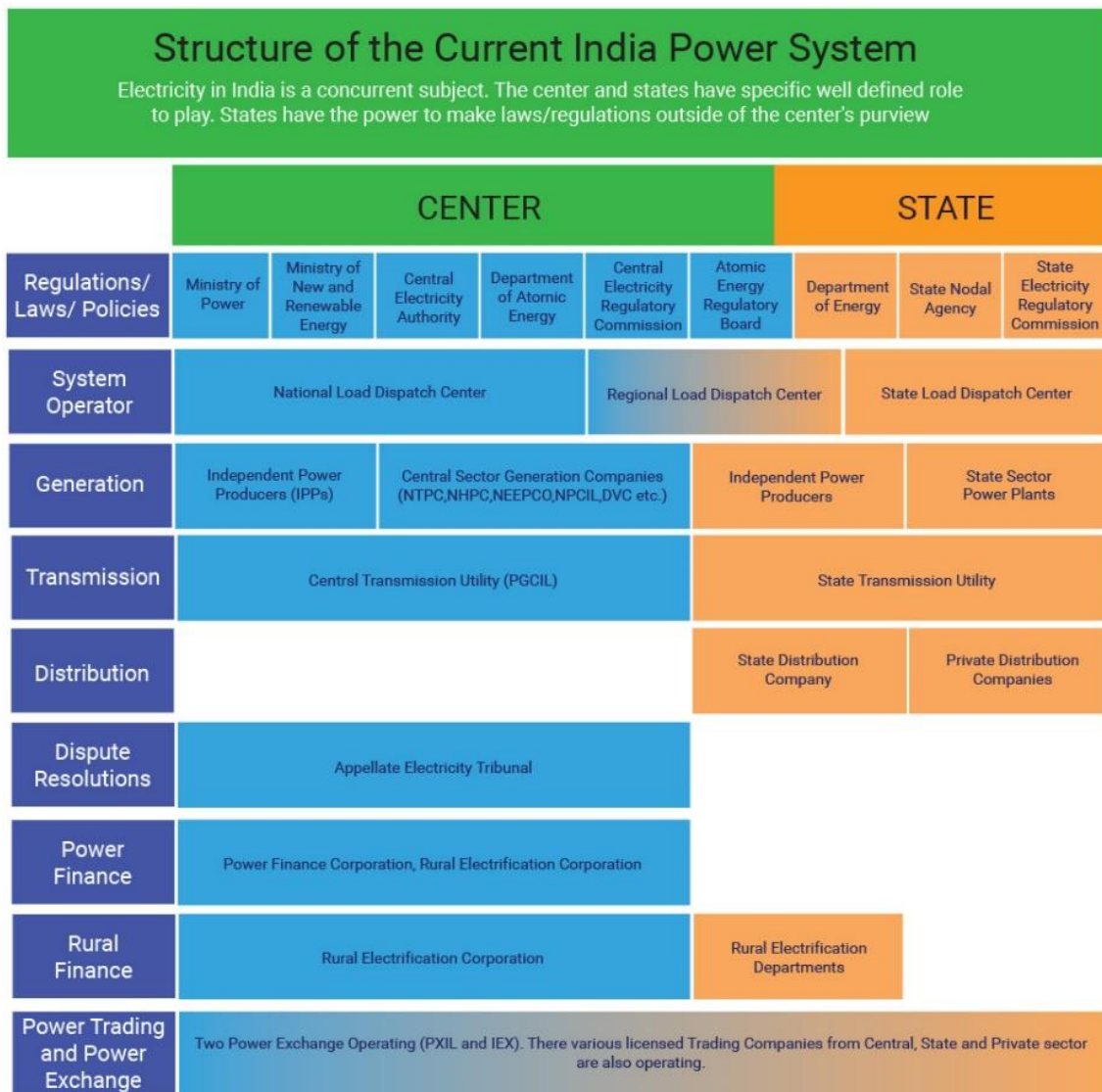
In 2025, the Indian renewable energy market is forecast to have a value of \$49.6 billion, an increase of 77.8% since 2020. The compound annual growth rate of the market in the period 2020–25 is predicted to be 12.2%.

Increasing investments in this segment strengthens its future prospects. The non-conventional energy segment received FDI inflow of US\$10 billion between April 2000 and March 2021. By 2028, the investment is expected to be at US\$500bn. The central government’s prerogative right now is also to build the capacity through the PLI scheme. The government also wants to develop a ‘green city’ in every state of the country which will be powered by renewable energy. Environment-friendly power through

solar rooftop systems, solar parks on the city’s outskirts, and electric mobility-enabled public transport systems will be characteristic to these ‘green cities’.

Self-generation is also a major trend in the renewable segment as households & businesses adopt methods to generate their own electricity. These methods include rooftop solar or small wind turbines. The costs, however, can take a few years to equate the benefit, post which these options become a better alternative to buying electricity. This is a relatively new trend and does not pose as much of a threat to the utility companies as of now.

Structure of Indian Political system –



Market Trends in 2021

1. Electric Vehicles – The increasing demand backed by the government’s push, EVs present themselves as a major opportunity for the power generation companies. The focus has been on increasing offerings such as EV charging, energy storage and vehicle-to-grid services.

2. Energy storage – The battery energy storage systems market is expected to grow ~5% from 2019 to 2023. Countries are working on increasing their capacity to store energy while India aims to become the market leader as the manufacturer of these batteries.

3. Digitisation – Cyberattacks have historically posed as a major threat to this sector in form of attacks on their grids. Advanced analytics and Internet of Things present an opportunity to not only help the companies monitor remotely, but they also support consumer demand forecasting, identifying peak hours, usage patterns and increasing customers. They also support capital expenditure and maintenance efforts.

4. Solar Energy will lead – Renewables are supposed to overtake the traditional sources of energy as major sources of energy by the end of this decade led by solar power. Solar energy is the cheapest source of electricity available to most countries now especially due to the low financing costs. By 2040, share in electricity generation mix from solar is expected to match the share from coal.

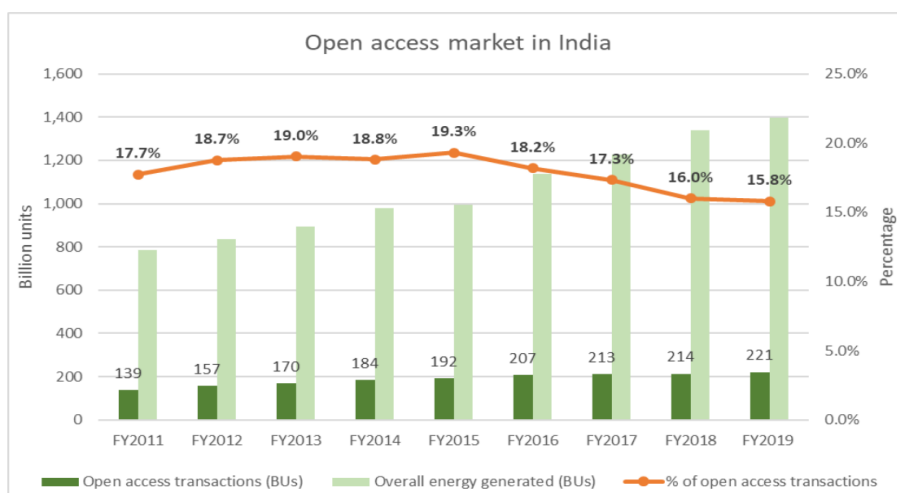
5. Open Access (OA) –

While the concept of Open Access isn't new, it is gaining increasing relevance. Here's why:

Power sector has 3 important components – Generation, Transmission, Distribution. In India, initially, the only component with private presence was generation. Consumers were reliant on the centre and state-run distribution companies as their suppliers of electricity. The introduction of open access brought the consumers the choice of suppliers. In simple terms, open access provides access to electricity to large customers through the transmission and distribution network of the suppliers other than the local distribution company. The Electricity Act, 2003 paved the way for open access with the idea to enhance efficiency and increase transparency in the Indian electricity industry.

Despite numerous attempts, there has been limited success of the open access model majorly due to the following reasons:

1. Restrictions on open access export transactions when there is a shortage and on import transactions when there is a surplus.
2. Cross-subsidy surcharges make open access uneconomical when they are too high.
3. Volatility in the demand (load to be served) for electricity through discoms as customers frequently switch their suppliers as per the price.



Source: CEA reports, CERC MMC reports and regional energy accounts

Way forward:

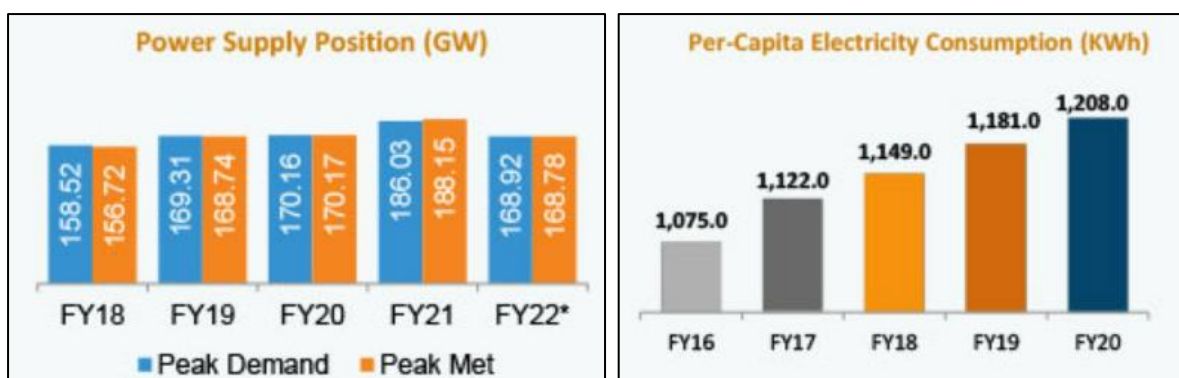
Given the impact of the frequent switching of customers, a limitation must be imposed on the customers to protect both the discoms and the non-OA customers. The choice of suppliers shouldn't be taken away, but the customer should be restricted from availing the discom regulated rates as per their need. There could be conditions associated with agreements such as a minimum period of association requirement for the customer with the discom. A roadmap should also be designed to phase out cross subsidy charges over the next 5 years.

Open access can be a viable tool in renewable energy transmission. The solar energy generated at one point could be easily transferred to another. This is important as the solar energy generation is concentrated in states like Karnataka, Rajasthan, Telangana, Madhya Pradesh, Andhra Pradesh etc. The advantages include states with less generation capacity can now fulfil their Renewable energy Purchase Obligation (RPO) by routing energy through OA. The process will help in strengthening the grid infrastructure in India, supporting renewable energy transmission to distant places across the country. As renewable energy would soon be the major source of electricity for the country, it makes sense to have the grids which support this kind of transmission in place.

The power ministry in August circulated the 'Draft Electricity (promoting renewable energy through Green Energy Open Access) Rules', 2021. These rules have been proposed for the purchase and consumption of green energy.

Growth Drivers

1. **Growing Demand** - India has been an energy deficit nation with demand being greater than the production over the years. GoI has initiated a number of programs to promote rural electrification and increase the per capita consumption of electricity. Before the pandemic hit the country, the growth in per capita consumption of electricity increased 32% from FY13 to FY20.



*upto May 2021 (Source: IBEF)

ICRA ratings estimate the all-India electricity demand growth at 6% for FY22. Given the expanding economy, population and focus of industrialisation, India is likely to see the highest energy demand by 2040. Power demand is expected to grow at 6.2% CAGR over the coming years till 2030 mainly driven by unlock down of Indian economy and pickup in economic activity supported by budgetary announcements, government led investments in large infra projects and rising capacity utilisations on account of expected consumption push. Further, strengthening of transmission and distribution infrastructure, intensive electrification across country, improved power quality and reduced power cuts are expected to fuel power consumption.

India has remained a Power deficit country due to higher power demand over supply. Power supply deficit has narrowed down over the years due to installed capacity additions. In the last 10 years, the deficit of ~13% has reduced to ~1%.

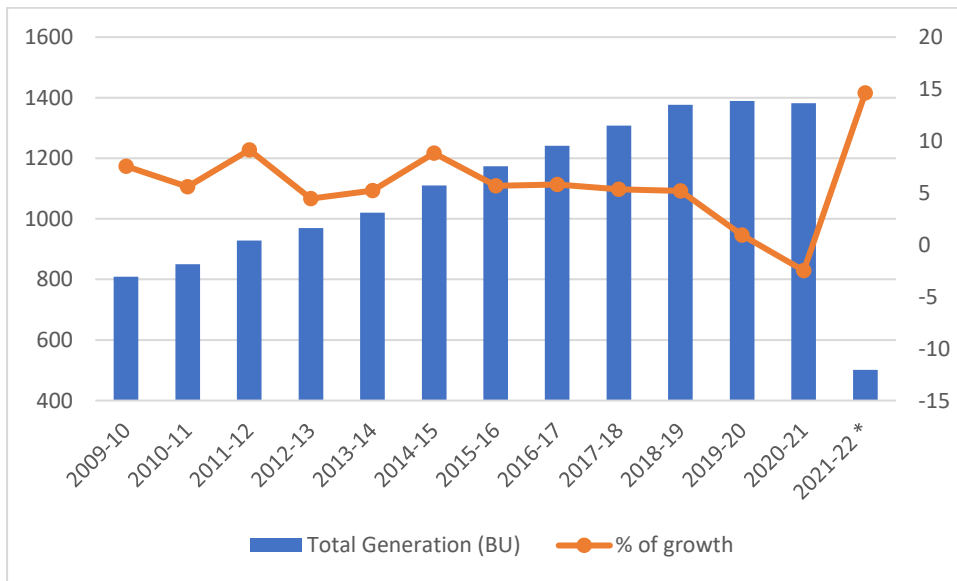
Year	Energy				Peak			
	Requirement	Availability	Surplus(+)/Deficits(-)		Peak Demand	Peak Met	Surplus(+)/ Deficits(-)	
	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%)
2009-10	8,30,594	7,46,644	-83,950	-10.1	1,19,166	1,04,009	-15,157	-12.7
2010-11	8,61,591	7,88,355	-73,236	-8.5	1,22,287	1,10,256	-12,031	-9.8
2011-12	9,37,199	8,57,886	-79,313	-8.5	1,30,006	1,16,191	-13,815	-10.6
2012-13	9,95,557	9,08,652	-86,905	-8.7	1,35,453	1,23,294	-12,159	-9
2013-14	10,02,257	9,59,829	-42,428	-4.2	1,35,918	1,29,815	-6,103	-4.5
2014-15	10,68,923	10,30,785	-38,138	-3.6	1,48,166	1,41,160	-7,006	-4.7
2015-16	11,14,408	10,90,850	-23,558	-2.1	1,53,366	1,48,463	-4,903	-3.2
2016-17	11,42,929	11,35,334	-7,595	-0.7	1,59,542	1,56,934	-2,608	-1.6
2017-18	12,13,326	12,04,697	-8,629	-0.7	1,64,066	1,60,752	-3,314	-2
2018-19	12,74,595	12,67,526	-7,070	-0.6	1,77,022	1,75,528	-1,494	-0.8
2019-20	12,91,010	12,84,444	-6,566	-0.5	1,83,804	1,82,533	-1,271	-0.7
2020-21	12,75,534	12,70,663	-4,871	-0.4	1,90,198	1,89,395	-802	-0.4
2021-22*	4,66,241	4,64,800	-1,012	-0.3	2,00,931	2,00,570	-361	-0.2

*upto July 2021

Further, with the aggressive capacity expansion plan it is expected that the deficit will narrow down further and the oversupply situation would persist.

The budgeted electricity generation target of conventional sources for the year 2021-22 has been fixed as 1356 BU to achieve a growth of around 9.83% over actual conventional generation of previous year (2020-21). However, the actual growth in generation through conventional sources was negative ~1.3% in 2020-21.

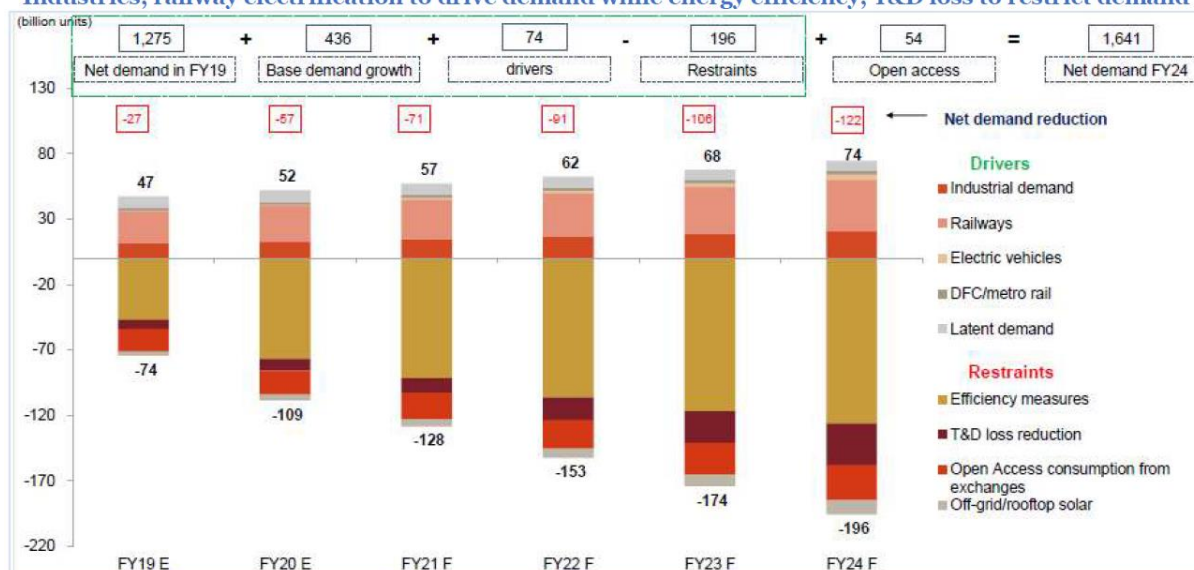
Year	Total Generation (BU)	% of growth
2009-10	808.498	7.56
2010-11	850.387	5.59
2011-12	928.113	9.14
2012-13	969.506	4.46
2013-14	1,020.20	5.23
2014-15	1,110.39	8.84
2015-16	1,173.60	5.69
2016-17	1,241.69	5.8
2017-18	1,308.15	5.35
2018-19	1,376.10	5.19
2019-20	1,389.10	0.95
2020-21	1,381.83	-2.49
2021-22 *	501.518	14.62



*Upto July 2021

Factors driving and restraining demand –

Industries, railway electrification to drive demand while energy efficiency, T&D loss to restrict demand



2. Policy Support -

Majority of India’s installed capacity for power generation is from Thermal with Coal based power plants forming the main fuel source. However, GoI has been aiming for increase in renewable power generation and taken measures in this direction. Policies such as the Deen Dayal Upadhyay Gram Jyoti Yojana and Integrated Power Development Scheme are expected to spearhead the electrification of households across the country.

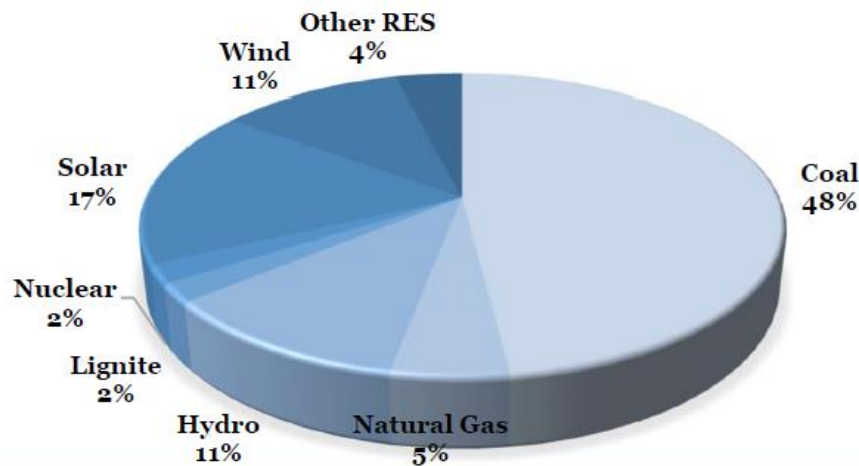
The electricity generation for the country has been increasing at a steady rate in the past. 100% FDI is allowed in the power sector which has boosted FDI inflows in the sector.

3. Increasing investments –

The energy sector accounted for the highest share of 24% out of the total expected capital expenditure of Rs. 111 lakh crores as per the National Infrastructure Pipeline 2019-25.

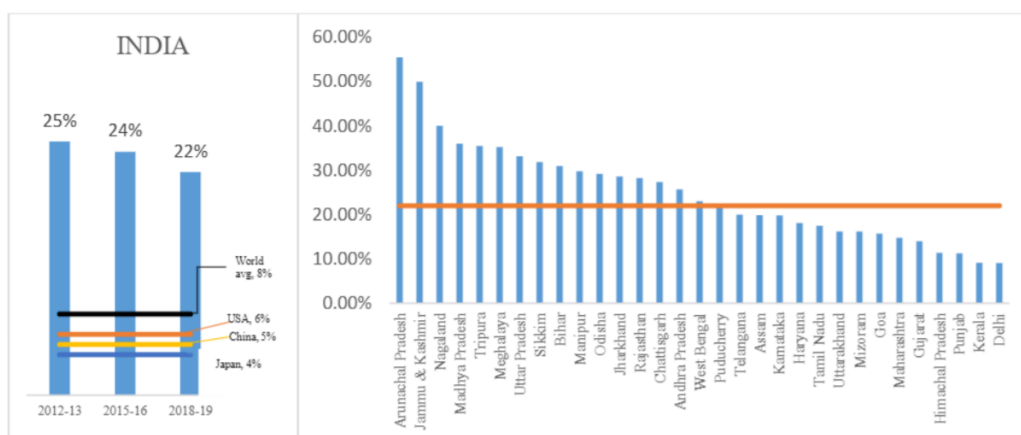
The power sector accounts for 3% of the total FDI inflow in India between April 2000 and March 2021, with the government allowing 100% FDI in this sector. This will be especially important in the expansion of the renewable energy generation. All-India installed capacity to reach ~455 GW by fiscal 2024 will be led by renewables. Capacity additions will be mainly driven by the central sector as the stressed financials of private players as well as lack of long-term PPAs limit the private investments. Renewable capacity of ~66 GW is expected to be added over the next five years. India was also ranked 3rd out of all countries in the “Renewable Energy Country Attractiveness Index” in May 2021.

The expected installed capacity division based on type of Fuel by FY24 is



Key Challenges for the Power Sector

1. Inadequate supply of fossil fuels & inadequate utilisation of thermal plants are factors that can raise costs related to operations of the plant. Inadequate supply could lead to higher procurement costs while inadequate utilisation increases the per unit cost of production.
2. Purchase Power Agreements (PPAs) are long term contracts between the generators and distributors which lock the tariffs for a long period of time. While they avoid the exposure of variability of tariff, the decreasing costs have made the tariffs more expensive for discoms.
3. High AT&C losses are characteristic to the Indian Power sector. Over 22% of the power generation is lost through theft, meter tampering, and dissipation through wires. AT&C losses for 2018-19 (National & State):



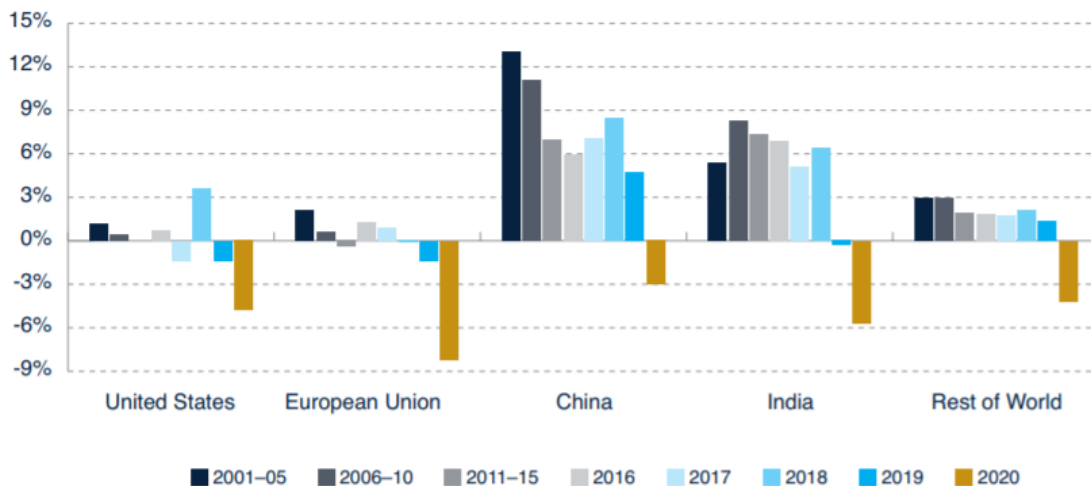
Source: PFC's report on performance of state power utilities 2018-19 report

4. Most discoms are recipients of government grants and subsidies which reduce their net losses. They also provide them with some liquidity to function properly. Often there is a gap in the amount promised and the amount received. There are usual delays in the disbursement as well with significantly affects the functioning capability of these discoms.
5. Delay in land acquisitions and environment clearances can add complexity in terms of execution for large scale projects. Since power is a concurrent subject, there are various government requests and clearances that have to be made. This makes the whole process a hassle, costly and time consuming.

6. Capacity building in the area of new technologies will be the need of the hour. Greater innovation, automation and tech adaption required due to the shift to renewables will require the infrastructure to support the same. Labour with the right amount of skill will have to be employed to operate the same.
7. Environmental concerns especially with respect to coal-based generation can pose as a limitation to thermal plants as well. There are a number of regulatory compliances such as those related to mercury, water, nitrogen dioxide etc that the companies must adhere to. These affect the firm's financial and operational ability.
8. Shift to renewables puts the conventional sources at a risk. There is an increasing need to adapt and to diversify the sources of generation to be able to hedge against the decline in thermal energy demand.

Covid-19 impact:

ANNUAL AVERAGE GROWTH RATES OF ELECTRICITY DEMAND IN SELECTED REGIONS, 2001-20



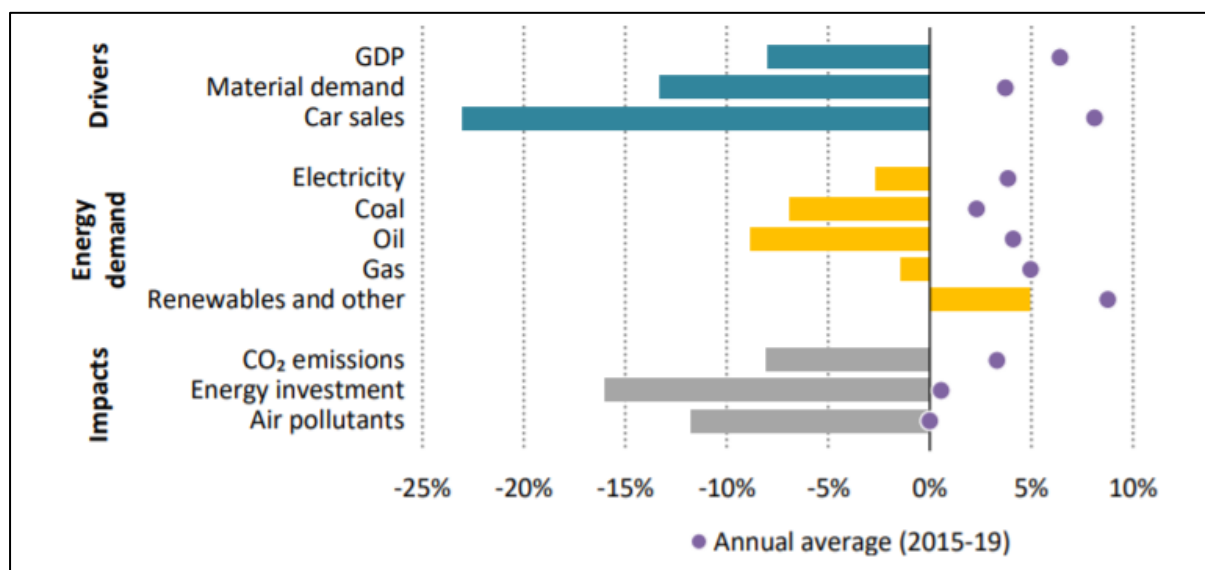
Source: IEA 2020. All rights reserved.

Prior to the pandemic, India's demand for energy was projected to increase by almost 50% between 2019 and 2030. Now, the projection has reduced to 35%. India's 40-day lockdown in 2020 resulted in a 30% fall in the energy demand, according to International Energy Agency.

India's electricity demand was majorly impacted due to the pandemic. Despite electricity being an essential service, the operations went on uninterrupted, however there were major issues on the demand and execution side. While the power demand was on rise from the essential services, hospitals and residential segments, the industrial and commercial activity had dropped significantly. Covid-19 impacted the supply chain, labour availability and overhead costs to maintain the security and safety required at workplace. By the end of August 2020, the demand hadn't restated to the pre-Covid levels. During the third quarter of FY21, increased economic activity led to a positive YoY increase in electricity demand of 4.4%.

The generation mix of renewables and non-renewables were also impacted. Thermal plants were running at a low capacity due to low industrial demand. However, the share of renewables on the grid

had increased due to their “must-run” status, showcasing the resilience of renewable power under the current circumstances. India added 2,320 MW of solar capacity amidst COVID-19 pandemic from January to September 2020.



Percentage annual change in key indicators for India in 2020 (Source: IEA)

The financial stress and debt burden experienced in the power sector is amongst the highest in industrial segment. The Covid-19 pandemic led to a fall in electricity consumption across the world, impacting power generation companies. There is also an increased uncertainty with respect to payment recovery for the companies as their customers struggle to pay or ask for discounts. The discoms are at the forefront here.

Kickstarting economic activity will play a crucial role in the recovery of the power sector. Containment of the virus and the vaccination programme will determine the pace of this recovery. Technological advancement with respect to improving efficiencies, forecasting demand, managing supply chains and collecting dues effectively will determine the resurgence and robustness of the power sector in the near future. The government has taken several initiatives to reduce the distress on this sector through liquidity infusion schemes and the RDSS scheme.

Government Initiatives

Some initiatives by the Government to boost sustained industrial growth in the Indian power sector are as below:

1. In June 2021, to improve the operational efficiency and financial stability of state discoms and power departments, the MoP has come up with the Revamped Distribution Sector Scheme (RDSS) with an initial outlay of Rs. 3037 bn including a grant from the central government estimated at 976.3 bn.
2. In June 2021, Indian Renewable Energy Development Agency Ltd. (IREDA) has invited bids from solar module manufacturers for setting up solar manufacturing units under the central government’s Rs. 4,500 crore (US\$ 616.76 million) Production Linked Incentive (PLI) scheme

3. In April 2021, the Central Electricity Authority (CEA) and CEEW's Centre for Energy Finance (CEEW-CEF) jointly launched the India Renewables Dashboard that provides detailed operational information on renewable energy (RE) projects in India.
4. In April 2021, the Ministry of Power (MoP) released the draft National Electricity Policy (NEP) 2021 and has invited suggestions from all stakeholders such as Central PSUs, Solar Energy Corporation of India, power transmission companies, financial institutions, industrial, solar, and wind associations, and state governments.
5. Rs 3.05 lakh crore was allocated in the Union Budget 2021-22 for the power distribution, to be released over five years. The intention is to get the discoms who faced disruptions due to the pandemic to get on the road to recovery.
6. The Government of India has allocated Rs. 111 lakh crore (US\$ 1.4 trillion) under the National Infrastructure Pipeline for FY 2019-25. The energy sector is likely to account for 24% capital expenditure over FY 2019-25.
7. Government plans to establish renewable energy capacity of 500 GW by 2030.
8. The Saubhagya Scheme or Pradhan Mantri Sahaj Bijli Har Ghar Yojana is an Indian government project to provide electricity to the households. The project was announced in September 2017 by Prime Minister Narendra Modi, who said that the aim was to complete the electrification process during financial year 2018 – 19.
9. In September 2018, a draft amendment to Electricity Act, 2003 was introduced. It discussed separation of content & carriage, direct benefit transfer of subsidy, 24*7 power supply as an obligation, penalisation on violation of PPA, setting up smart meter and prepaid meters along with regulations related to the same.
10. GoI has been in process of distributing electricity saving lamps and LED lamps across the nation to promote availability of electricity. They have distributed 36+ crore lamps as a part of the UJALA Scheme across nation.
11. Ujwal Discoms Assurance Yojana (UDAY) was launched by the Government to encourage operational and financial turnaround of State-owned Power Distribution Companies (DISCOMS) with an aim to reduce Aggregate Technical & Commercial (AT&C) losses to 15 per cent by FY19.

Achievements:

Following are some of the major achievements of the Government initiatives:

1. According to the Union Budget 2021-22, 139 GW of installed capacity and 1.41 lakh circuit km of transmission lines were added and 2.8 crore households were connected in the past 6 years.
2. Solar tariffs in India have reduced from ~Rs. 7.36/kWh in FY15 to Rs. 2.63/kWh in FY20.
3. As December 2020, over 36.69 crore LED bulbs, 1.14 crore LED tube lights and 23 lakh energy-efficient fans have been distributed across the country.
4. NTPC Ltd.'s oldest unit in Singrauli, Uttar Pradesh, has achieved the highest Plant Load Factor (PLF) of 100.24% among all thermal units in the country between April 2020 and December 2020.

5. India's rank jumped to 22 in 2019 from 137 in 2014 on World Bank's Ease of doing business - "Getting Electricity" ranking in 2019.
6. Energy deficit reduced to 0.7% in FY20 from 4.2% in FY14.
7. As of April 28, 2018, 100% village electrification was achieved under Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY). 100% households in 25 states have also achieved electrification.

Electricity Amendment Bill, 2021

Key Proposals:

1. The amendment seeks to delicense the power distribution which will allow private sector companies to compete against the state-owned discoms. The gives consumers the ability to choose a distribution company.
2. The Electricity Contract Enforcement Authority (ECEA) will be provided the absolute authority to adjudicate contract-related disputes in the electricity sector.
3. The bill creates provision for penalties if the Renewable Purchase Obligations are not met by the licensees.

Major Companies in the power sector

Generation	Transmission	Distribution
Adani Green	Power Grid	State Discoms
Adani Power	JSW Energy	Tata Power
NTPC	Tata Power	Torrent Power
JSW Energy	Torrent Power	
NHPC		
Tata Power		
Torrent Power		

1. Adani Power Limited and Adani Green Energy Limited




Adani Power Limited is engaged in power generation by coal-based thermal power plants and coal trading. It has seven power projects with aggregate 12,450 MW power generation capacity spread out across Gujrat, Maharashtra, Rajasthan, Karnataka and Chhattisgarh. Adani Group aims to become the world's largest solar power company by 2025 and the biggest renewable energy firm by 2030.

2. National Thermal Power Corporation (NTPC) Limited



NTPC Limited is engaged in the generation and sale of electricity. The main business activity of the company is the electric power generation by coal-based thermal power plant. The company also provides consultancy, project management and supervision, re-gasification, oil and gas exploration and coal mining. Total installed capacity – 66,900 MW. NTPC is working on diversifying on their fuel mix and non-fuel-based generation should comprise 30% of their portfolio. It was also ranked “Top 50 companies to work in India” multiple times.

3. Power Grid Corporation



Power Grid Corporation of India Limited is a transmission company engaged in the power transmission business with planning, implementation, operation and maintenance of inter-state transmission system and operation of national and regional load dispatch centres. The company's provides consultancy. The transmission segment includes extra high voltage/high voltage (EHV/HV) networks and grid management with transmission lines of 1,69,397 ckm with 4,45,806 MVA transformation capacity.

4. Tata Power –



Tata Power is India's largest integrated power company, with significant presence in solar, hydro, wind and geothermal energy space. Tata Power, together with its subsidiaries & joint entities, has a generation capacity of 13,061 MW of which 32% comes from clean energy sources. The company accounts for 52 per cent of total generation capacity in the private sector. It is India's largest rooftop solar company.

5. NHPC –



NHPC Limited is the largest organisation for hydropower development in India, with capabilities to undertake all the activities from conceptualization to commissioning in relation to setting up of hydro projects. NHPC Limited has also diversified in the field of Solar & Wind power. NHPC Limited presently has an installation base of 5551.2 MW from 22 power stations. The plants are present across Northern, Eastern and North-Eastern regions of India.

6. JSW Energy –



JSW Energy Ltd. is a leading private sector company generating thermal, hydropower and solar power. They are present in various Indian states and have investments in South Africa. They currently generate 4559 MW of power. They operate in various areas: Generation, Transmission and Trading.

7. Torrent Power –



Torrent Power has presence in the power generation, transmission and distribution of electricity. It also manufactures and supplies power cables as well. Its distribution areas include parts of Gujarat, Maharashtra and Uttar Pradesh comprising more than 3.65 m customers annually. It has a portfolio of coal based, gas based and renewable power plants with an aggregate generation capacity of 3879 MW. The T&D losses faced by Torrent Power in its license area are amongst the lowest in the country.

Valuation metrics:

1. As revenue is regulated based on the Power Purchase Agreement (PPA's) and the cost are based mainly on the operational cost and cost of coal, discounted cash flow (DCF) forms the most important method for valuation.
2. EV/EBITDA is used to understand the value of the business. Since the power sector is highly capital intensive and with long gestation periods, the capital expenditure could be huge. The ratio isn't impacted by a change in the capital mix and hence can be used for evaluation.

3. EV/MW gives the value of the plant with respect to the installed capacity of the plant.
4. P/E gives a quick idea to the equity investors the return they can generate on their investment.

New Deals/Investments –

1. In June 2021, a global tender for setting up a 1,000 MWh grid-scale battery storage system was floated by the NTPC. The plan involved designing, building and operating the system and also offered a co-investment partnership.
2. In June 2021, Tata Power Solar secured a contract worth Rs. 686 crores from the NTPC to build 210 MW projects in Gujarat. The expected commissioning date is November, 2022.
3. In May 2021, Adani Green acquired SB Energy India for the SoftBank Group and Bharti Group. SB Energy's total renewable portfolio comprised 4954 MW spread across 4 states within India.
4. In March 2021, Actis LLP – a private equity firm, planned to build two green energy platforms in India. The first would focus on setting up grid-connected solar and wind power parks and the second was cater to the industrial and commercial segment. The amount of this investment would be US\$850 million.
5. The NTPC is expected to commission India's largest floating solar power plant in Ramagundam, Telangana by May-June 2022. The expected total installed capacity is 447MW. The project is worth Rs. 423 crores.
6. TotalEnergies, a major oil company acquire 20% stake in Adani Green Energy in January 2021. They also undertook 50% stake in the 2.35GW portfolio of their operating solar assets. The combined deal was worth US\$ 2.5 billion.
7. In March 2021, India and the US agreed to restructure their strategic energy partnership to concentrate on cleaner energy sectors including biofuels and hydrogen production. The aim is to demonstrate and scale green initiatives needed to decarbonize sectors like transportation and power.
8. In December 2020, India's largest hybrid – solar and wind renewable energy park having 30 GW capacity was laid out in Gujarat at Vighakot village in the district of Kutch. The estimated cost of this project is ~Rs. 1.5 lakh crore. The plant should be able to generate 15 GW of energy by 2024.
9. In December 2019, NTPC announced investment of Rs. 50,000 crores to add 10 GW solar energy capacity by 2022. In June 2021, they set a target plan to install green energy capacity of 60 GW by 2032.

Outlook

GoI has released its roadmap to achieve 175 GW (achieved 100 GW as of now) capacity in renewable energy by 2022, including 100 GW of solar power and 60 GW of wind power, and 450 GW in installed capacity in renewable energy by 2030. The Union GoI is also in process of initiating 'rent a roof' policy for supporting its target of generating 40 gigawatts (GW) of power through solar rooftop projects by 2022. India plans to reduce its carbon footprint by 33-35% from its 2005 levels by 2030 and meet 40% of its electricity needs from non-fossil fuel sources by then.

Indian Government is in process of increasing the power generation capacity of the country to meet the increasing consumption requirements however, the distribution segment remains the weakest link. The outstanding dues for the discoms were at Rs. 68,508 cr. at the end of April, 2021.

The second wave of Covid-19 was an unexpected hindrance in the operations of the commercial and industrial activities however, the level seems to have picked up which has resulted in an increase in demand and receivables. Threats of upcoming variants and the third wave can be a limitation to the power demand. In light on the current scenario, the government has been vigilant in coming up with measures to relieve the stress of this sector keeping in line with the long-term goals. Effective implementation of the RDSS, DBT for subsidy and privatisation of discoms will play a vital role in future prospects of this sector.