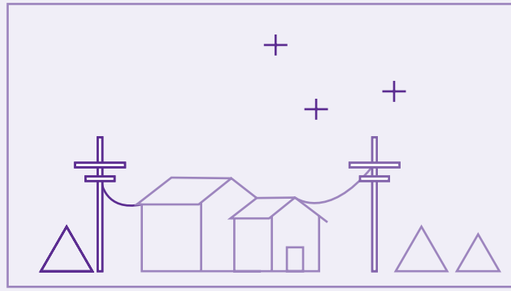
MANUFACTURED CAPITAL

Co-creating the future of sustainable energy



Tata Power is committed to fulfilling the growing energy requirements of a developing India in a sustainable manner. We have embarked on an ambitious journey to transform our energy generation portfolio towards 'clean and green' energy sources and attain carbon neutrality before 2050.

Our ambition and commitment stem from our vision and purpose to serve our customers' needs as well as address the risks associated with climate change. We are focused on overcoming the challenges associated with sourcing of materials, regulatory pressures, and uncertainty in renewables, to develop and deliver eco-friendly energy to our customers.

Strategic Business Objectives

SBO1: Profitable scaleup of Renewables, Distribution, Services and Energy Solutions business

SBO5: Develop future energy products and solutions

SBO8: Set new benchmarks in operational excellence and financial returns for existing businesses

Governance enablers

— Risk Management Committee
— Executive Committee of the Board
— Committee of Directors
— Risk Management Policy
— Corporate Sustainability Policy

Material topics

— Increase in renewables portfolio
— Operational efficiency

Key performance indicators

— Installed capacity
— Clean and green capacity %
— Investments made in RE portfolio

Key risks addressed

— Technology risk
— Regulatory risk
— Commercial risk

Sustainable Development Goals

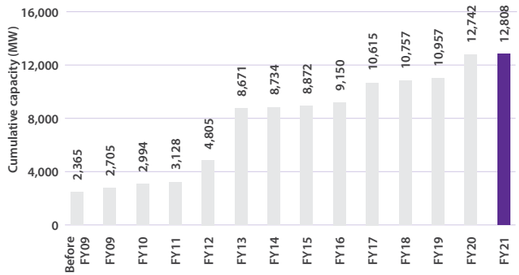
Interaction of manufactured capital with other capitals

	HUMAN	INTELLECTUAL	FINANCIAL	SOCIAL & RELATIONSHIP	NATURAL
Capital tradeoffs	Enhancing generation and manufacturing capacity provides suitable work opportunities for our employees	Dedicated thrust in our clean and green capacity enables us to deliver future ready products for our customers	Profitable growth in renewables business through prudent bidding and cost optimization, generation of income through Carbon Emssion Reduction (CER) trading	Leveraging our products and services to delight customers with future-ready energy solutions	Our clean and green capacity enable us to reduce carbon emissions and other negative environmental impacts
Impact across the <IR> capitals	8.6% new employee hire rate in FY21	225 MW of hybrid RE asset under construction	₹5,888 crore revenue from renewable segment-higher by 48% from FY20	Over 30,000 customers for solar rooftop	2,694 MW of renewable portfolio domestically

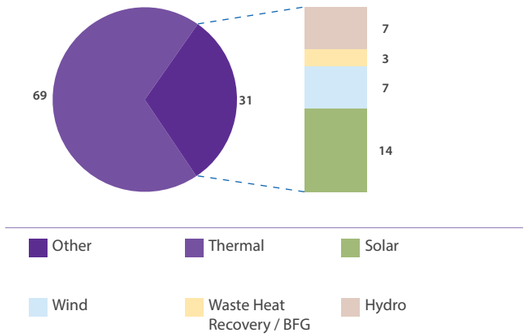
Powering a sustainable economy – our generation capacity

We have consistently increased our generation capacity to meet the growing demands of our consumers and help elevate the quality of life of millions of people. We have witnessed over four fold growth in capacity addition in the past decade. While the initial growth phase was primarily from fossil fuel based generation (coal / oil / gas), we are now primarily focusing on growing through renewables, transmission & distribution, services and energy solutions business to address the future requirements and challenges. The absence of any thermal addition in the reporting period is a testament to this commitment.

Cumulative Annual Capacity growth

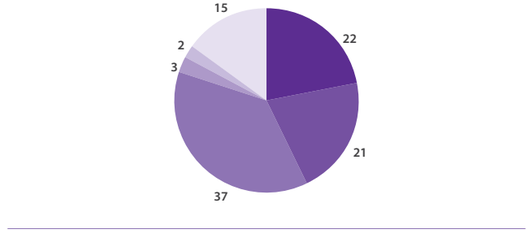


Fuel mix (domestic + international)

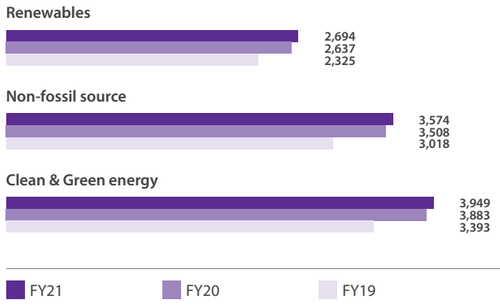


As on 31st March 2021, our total generation capacity nationally and internationally was 12,321 MW and 487 MW, respectively.

Business Model



Eco-friendly generation capacity (MW)



Note:
Renewables: Solar and Wind capacity
Non-fossil source: Renewables and Hydro
Clean & Green energy: Non-fossil source and Waste Heat Recovery

Domestic Assets

Fuel source	State / Union Territory	Location	Normative capacity under management (MW)	PPA tenure	Return profile	Total capacity by fuel source (MW)
Thermal (Coal / Gas / Oil)	Gujarat	Mundra	4,150	Long-term	Bid-based	**8,805**
	Maharashtra	Mumbai	930	Medium-term	Regulated	
	Jharkhand	Maithon	1,050	Long-term	Regulated	
	Jharkhand	Jojobera	547	Long-term	- Regulated returns - Bilaterally negotiated (captive)	
	Odisha	Kalinganagar	40	Long-term	Tolling / Fixed tariff	
	Uttar Pradesh	Prayagraj	1,980	Long-term	- 90% Regulated - 10% Merchant	
	New Delhi	Rithala (Gas based)	108*	None	Non-operational	
Thermal (Waste heat recovery)	Jharkhand	Jamshedpur	120	Long-term	Bilaterally negotiated (captive)	**375**
	Odisha	Kalinganagar	135	Long-term	Bilaterally negotiated (captive)	
	West Bengal	Haldia	120	Short-term	Merchant sale and bilateral contracts	
Hydro	Maharashtra	Bhira	300	Medium-term	Regulated	**447**
	Maharashtra	Khopoli	72	Medium-term	Regulated	
	Maharashtra	Bhivpuri	75	Medium-term	Regulated	
Renewables	Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Tamil Nadu, Rajasthan, and Andhra Pradesh	Wind Farms	932	Long-term	Feed-in tariff and bid-driven contracts	**2,694**
	Andaman & Nicobar, Andhra Pradesh, Bihar, New Delhi, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh and Uttarakhand	Solar Photovoltaic (PV)	1,762	Long-term	Feed-in tariff and bid-driven contracts	
					Total domestic capacity	**12,321**

*Classified as assets held for sale

International Assets

Fuel source	State / Union Territory	Location	Normative capacity under management (MW)	PPA tenure	Return profile	Total capacity by fuel source (MW)
Thermal (Coal / Gas / Oil)	Indonesia	PT Citra Kusuma Perdana	54	Long-term	Bilaterally negotiated (captive)	**54**
Hydro	Bhutan	Dagachhu	126	Short-term	Merchant sale	**246**
	Zambia	Itezhi Tezhi	120	Long-term	PPA/Fixed tariff	
	Georgia		187	Long-term	PPA/Fixed Tariff	**187**
					Total international capacity	**487**

Our portfolio has a diverse mix of PPA/ Fixed tariff and Return on Equity (RoE) based regulated tariff which provides a natural balance and guarantees a stable return even in fluctuating business conditions especially in a lower margin renewable environment due to competitive bidding. For details of our business portfolio, you may also refer page 161 Management Discussion and Analysis.

Creating a greener India – our renewables story

Climate change is one of the biggest challenges of the 21st century, with the energy sector contributing 25% (Source: IPCC AR5 2014) to the global GHG emissions. As energy is an essential requirement for economic growth and societal wellbeing, renewable energy (RE) is gaining prominence globally and is at the centre of all our GHG mitigation plans.

Aligning with our commitment towards environmental stewardship, we commissioned our first wind asset at Supa in Maharashtra in 2001 and first solar asset at Mulshi in Maharashtra in 2011. Additionally, our largest renewable acquisition of Welspun Energy (in 2016) accelerated our commitment towards increasing the renewables portfolio. Today, we have an impressive renewable portfolio of 2,694 MW domestically, which makes over 22% of our domestic generation portfolio and has under construction capacity of 1,314 MW.

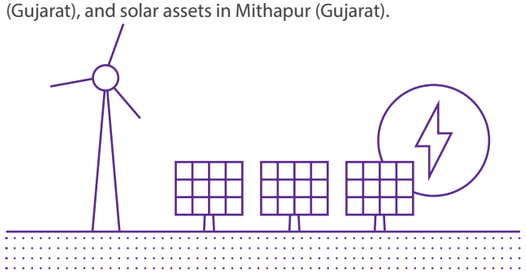
Furthermore, we have our presence across value chains of renewable business, be it products (solar pumps, solar RO system, solar modules and cells), utility scale solar EPC, solar rooftop solutions, Microgrids, hybrid renewables, floating solar as well new future ready business ventures.

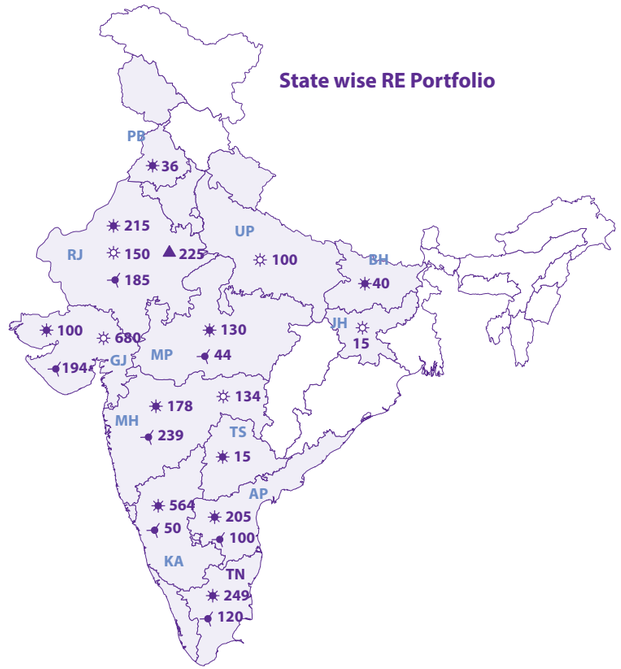
Our 100% subsidiary,Tata Power Solar Systems Limited (TPSSL), is India's largest utility scale solar EPC company with presence across 11 states in India and has order book of over 2,800 MW with value of around ₹8,700 crore as on 31st March 2021.

It has also been manufacturing solar cells and modules since 1989 (oldest in India) and has enabled us to provide end-to-end solutions to our customers.

During this financial year, we have made significant expansion of our state of the art manufacturing facility in Bengaluru, taking the total production capacity of the cells and modules to 1,100 MW.

Leveraging the opportunities to offset carbon emissions, Tata Power currently has five renewable projects registered under the Clean Development Mechanism (CDM) programme by the United Nations Framework Convention on Climate Change (UNFCCC). These include wind assets at Gadag (Karnataka), Khandke (Maharashtra), Samana and NewGen Saurashtra (Gujarat), and solar assets in Mithapur (Gujarat).





Total RE Portfolio
4,008 MW

Solar
2,851 MW#

Wind
932 MW

Hybrid
225 MW@

Operating Wind Asset

Operating Solar Asset

Under Construction Solar Asset

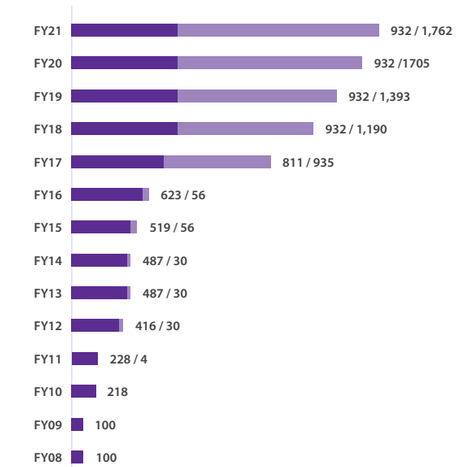
Under Construction Hybrid Asset

includes u/c solar capacity of 1,089 MW @ u/c Hybrid capacity of 225 MW

A total of 87,351 Certified Emission Reductions (CERs), better known as carbon credits, were traded from these projects in FY21, generating gross revenues of around ₹ 1.77 crore. Walwhan Renewable Energy Limited (WREL) has eight CDM registered projects but no CERs were issued or traded in FY21.

Empowered by our rich experience in the renewable sector and a very clear vision towards the future, we are well poised to strengthen our industry position and brand recall. We are committed to take our clean and green portfolio from 31% in 2021 to around 80% by 2030.

Cumulative capacity of renewable energy installed (MW)



Tata Power's Renewable Portfolio

State / Union Territory	Solar (MW)	Wind (MW)	Total (MW)
Andaman & Nicobar	0.2	Nil	0.2
Andhra Pradesh	205	100	305
Bihar	41	Nil	41
New Delhi	3	Nil	3
Gujarat	100	194	294
Haryana	1	Nil	1
Jharkhand	8	Nil	8
Karnataka	566	50	616
Madhya Pradesh	130	44	174
Maharashtra	185	239	424
Punjab	36	Nil	36
Rajasthan	215	185	400
Tamil Nadu	253	120	373
Telangana	16	Nil	16
Uttar Pradesh	1	Nil	1
Uttarakhand	2	Nil	2
Total	**1,762**	**932**	**2,694**

Financial assistance from government

— ₹50.76 crore exemption of customs duty on import of raw materials to manufacture solar modules and solar cells and import of solar inverters and solar trackers for large projects

— Viability Gap Funding of ₹49.10 crore receivable from Solar Energy Corporation of India Limited for 100 MW Ananthapuram Project and 30 MW Palaswadi Project.

#FutureReady technologies implemented in RE portfolio:

— Maintenance of drones to detect offline strings, Hot spots, diode defaults, revers faults, string mismatch, microcracks and surface faults

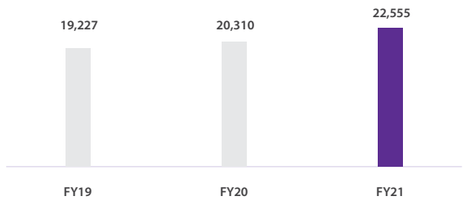
— Robotic waterless cleaning

— String level monitoring on real-time basis to track the output and performance of solar panels

Focus areas envisaged to be #FutureReady:

— Competitive bidding to ensure profitable growth
— Hybrid project opportunities
— Round the clock renewables solutions
— Offshore wind projects
— Strategic tie-ups for battery storage projects
— Floating solar (coupled with hydro power)
— Hydrogen as alternate fuel - Green Hydrogen

Cumulative Investments in Renewable Energy (in ₹crore)



Our steady increase in Investments in renewable assets underlines our commitment to grow responsibly without compromising the energy need of customers.
Government of India is also providing impetus to the growth of non fossil based energy solutions in the country through increased focus and financial assistance, which is expected to increase further in future.

Microgrids — making rural India future ready

Despite the Government's efforts to improve electricity access in India through household electrification, energy crisis is a big challenge in many parts of rural India. The situation is further worsened by the poor financial health of Discoms, impairing the service quality in villages. The lack of reliable and affordable power supply and grid connectivity compels the inhabitants to switch to polluting diesel generators. This situation in large measure restricts the overall growth opportunities of rural India, and also adds to the country's carbon footprint.

We have embarked upon an ambitious new initiative to help transform rural India through many micro-enterprises, powered by clean, affordable and reliable energy from renewable microgrids. So far, we have set up microgrids in rural regions of Bihar (6 districts) and Uttar Pradesh (3 districts).

Tata Power's Aspirations

- Electrify villages using renewable mini grids in selected states.
- Provide affordable, reliable, high-quality 24x7 service to customers
- Roll out value-added services e.g. water treatment plant to provide clean drinking water in rural India
- Drive economic growth via small enterprises and agriculture
- Promoting affordable and energy efficient appliances
- Work with relevant central and state governmental bodies to advance thoughtful policy reforms

Highlights

Installed microgrids
161 (4.8 MW)

Microgrids under construction
40 (1.2 MW)

Villages covered
200

Customers connected
3,887

Tata Power's efforts on energy transition is targeted to bridge the gap between unreliable power supply for micro-enterprises and socio-economic development of the country. We have rolled out microgrids in rural India to provide innovative solutions for the under-served communities and expanded our global microgrid footprint. We are constantly looking for ways to further scale up this business.

Rooftop Solar

As a leading player promoting rooftop solar solutions, we are encouraging the shift of consumers to prosumers and maximising our solar potential through innovative models. We have also launched a campaign across India titled 'SOLAROOF' Kamai Badhaye Dildaar Banaye to promote solar rooftops as a solution to conserve energy, reduce energy costs and help protect the environment. This is augmented by our customised offerings for a diverse set of consumers (residential, MSMEs SMEs, commercial and industrial).

We have over two decades of pioneering excellence in the rooftop solar segment and are a partner of choice for over 30,000 customers. Our solar rooftops business continued its growth trajectory with over 6,000 customer sites in FY21, approximately 100% growth over that of previous financial year. Our accomplishments have been acknowledged by the leading Renewable Consultancy Bridge to India, which has recognised us as the No.1 EPC rooftop player for seven years in a row.

Flagship Projects

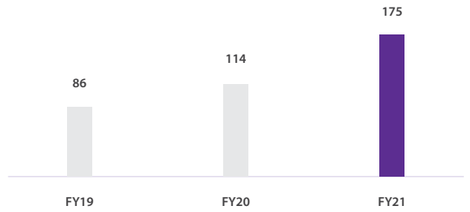
World's largest solar-powered cricket stadium - Brabourne Stadium, Mumbai

India's largest carport installation in Pune

India's largest vertical solar farm for Dell in Bengaluru

World's largest rooftop solar system at Radha Swamy Satsang Beas, Punjab

Rooftop business Y-o-Y installations (MW)



Highlights

Cumulative customers
30,000+

Residential customers
15,000+

Installed
500+ MW
~40% CAGR (FY18-21)

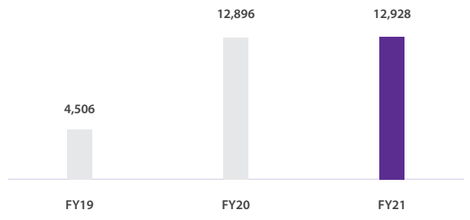
Pan India network of
250+ channel partners

Ranked
No 1 Solar EPC Player
for 7 years in a row

Solar Water Pumps

A large proportion of India's population still depends on agriculture for their sustenance. The high dependence on monsoons to irrigate crops leads to opportunity losses for farmers in drier months, as well as increases the use of expensive, polluting fuels to operate conventional irrigation systems. Solar water pumps are a cheaper and cleaner alternative to farmers, which enables them to improve their productivity throughout the year. This further benefits society through the creation of environment friendly employment opportunities and less hardship on women and children while carrying water.

Annual sales (no. of pumps)



Highlights

Pumps across India
30,000+

Turn Around Time (TAT) reduced by
50-70%

Leading player in solar pumps

Customers have benefited with
₹200+ crore
subsidy from government under the KUSUM programme

To propagate its twin priorities of agriculture and renewable energy, the Government of India is heavily focusing on distribution of solar water pumps. It aims to benefit 3.5 million farmers by providing them solar pumps with 60% subsidy through the Pradhan Mantri Kisan Urja Suraksha Evem Utthan Mahabhiyan (KUSUM) scheme. Tata Power is proud to support this future focused initiative of the Government of India and is leveraging its strong network to reach out to rural geographies of the country. Till date, we have built a portfolio of 30,000+ solar water pumps across India. Thus, we are enabling sustainable growth of the agriculture sector through dedicated focus on setting up around 1 million solar pumps by FY26.

#Futureready renewable energy solutions for tomorrow

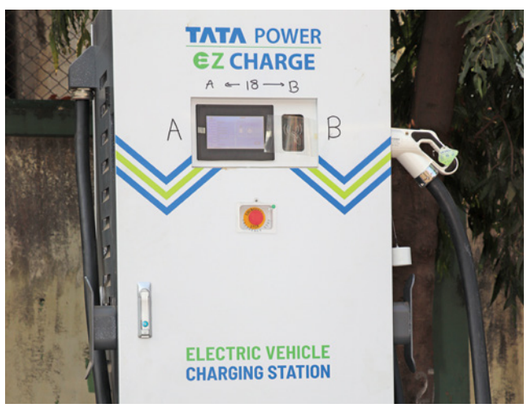
Hybrid/ Round the Clock/ Solar plants with battery

Tata Power is of the belief that going forward the emerging trend and general direction of growth in the renewables sectors would be in the form of hybrid/Round the clock RE solutions. The hybrid solutions would include a combination of wind and solar plants along with some battery electric storage solutions (BESS). In this regard, Tata Power is already constructing our first hybrid project of 225 MW, developing land bank for wind site and engaging into strategic tie up with Wind Turbine manufacturers. Tata Power has already an operational 10 MW/10 MWH BESS solution in their TPDDL facility. Tata Power is leveraging on this experience of assimilating BESS technology and operating the largest BESS installation in India to undertake strategic tieup with Battery Original Equipment Manufacturers (OEM). It has also developed the engineering team to evaluate the rapid changes in battery chemistry and specification to be able to have the optimum techno commercial solution for the future opportunities. These opportunities could range from small scale storage with Roof top solutions to utility scale application for peaking shifting and ancillary services required for frequency regulation.

Floating Solar

We are executing 70 MW floating solar project at Kayamkulam in Kerala, on backwaters owned by NTPC in Rajiv Gandhi Combined Cycle Power Plant. This will be the second largest floating solar project in India and largest in the state of Kerala. We expect to commission it by the end of this year.

Being #FutureReady – Our New Services Business



Electric Vehicle (EV) Charging-Greener Mobility

A complementary mix of policies is being carefully laid out by the Government of India to promote EV adoption in India. In addition to reducing the pollution load on the roads, especially in urban areas, this shift promises more jobs in the EV manufacturing space. To complement the EVs being sold, presence of a suitable public charging infrastructure is crucial for successful transformation of mobility in India.

Tata Power has made significant impact in developing an EV ecosystem and encouraging EV adoption in the country. We are committed to playing a key role along with our stakeholders to achieve the national goal of transition to Green mobility.

In addition to its partnership with Tata Motors and Jaguar Land Rover in FY21, Tata Power has also partnered with MG Motors, for developing EV charging infrastructure for their customers and dealers.

Charging points for public
532

National Highways catered
27 city pairs

Cities served
92

Home chargers installed
3,000

In FY21, we have launched our software platform and mobile application which plays a crucial role in a customer's journey of EV charging by helping them to locate EV charging stations, charging EVs and paying bills online. Our charging platform has been conferred Gold Award by India Smart Grid Forum to recognise the innovative solutions deployed through it. We expect to expand our current network of 532 EV charging points across 92 cities to over 1 lakh charging points across the country by FY26.

Energy Services

Our interventions via a dedicated Energy Service Company (ESCO) business encourage large commercial and industrial clients to embrace digitalisation and monitor energy savings. The ESCO vertical aims to substantially reduce carbon footprint and lower the energy consumption through its integrated Energy as a Service (EaaS) offerings supported with digital technologies. We have associated with multiple partners including global companies, which are into smart energy management and have commenced offering solutions to clients primarily in industrial and commercial segments. We envision ESCO to be the one-stop solution by leveraging on the diverse offerings in the power value chain.

Energy saving services

— Audits
— Design and retrofit
— Financing
— Implementing solutions
— Real-time monitoring

Energy management

— Transactions from exchange
— Optimizing power procured
— Open Access power
— Monitoring energy consumption patterns
— Renewable Purchase Obligation (RPO) compliance

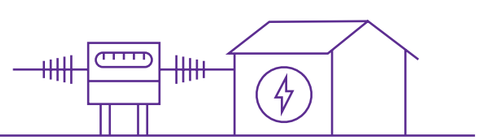
We plan to leverage our diverse offerings in various segments of the power value chain to create a one stop solution for our customers. This would enable us to provide enhanced service level to our clients to meet their present, latent and future energy requirements. We anticipate a steep rise in revenue from ESCO to the tune of over ₹3,500 crore by FY26.

Home Automation-Smart Energy Management

India is home to a growing middle class population with the ambition and drive to improve their quality of life. Aligning with Tata Group's philosophy, we aim to cater to the rising needs of these consumers by providing innovative solutions at affordable prices. Empowering our customers is key to our pursuit of our new-age energy solutions.

Home automation solutions are aligned to enable cost savings, energy efficiency and consequently reduce emissions. Being the leader in green and sustainable initiatives, Tata Power developed Internet of Things (IoT) based home automation solutions as part of its smart energy management tools. We introduced Tata Power EZ Home products for customers across the country. This helps Customers to monitor, operate and schedule any kind of home appliances such as ACs, geysers, lights, fans from anywhere through EZ Home app. The solution has the analytical capability to track and optimise energy consumption at appliance/room/ home level and predict monthly consumption.

We have launched the Tata Power EZ Home products in Delhi, Mumbai, Pune, Bengaluru, Bhubaneswar and Surat so far through rooftop solar channel partners. We are also planning to sell our Home Automation products through E-commerce platforms such as Amazon, Flipkart, Tata CLiQ and modern retail stores such as Croma. We are planning to introduce more categories of products to have a wide product range and are targeting to sell 2.0 lakh EZ Home devices through various network throughout the country in FY22.



Saluting our stalwarts – future of conventional energy generation

Guided by our founder's vision that clean, cheap and abundant power is one of the basic ingredients for the economic progress of a City, State or Country, we commissioned our first generation capacity of clean energy i.e. Hydro Power Plant of 40 MW at Khopoli in Maharashtra in 1915. Ensuring stability and sovereignty of electricity is of paramount importance to a developing India. With a combination of hydroelectric and fossil fuel based thermal capacity, we are providing equitable power to people for over 104 years.

This approach has also enabled us to meet our customers' needs at affordable rates. However, as the energy demands continue to grow and we became cognizant of the harmful impacts of burning fossil fuels, we have taken a conscious business decision to not develop any new projects based on fossil fuels. The equity acquisition of Prayagraj Power Generation Company Limited (PPGCL) by our foreign JV, Resurgent, in the previous year remains to be our last foray in this sector.

Tata Power's aspirations in thermal sector

— No new coal based capacity to be developed

— No further acquisition of coal based stressed assets

— Phase out coal based generation upon end of asset life or expiry of existing PPAs

— Selective waste heat based thermal generation through Tata Group companies to be pursued

Our domestic hydro portfolio, currently at 447 MW, continues to operate strong due to our focused interventions in management and optimisation of the assets. We undertake risk assessment for existing projects as well as planned expansions or new undertakings to ensure long-term availability of electric supply. In addition, we also ensure that the impacts of hydro projects on the surrounding biodiversity is minimised and we aspire to add value to the lives of the neighbouring communities.

Focus areas for Hydros

— Maximise Plant Load Factor

— Centralised operation of plants

— Hydro Analytics – Inflow prediction and integrated maintenance with drone and video

— Support micro & mini hydro generation

— Large scale afforestation

— Western ghats biodiversity hotspot conservation

Illuminating lives – Transmission & Distribution

Efficiently transporting the power generated from stations to the end users is an important segment in the power value chain. Transmission and Distribution (T&D) is poised to attract 25% of the investment in power sector between FY21 and FY25, with suitable policies and regulations playing an important role to initiate the investment cycle. An opportunity can be realised, wherein the need for inter-regional corridor, dedicated green corridor (for RE), enhanced capacity and improved efficiencies will drive growth in the T&D space. Tata Power is further focusing on creating a 'Utility of the Future' by developing an integrated management system for advanced real time monitoring and control of operations, which would further enhance customer experience.

Our strategic focus on customer-centricity has enabled us to emerge as one of India's largest private power distribution company. We have a well-established T&D portfolio in Mumbai and New Delhi to serve our customers most effectively. We also operate distribution service in Ajmer (franchisee based) to cater to end user requirements. In line with the Company's expansion strategy in distribution, we have recently acquired four distribution companies in Odisha through competitive bidding and expanded our customer base to 11.8 million. This business vertical provides an opportunity to closely interact with our customers We envisage serving 40 million customers by FY26.

To help conserve the environment, we go beyond our business priorities to encourage our customers to reduce their energy consumption. This is achieved through Demand Side Management (DSM) initiatives, which helps reduce the customer's energy bills. Further details can be found on page 92.

Current T&D Portfolio

Transmission-Circuit KM	FY21	FY20
Mumbai Transmission	1,211	1,206
Powerlinks (Joint Venture)	2,325	2,325
Total	**3,536**	**3,531**

Distribution-Consumers (in million)	Business Model	FY21	FY20
Mumbai	Distribution License	0.73	0.72
Delhi	Distribution License	1.82	1.75
Ajmer	Distribution Franchisee	0.15	0.15
Central Odisha	Distribution License	2.71	Nil
Western Odisha	Distribution License	2.14	Nil
Southern Odisha	Distribution License	2.34	Nil
Northern Odisha *	Distribution License	1.91	Nil
Total		**11.80**	**2.62**

*Acquired 51% stake w.e.f. 1st April 2021

Aggregated Technical & Commercial Losses	FY21	FY20
Mumbai Distribution	0.7%	1.4%
Delhi Distribution	7.3%	7.9%
Ajmer Distribution	10.2%	10.0%

Focus areas for Transmission business

— Mergers and acquisitions

— Greenfield opportunities to leverage project execution strength

Focus areas for Distribution business

— Acquiring new distribution areas

— SMART meter installations

— Process outsourcing, advisory and consultancy

— Discom privatisation and PPP business models

Initiatives to reduce AT&C losses

To reduce the length and load on 66kV and 33kV feeders, we conducted policy advocacy and introduced more 220kV grids near load areas. This has not only led to the reduction in circuit length of incoming circuits, but also ensured reliable power supply to our customers. To reduce AT&C losses further, we continued our activities across the following three focus areas:

Process Management

— Special electricity court for theft and electricity dues

— Focus on meter reading & billing quality check

— High revenue customer data analysis

— Mass enforcement raids in high loss areas

— Camp connections in slum areas

— Optimizing revenue billing cycle

— Data analytics – defaulter / theft prediction

— Energy audit module developed to calculate loss

Commercial Management

— Outsourcing collection of outstanding amounts

— Customer counselling group leading recovery

— Disconnection drives along with zonal staff for recovery

— Recovery of arrears from 'disconnection with due' cases

Infrastructure

— Installation of electronic meters and automated meter reading for high revenue customers

— Revision of meter specifications

— Increasing payment avenues for augmenting digital payments, improving collection efficiency and liquidating backlogs

— SMART metering: Tie-ups with manufacturers and backward integration