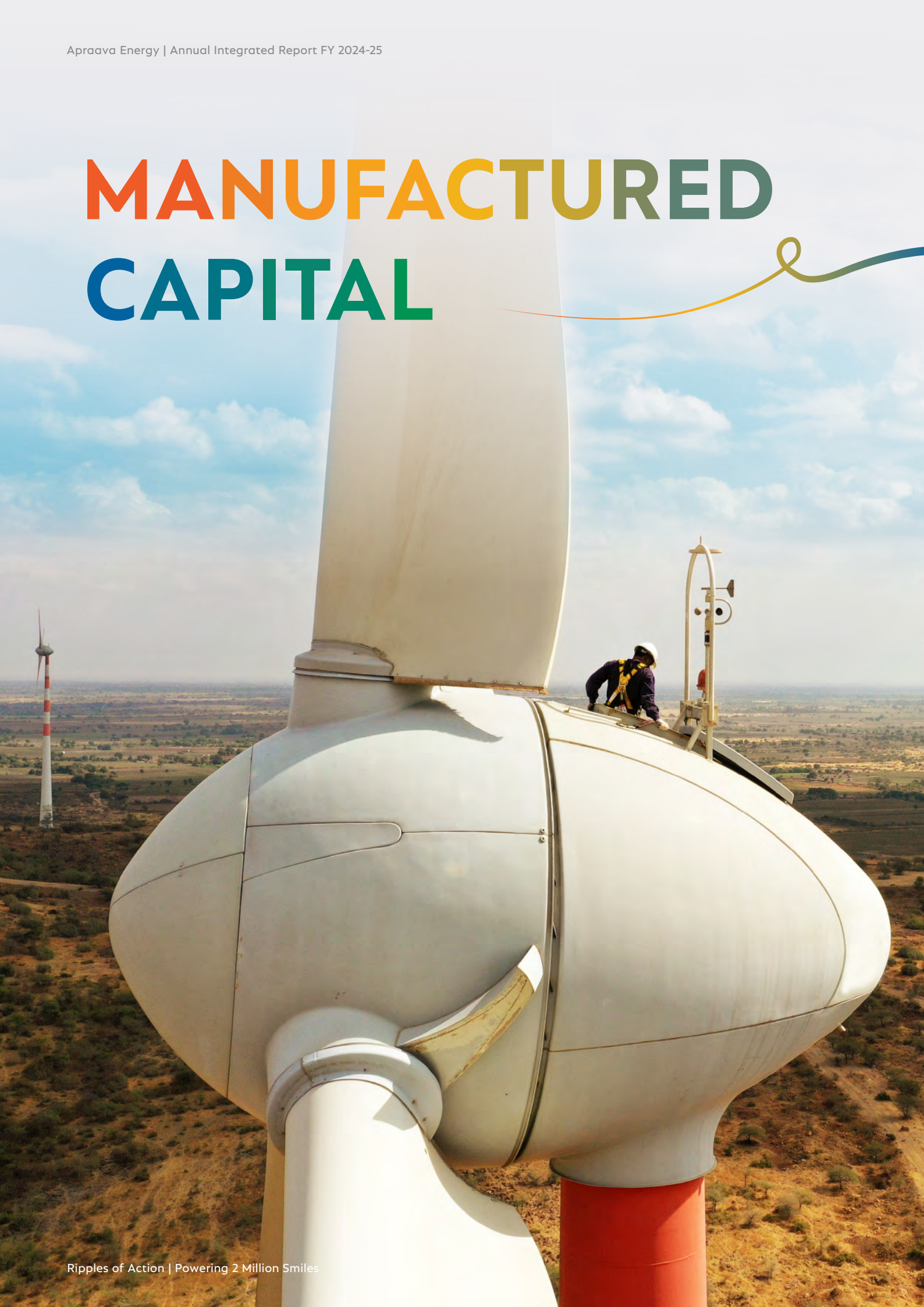


MANUFACTURED CAPITAL

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MANUFACTURED CAPITAL

Reading time: 24 minutes

MATERIAL TOPICS

- o Operational Excellence
- o Performance Monitoring and Management
- o Adoption of Advanced Technology



Energy powers progress, and at Apraava Energy, we recognise our responsibility to drive growth and improve lives. This awareness has guided us in setting an ambitious vision for the future—one that balances sustainability with the growing demand for power. While our aspirations have expanded significantly, it is our chosen path to achieving them that truly sets us apart. Over the past years, our efforts have impacted millions of lives by ensuring reliable access to our growing clean energy portfolio and developing regions where we operate. By leveraging advanced technologies, empowering communities, and fostering collaboration, we are shaping an energy future that is resilient, inclusive, and progressive.

Strengthening Our Asset Portfolio

Energy is always in motion, and so are we. Our journey continues with investments in Renewable Energy generation and allied energy business infrastructures such as power transmission and Advanced Metering Infrastructure (AMI). The latter has enabled us to deliver smarter, more efficient energy solutions. These innovations, alongside our growing transmission capabilities and expanded renewable energy efforts, reflect a portfolio designed to meet India’s energy needs that prioritises sustainability and community well-being.



2008–2012

Won the bid to establish the 1,320 MW supercritical Jhajar Power Plant (JPL) in Haryana in 2008. It was commissioned in two parts: unit #1 (660 MW) on March 29, 2012, and unit #2 (660 MW) on July 19, 2012



2002

Entered India’s power sector by acquiring the 655 MW Paguthan Combined-Cycle Power Plant in Gujarat



2010 ONWARDS

Expanded into wind and solar generation with key projects across different states



2009

Marked our shift toward clean energy with initial investments in wind generation projects



2023

Entered the B2C space with an Advanced Metering Infrastructure (AMI) business



2025

Built our first Interstate Transmissions (ISTS) project on the Sidhpur Windfarm, and it became fully operational in the last quarter of FY 2024-25



2019 ONWARDS

Expanded into the power transmission sector through strategic acquisitions of STPL (November 20, 2019) and KMTL (December 20, 2021) projects, and successful bidding for transmission assets in Rajasthan and Madhya Pradesh

Our **asset portfolio** is expanding to optimise renewable, transmission, and thermal assets that enhance efficiency and long-term reliability.

Renewable Energy

Increasing clean energy capacity through strategic solar and wind expansions, optimising performance, and digital integration

Advanced Metering Infrastructure (AMI)

Expanding smart metering coverage, improving data security, and enabling real-time energy insights for consumers

Jhajjar Power Limited

Driving operational efficiency with biomass co-firing, energy-saving initiatives, and enhanced process automation at our plant in Jhajjar, Haryana

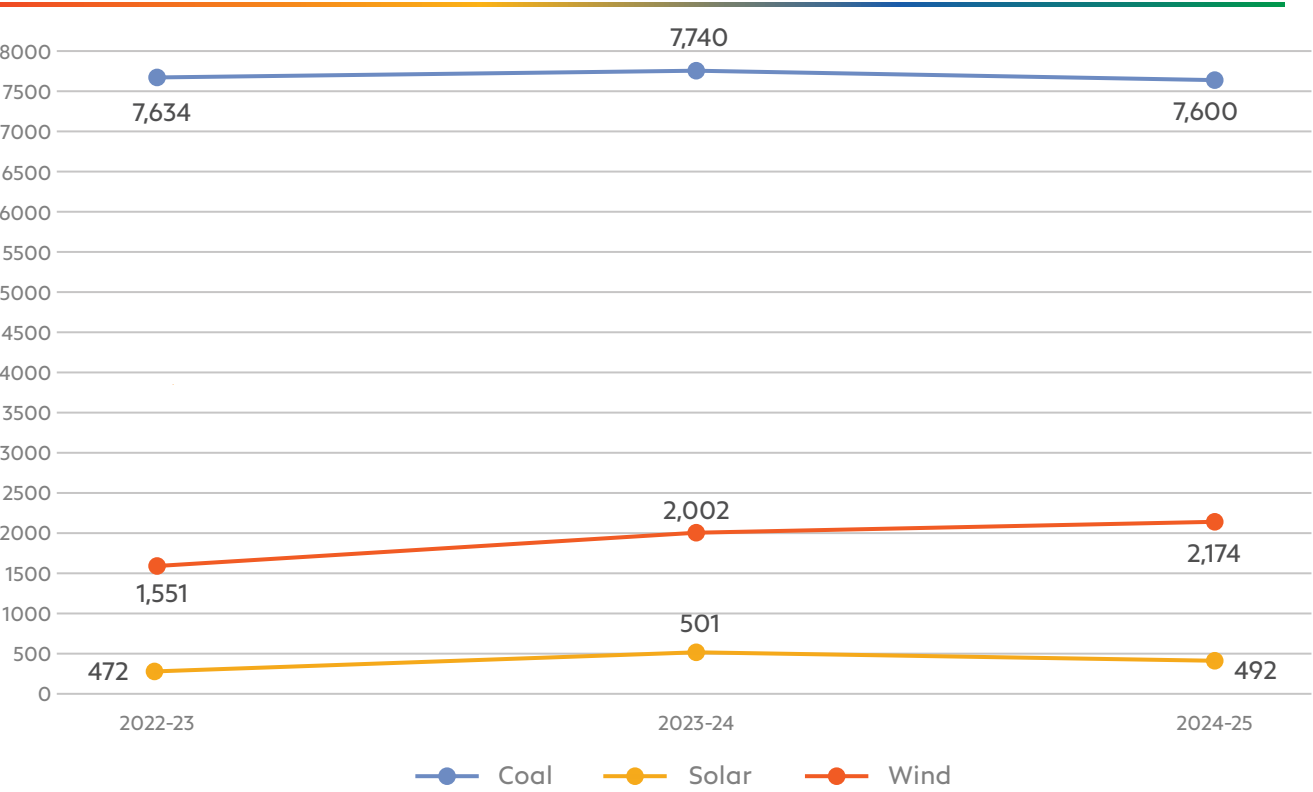
Transmission

Strengthening grid reliability with aerial monitoring, vegetation management, and advanced predictive maintenance systems

Apraava Energy’s Power Generation Assets (as of March 31, 2025)

Technology Type	State	Capacity
Coal-fired Supercritical Power Station	Jhajjar, Haryana	1,320 MW
Solar Projects	Telangana, Maharashtra	250 MW
Wind Farms	Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Karnataka, Tamil Nadu	1,173.25 MW
400 kV Transmission Lines	Madhya Pradesh, Assam, Nagaland, Manipur	494 KM
AMI Business (consumers)	Assam, Gujarat, Himachal Pradesh and West Bengal	1,161,312

Source-Wise Energy Sent Out (GWh)



Apraava Energy’s Total Energy Consumption within the Organisation (GRI 302-1, 302-3, 302-4)

Source	Unit	FY 2022-23	FY 2023-24	FY 2024-25
Coal	TJ	75,441.73	74,410.14	71,332
Renewable Energy (Biomass)	TJ	0	1,149.40	3,046
HSD	TJ	54.27	32.99	39.37
Diesel	TJ	12.71	13.10	11.46
Petrol	TJ	0.13	0.14	0.34
Purchased Electricity (GRID)	TJ	49.76	59.03	3.49
LPG*	TJ	1.72	1.98	
Total Energy Consumption	TJ	75,560.32	75,664.80	74,433
Energy Intensity	TJ/MWh	0.0078	0.0074	0.0098

*Since FY 2023-24, LPG consumption is not accounted for in Scope 1 and has been shifted to Scope 3 accounting. Accordingly, LPG is not part of the total energy consumption within the organisation for FY 2024-25.

Enabling Sustainability with Renewable Energy

Apraava Energy’s renewable portfolio continued to expand in FY 2024-25, supporting India’s clean energy goals. Our current operational capacity includes 1,173.25 MW of wind and 250 MW of solar energy. Projects secured last year, i.e., a 300 MW wind project in Karnataka and two solar projects (250 MW and 300 MW) in Rajasthan, are under construction. This expansion of our renewable energy portfolio highlights Apraava Energy’s unwavering commitment to building a sustainable future through clean energy solutions.

Alongside capacity growth, we have strengthened our operations through real-time monitoring and a Central Monitoring Facility (CMF) for all our RE assets, enabling early performance insights and smoother coordination with Original Equipment Manufacturers (OEMs) and Independent Service Providers (ISPs). The CMF has significantly enhanced the team’s ability to monitor and analyse operational performance. It enables year-on-year comparison across various metrics, including Wind Turbine Generator (WTG) breakdowns, internal grid issues, and government utility-related outages. The framework facilitates the generation of timely reports, including daily updates, weekly summaries, and asset management reports. A dedicated Project Management Dashboard provides a comprehensive view of plan versus actual performance across all sites.

Additionally, the CMF consolidates Operations & Maintenance (O&M) contractual data in a single location and supports the annual calculation of Resource Availability Guarantee (RAG) performance ratings. Ongoing developments under the CMF include centralised updates on Forecasting & Scheduling (F&S) metrics for all sites and tracking major breakdowns.

Operational Dashboard

The Operational Dashboard serves as a centralised, data-driven platform supporting real-time decision-making across Apraava Energy’s sites. With historical data available since 2017, the dashboard enables year-on-year comparisons across key performance metrics, including WTG breakdowns, internal grid issues, and government utility interruptions. It consolidates critical reports (daily, weekly, and asset management updates) into one accessible interface. The dashboard also features a Plan vs Actual (PM) module for all sites, along with comprehensive tracking of O&M contractual data. At the close of each financial year, it supports automated RAG (Resource Available Guarantee) preparation, ensuring performance visibility across teams. Ongoing enhancements include integration of F&S (Forecasting and Scheduling) updates and major breakdown tracking, further strengthening operational oversight and responsiveness.



Operational Efficiency Across RE Assets (%)



Innovative Solutions Harnessing the Power of Wind

As one of India’s leading renewable energy producers, we continue to harness wind energy with an operational capacity of 1,173.25 MW.

The 300 MW Wind Farm secured in the SECI Wind (Tranche XIV) Auction, Karnataka, is under construction.

Apraava Energy has consistently pushed boundaries to enhance the performance and reliability of its wind energy assets. By leveraging cutting-edge technologies and meticulous maintenance practices, we ensure optimal efficiency across our wind farms.

Enhancing Blade Performance and Lifespan

Restoring Output with Blade Cleaning

At the Theni Windfarm, blade cleaning is conducted through rope access to remove accumulated oil and dirt that reduces aerodynamic performance. Regular cleaning has yielded twofold benefits:

- **Higher energy yield** by lowering drag and restoring blade smoothness.
- **Proactive damage detection** by identifying early signs of cracks or wear, allowing timely intervention and avoiding downtime.

Blade Repairs and Replacements at Theni

At Theni, several successful blade repair and replacement activities have been carried out, requiring extreme care, coordination, and technical precision. Blade root repairs typically involve threaded bush testing and removal, followed by re-bonding new bush components surrounded with roving and resin. The repair is completed with an 18-layer lamination using glass fiber, epoxy resin, hardener, and accelerator, along with putty and paint application to restore blade integrity. These repairs not only recover performance but also extend blade life and ensure safe, long-term operation.

Non-Invasive Blade Inspections

Using high-powered spotting telescopes, our teams conduct ground-based visual inspections to detect cracks, erosion, or surface wear without needing physical access. This non-invasive approach reduces inspection costs and downtime while enabling timely maintenance planning.



Leveraging CMS for Condition Predictive Maintenance

Our Condition Monitoring System (CMS) continuously monitors critical turbine components like gearboxes, generators, and blades. By analysing sensor data on vibrations, temperature, and operational metrics, CMS helps with:

- Early detection of anomalies to prevent major failures
- Lower maintenance costs through targeted interventions
- Reduced downtime and reliable energy production

Generator Replacement for Longevity

Aging generators pose challenges in maintaining peak performance. At our wind farms, defective generators in turbines are replaced using heavy-lifting equipment for continued efficiency and reliability in energy conversion.

Overcoming Nature’s Challenges at Sidhpur Wind Farm

Set just a few kilometres from the Arabian Sea, our Sidhpur Wind Farm in Saurashtra, Gujarat, faced unique environmental challenges. Salty air and dust combine to coat porcelain insulators at pooling substations and form a conductive layer that can cause flashovers, outages, and major revenue losses, especially during peak wind seasons.

Upon identifying abnormal noise and current leakage from outdoor insulators, our engineering team promptly applied Room Temperature Vulcanising (RTV) / High Voltage Insulator Coating (HVIC) silicone. This timely intervention effectively mitigated the leakage, restored system performance, and ensured uninterrupted operations.

Meanwhile, the region saw its heaviest rains in recent decades. To prevent flooding of transformers, which were installed at a ground clearance of just 750 mm, our team raised eight platforms by 4-5 feet. This quick action protected key equipment during two major rainfall events, maintaining steady power generation.



Advancing Solar Infrastructure with Innovation and Responsibility

At Apraava Energy, our solar journey reflects a deep-rooted commitment to sustainable infrastructure, operational innovation, and inclusive community development. Over the years, we have steadily transitioned to forward-looking, resource-efficient practices—building not just solar plants, but long-term resilience.

Apraava Energy is making due progress on the construction of two solar projects awarded in FY 2023-24. These include:

-  250 MW Solar capacity secured in NHPC Solar Auction under construction in Bhanipura, Rajasthan
-  300 MW Solar capacity secured in NTPC Solar Auction under construction in Bhanipura, Rajasthan

Infrastructure Development: Enhancing Connectivity and Inclusion

Reliable infrastructure plays a vital role in ensuring uninterrupted site operations and improving the quality of life for neighboring communities. Key developments included:

-  At Veltor, RCC culverts and road repairs enhanced year-round accessibility for farmers and improved logistics.
-  At Vikarabad Solarfarms, the construction of a 2.5 km murram road is underway, easing monsoon access to paddy fields and improving community transport.
-  At Sakri, we supported community initiatives through sponsorships:
 -  For the Dhule Marathon (January 2025), organised by the Maharashtra Police.
 -  For the district-level sports and cultural competitions hosted by the Collector's Office, Dhule.

Technical Exposure: Building Awareness and Career Pathways

Recognising the importance of practical exposure, we engaged students and residents through site visits, educational sessions, and environmental activities. These efforts are helping bridge the gap between theoretical knowledge and hands-on experience in the renewable energy sector.

-  At Nirmal Solarfarms, knowledge-sharing sessions were held at multiple institutions, including KGBV School in Dilawarpur, government schools in Mallapur and Sangvi, and a local ITI college.
-  At Vikarabad Solarfarms, an educational session was facilitated at KGBV School in Inelli Village, Telangana.
-  Across our solar sites, students and young professionals participated in experiential learning, tree plantation drives, and interactive field sessions.

Modernising Operations: Smarter, Cleaner, and More Efficient

In our commitment to optimising operations and conserving natural resources, we have transitioned from traditional water-intensive cleaning of PV modules. Through the adoption of **robotic dry-cleaning systems** under an OPEX model, we significantly reduced water usage while enhancing performance.

Implemented across major solar assets—**Gale, Tornado, Vikarabad Solarfarms, and Nirmal Solarfarms** (each with a capacity of 50 MW)—this system has resulted in **annual water savings of approximately 14,000 kilolitres**, underscoring our dual focus on operational excellence and environmental stewardship. This shift has resulted in significant annual water savings, contributing to our operational and environmental goals in FY 2024-25:

-  **Veltor (100 MW) and Nirmal Solarfarms (50 MW)**, in alignment with our energy optimisation strategy, two 5 HP pumps were solarised in January
-  **Vikarabad Solarfarms (30 MW)**, where implementation is in progress

This shift has resulted in significant annual water savings, contributing to our operational and environmental goals in FY 2024-25.

Sustainable Asset Lifecycle: Circularity in Practice

Responsible asset management is central to our infrastructure strategy. We are currently in the process of identifying and onboarding vendors for the disposal of faulty or end-of-life solar PV modules at DSPL. This proactive step ensures environmental compliance while laying the groundwork for future circular economy practices within our solar portfolio.

Entering the AMI Foray

Apraava Energy entered the transformative space of AMI in 2023 and secured significant projects across Assam, Gujarat, Himachal Pradesh, Madhya Pradesh, Rajasthan, and West Bengal. The deployment of these cutting-edge smart electricity meters redefined energy management for customers and distribution companies alike. These systems enhance efficiency, promote transparency, and empower stakeholders with real-time insights into energy usage. In a short span, we have emerged as a key player in the energy infrastructure sector, securing total awarded quantity of 6.86 million smart meters across six states, as on March 31, 2025.

Under the Government of India’s Revamped Distribution Sector Scheme (RDSS), we achieved a milestone by installing the country’s first smart meter in Assam. Further bolstering this achievement, our HPSEBL South (Shimla) AMI project achieved the fastest Operational Go-Live under RDSS.

AMI Deployment Dashboard (as of March 31, 2025)

State	Utility	Awarded Meter Quantity (Nos.)	Cumulative Meter Installed Quantity (Nos.)
Assam	APDCL	693,077	610,090
Gujarat	PGVCL	2,366,608	121,584
West Bengal	WBSEDCL	774,101	191,761
Himachal Pradesh	HPSEBL	934,409	237,050
Rajasthan	JVVNL	1,138,682	0
Madhya Pradesh	MPMKVVCL	957,758	0
Total		6,864,635	1,160,485

Balancing Efficiency and Sustainability at JPL

While many developed nations are phasing out coal, it remains a reliable and affordable energy source for India's growing economy. At Apraava Energy, we remain aware of coal’s environmental impact and ensure our sole thermal power plant adheres to stringent environmental norms.

With a generation capacity of 1,320 MW, JPL is among the most efficient and clean thermal assets in North India. It is the first thermal plant in the region to be fully equipped with a Flue Gas Desulphurisation (FGD) unit, a hybrid Electrostatic Precipitator and Fabric Filter, low NOx burners, and a zero water discharge system. JPL also achieves 100% ash and gypsum utilisation, advancing our efforts toward a circular economy.

Through operational excellence, JPL has consistently met the expectations of its governing stakeholders, including its customer Haryana Distribution companies and Tata Power Trading Company Limited (TPTCL), by ensuring high plant availability and reliably serving the state’s electricity needs.

Highlights

- One of the top thermal power plants in India, which has the highest biomass pellets cofiring percentage of **4.11% in FY 2024-25 with 2.15 Lakh MT quantity.**
- 13,521 positive ESCerts** awarded to JPL by the Ministry of Power (MoP) for improved heat rate performance, reduction in coal consumption, cutting emissions, and enhancing sustainability.

Economiser Coil Replacement

Last year, we undertook a crucial replacement of 40 heavily eroded economiser coils in Unit #2 at JPL. These coils had faced repeated damage over the years due to fly ash erosion and posed a risk to operational reliability. The team replaced the damaged components with a combination of twenty-four new and sixteen refurbished coils during the annual overhaul. Since the intervention, there have been no boiler tube leakages in the economiser area.

Protecting the Flue Can with LCS & Borosilicate Lining

Severe corrosion from the FGD’s acidic condensate had been damaging the flue can of Unit #1’s chimney at JPL. This led to an expert consultation and the installation of a Liquid Collection System (LCS) in Units #1 and #2. Following this, we applied a borosilicate lining of up to 152 metres in Unit #2, with a plan to do the same for Unit #1 in the annual overhauling period. The project now collects and recycles nearly 3,600 litres of condensate daily to prevent corrosion and extend the operational life of the chimney.

Pioneering Biomass Co-Firing at JPL

Over the past year, JPL has further strengthened its role in Apraava Energy’s low-carbon transition by significantly scaling up its biomass co-firing efforts. In FY 2024-25, JPL consumed approximately 215,000 metric tonnes of biomass pellets, marking a nearly threefold increase from the ~79,511 metric tonnes used in FY 2023-24. This leap was achieved by resolving complex supply chain and process challenges, reinforcing our capacity to adapt and innovate at scale.

This consistent upward trajectory places JPL among the top thermal power plants in India for biomass consumption, supporting national decarbonisation goals while ensuring regulatory alignment on mandated co-firing thresholds. Through this initiative, JPL not only reduced its dependence on coal but also helped curb carbon emissions, improve operational efficiency, and enhance long-term asset resilience.

Details of Technology Absorption

Sr. No.	Technology Absorption	Earlier / Existing System	New System	Benefits to the Company	Expenditure (₹ Mn.)
1.	Maintenance-free Optical Dissolved oxygen analyser at SWAS	Earlier, we had membrane-type operations based on the Clark electrode principle, where dissolved oxygen in a solution diffuses through a permeable membrane to a cathode (usually platinum) where it is reduced, generating a current proportional to the oxygen concentration.	Works by using luminescent technology to measure dissolved oxygen levels in a sample, where the sensor emits light, which is then affected by the presence of oxygen, allowing for a precise measurement without the need for a membrane or electrolyte solution, resulting in minimal maintenance and high stability compared to traditional electrochemical sensors.	Reduced maintenance and calibration requirements.	0.826

Details of Technology Absorption

Sr. No.	Technology Absorption	Earlier / Existing System	New System	Benefits to the Company	Expenditure (₹ Mn.)
2.	Installation of VFD in Jockey pumps of a fire water system.	The fire hydrant system is equipped with small-rated jockey pumps (30 kW) and high-rated hydrant pumps (200 kW). According to design, the jockey pump is intended to run continuously to maintain nominal hydrant pressure, while the hydrant pump is to be kept in standby mode. However, due to the high-pressure requirements of the plant, the jockey pump was unable to maintain pressure and consistently resulted in overheating and subsequent damage to electrical components. Thus, the hydrant pump was always operational throughout the year, with the recirculation valve set at an open position of 70-80%.	Running the jockey pump instead of the main fire pump to maintain fire line pressure by replacing diaphragm-operated valves with pneumatic control recirculation valves. Also, A VFD was installed in the jockey pump (30 kW), allowing it to manage the nominal hydrant pressure by varying frequency and following the limiters, with a 100% recirculation valve in the open condition. The hydrant pump remains in standby condition most of the time for a nominal O&M period.	With this modification, considerable energy is being saved. The estimated annual energy saving is around 634 MWh	2.0

Fuel Consumption at JPL

Source	Unit	FY 2022-23	FY 2023-24	FY 2024-25
Coal	TJ	75,442	74,410	71,332
	MT	5,040,563	5,080,173	5,019,324
Biomass	TJ	-	1,149.40	3,046.56
	MT	-	79,511	215,165.35
High Speed Diesel	TJ	54	33	39.37
	Kl	1,483	902	1,075.73
Specific Coal Consumption	MT/MWh	0.62	0.63	0.64
	ml/kWh	0.18	0.11	0.13

Enhancing Energy Efficiency at JPL through PAT

Jhajjar Power Limited (JPL), recognised under PAT Cycle III by BEE, has improved energy performance through heat rate optimisation, reducing coal use, emissions, and fuel costs.

To monetise savings, JPL is registered with POSOCO and is pursuing IEX registration for trading Energy Saving Certificates (ESCs).

Turbine Valve Upgrade Enhances Reliability at JPL

At JPL, recurring jamming of turbine stop valves and HPCV failures due to oxide scaling and coupling pin shear impacted reliability. To address these issues, the team initiated a comprehensive modernisation and retrofitting project in FY 2024-25 with a total investment of ₹47.5 million which included upgradation of steam stop valve and control valve through upgradation of MOC of valve internals and using stellite inlaying at bushing inner surface along with a robust bolted sleeve-type HPCV coupling. These upgrades were standardized across both units for long-term performance.

A Roadmap for the Future

Looking ahead, JPL has embarked on PAT Cycle VII with a target Net Station Heat Rate (NSHR) of 2,411 Kcal/KWh to be achieved during the assessment year of FY 2024-25. The Monitoring and Verification (M&V) audit, scheduled for mid-2025, will ensure that JPL’s continuous improvements are on track to replicate and enhance its success.

Upgrading Water Security at JPL

In recent years, there has been an increase in the non-supply cycle period of raw water supply at JPL, which has increased from 16 days to 24 days frequently. This has posed a risk to the plant operation. To mitigate the risk of raw water shortages during high-demand periods, we undertook a strategic upgrade of the water reservoir at JPL. The reservoir was previously capable of holding water up to a level of 9.6m and had previously sustained operations for 20 days at optimal load.

In FY 2024-25, we increased the reservoir wall height, resulting in an extended water storage capacity that now reaches up to 10.8m, providing an additional 6-7 days for the plant’s operational requirements, assuming 80% Plant Load Factor (PLF). Notably, the enhancement was executed while the reservoir remained filled, requiring meticulous hazard identification, well-defined safety protocols, round-the-clock supervision, and the presence of an emergency rescue team.



Optimising Efficiency with Daily Power Consumption Analysis

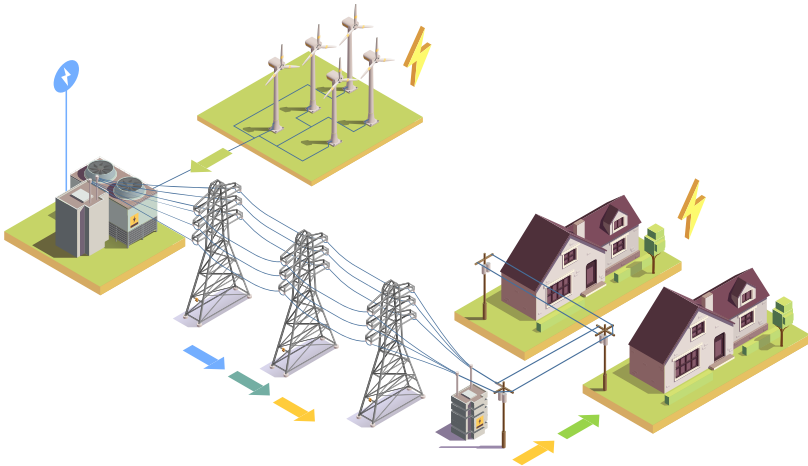
JPL leverages a digital Energy Management System (EMS) to monitor real-time power consumption of key auxiliaries like fans, pumps, and conveyors. By tracking daily reports on High-Tension (HT) drive usage, the team quickly identifies deviations and acts promptly to reduce inefficiencies and improve operational performance.

JPL’s Operational Efficiency (%)

KPI	FY 2022-23	FY 2023-24	FY 2024-25
Net Thermal Efficiency	36.40	36.84	36.77
Plant Load Factor	70.45	71.16	70.33
Availability	86.23	86.11	92.24
Auxiliary Power Consumption	6.28	6.19	6.54

Power Transmission for Sustainable Growth

Efficient power transmission is the backbone of a sustainable energy ecosystem. It ensures that renewable energy generated in remote locations efficiently reaches consumers. This is vital for integrating renewable energy into the grid and supporting India’s ambition of achieving 500 GW of installed electricity capacity from non-fossil fuel sources by 2030. Expanding our transmission portfolio aligns with our vision to be a key integrated service provider while growing our presence in non-carbon businesses.



Current Assets and Performance

 Satpura Transco Private Limited (STPL)

Operating a 400 kV, 240-kilometre intrastate double-circuit transmission line in Madhya Pradesh, STPL has consistently demonstrated near-perfect system availability over the past three years. This success is attributed to efficient Operations and Maintenance (O&M) strategies and proactive maintenance.

 Kohima Mariani Transmission Limited (KMTL)

The 254-kilometre double-circuit 400 kV transmission line and substation (Apraava Energy holds 74% equity stake) operate under a Build, Own, Operate & Maintain (BOOM) model, serving long-term customers in Manipur, Nagaland, and Assam.

Asset Availability

KMTL

FY 2022-23	FY 2023-24	FY 2024-25
99.84%	99.86%	99.87%

STPL

FY 2022-23	FY 2023-24	FY 2024-25
100%	99.96%	100%

Alongside, Apraava Energy is well on its way to completing the construction of four transmission projects secured in FY 2023-24. These include:

**Fatehgarh-IV Transmission Ltd:** Transmission System for evacuation of power from REZ in Rajasthan (20GW) under phase III- Part A1.

**Fatehgarh-III Transmission Ltd:** Transmission System for evacuation of power from REZ in Rajasthan (20GW) under phase III- Part A3.

**Karera Power Transmission Ltd:** Western Region Expansion Scheme XXXIII (WRES-XXXIII): Part B in Madhya Pradesh.

**Rajasthan Phase-IV A Power Transmission Ltd:** Transmission System for evacuation of power from Rajasthan REZ Ph-IV (Part-2:5.5GW) (Jaisalmer/Barmer Complex): Part A.

There have been initial challenges in securing the Right of Way (RoW) for the transmission project, as has been the case with numerous projects implemented in the region. However, the Apraava team is working diligently to address these issues, learning continuously, and remains on track to complete the project in accordance with regulatory requirements.

Enhancing Aerial and Bird Safety at KMTL

Aviation Marker Balls Increasing Visibility for Aircraft

To mitigate risks for low-flying aircraft and helicopters, aviation marker balls have been installed on overhead conductors, particularly in areas near airports, flight corridors, and critical crossings such as rivers and valleys.



- 1 Made from durable ABS plastic, they are designed to withstand harsh environmental conditions.
- 2 Available in alternating colours—aviation orange, white, and yellow—to ensure maximum contrast against the sky.
- 3 Measuring 20 to 36 inches in diameter and weighing approximately 6.5 kg, these marker balls provide effective aerial warning signs without adding undue weight to transmission lines.

Protecting Birds and Infrastructure

Wildlife protection remains integral to our approach to sustainable infrastructure, helping our operations align with ecological well-being. To minimise the risk of bird collisions, we’ve installed bird diverters across KMTL’s transmission corridors. These highly visible markers help birds identify and avoid power lines mid-flight, significantly lowering the chances of impact.

Innovations in Maintenance to Protect Infrastructure

At KMTL and STPL, we have introduced a series of innovative maintenance practices that strengthen the resilience of our assets.

Laser Range Finder for Improved Safety and Reliability

At KMTL and STPL, we have integrated an industry-first Laser Range Finder technology to measure electrical clearance between conductors and nearby vegetation. It identifies potential risks with ± 4 cm (1.6 in) accuracy, preventing safety-related incidents before they arise.

Enhancing Insulator Performance with Specialised Cleaning Gel

Contaminants, pollution, and moisture can significantly impact insulator performance and lead to flashovers and reduced reliability. During our Annual Shutdown work at KMTL, we deployed a specialised insulator cleaning gel to remove deposits and prevent contamination-related failures. This unique gel-based solution acts as a cleaner and a protective barrier so that high-voltage insulators remain in optimal condition.

Periodic Maintenance and Condition Monitoring

Maintaining transmission assets in challenging terrains demands a structured, disciplined approach. We follow a rigorous inspection and monitoring schedule, including:

- 1 Frequent ground patrolling to identify and address early-stage risks
- 2 Biannual tower-top patrolling to inspect key structural
- 3 Annual thermography assessments to detect potential faults before failures occur
- 4 Tower Footing Resistance (TFR) monitoring to maintain electrical safety

With nearly 100% efficiency in transmission asset performance, these measures play a crucial role in ensuring our power transmission network's long-term stability, reliability, and safety.



Ensuring Long-Term Reliability Through Collaboration

At Apraava Energy, we encourage stakeholder collaboration while focusing on technical excellence to build a resilient, well-managed, and future-ready transmission network.

The success of operational assets is a direct result of advanced operational and maintenance strategies and strong stakeholder collaboration. We actively engage with government authorities such as MPPTCL, NRLDC, NRPC, WRLDC, SLDC, NERPC, and NERLDC, as well as local communities, to ensure seamless operations and continued asset performance. Through regular participation in Outage Coordination Meetings (OCC), Technical Coordination Committee (TCC) Meetings, Northern Region Power Committee (NRPC), and Northeastern Region Power Committee (NERPC) Meetings, we are proactive in communicating and aligning operations.

Commencing Short-term Power Sale at Andhra Lake Wind Farm

FY 2024-25 marked a significant shift in Apraava Energy’s commercial strategy with the successful commencement of power sales on the Indian Energy Exchange (IEX) from our Andhra Lake Wind Project. This is our first-ever power sale on the open market and signals a new chapter in managing energy offtake post-PPA expiry. As select feeders transitioned from long-term PPAs to open access, we worked closely with forecasting and trading partners to ensure strategic bidding and operational readiness.

Feeders 1-5

Now operating as dedicated feeders, these are selling power directly on the exchange, marking our entry into a dynamic and competitive market.

Feeders 6-8

Power from turbines exiting PPAs is being sold bilaterally to Adani Electricity Mumbai Limited (AEML) under a short-term agreement.

This approach strengthens our ability to respond to market signals while maintaining operational discipline. It also lays the groundwork for deeper participation in firm and dispatchable renewable energy (FDRE) opportunities, as India’s power landscape continues to evolve.

Advancing Energy Transition Through Renewable Energy Storage

Renewable energy sources like wind and solar are key to cutting emissions, but their intermittent nature makes it harder to keep the grid stable and integrate them smoothly into the power system. To address this, we are actively exploring and prioritising advanced storage technologies. Our focus is to incorporate Battery Energy Storage Systems (BESS) in both standalone and integrated solutions. By investing in these storage solutions, the aim is to enhance grid reliability and accelerate renewable energy integration.

Towards a Smarter, Greener Grid

We are in the business of building a future. A future where our expanded renewable energy footprint, courtesy of cutting-edge digital infrastructure, helps us not just generate but optimise, store, and seamlessly integrate power.

As we continue this journey, our focus remains on operational excellence, technological advancement, and sustainable growth. By harnessing the strength of our assets, the ingenuity of our people, and the potential of emerging energy solutions, we are shaping a future that is energy-secure and environmentally responsible.