

## Sector

# Power Business Review

With over six decades of engineering excellence, the Power Business Unit (PBU) of Tata Consulting Engineers continues to be a key contributor to India's energy infrastructure and a trusted partner globally. The unit has designed over 300 gigawatts of power generation capacity spanning thermal, nuclear, hydro, and renewable sources. It has engineered more than 85 per cent of the country's civilian nuclear infrastructure, over 12,000 circuit kilometres of transmission and distribution lines, and more than 250 substations. PBU operates across the entire electricity value chain, offering end-to-end services that include feasibility studies, basic and detailed engineering, procurement support, inspection, construction supervision, and commissioning assistance. The unit also provides asset sustenance services to optimise plant operations and improve performance over time.

## 2024-25 Performance Highlights

21%

share in total  
revenue

26%

share in total  
acquisition

1096

workforce on  
31st March 2025

1,259

crore worth value  
engineering for customer

## Industry Trends and Market Outlook

The global power sector is undergoing a period of profound change as nations balance rising energy demand with decarbonisation goals. India is at the heart of this shift. As one of the fastest-growing economies, the country's electricity consumption is projected to triple by 2040, driving significant investment in generation, transmission, and storage.

The thermal power segment continues to play a crucial role in meeting India's baseload requirements. The Government of India has announced major investments in supercritical and ultra-supercritical technologies, targeting 80 gigawatts of new coal-fired capacity by 2032. These plants are designed to be more efficient and environmentally responsible. At the same time, existing assets are being modernised for flexible operations, with co-firing options for biomass, green hydrogen, and ammonia, supported by growing initiatives in carbon capture and utilisation.

Nuclear power is regaining strategic momentum. India aims to develop fleet-mode reactors to deliver 100 gigawatts of nuclear capacity by 2047. Globally, interest in Small Modular Reactors (SMRs) is rising, and India has launched the Bharat Small Reactor initiative to enable private sector participation. Nuclear energy is increasingly recognised as a clean and dependable contributor to the energy mix.

Hydropower is also experiencing a revival. Large hydro projects and pumped storage plants are being prioritised for their ability to provide balancing capacity for renewable energy. Many older hydropower stations are undergoing refurbishment to improve performance and extend their operational life. Pumped storage projects, including those using abandoned mine sites, are being explored as natural energy storage solutions.

Renewables remain the fastest-growing segment. India is committed to its ambitious target of 500 gigawatts of renewable capacity, with over USD 190 billion expected to be invested. Solar PV, wind, and hybrid projects are expanding rapidly, supported by the falling cost of solar modules and government incentives for domestic manufacturing. Floating solar is an emerging opportunity, particularly on reservoirs. Globally, renewable energy investment continues to grow, with the Middle East and North Africa making significant strides in green hydrogen and ammonia for export.

In transmission and distribution (T&D), High Voltage Direct Current (HVDC) systems are increasingly being deployed for long-distance transmission to reduce energy losses. Battery Energy Storage Systems (BESS) have become critical for integrating intermittent renewable sources into the grid. Digital technologies such as asset performance management tools are also helping utilities move from reactive to predictive maintenance models.

In this dynamic environment, Tata Consulting Engineers' Power Business Unit (PBU) continues to deliver trusted, end-to-end engineering solutions across the entire power value chain.

### Key Areas of Expertise

The Power Business Unit brings over six decades of expertise, offering services across all power generation technologies and the entire asset lifecycle.

**Thermal Power:** PBU provides solutions for large coal plants, captive power and cogeneration units, and waste-to-energy facilities. The team also supports repurposing older assets for flexible operations, integrating green fuels such as hydrogen and ammonia, and upgrading systems for emission compliance.

**Nuclear Power:** TCE has engineered more than 85 per cent of India's nuclear power plants and related infrastructure. The scope of work spans detailed design, safety systems, containment engineering, cooling water systems, and specialist civil and structural services for nuclear installations.

**Hydropower:** Expertise includes hydrological and hydraulic studies, seismic and structural design, 3D finite element modelling (FEM) for dams, electromechanical and hydro-mechanical engineering, underground civil works, water resources planning, dam-break analysis, and execution in EPCM mode.

**Renewable Energy:** PBU offers end-to-end services for solar, wind, hybrid and floating solar PV (FSPV) projects, from conceptualisation to commissioning. The unit also provides design and integration support for energy storage and hybrid systems.

**Transmission & Distribution (T&D):** Capabilities include AIS, GIS and HVDC substation design, transmission network planning, monopole and tower engineering, grid compliance studies for renewables, power system studies, technical due diligence, and engineering for grid-connected battery storage.

### Business Performance and Capabilities

FY25 was a year of robust growth and impact for the Power Business Unit, with major achievements across all focus areas.

In thermal power, the unit secured eleven new coal-based projects for detailed engineering and provided owner's engineering services for several large-scale supercritical plants. Basic engineering services were delivered for a gas-fired project in Australia, marking TCE's first such assignment in that region. PBU also provided consulting for power plants in the Philippines and pre-bid support to help clients win major international tenders.

In hydropower, PBU completed advanced 3D FEM analysis for a concrete dam over 200 metres tall and commissioned units for India's first off-river pumped storage project. The team carried out dynamic seismic analysis for a dam located in a high-risk seismic zone, validated by a national academic institution. Engineering services are underway for some of India's largest planned pumped storage facilities, and a white paper was submitted to the government on repurposing abandoned coal mines for pumped storage development.

The renewable energy team expanded its global footprint by securing projects in Australia, Europe, and the Middle East. The unit is developing offshore floating solar projects for a Middle Eastern utility and has established a new dedicated engineering centre (DEC) for a global energy major. Expertise in battery storage and hybrid plant integration has strengthened TCE's position in next-generation renewable solutions.

In T&D, PBU built in-house capabilities for grid compliance studies aligned with national transmission guidelines, delivered power system studies for industrial and utility clients, and provided pre-bid engineering support for major substation projects. A large-scale electricity access project was completed for a national utility in East Africa, involving surveys, detailed project reports, and the development of medium- and low-voltage networks.

### Key Initiatives

PBU undertook a series of initiatives to strengthen technical expertise and enhance operational efficiency.

- **Thermal:** Entered the Australian market with a major gas-fired project, establishing a new presence and deepening global reach.
- **Hydro:** Adopted advanced digital engineering tools, new data collection techniques, and 3D modelling to improve precision and efficiency in design.
- **Renewables:** Expanded floating solar and hybrid capabilities while strengthening energy storage engineering expertise.
- **T&D:** Advanced digital engineering by standardising design documents and methodologies and enhanced skills in specialised software platforms.

Knowledge management and workforce training remained central to these initiatives, ensuring the team is prepared for future opportunities.

Strategic collaborations were pursued to share expertise and strengthen project execution capabilities.

### Future Priorities

Looking ahead, the Power Business Unit is committed to deepening its leadership in clean energy technologies while continuing to support traditional power segments.

- **Thermal Power:** Focus will remain on making plants flexible, co-firing with alternative fuels, and ensuring carbon capture readiness for existing and future facilities.
- **Nuclear:** Expand work on fleet-mode reactors and small modular reactors, enabling safe and scalable clean power solutions.
- **Hydro:** Drive development of pumped storage projects, particularly mine-based schemes, while providing advanced engineering and advisory services.
- **Renewables:** Scale hybrid projects, floating solar, and battery storage, supported by digital twin and smart grid solutions.
- **T&D:** Build further expertise in HVDC, BESS, and grid compliance, expanding support for industrial and utility-scale infrastructure worldwide.

By aligning these priorities with global energy transition trends, TCE will continue to deliver solutions that are sustainable, technology-driven, and transformative.

“*The power sector is at the heart of the world’s energy transition, and at Tata Consulting Engineers, we see this as an opportunity to lead with purpose. Our focus on engineering excellence and sustainable solutions, from nuclear and hydro to renewables and transmission, is helping shape a future-ready power ecosystem. By combining deep technical expertise with innovative thinking, we are enabling growth for our clients, our nation, and the global community.*”

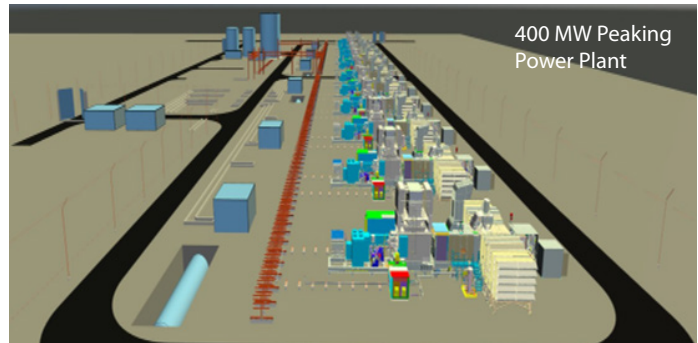
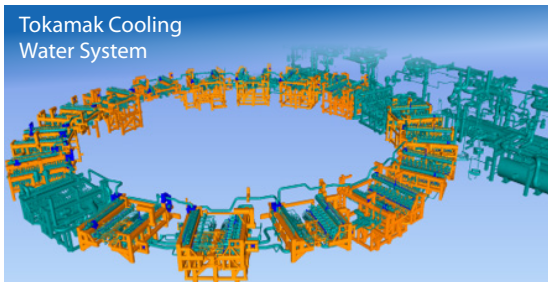
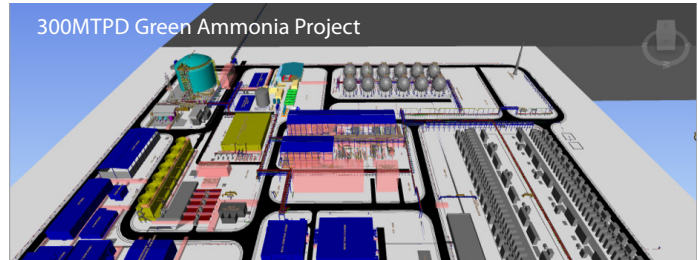


**Ramadurai Raghavan**

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## Projects 2024-25



450 MW Gas-fired Power Plant