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Executive summary

2. ELECTRIFICATION ACHIEVEMENTS

- India has been on a path to achieve 100% household electrification as envisaged under the Saubhagya scheme. As of March 2019, more than 26.2 million households were electrified under the Saubhagya scheme.
- 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.

1. THIRD-LARGEST PRODUCER AND SECOND-LARGEST CONSUMER GLOBALLY

- India is the third-largest producer and second-largest consumer of electricity worldwide, with an installed power capacity of 390.79 GW, as of October 2021.
- India was ranked fourth in wind power, fifth in solar power and fourth in renewable power installed capacity, as of 2020.

3. ROBUST GROWTH IN RENEWABLES

- As of October 2021, India had an installed renewable energy capacity of 103.05 GW.
- Solar energy is estimated to contribute 114 GW, followed by 67 GW from wind power and 15 GW from biomass and hydropower by 2022. The target for renewable energy has increased to 227 GW by 2022.
- In April-June 2021, India added 521 MW of rooftop solar power, the highest quantity installed in a quarter.

4. FAVOURABLE POLICY ENVIRONMENT

- 100% FDI is allowed under the automatic route in the power segment and renewable energy.
- Under the Union Budget 2021-22, the government proposed to launch a National Hydrogen Mission for generating hydrogen from green power sources.
Advantage India
1. Growing demand
► Expansion in industrial activity to boost demand for electricity.
► Growing population along with increasing electrification and per-capita usage to provide further impetus.
► Power consumption is estimated to reach 1,894.7 TWh in 2022.
► India ranked sixth in the list of countries to make significant investments in clean energy by allotting US$ 90 billion between 2010 and the second half of 2019.

2. Higher investment
► India’s power sector is forecast to attract investment worth Rs. 9-9.5 trillion (US$ 128.24-135.37 billion) between FY19-FY23.
► Total FDI inflows in the power sector reached US$ 15.36 billion between April 2000 and June 2021.
► As per the National Infrastructure Pipeline 2019-25, energy sector projects accounted for the highest share (24%) out of the total expected capital expenditure of Rs. 111 lakh crore (US$ 1.4 trillion).

3. Policy support
► 100% FDI allowed in the power sector has boosted FDI inflow in this sector.
► Electrification in the country is increasing with support from schemes like Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY), Ujwal DISCOM Assurance Yojana (UDAY), and Integrated Power Development Scheme (IPDS).

4. Opportunities
► Under the Union Budget 2021-22, the government allocated Rs. 305,984 crore (US$ 42 billion) for a revamped, reforms-based and result-linked new power distribution sector scheme over the next five years.
► In June 2019, Government launched US$ 5 billion of transmission-line tenders in phases to reach 175 GW target by 2022.

Market Overview
Evolution of the Indian power sector

Before 1956 Introductory Stage
- Electricity (Supply) Act 1948
- Establishment of semi-autonomous State Electricity Boards (SEBs)

1956-1991 Nationalisation Stage
- Industrial Policy Resolution (1956)
- Generation and distribution of power under state ownership
- Power losses, subsidies, infrastructure bottlenecks and resource constraints.

1991-2003 Liberalisation Era
- Legislative and policy initiatives (1991)
- Fast-track clearing mechanism of private investment proposals
- Electricity Regulatory Commissions Act (1998) for establishing Central and State Electricity Regulatory Commissions and rationalisation of tariffs

2003 onwards Growth Era
- Electricity Act (2003)
- Implementation of Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) and Integrated Power Development Scheme for rural and urban areas, Implementation of Ujwal DISCOM Assurance Yojana (UDAY) which will be helpful to all villages and tracking it using the Grameen Vidyutikaran App
- As of October 31, 2021, the total installed capacity of renewable power was 103.05 GW, accounting for 26.37% of the total installed capacity.
India among top four power generating nations

- With a generation of 1,560.9 TWh, India is the third-largest producer and the third-largest consumer of electricity in the world.

- Although power generation has grown more than 100-fold since independence, growth in demand has been even higher due to accelerating economic activity.

- India’s energy firms have made significant progress in the global energy sector. According to the S&P Global Platts Top 250 Global Energy Rankings 2019, Reliance Industries Ltd. and Indian Oil Corp. Ltd. ranked 19th and 25th, respectively.

- In June 2021, the Export-Import Bank of India (Exim Bank) announced that it has extended a line of credit (LOC) worth US$ 100 million to the Sri Lankan government for the purpose of funding projects in the solar energy sector and assure that the country’s 70% power requirements are met by renewable energy sources by 2030.

Note: TWh - Terawatt Hours
Source: BP Statistical Review World Energy 2021
Power generation has grown rapidly over the years

- With electricity generation (including renewable sources) of 1,234.44 BU in India in FY21, the country witnessed a decline of -11.1% over the previous fiscal year.
- During FY16-FY21, electricity production in India increased at a CAGR of 1.0%.
- In FY22*, installed electricity stood at 562.52 BU.
- According to Icra Ltd., a rating agency, the country’s electricity demand is expected to grow 8-8.5% in FY22.
- All un-electrified inhabited census villages were electrified by April 28, 2018, ahead of the deadline of May 1, 2018.
- Under the Union Budget 2021-22, the government has allocated Rs. 15,322 crore (US$ 2.11 billion) for the Ministry of Power and Rs. 5,753 crore (US$ 794.53 million) for the Ministry of New and Renewable Energy.
- For FY21, electricity generation attained from conventional sources was at 1,234.44 BU, comprising 1,032.39 BU of thermal energy; hydro energy (150.30 BU) and nuclear (42.94 BU). Of this, 8.79 BU was imported from Bhutan.
- According to data from the Ministry of Power, India's power consumption increased 4.8% in October 2021 to 114.37 billion units (BU), indicating good recovery amid coal shortages at electricity generation plants.
- The Nathpa Jhakri Hydro Electricity Station of Satluj Jal Vidyut Nigam (SJVN) has set a new monthly power generation record, increasing from 1,213.10 million units to 1,216.56 million units on July 31, 2021.

Notes: BU - Billion Unit, * - From April 2021 to August 2021
Source: BP Statistical Review, Ministry of Power, News Articles
Wind energy is the largest renewable energy source in India. Projects like the Jawaharlal Nehru National Solar Mission (aims to generate 20,000 MW of solar power by 2022) are creating a positive environment among investors keen to exploit India’s potential. There are plans to set up four solar power plants of 1 GW each. As of October 2021, India had 103.05 GW of renewable energy capacity. The target is to achieve installed capacity of 227 GW by FY22.

India has large reserves of coal. By October 2021, the total installed coal thermal power capacity in India stood at 202.41 GW. By 2022, it is expected to witness total installed capacity addition of 47.86 GW.

India’s gas thermal power capacity stood at 24.89 GW, as of October 2021. By 2022, it is expected to witness total installed capacity addition of 0.41 GW. Lignite thermal power capacity stood at 6.62 GW, as of October 2021.

India’s diesel thermal power capacity was ~0.51 GW, as of October 2021.

With a large swathe of rivers and water bodies, India has an enormous potential for hydropower. As of October 2021, India’s hydro power generating capacity stood at 46.51 GW. By 2022, it is expected to witness total installed capacity addition of 6.82 GW.

As of October 2021, India had 6.78 GW of installed nuclear capacity. With one of the world’s largest reserves of thorium, India has a huge potential in nuclear energy. By 2022, it is expected to witness total installed capacity addition of 3.30 GW.

Notes: GW - Gigawatt
Source: Ministry of Coal, NHPC, CEA, Corporate Catalyst India, Indian Power Sector, Ministry of Power
Sources of power with shares in total installed capacity… (2/2)

- In FY22*, the total thermal installed capacity in the country stood at 234.44 GW. Installed capacity of renewable, hydro and nuclear energy totalled 103.05 GW, 46.51 GW and 6.78 GW, respectively.

- By 2022, India has a target to achieve total production of 227 GW from renewable resources, of which 114 GW will be produced from solar power.

- As part of the green corridor project, power lines would transmit 20 GW of power capacity from 34 solar parks across 21 states.

- 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.

- NTPC generated 270.9 BU in FY21, an increase of 4.3% over the previous year.

- All India PLF of thermal power plants (excluding gas-based power plants) stood at 56.73% in July 2021, compared with 53.09% in July 2020.

Notes: GW - Gigawatt, *Until October 2021
Source: Ministry of Coal, NHPC, Central Electricity Authority (CEA), Corporate Catalyst India
Installed capacity have increased steadily over the years, posting a CAGR of 6.39% in FY16-FY21.

Coal-based power installed capacity in India stood at 202.41 GW in October 2021 and is expected to reach 330-441 GW by 2040.

**Note:** GW - Gigawatt, ^-Provisional, @ CAGR until FY21, *- Until October 2021

**Source:** CEA (Central Electricity Authority)
Major players in the power sector … (1/3)

1. NTPC is the largest power producer in India and is also the sixth-largest thermal power producer in the world.
   - With a total installed capacity of 65.81 GW, NTPC has 73 power stations comprising 24 coal, seven combined cycle gas/liquid fuel, one large and small hydro and 14 renewables, along with 26 subsidiary & JV power stations. The group has over 18 GW of capacity under construction.
   - It has also diversified into hydro power, coal mining, power equipment manufacturing, oil and gas exploration, power trading and distribution. NTPC group reported a 5,290 MW commercial capacity addition plan for FY20.
   - As of September 2021, NTPC won 4.32 GW capacity in renewable energy bids since FY21.
   - In October 2021, the NTPC was awarded a contract to set up a 325 MW solar power project in Madhya Pradesh.
   - In November 2021, the NTPC announced that its 80 MW solar power-generation capacity in Jetsar (Rajasthan) has started commercial operations from October 22, 2021. The total capacity of the project is 160 MW.

2. Tata Power is India’s largest integrated power company with significant presence in solar, hydro, wind and geothermal energy space. The company accounts for 52% of the total generation capacity in the private sector.
   - The company has an installed capacity of 10,957 MW. By 2022, the company plans to increase the generating capacity to 18 GW, distribution networks to 4 GW and energy resources to 25 million tonnes per annum.
   - In October 2021, Tata Power won a 250 MW solar power project by Maharashtra State Power Generation Corporation and a 330MW solar projects in Madhya Pradesh.

3. Power Finance Corporation Limited (PFC) is an NBFC, engaged in financing and development activities within the Indian power sector.
   - Major products and services include project term loans, lease financing, direct discounting of bills, short-term loans and consultancy services.

Source: Company website, News articles, Industry sources
Major players in the power sector … (2/3)

4. Adani Power is one of India’s largest private thermal power producers, with total capacity at 12.45 GW in 2019; the company aims to generate 20 GW of power by 2020.
   - In September 2021, Adani Group announced to invest US$ 20 billion over the next 10 years in renewable energy generation and component manufacturing.

5. CESC Limited is a vertically integrated player engaged in coal mining and generation and distribution of power.
   - As of January 2020, it owns and operates three thermal power plants generating 1,125 MW of power.
   - These are Budge Budge Generating Station (750 MW), Southern Generating Station (135 MW) and Titagarh Generating Station (240 MW).

6. NHPC is the largest hydro power utility in India.
   - It has drawn an extensive plan to add about 6 GW of hydropower capacity by 2022.
   - In September 2021, NHPC’s 510 MW Teesta-V power station located in the Himalayan state of Sikkim has been conferred with the prestigious ‘Blue Planet Prize’ by International Hydropower Association (IHA).

7. Damodar Valley Corporation (DVC) is engaged in power generation, distribution and transmission of electric power, irrigation and flood control.
   - In April 2021, DVC’s three thermal stations were ranked among the top 10 in the central utility sector as of March 2021.

Source: Company website, News articles, Industry sources
Major players in the power sector … (3/3)

8
• SJVN Limited is the second largest hydro power company in India.
• The company plans to diversify into wind power projects soon.
• Total income stood at Rs. 3,213.07 crore (US$ 432.61 million) in FY21
• In November 2021, SJVN began the second unit work of the 1,320 MW Buxar thermal power plant in Bihar.

9
• Power Grid Corporation of India Limited (PGCIL) is the single largest transmission utility in India. It is responsible for planning, co-ordination, supervision and control over inter-state transmission systems.
• As of October 31, 2021, the company managed 172,104 kms of transmission lines and 264 substations.

Source: Company website, News articles, Industry sources
Recent Trends and Strategies
Strategies adopted

1. Control generation costs
   • Companies are developing captive coal fields to reduce price volatility and ensure uninterrupted supply of fuel to control generation cost.
   • Most of the power companies are now located near energy source. This helps minimise costs of fuel transport.

2. Acquiring sources of fuel supply
   • Power companies are now looking at securing adequate supplies of fuel by targeting not only domestic but also overseas resources.
   • Reliance Power already has coal reserves in Indonesia.
   • Essar Power have captive coal mines in Indonesia from which it extracts coal for power plants in India.
   • Government has enabled power utilities for swapping their coal supplies with the nearest source to save miscellaneous costs and decongest the rail network.

3. Diversifying generation technologies
   • Companies are using multiple-generation technologies based on a project’s requirement.
   • Companies such as NTPC and Reliance Power already have coal-fired, gas-fired and hydroelectric capacity. This helps them diversify and reduce dependence on a single source.

4. Additional revenue streams
   • Most of the companies are now looking to sell their carbon credits to generate additional revenue by employing supercritical technology.

5. Digital India
   • Launch of smart grid mission with 14 DISCOMS as a pilot. Smart metering for high-end users of electricity.
   • In June 2020, Government launched pan-India Real Time Market in electricity.

6. Aatmanirbhar Bharat
   • In September 2021, Bharat Heavy Electricals Limited (BHEL) successfully commissioned India’s largest floating Solar PV plant. Located at NTPC Simhadri in Andhra Pradesh, the 25 MW floating SPV project covers an area of 100 acres.
Growth Drivers
Growth drivers in power sector of India

Growing demand
- Electricity generation in India stood at 1,234.44 BU in FY21
- Electricity generation recorded a growth of 1.3% YoY in FY21

Policy support
- Supports commissioned power plants to sell electricity in the absence of valid Power Purchase Agreement (PPA)
- Relaxed FDI Norms

Increasing investment
- India’s power sector is forecast to attract investment worth Rs. 9-9.5 trillion (US$ 128.24-135.37 billion) between FY19-FY23
- PE Investments in renewable energy totalled US$ 1.4 billion in 2019
- Economic Survey predicts an investment of US$ 330 billion in renewable sector by 2030

Note: FDI - Foreign Direct Investment
Source: Central Electricity Authority of India
Industrial expansion and strong GDP growth driving power demand… (1/2)

- Multiple drivers (industrial expansion, growing per-capita incomes) are leading to growth in power demand. This is set to continue in the coming years.
- India is set to become a global manufacturing hub with investment across the value chain.
- India’s power demand is expected to rise to 1,905 TWh by FY22.
- The industrial sector accounted for 42% of the total electricity consumption in FY19P.

Note: TWh - Terawatt Hours, P - Provisional
Source: Ministry of Statistics and Program Implementation, CEA
Industrial expansion and strong GDP growth driving power demand… (2/2)

- Future investment will benefit from strong demand fundamentals, policy support and increasing Government focus on infrastructure.

- Per capita electricity consumption in the country grew at a CAGR of 2.96% from FY16 to FY20, reaching 1,208 KWh in FY20.
  - This growth was mainly attributed to electrification of villages and households across the country.

- Per capita electricity consumption posted consistent growth from 914 kWh in 2012-13 to 1208 kWh in 2019-20, an increase of 32%.

- India aims to reduce emissions intensity of its gross domestic product (GDP) by 33% to 35% by 2030 from 2005 levels and increase share of non-fossil fuels to 40% of the total electricity generation capacity.

![Per-capita electricity consumption (KWh)](chart)

**Note:** P : Provisional, data as per latest available figures, BU - Billion Units

**Source:** CEA, KPMG

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**Per-capita electricity consumption (KWh)**

<table>
<thead>
<tr>
<th>FY</th>
<th>Per-capita kWh</th>
</tr>
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<tbody>
<tr>
<td>FY16</td>
<td>1,075</td>
</tr>
<tr>
<td>FY17</td>
<td>1,122</td>
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<tr>
<td>FY18</td>
<td>1,149</td>
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<tr>
<td>FY19</td>
<td>1,181</td>
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<tr>
<td>FY20</td>
<td>1,208</td>
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**CAGR 2.96%**
Policy support and initiatives… (1/5)

1 National Policy on Biofuels - 2018
   • In May 2018, the Government of India approved National Policy on Biofuels 2018.
   • Benefits of this policy were related to health, clean environment, employment generation, reduced import dependency, and boost to infrastructural investment in rural areas.

2 Ultra Mega Power Projects (UMPPs)
   • Launch of UMPP scheme through tariff-based competitive bidding.
   • Ease of land possession, provision of fuel, water and necessary clearances for enhancing investor confidence

3 R-APDRP
   • Linking disbursement of central Government funds (to states), with actual reduction in transmission and distribution losses. Sanctioned projects of more than US$ 5.8 billion.
   • In June 2019, the state administrative council sanctioned Rs. 173 crore (US$ 24.3 million) for Supervisory Control and Data Acquisition (SCADA) and Distribution Management System (DMS) under R-APDRP Scheme for Jammu and Srinagar cities.

4 Saubhagya Scheme
   • The Pradhan Mantri Sahaj Bijli Har Ghar Yojana, “Saubhagya”, was launched by the Government of India with an aim of achieving universal household electrification by March 2019. As of FY21, 2.82 crore households have been electrified under the scheme.
   • The total financial implications of the project was Rs. 16,320 crore (US$ 2.19 billion) while the gross budgetary support (GBS) was Rs. 12,320 crore (US$ 1.65 billion).

Notes: R-APDRP - Restructured Accelerated Power Development and Reform Programme
Source: Ministry of Power, Asian Development Bank, KPMG, News Articles
Policy support and initiatives… (2/5)

5 UnnatJyoti by Affordable LEDs for All (UJALA) and Street Lighting National Programme (SLNP)

- 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, saving ~47.65 billion kWh per year.

6 Loan

- In December 2020, the Asian Development Bank (ADB) and the Government of India signed a US$ 100 million loan to modernise and upgrade the power distribution system for enhancing the quality and reliability of electricity supply in Bengaluru, Karnataka.
- In December 2020, the Asian Development Bank (ADB) and Government of India signed a US$ 132.8 million loan to strengthen and modernise the distribution network and improve quality of power supplied to households, industries and businesses in Meghalaya.

7 Energy Conservation Campaign

- Replacing nationwide streetlights with LED lights. Plan to save 10% energy that would light up 11 crore lives. Replacing 1 crore bulbs in Delhi within one year.

8 Power to the people

- The Union Budget 2021-22 has allocated Rs. 5,300 crore (US$ 731.75 million) to the Integrated Power Development Scheme (IDPS) and Rs. 3,600 crore (US$ 497.03 million) towards the Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY).

Source: Ministry of Power, Asian Development Bank, KPMG, News Articles, Union Budget 2021-22
9

Tariff
- Feed-in Tariff scheme is used for promoting generation of electricity from renewable energy sources. The Ministry of New and Renewable Energy set solar power tariff caps at Rs. 2.50 (US$ 0.04) and Rs. 2.68 (US$ 0.04) unit for developers using domestic, and imported solar cells and modules, respectively, in August 2018.
- Solar tariffs in India have reduced from ~Rs. 7.36/kWh (US 10 cents/kWh) in FY15 to Rs. 2.63/kWh (US 3.57 cents/kWh) in FY20.

10

Boost to manufacturing
- To create potential for domestic manufacturers and developers, Government will auction 40 GW of renewable energy projects including 30 GW solar and 10 GW wind every year until 2028.
- > 70% of equipment used in generation of wind power is manufactured in India.

11

Smart Meter
- Under the Union Budget 2020-21, the government has set a target of installing smart electricity meters in all households across the country by 2023.
- As of July 2021, 7.23 lakh smart metres have been approved under the National Smart Grid Mission (NSGM).

12

India Energy Modelling Forum (IEMF)
- In October 2020, the government announced a plan to set up an inter-ministerial committee under NITI Aayog to forefront research and study on energy modelling. This, along with a steering committee, will serve the India Energy Modelling Forum (IEMF) jointly launched by NITI Aayog and the United States Agency for International Development (USAID).

Source: Ministry of Power, Asian Development Bank, KPMG, News Articles
Policy support and initiatives… (4/5)

13
Direct Benefit Transfer (DBT) Scheme
- Union and state Governments have agreed to implement Direct Benefit Transfer (DBT) scheme in the electricity sector for better targeting of subsidies.

14
Vision ‘24x7’ Power for All’
- All the states and union territories of India was on board to fulfil Government’s vision of ensuring 24x7 affordable and quality power for all as per the Ministry of Power and New & Renewable Energy, Government of India.

15
No environment clearance required for solar projects
- The Ministry of Environment, Forest and Climate Change, Government of India has clarified that solar PV (photovoltaic) power, solar thermal power projects, and solar parks will not require the environment clearance which was mandatory under the provisions of Environment Impact Assessment (EIA) notification, 2006.

16
Green Energy Corridor Project
- Under the Union Budget 2021-22, the government has allocated Rs. 300 crore (US$ 41.42 million) to increase capacity of the Green Energy Corridor Project, along with Rs. 1,100 crore (US$ 151.90 million) for wind and Rs. 2,369.13 crore (US$ 327.15 million) for solar power projects.

Source: Ministry of Power, Asian Development Bank, KPMG, News Articles
Rooftop solar
- Indian Government is preparing a 'rent a roof' policy for supporting its target of generating 40 GW of power through solar rooftop projects by 2022.
- To encourage rooftop solar (RTS) throughout the country, notably in rural regions, the Ministry of New and Renewable Energy is undertaking Rooftop Solar Programme Phase II, which aims to install RTS capacity of 4,000 MW in the residential sector by 2022 with a provision of subsidy.

National Electricity Policy 2021
- In April 2021, the Ministry of Power (MoP) released the draft National Electricity Policy (NEP) 2021.
- The MoP has created an expert committee including members from state governments, the Ministry of New and Renewable Energy (MNRE), NITI Aayog and the Central Electricity Authority (CEA).
- Power is one of the key sectors attracting FDI inflow into India.
- From April 2000 to June 2021, India recorded FDI inflow worth US$ 10.27 billion in the non-conventional energy sector. New and renewable energy sector witnessed maximum power generation capacity addition, since 2000.
- Power sector accounted for 3% of the total FDI inflow until March 2021.
- Cumulative FDI inflow in the power sector stood at US$ 15.36 billion between April 2000 and June 2021.
- In September 2021, the Government of the United Kingdom announced that it will invest US$ 1.2 billion through public and private investments in green projects and renewable energy in India to support the latter’s target of 450 GW of renewable energy by 2030.

Source: DPIIT
Increasing investments: FDI inflow and key deals… (2/2)

### Important deals

<table>
<thead>
<tr>
<th>Acquirer</th>
<th>Target</th>
<th>Date</th>
<th>Value (US$ million)</th>
</tr>
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<tbody>
<tr>
<td>Adani Transmission Ltd.</td>
<td>REC Power Development and Consultancy Ltd.</td>
<td>Nov 2021</td>
<td>100% stake</td>
</tr>
<tr>
<td>Secure Meters</td>
<td>Adaptricity AG</td>
<td>Nov 2021</td>
<td>100% stake</td>
</tr>
<tr>
<td>Ayana Renewable</td>
<td>ReNew Power (Wind Farm in Karnataka)</td>
<td>Nov 2020</td>
<td>219</td>
</tr>
<tr>
<td>Global Infrastructure Partners</td>
<td>RattanIndia</td>
<td>Sep 2020</td>
<td>232</td>
</tr>
<tr>
<td>Actis</td>
<td>Acme Solar</td>
<td>Aug 2020</td>
<td>312</td>
</tr>
<tr>
<td>Adani Power Limited</td>
<td>Odisha Power Generation Corporation (OPGC)</td>
<td>Jul 2020</td>
<td>135</td>
</tr>
<tr>
<td>TOTAL Gas &amp; Power Business Services</td>
<td>Adani Green Energy Limited (AGEL)</td>
<td>Apr 2020</td>
<td>530.40</td>
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<tr>
<td>IndiGrid</td>
<td>Sterlite Power</td>
<td>Jan 2020</td>
<td>145.94</td>
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<tr>
<td>Bharti Airtel Limited</td>
<td>AMPSolar Evolution</td>
<td>Oct 2019</td>
<td>1.20 (26%)</td>
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<td>Adani Transmission</td>
<td>Bikaner-Khetri Transmission Limited (BKTL)</td>
<td>Sept 2019</td>
<td>-</td>
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<td>SunEdison Infrastructure</td>
<td>Megamic Electronics</td>
<td>Jul 2019</td>
<td>10 million</td>
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<tr>
<td>Power Finance Corporation (PFC) Ltd.</td>
<td>Rural Electrification Corporation (REC) Ltd.</td>
<td>Dec 2018</td>
<td>52.63% of holding</td>
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<td>Renascent Power Ventures Pte Ltd.</td>
<td>Prayagraj Power Generation Company Ltd (PPGCL)</td>
<td>Nov 2018</td>
<td>854.94 (75.01% stake)</td>
</tr>
<tr>
<td>Kohlberg Kravis Roberts &amp; Co (KKR)</td>
<td>Ramky Enviro Engineers Limited</td>
<td>Aug 2018</td>
<td>530</td>
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<td>ReNew Power</td>
<td>Ostro Energy</td>
<td>Apr 2018</td>
<td>1,668.21</td>
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<td>Canada Pension Plan Investment Board (CPPIB)</td>
<td>ReNEW Power Ventures Ltd.</td>
<td>Jan 2018</td>
<td>144 (6.3% stake)</td>
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<td>ReNew Power</td>
<td>Wind power assets of KC Thapar Group</td>
<td>21 Nov 2017</td>
<td>155.55</td>
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<td>Adani Transmission Limited</td>
<td>Reliance Infrastructure Limited (Mumbai)</td>
<td>Oct 2017</td>
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**Note:** FDI - Foreign Direct Investment, PE - Private Equity, Thomson One Banker

**Source:** Thomson One Banker, Industry News, VC Circle
Opportunities
In the current decade (2020-2029), the Indian electricity sector is likely to witness a major transformation with respect to demand growth, energy mix and market operations.

Demand for electricity is expected to increase - per capita consumption of electricity is estimated to be at 1,894.70 TWh by FY22.

Current production levels are not enough to meet demand - annual demand outstrips supply by about 7.5%.

Various reforms being undertaken by the Government are positively impacting India’s power sector. In wake of the surging domestic coal production, the country’s power sector is becoming increasingly stable.

Non-coking coal consumption is forecast to grow at a CAGR of 5.4% to reach 1,076 MT in FY23 from 826 MT in FY18. Domestic supply is forecast to reach 931 MT in FY23 from 664 MT in FY19, growing at a CAGR of 7%.

In order to decarbonise the energy consumption, India needs a 30-fold increase in renewable energy, 30-fold increase in nuclear energy and doubling of thermal energy, which would make 70% of energy consumed carbon free.

In November 2021, Energy Efficiency Services Limited (EESL) stated that it will partner with private sector energy service companies to scale up its Building Energy Efficiency Programme (BEEP).

Notes: TWh - Terawatt Hour
Source: International Energy Agency (IEA), CEA, Demand estimates based on IEA forecasts
- India is witnessing a deficit in meeting the peak demand over the last two fiscal years.
- The peak power demand in the country stood at 196.77 GW in FY2022*.
- Peak power demand met or the highest supply in a day witnessed growth of over 15% in the first week of June 2021 at 168.72 GW.

**Power supply position (GW)**

*Note: GW - Gigawatt, P – Provisional, *- Until August 2021
*Source: CEA*
Renewable energy is fast emerging as a major source of power

- As per the Central Electricity Authority (CEA) estimates, by 2029-30 share of renewable energy generation would increase from 18% to 44%, while that of thermal is expected to reduce from 78% to 52%.
- Wind energy is the largest source of renewable energy in India. It accounts for 41.23% (39.44 GW)* of the total installed renewable capacity (95.65 GW)*. There are plans to double the wind power generation capacity to 60 GW by 2022.
- Solar power is the second-largest source of renewable energy. It accounts for 42.94% (41.08 GW)* of the total installed renewable capacity (95.65 GW)*. The government has set a target of achieving 100 GW by 2022.
- The Ministry of Power aims to achieve 227 GW of installed renewable energy capacity by 2022.
- Around 15 GW of wind-solar hybrid capacity is expected to be installed between 2020-2025.
- In September 2021, Mr. R K Singh, Union Minister for Power, New and Renewable Energy, met with his Danish colleague, Mr. Dan Jrgensen, and announced to expand their cooperation in renewable energy, particularly offshore wind and green hydrogen.
- In September 2021, Indian Renewable Energy Development Agency Ltd (IREDA) said it has entered a pact with Tamil Nadu Generation & Distribution Corporation Limited (TANGEDCO) for providing technical expertise in developing renewable energy projects and raising funds.
- In November 2021, the Union Minister for Power and Ministry of New and Renewables Energy, Mr. R. K. Singh, reviewed implementation of the 10 GW Renewable Energy Project at Leh, along with its evacuation plan.

In April 2021, GE Renewable Energy announced to supply 42 units of 2.7-132 onshore wind turbines, totaling 110 MW for onshore wind hybrid projects to CleanMax.

Notes: TWh - Terawatt-hours, Figures mentioned in the graph is as per latest data available, * - as of May 2021, SEIC - Solar Energy Corporation of India
Source: International Hydropower Association, BP Statistical Review World Energy 2020, CEA, News Articles
Strong upward momentum in nuclear energy likely in medium to long term

- India has a net installed capacity of 6.78 GW as of May 2021. It has been using nuclear fuels across 20 reactors, and of these, 18 are Pressurised Heavy Water Reactors (PHWR) and 2 are Boiling Water Reactors (BWR).

- Nuclear Power Corporation of India Limited (NPCIL) plans to construct 5 nuclear energy parks with a capacity of 10,000 MW.

- The Government of India will set up 21 new nuclear power reactors with a total installed capacity of 15,700 megawatt (MW) by 2031.

- Under the Union Budget 2021-22, the government allocated Rs. 278.95 crore (US$ 38.56 million) for the development of nuclear power projects under the Ministry of Atomic Energy.

- In June 2021, Russia’s Rosatom began construction of the fifth and sixth nuclear power unit of 1,000 MW generation capacity each in Kudankulam, Tamil Nadu.

- On July 23, 2020, NPCIL achieved criticality of a third unit of 700 MWe (Megawatt electric) at its plant in Tapi district based completely on indigenous technology.

- In July 2021, Bharat Heavy Electricals Limited (BHEL) received a large contract from Nuclear Power Corporation of India Limited (NPCIL) for the supply of 12 steam generators of India's highest rated indigenously-developed 700 MW Pressurized Heavy Water Reactors (PHWR) worth Rs. 1,405 crore (US$ 189.20 million).

### Nuclear energy installed capacity in India (GW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (GW)</th>
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<tbody>
<tr>
<td>FY21</td>
<td>6.78</td>
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<td>2025E</td>
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### Nuclear power plants and reactors under construction in India

<table>
<thead>
<tr>
<th>Power station</th>
<th>Operator</th>
<th>Capacity (MW)</th>
<th>Expected Operation</th>
<th>Sanctioned Cost (Rs. Crore)</th>
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<tr>
<td>Madras</td>
<td>Bhavini</td>
<td>500</td>
<td>2020</td>
<td>5,677</td>
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<tr>
<td>Kakrapar Unit 3 and 4</td>
<td>NPCIL</td>
<td>1,400</td>
<td>2022</td>
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<td>39,849</td>
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*Note: GW - Gigawatt, E – Estimates, * - Under revision
Key Industry Contacts
### Key industry contacts

<table>
<thead>
<tr>
<th>Agency</th>
<th>Contact Information</th>
</tr>
</thead>
</table>
| Council of Power Utilities                        | Address: A-2/158, Janakpuri, New Delhi-110058, India  
Tel: 91 11 25618472, 45652708  
Fax: 25611622  
E-mail: councilofpowerutilities@gmail.com  
Website: www.indiapower.org                                                                 |
| Bureau of Energy Efficiency (BEE)                 | Address: Ministry of Power, 4th Floor, SEWA Bhawan, R. K. Puram, New Delhi - 110066, India  
Tel: 91 11 26179699  
Fax: 91 11 26178352  
E-mail: dq-bee@nic.in  
Website: www.beeindia.in                                                                 |
| Hydro Power Association (India)                   | Address: Flat no 6, Green Park Apartment, Shriram Society, Warje, Pune - 411058, Maharashtra, India  
Tel: 91 20 25233338  
E-mail: hypaindia@gmail.com, president@hpaindia.org, secretary@hpaindia.org  
Website: www.hpaindia.org                                                                 |
| Indian Wind Energy Association (INWEA)            | Address: 2nd Floor, All India Federation for the Deaf (AIFD) Building,  
12-13, Special Institutional Area, Shaheed Jeet Singh Marg, New Delhi-110067, India  
Tel: 91 11 4652 3042  
E-mail: manish@inwea.org  
Website: www.inwea.org                                                                 |
Glossary

- CAGR: Compound Annual Growth Rate
- FDI: Foreign Direct Investment
- FY: Indian Financial Year (April to March)
  - So FY10 implies April 2009 to March 2010
- GW: Gigawatt
- M&A: Merger and Acquisition
- MW: Megawatt
- NBFC: Non-Banking Financial Company
- PE: Private Equity
- PLF: Plant Load Factor
- R&D: Research and Development
- R-APDRP: Restructured Accelerated Power Development and Reform Programme
- T&D: Transmission and Distribution
- TWh: Terawatt-Hour
- RGGVY: Rajiv Gandhi Grameen Vidyutikaran Yojana
- US$: US Dollar
- Rs.: Indian Rupee

Wherever applicable, numbers have been rounded off to the nearest whole number
### Exchange Rates (Fiscal Year)

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### Exchange Rates (Calendar Year)

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<tr>
<td>2021*</td>
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</tbody>
</table>

**Note:** As of November 2021  
**Source:** Reserve Bank of India, Average for the year
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