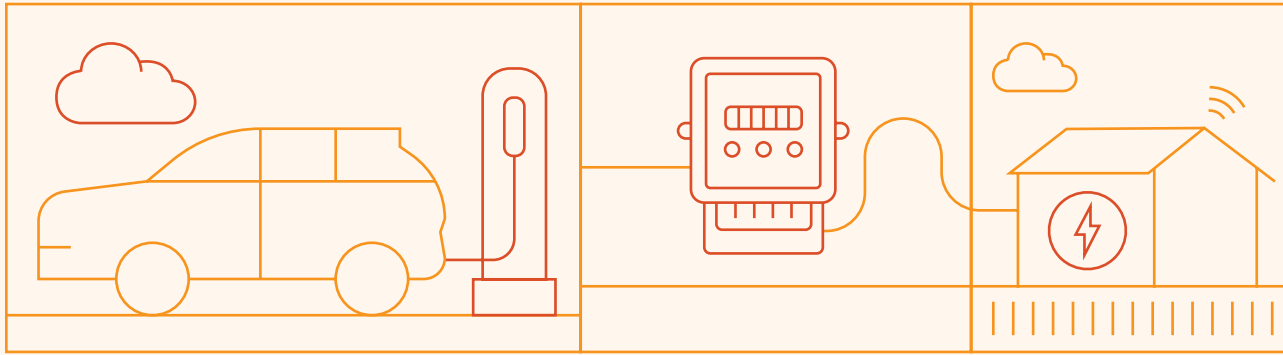


Innovation to reinvent energy for tomorrow



Innovation is the key catalyst of value creation at Tata Power. The intellectual capital that we have nurtured and grown for years resides at the core of our strategy and operational excellence. Our approach is to leverage on our intellectual capital and steadily enhance and enrich our business portfolio to drive sustainable growth and deliver smart energy solutions, empowering our customers to be future ready.

Strategic Business Objectives

- SBO1:** Profitable scale-up of Renewables, Distribution, Services and Energy Solutions busines
- SBO4:** Leverage digital platforms to drive new customer centric businesses
- SBO5:** Develop future energy products and solutions

Key performance indicators

- Research and Development (R&D) activities and business collaboration
- Energy efficiency and renewable energy technologies
- Distributed energy
- Transmission and distribution technologies
- Advance generation and technologies
- Innovation sustainability related services

Governance enablers

- Committee of Directors
- Apex Management Committee

Key risks addressed

- Technology risk
- Climate change and business continuity linked risks

Material topics

- Increase in renewables portfolio
- Innovation in process, services and solutions
- Digitisation
- Cybersecurity

Sustainable Development Goals



Interaction of intellectual capital with other capitals

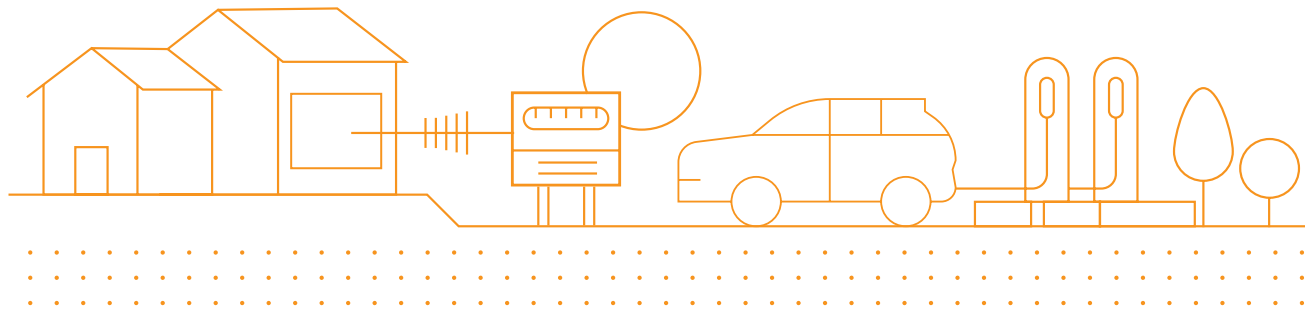
	HUMAN	MANUFACTURED	FINANCIAL	SOCIAL & RELATIONSHIP	NATURAL
Capital tradeoffs	Employee are key partners in Innovation process. Enhancing capabilities of our workforce by leveraging through various digital learning platforms	Developing innovative technologies enhances our future ready product portfolio	Innovative future ready solutions in developing new customer base in energy efficient businesses such as home automation, ESCO and thereby contributing to bottom-line	Energy efficient solutions and digitalisation augments customer satisfaction and improves the quality of life for our communities	Innovative and clean technology improves operational efficiency, reduces GHG emissions and reduces waste
Impact across the <IR> capitals	1,668 new ideas generated in our innovation workshop with our employees	2 patents granted in FY21 to improve the metering system and performance of Solar PV installations, respectively	₹3,500 crore expected revenue from ESCO business by FY 2026	2 collaboration projects rolled out in FY21	10,000 m ³ of DM water saved in CGPL due to innovative water conservation measures



Entrenching innovation at the heart of our operations

With a 107 year old history, Tata Power's intellectual capital represents the Company's knowledge and capability, inclusive of patents, copyrights, software, rights and licenses intrinsic to our business activities. We leverage digital solutions and innovative technologies to enhance and enrich our market leading portfolio, enabling smart and value generated outcomes for all our stakeholders. We continue to strengthen our investments towards SMART grid technologies such as SMART meters, sensors

and IOT based technological solutions to ensure an intelligent and efficient network (**The Power of SMART**). Additionally, we provide impetus to the development and upgradation of energy storage and battery systems to meet the high energy demand of EV charging solutions as well as renewable business. This approach enables us to inculcate fresh perspective across Tata Power's strategy to augment value creation and empower our customers to be future ready.



Leveraging our intellectual capital for value creation

To accelerate our value creation journey and push the edge of our innovation envelope, we follow a three step process to capitalise on market differentiating opportunities and deliver value added services for our customers.



Ideate and strategise

- We build innovative capabilities through employee training programmes and across competitions. Forums such as Power Innovista, Shikhar, ACE, Idea Crucible and Hackathon.
- Tata Power also participates at group level innovation activities such as Tata Innovista and e-Hackathon.
- We assess market needs to establish short, medium and long-term technology roadmaps with regard to emerging customer requirements.
- We leverage partnerships with academic institutions such as IIT Bombay, industry partners such as Tata Trusts and the Government of India to encourage and implement sustainable, high quality and affordable solutions.

KEY HIGHLIGHTS

- Established the Clean Energy International Incubation Centre (CEIIC) in 2018. This centre provides state of the art laboratory facilities with qualified experts, specialists and sector leaders for trials and testing of products and services.
- Identified improvement areas to implement technologies to ensure a resilient distribution grid and automated support for our customers. Along with this it also encouraged value added services such as demand response, home automation, solar rooftop and energy efficiency initiatives.
- Identified opportunities to transition towards Energy as a Service (EaaS) Business Model.
- 8 major collaboration projects are in the implementation phase, of which 2 have been rolled out in FY21.



Guide innovative thinking

- The Innovation Council set up at the divisional level propels a stimulating work culture. It ensures seamless implementation of ground breaking ideas and prioritised projects.
- We continue to enhance our innovation hub along with the Tata Group Innovation Management System (GIMS), which represents an integrated platform to post and track theme based as well as 'Blue Sky' ideas and innovative solutions.
- We evaluate and shortlist ideas to current business priorities and emerging customer needs.

KEY HIGHLIGHTS

- Tata Power's divisional innovation council includes a diverse set of members, which is built on a strong foundation of inclusivity.
- Tata Power has filed 6 patents in FY21
- Granted 2 patents for 'Tamperproof Metering System' and 'Method to recover and prevent potential induced power degradation in solar photovoltaic devices' in FY21.
- Enabled development of in-house projects such as Remote Breaker Rack In/Out BoT platform, among others.



Drive efficacious implementation

- Our innovation projects are reviewed at divisional and corporate levels.
- We conduct an annual business planning exercise to track progress and improvements in projects across divisions/functions.
- Tata Power's Board of Directors approves the final investment decisions.
- The Company implements a stage gate process to launch a potential innovative product or service.
- We earmark a separate budget to undertake work on innovation projects that meet a certain minimum criterion defined in the stage gate process

KEY HIGHLIGHTS

- In FY21, our R&D expenditure stood at ₹7.44 crore.
- In FY21, Tata Power completed projects such as Uniflow Generator, Painting BoT and Low Voltage High Intensity Lighting. Projects such as Solar Panel Cleaning BoT, Air Gap inspection, Transmission Line Inspection, Solar Panel Hot & Cold Detection, Switchyard Inspection, PID, Clean Coal Centre with IITB and AI integration for Discoms are still in progress.
- Our innovative technology to address grease leakage as well as pitch bearing failure across our wind operations won the **Gold Award in the 39th National CII Kaizen Competition in FY21**.

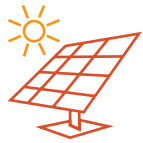
Investing in best in class technology to drive sustainable growth

At Tata Power, we believe in accelerating innovation to drive maximum value for our businesses and stakeholders. We ensure continuous improvement to enhance overall operational efficiency and propel innovative products or services across the organisation. Taking into cognisance the macroeconomic environment, regulatory changes, technology disruption and future global challenges, we have developed a technology roadmap with emphasis on evolving business opportunities. These include hydrogen as an energy source, carbon capture and valorisation, Energy as a Service (EaaS), Battery Storage, SMART metering solutions and growth in innovative solutions in renewables like hybrid, round the clock model, floating solar among others.



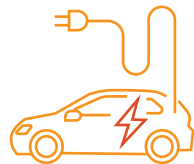
ENERGY AS A SERVICE (EAAS)

- Introduced multitude Demand Side Management initiatives to augment CO₂ reduction
- Lighting scheme for LED and Anti-Bac LED bulbs
- Electric Leakage Circuit Breaker (ELCB) at discounted rates
- Dedicated EaaS programme for ESCO opportunities
- Discount base AC scheme for all consumers
- Customer Engagement Interface at TPDDL Connect for frequently requested services



RENEWABLE ENERGY SOLUTIONS

- Implemented 17 grid-injected solar plants with a total capacity of 1.7 MWp. This includes the largest Utility Owned 1MWp grid-connected roof-top solar plant commissioned in 2010.



DISTRIBUTED ENERGY SOLUTIONS

- EV products and services
- DC fast charge
- Battery swap stations
- Demand response Hot Spot
- Energy transition with renewables based tariff for open access consumers



TRANSMISSION AND DISTRIBUTION TECHNOLOGIES

- 10 MWh system Battery Energy Storage System (BESS) installed at Rohini Grid Station. This system addresses peak load management, enhances solar grid capacity and supports the Delhi Metro during exigencies, among others.
- Implementation of Advanced Metering Infrastructure (AMI) and roll-out 2,700 smart meter in Mumbai distribution
- Launch of SMART Meter Reading and Dispatch app (SMRD)



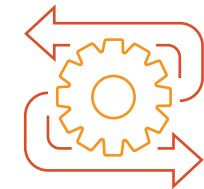
INNOVATIVE SUSTAINABILITY RELATED SERVICES

- Deployed Radio Frequency (RF) mesh canopy in areas of operation and rolled out smart meters for customers.
- Initiated smart metering on NBLoT communication technology for non-smart clusters with a target of 20,000 NBLoT smart metering in FY21.
- **Tata Power and Social Alpha have jointly invested in Industrial IOT startup 'URJA' - an innovative solution consisting of Smart Sensors and Analytics platform.** URJA has been awarded a patent on the sensor technology and analytics platform that generates 'real-time actionable insights' for factory floor monitoring & automation. With this offering, Tata Power aims to be a fully integrated Energy as a Service (EaaS) solution provider with niche Smart Energy Management offerings.



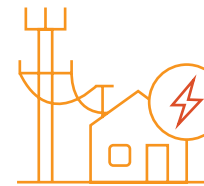
TECHNOLOGY ABSORPTION, ADAPTATION AND INNOVATION

- Launched a Health Advisory System to provide healthcare recommendations with regards to the COVID-19 pandemic and work-from-home challenges.
- Introduced automated solutions such as load demand prediction, dues verification and a Unified Functional Testing tool (UFT) for SAP application, meter reading entry, billing, invoice purchase requisition or order creation, among others. We also implemented a selenium tool for automation testing of web applications.
- Encouraged implementation of analytics and e-security initiatives such as cloud based analytics delivery for distribution utilities and ThreatCop Phishing Simulation Solution to reduce security risks to the organization.
- Implemented Network topology correction to leverage the use of smart meter data analytics and provide prescriptive anomalies in DT to CA mapping, derived from smart meter events



KNOWLEDGE-BASED PLATFORMS

- Robust presence of group level knowledge based platforms such as Tata Ideas/ Idealogy, Tata Edge and Tata Innovista
- **Enhanced our in-house platforms to capture explicit and tacit knowledge such as:**
 - SHINERGY (platform for registering of improvement projects)
 - Gyan Sangam (repository for SEEKH Sessions organised throughout the organisation)
 - IMS process approval and document availability
 - IMS and 6S Audit System
 - Business Excellence Maturity Index



ADVANCED GENERATION AND TECHNOLOGIES

- Urban Micro Grids to enhance power supply to rural areas without the need of laying long rural feeders.
- Ground fault neutraliser system to enhance reliability and help with earth fault without the need of any outage.
- Low Voltage Automation through Internet of Things (IoT) to support in load balancing and stable voltages.
- Community Storage at Distribution Transformer (DT) level for customized bus arrangement and battery storages for reducing asset stress during peak hours.
- Tariff Reforms and subsidy design to enable better policy advocacy.
- Network optimization and RE impact to help reduce technical losses and forecast RE impacts.
- Deployed projects such as EV charging, Demand Response (DR) & Energy Transition (ET) and I-Electrix.



COLLABORATIVE PROJECTS FOR INNOVATION

- Tata Power set up the Central Control Room for Renewable Assets (CCRA) in 2019 to ensure regular monitoring of assets, predictive maintenance analytics and enhance our overall initiatives across the renewable power generation business.
- Implemented an in-built peak power control at our solar operating plant to compensate for energy loss during peak hours.
- Introduced new products such as solar trees, solar artefacts, solar car ports and elevated solar solutions across our EPC business.
- SAT-Bifacial system to harness energy from bifacial solar module maximizing the reflection from the rear side.

Further details regarding our digital initiatives and technologies can be accessed in Management Discussion and Analysis (MD&A) Page 174 and in Board Report Annexure III (Page 146-149) respectively.