

# NTPC Green Energy Ltd

**CMP:** Rs. 105

**Target:** Rs. 145 ▲+37%

Investment Horizon: 15 to 18 months

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**Rating:** Accumulate

**Industry:** Renewable Energy Generation

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Date: 19th Feb, 2025

 **Initiating**  
Coverage



# Company Overview

NTPC Green Energy Ltd (NGEL) stands as a pivotal player in India's renewable energy sector, operating as a wholly owned subsidiary of NTPC Ltd—a prestigious 'Maharatna' central public sector enterprise renowned for its significant footprint in the Indian power landscape.

- **Strategic Position and Operational Capacity:** NTPC Green Energy Ltd. is currently the largest renewable energy public sector enterprise in India, excluding hydro, both in terms of operational capacity and power generation as of Q3FY25. With a total operational capacity of 3,475 MW (as of Dec-24), of which 3,375 MW in solar and 100 MW in wind projects, spread across six states.
- **Portfolio Expansion and Project Pipeline:** As of September 30, 2024, NTPC Green Energy's portfolio includes 16,896 MW, comprising 3,320 MW of operational projects and 13,576 MW of contracted and awarded projects. Additionally, the company has 9,175 MW under pipeline, awaiting definitive agreements, which reflects a robust growth trajectory towards augmenting its renewable energy footprint significantly.
- **Parent Company Synergy:** Promoted by NTPC Limited—India's largest power entity in terms of installed capacity and power generation — NTPC Green Energy benefits from the robust support and leadership of its parent. This relationship not only provides strategic advantages in terms of resource allocation and expertise, but also aligns NGEL with the broader objectives of the NTPC Group to increase its non-fossil-based capacity to 45-50% by 2032, with a target to achieve 60 GW of renewable capacity by FY32.
- **Stakeholder and Off-taker Relationships:** The company boasts a diverse array of 17 off-takers for its 41 solar and 11 wind projects (as of September 2024). These off-takers primarily include government agencies and public utilities, with whom NTPC Green Energy has established long-term Power Purchase Agreements spanning an average of 25 years. This ensures sustained revenue streams.
- **Project Execution and Operational Efficiency:** As of September 30, 2024, NGEL has 36 renewable energy projects under construction. The company is recognized as a preferred partner for public sector undertakings and has entered into several joint venture agreements. Additionally, the adoption of advanced Operation and Maintenance (O&M) technologies such as robotic dry cleaning for photovoltaic arrays and drone thermography further enhances the operational efficiency and longevity of its installations.
- **Portfolio Diversification and Market Expansion:** In its quest to emerge as a dominant force in the green energy sector, NGEL actively participates in a variety of competitive avenues including bidding for projects, engaging in tenders, and developing Ultra Mega Renewable Energy Power Parks (UMREPP).

# Company History

- Corporate Restructuring and Asset Integration:** NGEL was established on April 7, 2022, as a strategic maneuver to reorganize the renewable energy assets of NTPC Limited, a move guided by the broader objectives outlined in the National Monetisation Pipeline (NMP) issued by the Ministry of Finance on August 23, 2021. This incorporation was part of a comprehensive strategy developed in consultation with the Ministry of Power to streamline and enhance the operational efficiencies of NTPC's renewable energy ventures.
- Transfer of Assets and Equity:** The reorganization process involved a transfer of renewable energy (RE) assets from NTPC Limited to NGEL, formalized through a business transfer agreement dated July 8, 2022. This agreement stipulated the transfer of assets at book value, ensuring transition within the statutory and financial frameworks. Simultaneously, NTPC Limited also executed a share purchase agreement on the same date, transferring 100% of its equity shareholding in NTPC Renewable Energy Limited (NREL) to NGEL. The completion of these transfers on February 28, 2023.

| Ratios           |      |
|------------------|------|
| ROE (FY24)       | 6.2% |
| ROCE (FY24)      | 6.1% |
| P/E Ratio (ttm)  | 256  |
| Dividend Pay-out | 0.0% |
| Dividend Yield   | 0.0% |

| Stock Price Movement |        |
|----------------------|--------|
| 5d                   | -2.70% |
| 30d                  | -13.4% |
| 52w High             | -32.5% |
| 52w Low              | 2.0%   |

| Quick Data         |               |
|--------------------|---------------|
| Face Value (Rs.)   | 10.0          |
| No. of Shares (Cr) | 843           |
| MCAP (Rs. Cr)      | 88,299.5      |
| 52W H/L (Rs.)      | 155.3 / 102.8 |
| BSE Code           | 544289        |
| NSE Symbol         | NTPCGREEN     |
| Book Value (FY24)  | 8.3           |

| Shareholding Pattern (Dec-24) |        |
|-------------------------------|--------|
| Promoters                     | 89.01% |
| FII                           | 2.18%  |
| DII                           | 5.28%  |
| Public                        | 3.52%  |

# Investment Rationale

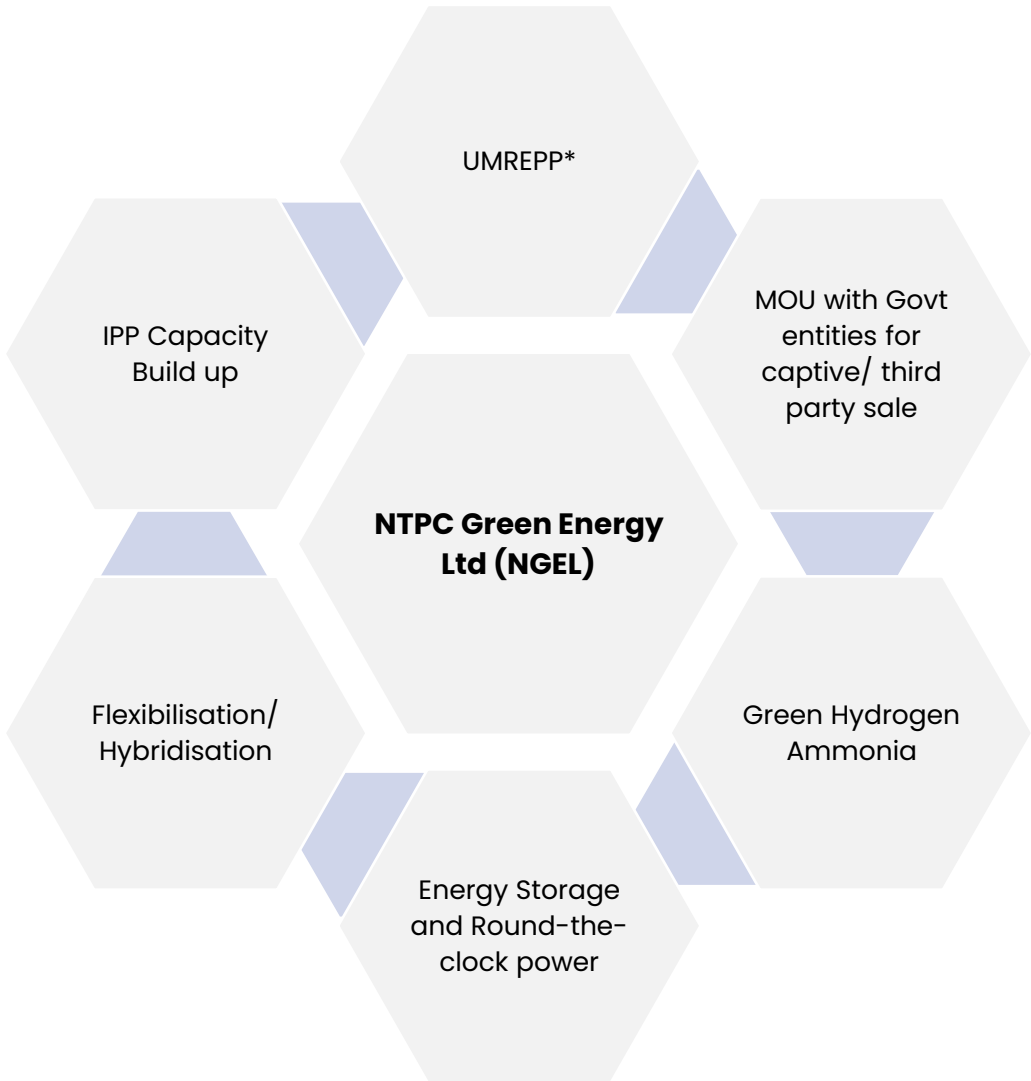
- **A pure play on renewal energy :** NTPC Green Energy is poised to benefit from India's ambitious 500GW of renewal energy capacity target by 2030.
- **Aggressive Capacity Expansion:** As a key player in the country's green energy transition, NGEL is undergoing unprecedented expansion, scaling up from 3.3GW in December 2024 to 19GW by FY27e—a 6x increase in the next three years. The company has set an ambitious 60GW capacity target by FY32e.
- **Expected multi-x growth in profitability:** The aggressive capacity expansion is expected to drive explosive profitability growth, with PAT surging about 8x from ₹354 Cr in FY24 to ₹2,800 Cr in FY27e. This sharp rise is fueled by increased capacity and operational efficiencies, making NGEL one of the fastest-growing renewable companies in India.
- **Supportive Macros, structural tailwind:** India's per capita power consumption remains significantly lower than global averages, creating a long runway for demand growth. As of 2023, India's per capita electricity consumption stood at 1,331 kWh, far below major economies such as Brazil (2,500 kWh in CY22), China (5,300 kWh), South Korea (11,313 kWh in 2023) and the United States (12,700 kWh). Even by FY30e, when India's per capita energy consumption is projected to reach ~1,900–2,100 kWh, which will still be well below aforesaid benchmarks.
- **Significant improvement in return ration going forward :** The company's return on equity (ROE) is set to more than double from 6.2% in FY24 to 14.1% in FY27e, bringing it in line with competitors such as Adani Green, JSW Energy, and Tata Power. Additionally, NGEL's PEG ratio is estimated to be less than 1 by FY27e, highlighting the stock's attractive valuation at its projected earnings.
- **Foray into new technologies :** NGEL is also future-proofing its business by aggressively investing in new technologies and expansion projects. It is actively developing wind-solar hybrid solutions, round-the-clock (RTC) green energy, green hydrogen, and energy storage systems. Its recent acquisition of Ayana Energy further strengthens its wind-solar integration and RTC capabilities, reinforcing its leadership in the renewable space.

# Valuation

- Valuing the company at a PER of 40x FY27e which is at a PEG of 0.37x, per share target price comes to around Rs. 145. Implying, an upside of 37% from current price of Rs. 105.
- Even under conservative assumptions, NGEL's earnings potential remains strong. If no additional capacity is added in FY28e, the company is still expected to deliver 2.2x its profit of FY27e at the then existing 19GW operational capacity, demonstrating its robust earnings power and operational efficiency.
- Given the demonstrated execution capability, aggressive expansion, strong demand tailwinds, operating efficiencies kicking in along with a forward-looking strategy, NGEL is well-positioned to capture a significant share of India's renewable energy growth story.
- We recommend accumulate rating on the company.

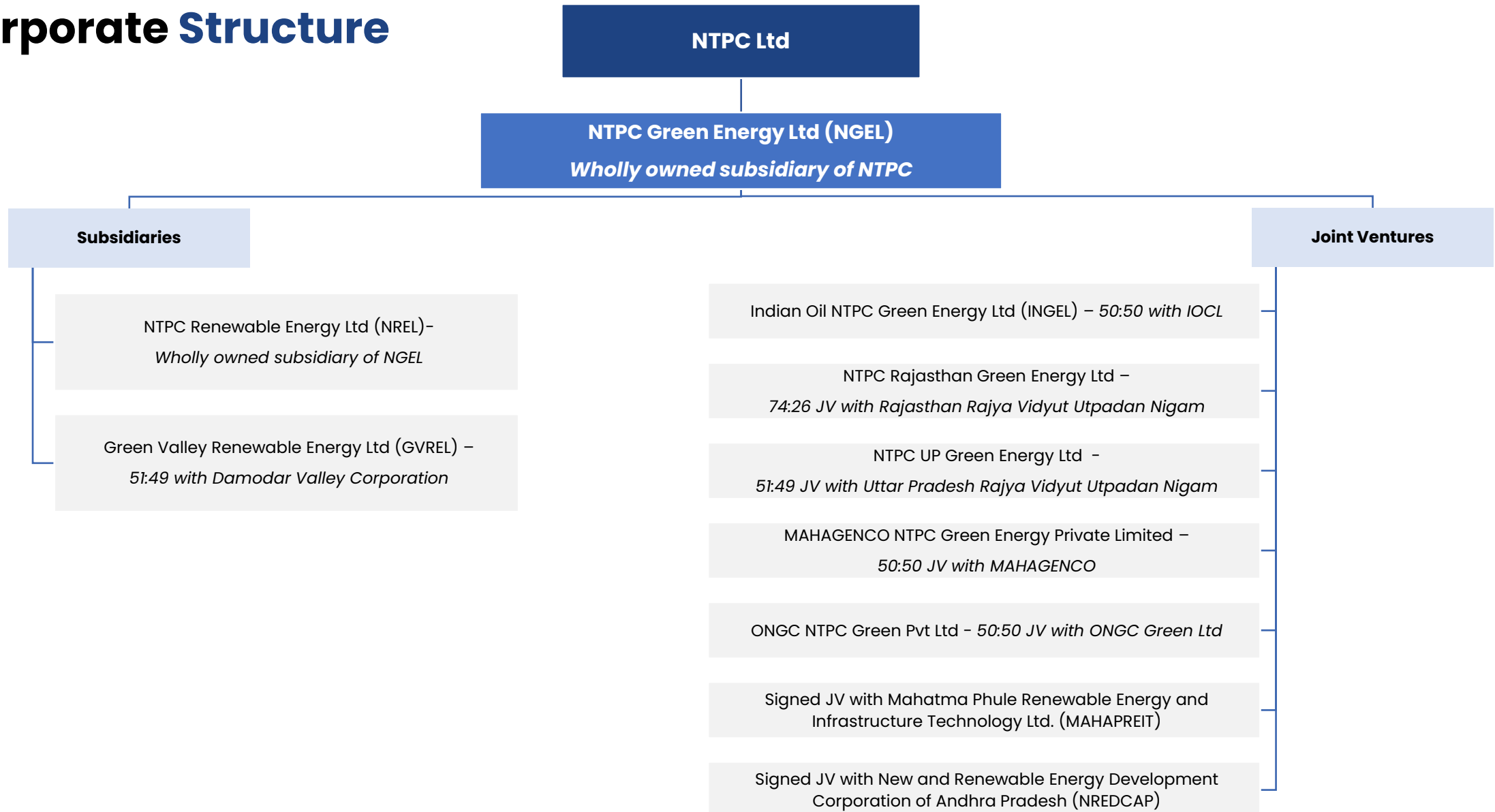


# Capability Matrix



\*Ultra Mega Renewable Energy Power Parks (UMREPP)

# Corporate Structure



### 1. Subsidiaries:

- **NTPC Renewable Energy Limited (NREL):** NREL, a wholly-owned subsidiary of NGEL, was incorporated on October 7, 2020, under the Companies Act, 2013, and was fully acquired by NGEL on February 28, 2023, as per a share purchase agreement dated July 8, 2022. The subsidiary specializes in generating power through non-conventional and renewable energy sources. It serves as a major vehicle for NGEL's renewable energy projects, contributing significantly to its revenue streams from these endeavors. NGEL planned to utilize a substantial portion of its net proceeds from the IPO, amounting to Rs. 7,500 Crores, to manage the financial liabilities of NREL, including the full or partial repayment or prepayment of certain borrowings that NREL has incurred from banks and financial institutions.
- **Green Valley Renewable Energy Limited (GVREL):** GVREL, another key subsidiary under NGEL, was incorporated on August 25, 2022. This public limited company is focused on the planning, promotion, and organization of integrated power generation projects utilizing non-conventional/renewable energy sources. Holding a 51% stake, NGEL exercises significant control over GVREL.

### 2. Joint Ventures:

- **IndianOil NTPC Green Energy Private Limited (INGEL):** INGEL represents a strategic partnership between NGEL and Indian Oil Corporation Limited, each holding a 50% stake. Incorporated on June 2, 2023, under the Companies Act, 2013, INGEL is dedicated to developing both grid-connected and off-grid renewable energy-based power projects. This joint venture harnesses the strengths and market presence of both entities to foster innovation and drive the development of renewable energy projects. The collaboration aims to combine NGEL's expertise in renewable energy operations with Indian Oil's extensive distribution network and industrial experience.
- **NTPC Rajasthan Green Energy Ltd:** A 74:26 JV with Rajasthan Rajya Vidyut Utpadan Nigam Ltd for development of renewable energy projects with a potential capacity up to 25 GW. This agreement also includes the ambit of green hydrogen production and its derivatives, targeting an annual production capacity of up to 1 million MT.
- **NTPC UP Green Energy Ltd:** A 51:49 JV with Uttar Pradesh Rajya Vidyut Utpadan Nigam (UPRVUNL), focused on renewable energy parks and projects in Uttar Pradesh.
- **MAHAGENCO NTPC Green Energy Pvt Ltd:** NGEL has partnered with Mahatma Phule Renewable Energy & Infrastructure Technology Limited (MAHAPREIT) through a 50:50 JV agreement to develop up to 10 GW of renewable energy park projects in Maharashtra. This collaboration encompasses solar, wind, and hybrid energy projects.
- **ONGC NTPC Green Pvt Ltd:** A 50:50 JV set up with ONGC Green Ltd for exploring renewable energy projects, including offshore wind initiatives.
- NGEL also signed a JV with **Non-conventional Energy Development Corporation of Andhra Pradesh (NREDCAP)** for establishing 25 GW of renewable energy capacity, 0.5 million metric tonnes of green hydrogen, and 10 GW of pumped storage projects in Andhra Pradesh.

### 3. Memorandums of Understanding (MoUs):

- An MOU has been signed with the Government of Bihar for investment in renewable energy projects, including solar, battery storage, and green hydrogen.
- Chhattisgarh State Power Generation Co. (CSPGCL) and NGEL have also signed an MOU for developing up to 2,000 MW of renewable energy projects, including floating solar.

**Operating, Contracted and Awarded, and Total Capacity (MW )**

| Particulars                                      | FY22         | FY23         | FY24          | H1FY25        | 9MFY25        |
|--------------------------------------------------|--------------|--------------|---------------|---------------|---------------|
| <i>Megawatts Operating</i>                       |              |              |               |               |               |
| Solar (MWs)                                      | 1,395        | 2,561        | 2,825         | 3,220         | 3,375         |
| Wind (MWs)                                       | 50           | 50           | 100           | 100           | 100           |
| <b>Total (MWs)</b>                               | <b>1,445</b> | <b>2,611</b> | <b>2,925</b>  | <b>3,320</b>  | <b>3,475</b>  |
| <i>Megawatts Contracted and Awarded</i>          |              |              |               |               |               |
| Solar (MWs)                                      | 4,616        | 5,750        | 9,571         | 10,576        | 11,076        |
| Wind (MWs)                                       | 150          | 500          | 2,000         | 3,000         | 3,000         |
| <b>Total (MWs)</b>                               | <b>4,766</b> | <b>6,250</b> | <b>11,571</b> | <b>13,576</b> | <b>13,576</b> |
| <i>Megawatts Operated Contracted and Awarded</i> |              |              |               |               |               |
| Solar (MWs)                                      | 6,011        | 8,311        | 12,396        | 13,796        | 14,296        |
| Wind (MWs)                                       | 200          | 550          | 2,100         | 3,100         | 3,100         |
| <b>Total (MWs)</b>                               | <b>6,211</b> | <b>8,861</b> | <b>14,496</b> | <b>16,896</b> | <b>17,396</b> |

**Capacity under Pipeline (MW)**

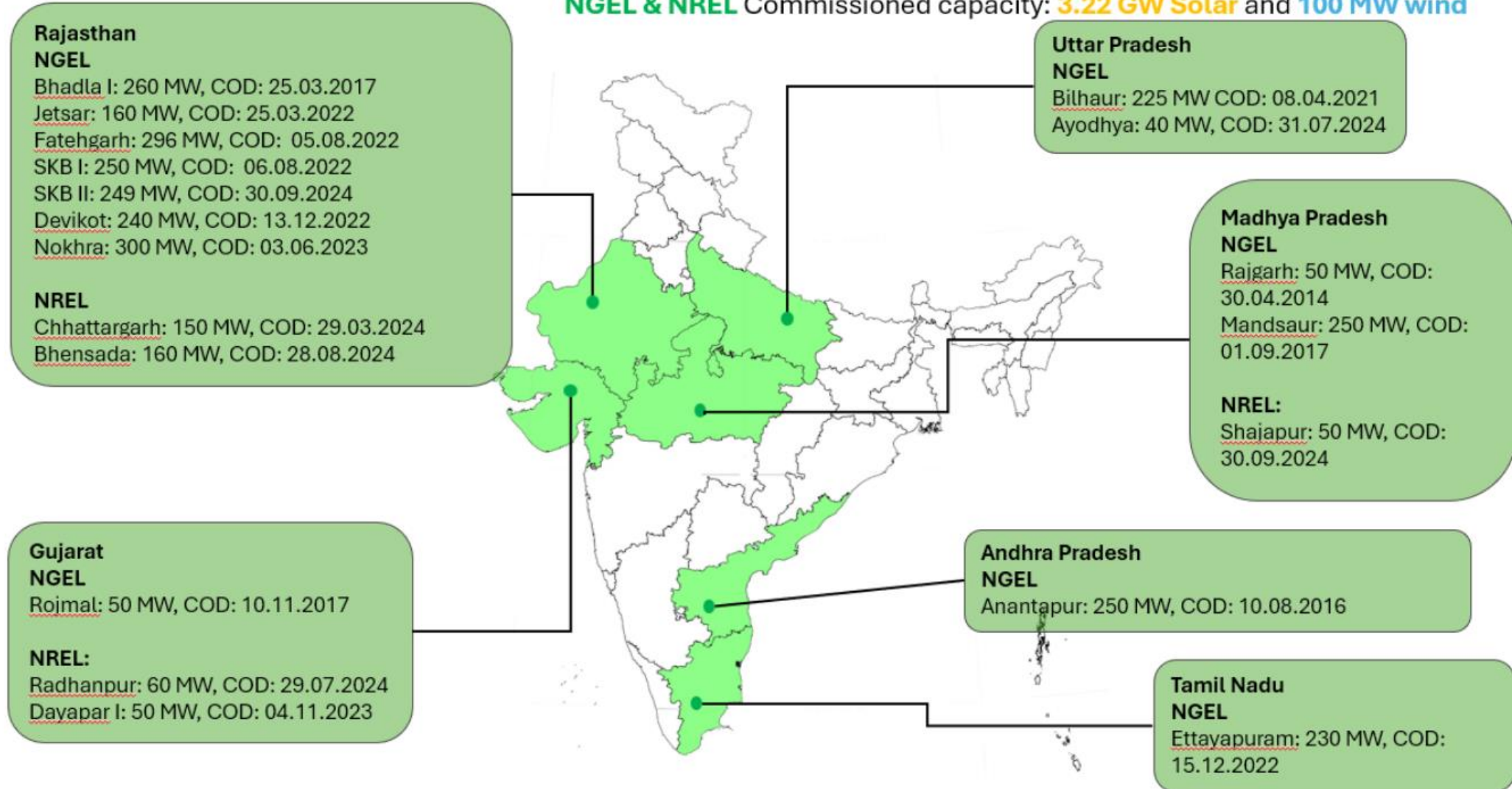
| Particulars                                                                                | H1FY25        |
|--------------------------------------------------------------------------------------------|---------------|
| Megawatts Operating, Contracted & Awarded                                                  | 16,896        |
| Capacity under Pipeline                                                                    |               |
| Solar (MWs)                                                                                | 6,925         |
| Wind (MWs)                                                                                 | 2,250         |
| Total (MWs) under pipeline                                                                 | 9,175         |
| <b>Total Megawatts Operating, Contracted &amp; Awarded + Capacity under Pipeline (MWs)</b> | <b>26,071</b> |

**Estimated Future Capacity (MW)**

| Year/ Time Period           | Installed Capacity |
|-----------------------------|--------------------|
| December 2024               | 3,475              |
| FY25e                       | 6,013              |
| Estimated addition in FY26e | 5,000              |
| FY26e                       | 11,013             |
| Estimated addition in FY27e | 8,000              |
| FY27e                       | 19,013             |

**Operational projects across India as of September 30, 2024**

**NGEL & NREL Commissioned capacity: 3.22 GW Solar and 100 MW wind**



**Geographical distribution of operational capacity**

| Particulars               | Carved Out Operating Data |                         |              |                         | Company Operating Data |                         |              |                         |
|---------------------------|---------------------------|-------------------------|--------------|-------------------------|------------------------|-------------------------|--------------|-------------------------|
|                           | FY22                      |                         | FY23         |                         | FY24                   |                         | HIFY25       |                         |
|                           | MW                        | % of operating capacity | MW           | % of operating capacity | MW                     | % of operating capacity | MW           | % of operating capacity |
| <b>Madhya Pradesh</b>     |                           |                         |              |                         |                        |                         |              |                         |
| Solar                     | 300                       | 20.8%                   | 300          | 11.5%                   | 300                    | 10.3%                   | 350          | 10.5%                   |
| Wind                      | -                         | 0.0%                    | -            | 0.0%                    | -                      | 0.0%                    | -            | 0.0%                    |
| <b>Andhra Pradesh</b>     |                           |                         |              |                         |                        |                         |              |                         |
| Solar                     | 250                       | 17.3%                   | 250.0        | 9.6%                    | 250                    | 8.6%                    | 250          | 7.5%                    |
| Wind                      | -                         | 0.0%                    | -            | 0.0%                    | -                      | 0.0%                    | -            | 0.0%                    |
| <b>Rajasthan</b>          |                           |                         |              |                         |                        |                         |              |                         |
| Solar                     | 620                       | 42.9%                   | 1,556        | 59.6%                   | 1,806                  | 61.7%                   | 2,065        | 62.2%                   |
| Wind                      | -                         | 0.0%                    | -            | 0.0%                    | -                      | 0.0%                    | -            | 0.0%                    |
| <b>Uttar Pradesh</b>      |                           |                         |              |                         |                        |                         |              |                         |
| Solar                     | 225                       | 15.6%                   | 225          | 8.6%                    | 239                    | 8.2%                    | 265          | 8.0%                    |
| Wind                      | -                         | 0.0%                    | -            | 0.0%                    | -                      | 0.0%                    | -            | 0.0%                    |
| <b>Gujarat</b>            |                           |                         |              |                         |                        |                         |              |                         |
| Solar                     | -                         | 0.0%                    | -            | 0.0%                    | -                      | 0.0%                    | 60           | 1.8%                    |
| Wind                      | 50                        | 3.5%                    | 50           | 1.9%                    | 100                    | 3.4%                    | 100          | 3.0%                    |
| <b>Tamil Nadu</b>         |                           |                         |              |                         |                        |                         |              |                         |
| Solar                     | -                         | 0.0%                    | 230          | 8.8%                    | 230                    | 7.9%                    | 230          | 6.9%                    |
| Wind                      | -                         | 0.0%                    | -            | 0.0%                    | -                      | 0.0%                    | -            | 0.0%                    |
| <b>Total MW Operating</b> | <b>1,445</b>              | <b>100.0%</b>           | <b>2,611</b> | <b>100.0%</b>           | <b>2,925</b>           | <b>100.0%</b>           | <b>3,320</b> | <b>100.0%</b>           |

# New Initiatives & Joint Ventures

- **ONGPL's Acquisition of Ayana Renewable Power:** ONGC NTPC Green Pvt Ltd (ONGPL), a 50:50 joint venture between ONGC Green Ltd (OGL) and NTPC Green Energy Ltd (NGEL), has acquired a 100% equity stake in Ayana Renewable Power Private Limited for an enterprise value of Rs. 19,500 Crores (USD 2.3 billion). The Share Purchase Agreement (SPA) was signed on February 12, 2025, with National Investment and Infrastructure Fund (NIIF), BII South Asia Renewables Limited, British International Investment Plc (BII), and Eversource Capital. This marks ONGPL's first strategic acquisition since its establishment in November 2024. Ayana, a leading renewable energy player, brings 4.1 GW of operational and under-construction assets and a 1 GW development pipeline. Its portfolio is strategically located in resource-rich states and contracted with high-credit-rated off-takers like SECI, NTPC, GUVNL, and Indian Railways, ensuring stable long-term revenues. This acquisition aligns with ONGC and NTPC's Net Zero goals, by 2038 and 2050, respectively, as well.
- **Battery Storage and Round-the-Clock Renewable Energy (RTC-RE):** Following the Ministry of Power's guidelines issued in June 2023 for the procurement of firm and dispatchable power (FDRE) from grid-connected renewable energy projects with energy storage systems, NGEL has undertaken efforts to develop RTC-RE projects. The company is developing 2.7 GW of RTC-RE capacity, including one of the world's largest projects of this nature, boasting 1.3 GW capacity. This initiative involves integrating battery storage systems with renewable energy sources such as solar, wind, or hydro to deliver power reliably at any hour, tailored to match demand dynamics.
- **Green Hydrogen Hub Development:** In a significant stride towards establishing a green hydrogen economy, NGEL is developing a comprehensive Green Hydrogen Hub at Pudimadaka, Andhra Pradesh. Spread over 1,200 acres, this project aims not only at the production of green hydrogen but also, at fostering an ecosystem for manufacturing renewable energy components and systems. The hub, set to commence planning phases in FY25, will feature state-of-the-art facilities, including a dedicated 600-acre segment for green chemicals production. This site will host India's largest green hydrogen production facility, with a capacity of 1,100 TPD, aimed at generating hydrogen derivatives such as green ammonia, green methanol, and sustainable aviation fuel for both domestic and export markets.
- **Strategic Electrolyser Partnerships:** To bolster its capabilities in green hydrogen production, NGEL has engaged in a selective process, choosing two technology providers through competitive bidding. This strategic move ensures NGEL's participation in upcoming tenders for large-scale green hydrogen projects.

# Strengths

- **Robust Parentage and Support from NTPC Limited:** NGEL benefits immensely from its association with NTPC Limited, a 'Maharatna' public sector enterprise, which provides it with substantial operational, financial, and strategic backing. NTPC Limited's extensive experience in executing large-scale energy projects, coupled with its long-term relationships with off-takers and suppliers, significantly enhances NGEL's operational capabilities and financial stability. As of September 2024, NTPC Group's large-scale integrated energy business includes over 76 GW of electric power generating capacity across diverse energy sources, contributing around 17% to India's total installed capacity and approximately 24% of the country's power generation.
- **Operational Capacity and Geographic Diversification:** NGEL commands a formidable presence in the renewable energy sector with a portfolio of 16,896 MW as of September 2024, spread across key resource-rich states like Rajasthan and Gujarat, as well as seven other states. The company's long-term Power Purchase Agreements (PPAs), averaging 25 years with government agencies and public utilities, ensure stable revenue streams and reinforce its financial health.
- **Experienced Team and Proven Project Execution:** With a project pipeline that includes 13,576 MW under construction as of September 2024, NGEL manages this extensive scale through its experienced in-house teams and partnerships with third-party EPC contractors. This expertise is pivotal in overseeing a variety of crucial stages such as land acquisition, regulatory compliance, and grid interconnection across significant land holdings. The company's operational expanse is considerable, with approximately 8,900 acres of freehold land and about 45,700 acres of leasehold land dedicated to its projects. This extensive area facilitates the implementation of large-scale solar and wind projects, optimizing the deployment of renewable energy technologies over wide geographical areas. This expertise extends to innovative project models, varying from traditional turnkey EPC contracts to models where NGEL takes direct responsibility for major equipment procurement, thereby optimizing costs and enhancing project control.
- **Strategic Procurement and Technological Integration:** NGEL's approach to procurement is characterized by a rigorous vendor empanelment process and a network of reputable domestic and international suppliers. This ensures not only the quality and reliability of solar panels, inverters, wind turbines, and other critical components but also favorable pricing through economies of scale derived from the NTPC Group. Furthermore, NGEL's operations are enhanced by the adoption of advanced technologies such as robotic cleaning for photovoltaic arrays, drone thermography, and live dashboards for real-time performance monitoring. These technologies drive operational efficiencies, reduce maintenance costs, and prolong the lifespan of the installations.

# Opportunities

- **National and Global Market Dynamics:** India is a prominent player on the global renewable energy stage, ranking fourth worldwide in total renewable installations, including solar and wind energy. This prominence is underscored by India's commitment at the twenty-sixth Conference of the Parties climate summit in Glasgow, where updated nationally determined contributions (NDCs) include reducing the emissions intensity of GDP by 45% by 2030 from the 2005 level and achieving net-zero emissions by 2070. Furthermore, India aims for about 50% of its cumulative electric power installed capacity to come from non-fossil fuel sources by 2030. These targets not only reflect India's dedication to combating climate change but also signal substantial market opportunities for renewable energy companies like NGEL.
- **Power Consumption Trends:** India's electricity demand has grown at a CAGR of approximately 8.4% between FY21 and FY24, with industry projections of 5.5–6.0% annual growth over the next five years. This demand is driven by robust economic fundamentals, infrastructural developments, and government initiatives aimed at enhancing the quality of power supply and expanding the electrical grid. Key government schemes like 24x7 power for all, the Sahaj Bijli Har Ghar Yojana (SAUBHAGYA) for universal household electrification, and the development of green energy corridors to facilitate renewable energy power evacuation are pivotal in this expansion.
- **Capacity Growth and Technological Advancements:** The installed capacity of renewable energy in India has seen a significant increase, growing from 63 GW in FY2012 to approximately 212 GW as of January 2025. This growth trajectory is expected to continue, with solar energy experiencing a CAGR of approximately 24.7% over the last five years. Industry reports anticipate an addition of 137–142 GW of solar capacity from FY25 to FY29. Similarly, wind energy, with India having the fourth largest installed capacity globally, is projected to add about 34–36 GW during the same period. These developments are supported by advancements in technology, competitive tariffs, and innovative government policies, including subsidies and incentives such as the Inter State Transmission System charge waiver. In order to meet the Govts ambitious target of 500 GW of renewable energy by 2030, an incoming capacity Of 250+ GW is set to come up in the next 5 years. Additionally, the deployment of Battery Energy Storage Systems (BESS) to support grid stability and peak load management is projected to add 23–24 GW by FY29, further enhancing the scope for renewable energy utilization.
- **Emerging Opportunities in Transport and Infrastructure:** Significant developments in railway electrification, aimed at achieving 100% electrification by FY25, and the expansion of metro rail services across multiple Indian cities are set to substantially increase power demand. These sectors, along with the burgeoning electric vehicle (EV) market, are expected to collectively contribute significantly to the incremental power demand, providing a broad spectrum of opportunities for renewable energy integration.

# Risks

- **Seasonal Variability and Resource Dependence:** NGEL's operations are significantly influenced by environmental conditions, which affect the output of both solar and wind energy projects. Solar energy output is particularly susceptible to variations in sunlight and ambient temperatures, typically decreasing during the monsoon season due to reduced sunlight, and peaking during the sunnier winter and summer months. Similarly, wind energy generation depends on wind patterns and speeds, with lower outputs during the "Low Wind Season" (October to March) and higher production in the "High Wind Season" (April to September). Such seasonality can cause fluctuations in revenue, with the lowest earnings typically recorded from June to September and the highest from January to March. Physical disruptions can also severely impact the operational performance of these assets, for example, the presence of nearby structures can cause "wake effects" that disrupt wind flows at wind farms, or shadows from nearby buildings can reduce the efficiency of solar farms. The performance of NGEL's renewable energy projects is also subject to environmental risks, including adverse weather, natural disasters, and other physical conditions that could damage infrastructure or reduce efficiency.
- **Regulatory and Policy Risks:** NGEL's growth and profitability are highly dependent on government policies, regulatory frameworks, and economic incentives, all of which remain subject to change. While India's commitment to renewable energy at global forums like COP suggests long-term policy support, past delays in Power Supply Agreement (PSA) signings due to fluctuating tariffs have disrupted revenue streams. Although recent government initiatives to enforce Renewable Purchase Obligations (RPOs) and tariff revisions have improved stability, any future reductions or withdrawals of incentives, such as viability gap funding, could impact project viability and investment attractiveness. Furthermore, potential shifts in tariff structures, compliance mandates, or regulatory conditions could increase operational costs and complicate project execution.
- **Financial Health of Off-takers:** A considerable risk arises from the financial instability of Distribution Companies (Discoms), which are NGEL's primary offtakers. Many Discoms suffer from high Transmission & Distribution (T&D) losses, inadequate tariff revisions, and delays in subsidy disbursements, weakening their financial position. While competitive tariffs and a payment security mechanism somewhat mitigate this risk, the financial health of these entities remains a concern for the assurance of sustained revenue. In FY24, more than 87% of NGEL's revenue came from its top five off-takers, with the largest single off-taker contributing about 50% of the revenue. This concentration increases vulnerability to changes in the financial or operational status of these key off-takers.
- **Interest Rate Fluctuations:** Given NGEL's considerable indebtedness, with aggregate outstanding borrowings of Rs. 17,057.5 Crores as of September 2024, all of which have floating interest rates. Fluctuations in interest rates could significantly impact its financial health.

- **Project Execution and Infrastructure Challenges:** Execution risks associated with ongoing projects can affect NGEL's profitability and liquidity. Challenges in land acquisition, due to the need to coordinate with multiple stakeholders for large land parcels, can delay project timelines. Additionally, securing timely transmission connectivity is critical for operational viability but can be jeopardized by inadequate infrastructure planning. The Green Energy Corridor Scheme aims to mitigate such risks by enhancing grid capacity for renewable projects, yet execution delays remain a potential risk.
- **Dependency on Supply Chain and Market Conditions:** NGEL's operations heavily rely on the continuous and cost-effective supply of key components such as solar panels, inverters, wind turbines, and related power evacuation systems. A significant concentration of supplier dependencies, with the top 10 suppliers accounting for 92.65% of NGEL's supplies in H1 FY25 and 77.71% in FY24, exposes the company to supply chain risks. Disruptions in the procurement chain, whether due to logistical issues, geopolitical tensions, or supplier insolvency, could lead to project delays and inflate costs. For instance, Sterling & Wilson Renewable Energy Limited alone supplied 35% of NGEL's requirements in H1 FY25, highlighting a considerable dependency on single-source suppliers.
- **Geographical Concentration Risks:** A significant portion of NGEL's operational projects, accounting for 62.20% in H1 FY25 and 61.74% in FY24 respectively, is concentrated in Rajasthan. This geographical concentration subjects the company to localized risks including social, political, economic disturbances, or natural calamities. Such events could lead to substantial operational disruptions or infrastructural damage, necessitating considerable capital expenditure to restore functionality or even a strategic overhaul.



# Financials And Projections

| Income Statement (Rs. Cr) | FY24         | FY25e        | FY26e        | FY27e         | 3 Yr CAGR |
|---------------------------|--------------|--------------|--------------|---------------|-----------|
| Revenue from operations   | 1,963        | 2,371        | 6,179        | 11,204        | 78.7%     |
| Other income              | 75           | 113          | 113          | 113           |           |
| <b>Total Income</b>       | <b>2,038</b> | <b>2,438</b> | <b>6,291</b> | <b>11,317</b> | 77.1%     |
| Less: Expenses            | 216          | 345          | 741          | 1,120         |           |
| <b>EBITDA</b>             | <b>1,746</b> | <b>2,026</b> | <b>5,437</b> | <b>10,084</b> | 79.4%     |
| EBITDA Margin             | 89.0%        | 85.5%        | 88.0%        | 90.0%         |           |
| Less: D&A                 | 643          | 800          | 1,947        | 3,216         |           |
| <b>EBIT</b>               | <b>1,104</b> | <b>1,225</b> | <b>3,490</b> | <b>6,868</b>  | 83.9%     |
| Finance Cost              | 691          | 823          | 1,699        | 2,916         |           |
| <b>PBT</b>                | <b>488</b>   | <b>515</b>   | <b>1,904</b> | <b>4,064</b>  | 102.7%    |
| Less: Tax Expense         | 143          | 129          | 476          | 1,016         |           |
| Tax Rate                  | 29%          | 25%          | 25%          | 25%           |           |
| <b>PAT</b>                | <b>345</b>   | <b>386</b>   | <b>1,428</b> | <b>3,048</b>  | 106.8%    |
| PAT Margin                | 17.6%        | 16.3%        | 23.1%        | 27.2%         |           |
| EPS                       | 0.73         | 0.46         | 1.69         | 3.62          |           |

| Balance Sheet (Rs. Cr)                | FY24          | H1FY25        | FY25e         | FY26e         | FY27e           |
|---------------------------------------|---------------|---------------|---------------|---------------|-----------------|
| <b>EQUITY AND LIABILITIES</b>         |               |               |               |               |                 |
| Share Capital                         | 5,720         | 7,500         | 8,426         | 8,426         | 8,426           |
| Reserves + Non Controlling Interest   | 513           | 781           | 10,241        | 11,669        | 14,717          |
| Borrowings                            | 17,646        | 20,698        | 29,404        | 50,034        | 87,881          |
| Other Liabilities                     | 3,328         | 3,429         | 3,441         | 3,759         | 4,178           |
| <b>TOTAL EQUITY &amp; LIABILITIES</b> | <b>27,206</b> | <b>32,408</b> | <b>51,513</b> | <b>73,888</b> | <b>1,15,202</b> |
| <b>ASSETS</b>                         |               |               |               |               |                 |
| Fixed Assets                          | 17,573        | 19,076        | 36,470        | 59,022        | 98,681          |
| CWIP                                  | 7,138         | 9,031         | 9,031         | 9,031         | 9,031           |
| Cash & Cash Equivalents               | 472           | 1,455         | 2,808         | 1,200         | 966             |
| Other Assets                          | 2,023         | 2,846         | 3,204         | 4,636         | 6,524           |
| <b>TOTAL ASSETS</b>                   | <b>27,206</b> | <b>32,408</b> | <b>51,513</b> | <b>73,888</b> | <b>1,15,202</b> |

# Financial Ratios

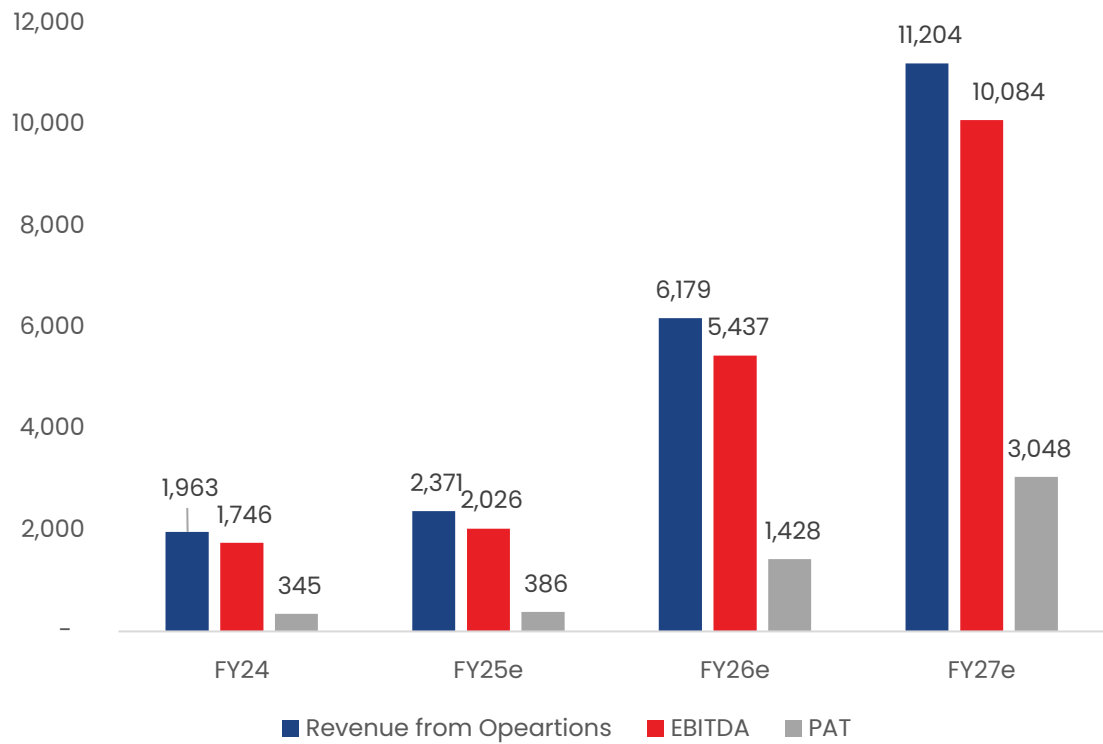
| Du Pont Analysis         |       | FY24 | FY25e | FY26e | FY27e |
|--------------------------|-------|------|-------|-------|-------|
| Profit/Sales             | (a)   | 0.18 | 0.16  | 0.23  | 0.27  |
| Sales/Assets             | (b)   | 0.09 | 0.06  | 0.10  | 0.12  |
| Sales/Net Fixed Assets   |       | 0.12 | 0.09  | 0.13  | 0.14  |
| Assets/Net Worth         | (c)   | 4.10 | 3.16  | 3.24  | 4.37  |
| Return on Equity (ROE %) | (abc) | 6.2% | 3.1%  | 7.4%  | 14.1% |

| Valuation Ratios             |  | FY24 | FY25e | FY26e | FY27e |
|------------------------------|--|------|-------|-------|-------|
| Earning Per Share (EPS)      |  | 0.7  | 0.5   | 1.7   | 3.6   |
| EPS Growth YoY%              |  |      | -37%  | 270%  | 113%  |
| Price to Earnings (P/E x)    |  |      | 228.6 | 61.8  | 29.0  |
| Book Value per Share (BVPC)  |  | 8.3  | 22.2  | 23.8  | 27.5  |
| Price to Book Value (P/BV x) |  | -    | 4.7   | 4.4   | 3.8   |

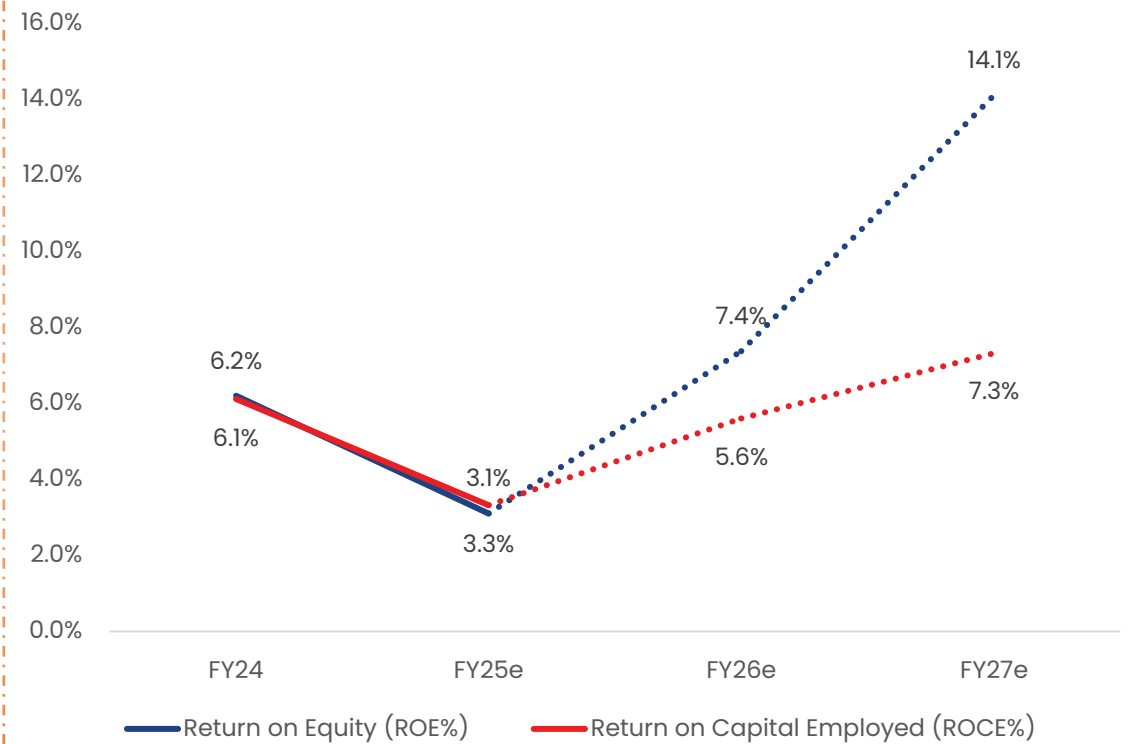
| Key Operational Ratios |  | FY24  | FY25e | FY26e | FY27e |
|------------------------|--|-------|-------|-------|-------|
| EBITDA Margin (%)      |  | 89.0% | 85.5% | 88.0% | 90.0% |
| PAT Margin (%)         |  | 17.6% | 16.3% | 23.1% | 27.2% |
| ROCE (%)               |  | 6.1%  | 3.3%  | 5.6%  | 7.3%  |
| Debt to Equity ratio   |  | 2.8   | 1.6   | 2.5   | 3.8   |

# Story In Charts

P&L with Projections (Rs. Cr)

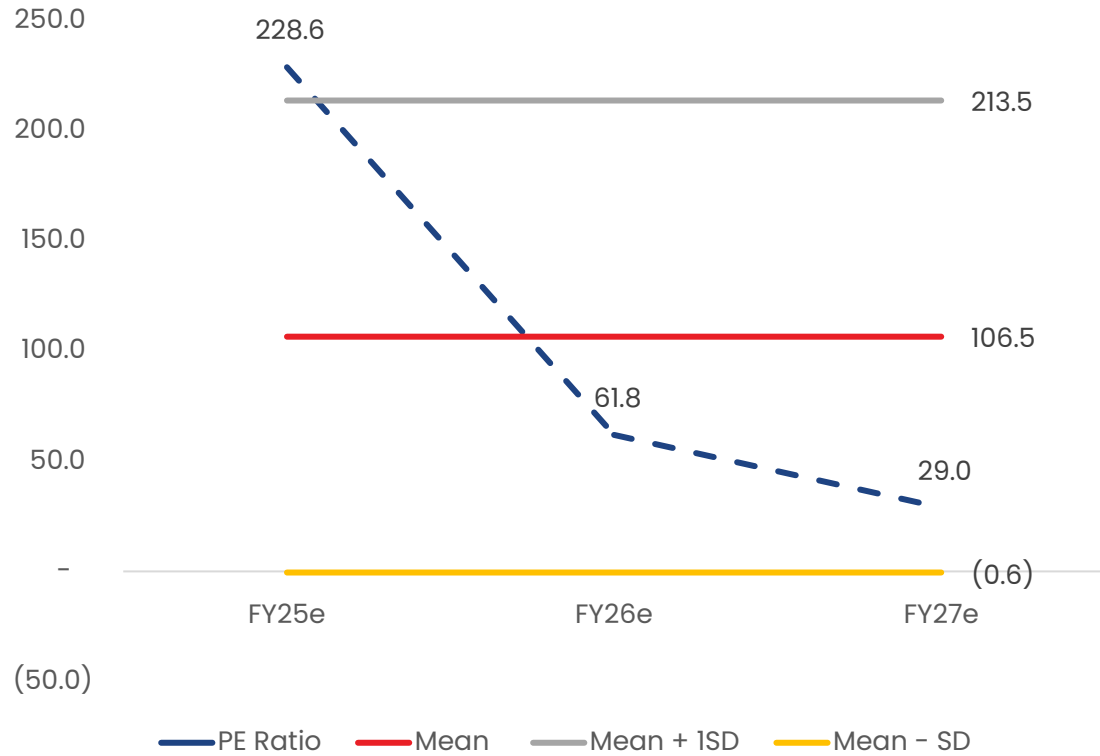


Forward Ratio (ROE% and ROCE%)

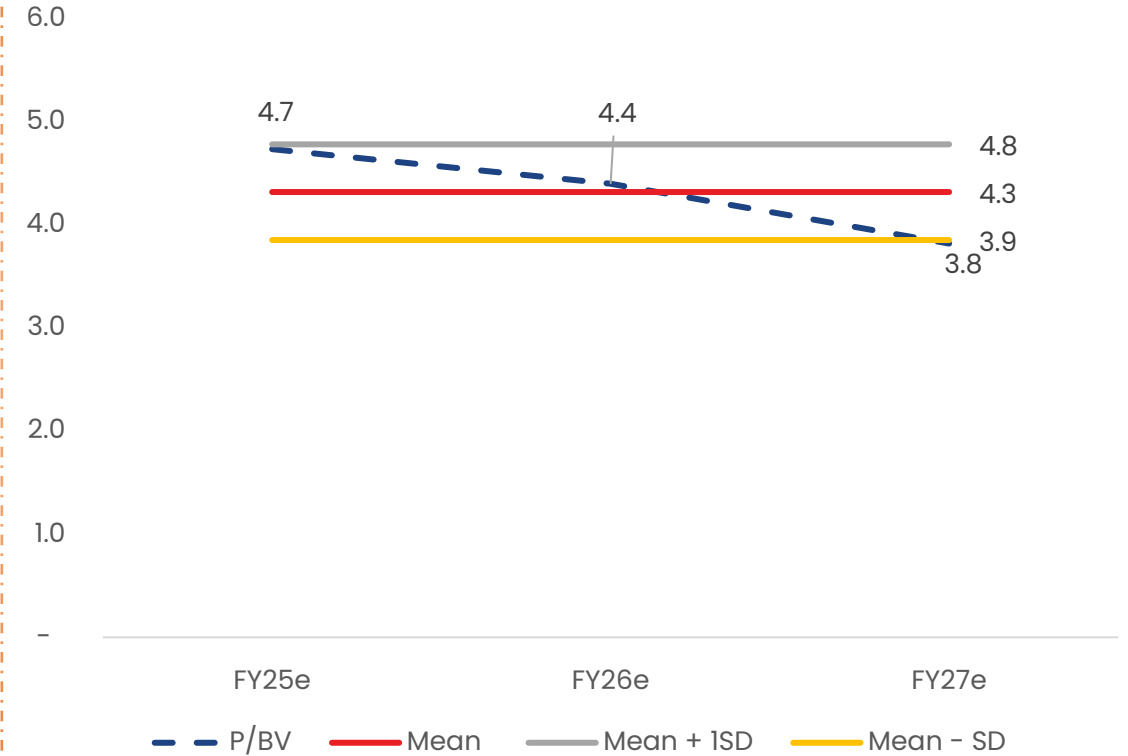


# Story In Charts

Forward Valuation Chart (PER Ratio)

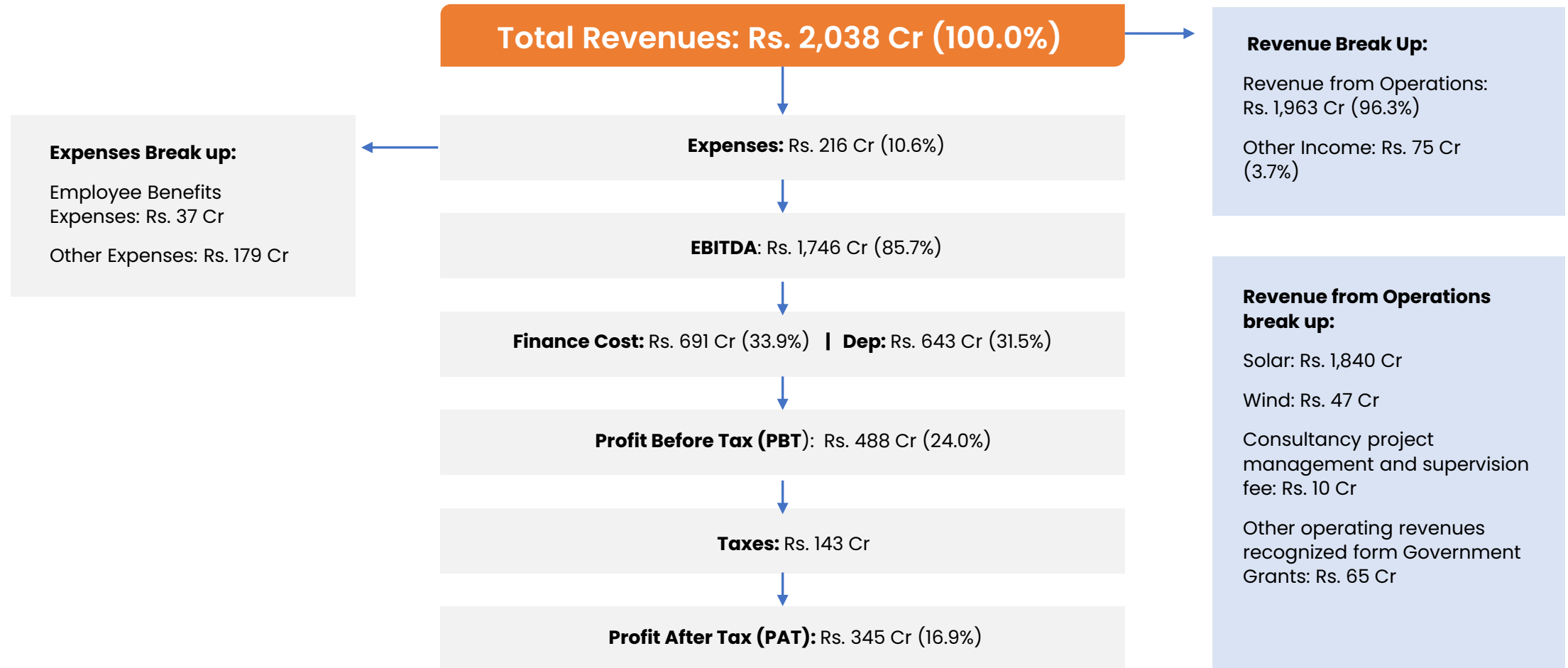


Forward Valuation Chart (P/BV Ratio)



# Income Statement Flow Chart

(As of FY24 – figures in Rs. Crores)



# Balance Sheet

as on 30<sup>th</sup> September, 2024 (Rs. Crores)

**Assets:**  
Rs. 32,408 Cr



|                          |               |
|--------------------------|---------------|
| Fixed Assets (Net Block) | Rs. 19,076 Cr |
| Capital WIP              | Rs. 9,031 Cr  |
| Cash & Cash Equivalents  | Rs. 1,455 Cr  |
| Other Assets             | Rs. 2,846 Cr  |

**Liabilities:**  
Rs. 32,408 Cr



|                   |               |
|-------------------|---------------|
| Share Capital     | Rs. 7,500 Cr  |
| Reserves          | Rs. 781 Cr    |
| Borrowings        | Rs. 20,698 Cr |
| Other Liabilities | Rs. 3,429 Cr  |

# Key Milestones

|                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2013:</b><br>The journey began with the commissioning of Dadri, the first solar project with a capacity of 5 MW on March 30th, followed by another 5 MW project in Port Blair, Andaman and Nicobar on March 31st.                                                                                                                                                                                             | <b>2014:</b><br>Marked by the commercialization of the floating solar project in Ramagundam, Telangana on January 9th and several other projects totaling 40 MW across various locations, reinforcing the foundation for future growth in renewable energy. | <b>2016:</b><br>A notable expansion occurred with a 250 MW capacity project commissioned in Anantapur, Andhra Pradesh on July 31st.                                                                                                                                                                                                                                                                                                                                                   | <b>2017:</b><br>Further expansion with the commissioning of Bhadla-I in Rajasthan with 260 MW on March 25th and Mandsaur in Madhya Pradesh with 250 MW on September 1st. The diversification into wind energy was marked by the Rojmal 50 MW wind project on November 10th, and the commissioning of Kayamkulam, the first floating solar project of 100KW on June 24th. |
| <b>2018:</b><br>NGEL pioneered the first hybrid project integrating solar and wind energy with a capacity of 3.4 MW at Kudgi and a small hydro project of 8 MW at Singrauli, Uttar Pradesh on March 5th.                                                                                                                                                                                                         | <b>2020:</b><br>Formation of NTPC REL on October 7th as part of a strategic move to consolidate renewable energy assets.                                                                                                                                    | <b>2021:</b><br>Achieved a significant milestone of 1 GW of renewable energy capacity in January.                                                                                                                                                                                                                                                                                                                                                                                     | <b>2022:</b><br>Formation of NGEL on April 7th to consolidate all renewable assets under one umbrella, surpassing 2 GW of installed capacity in June and escalating to 3 GW by December.                                                                                                                                                                                 |
| <b>2023:</b> <ol style="list-style-type: none"> <li>Acquired 15 renewable assets with a combined capacity of 2,861 MW.</li> <li>Formed a joint venture with Indian Oil Corporation Limited named "Indianoil NTPC Green Energy Private Limited" (INGEL) to develop renewable energy-based power projects.</li> <li>Launched its first wind project in Dayapar, Bhuj, Gujarat with a capacity of 50 MW.</li> </ol> |                                                                                                                                                                                                                                                             | <b>2024:</b> <ol style="list-style-type: none"> <li>Commissioned a 150 MW solar project in Chhattargarh, Rajasthan, and a 40 MW project in Ayodhya, demonstrating rapid project execution.</li> <li>Operational capacity exceeded 3 GW on a consolidated level.</li> <li>Entered into several significant JV agreements for the development of renewable energy projects totaling over 60 GW and initiatives in green hydrogen, underscoring an ambitious growth strategy.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                          |

# Management Structure



**Mr. Gurdeep Singh**

**Chairman and Managing Director**

Mr. Singh serves as the Chairman and Managing Director of NGEL, a role he has held since 2016, concurrently with his position as the Chairman and Managing Director of NTPC Limited. Mr. Singh holds a Bachelor's degree in Mechanical Engineering from Kurukshetra University and has completed a management education program from the Indian Institute of Management, Ahmedabad. With over 18 years of directorial experience in the power sector, he has a robust background in corporate leadership. Before his tenure at NTPC Limited, he was the Managing Director at Gujarat State Electricity Corporation Limited.



**Mr. Rajiv Gupta**

**Chief Executive Officer (CEO)**

Mr. Gupta has been the Chief Executive Officer of NGEL since joining the company. A long-term associate of NTPC Limited since 1987, he brings over 36 years of experience in the power sector. He holds a Bachelor's degree in Mechanical Engineering and a Master's degree in Business Administration, both from Delhi University.



**Mr. Neeraj Sharma**

**Chief Financial Officer (CFO)**

Mr. Sharma, serving as the Chief Financial Officer, joined NTPC Limited in 1998 and later transitioned to NGEL. He is a Chartered Accountant, a member of the Institute of Chartered Accountants of India, and holds a Bachelor's degree in Commerce from Panjab University. With over 25 years of experience in the power sector, his expertise lies in financial management.

# Management Structure



## Mr. Jaikumar Srinivasan

### Director (Finance)

Mr. Srinivasan is the Director of Finance at NGEL and NTPC Limited. He is an associate member of the Institute of Cost and Work Accountants of India and holds a Bachelor's degree in Commerce from Nagpur University. His career includes significant roles such as Director of Finance at NLC India Limited and Maharashtra State Electricity Distribution Company Limited. He holds more than 17 years of experience as a Director in various companies within the power sector.



## Mr. Shanmugha Kothandapani

### Director (Projects)

Mr. Kothandapani, the Director of Projects at NGEL and NTPC Limited, has been with NTPC since 1988. He holds a Bachelor's degree in Engineering (Electronics and Communication) from Bharathiar University and a Postgraduate Diploma in Business Management from the Management Development Institute, Gurgaon. He boasts over 36 years of diverse experience in project management, construction, and commissioning of power stations.

| Common Size Income St.    | FY24          | H1FY25        |
|---------------------------|---------------|---------------|
| Revenue from operations   | 96.3%         | 95.5%         |
| Other income              | 3.7%          | 4.5%          |
| <b>Total Income</b>       | <b>100.0%</b> | <b>100.0%</b> |
| Less: Expenses            | 10.6%         | 13.2%         |
| <b>EBITDA</b>             | <b>85.7%</b>  | <b>82.4%</b>  |
| Less: D&A                 | 31.5%         | 31.6%         |
| EBIT                      | 54.2%         | 50.8%         |
| <b>Less: Finance Cost</b> | <b>33.9%</b>  | <b>33.4%</b>  |
| PBT & Exceptional Items   | 24.0%         | 21.9%         |
| Exceptional items         | 0.0%          | -0.1%         |
| PBT                       | <b>24.0%</b>  | <b>21.7%</b>  |
| Less: Tax expense         | 7.0%          | 6.3%          |
| <b>PAT</b>                | <b>16.9%</b>  | <b>15.5%</b>  |

| Common Size Balance Sheet     | FY24          | H1FY25        |
|-------------------------------|---------------|---------------|
| <b>EQUITY AND LIABILITIES</b> |               |               |
| Share Capital                 | 21.0%         | 23.1%         |
| Reserves                      | 1.9%          | 2.1%          |
| Borrowings                    | 64.9%         | 63.9%         |
| Other Liabilities             | 12.2%         | 10.6%         |
| <b>Total</b>                  | <b>100.0%</b> | <b>100.0%</b> |
| <b>ASSETS</b>                 |               |               |
| Fixed Assets                  | 64.6%         | 58.9%         |
| CWIP                          | 26.2%         | 27.9%         |
| Cash and Cash equivalents     | 1.7%          | 4.5%          |
| Other Assets                  | 7.4%          | 8.8%          |
| <b>Total</b>                  | <b>100.0%</b> | <b>100.0%</b> |

## Revenue Split

| Particulars                                                | FY24           |               | H1FY25         |               |
|------------------------------------------------------------|----------------|---------------|----------------|---------------|
|                                                            | Rs. Cr         | %             | Rs. Cr         | %             |
| Renewable Energy Sales                                     |                |               |                |               |
| Solar                                                      | 1,840.3        | 93.8%         | 982.5          | 90.8%         |
| Wind                                                       | 47.1           | 2.4%          | 50.3           | 4.6%          |
| Consultancy project management and supervision fee         | 10.0           | 0.5%          | 14.0           | 1.3%          |
| Other operating revenues recognized form Government Grants | 65.1           | 3.3%          | 32.8           | 3.0%          |
| Interest from Customers                                    | -              | 0.0%          | 2.6            | 0.2%          |
| <b>Revenue From Operations</b>                             | <b>1,962.5</b> | <b>100.0%</b> | <b>1,082.3</b> | <b>100.0%</b> |

## Pipeline (MW)

| Revenue from Operations (Rs. Cr)                                                              | H1FY25          |
|-----------------------------------------------------------------------------------------------|-----------------|
| Megawatts Operating, Contracted & Awarded (MWs)                                               | 16,896.0        |
| Capacity under Pipeline                                                                       |                 |
| Solar (MWs)                                                                                   | 6,925.0         |
| Wind (MWs)                                                                                    | 2,250.0         |
| Total (MWs)                                                                                   | 9,175.0         |
| <b>Total Megawatts Operating, Contracted &amp; Awarded plus Capacity under Pipeline (MWs)</b> | <b>26,071.0</b> |

## Business concertation – Top 9 Off-takers

| Particulars                                       | Revenue from largest offtaker |       | Revenue from top 5 offtaker |       | Revenue from top 9 offtaker |       |
|---------------------------------------------------|-------------------------------|-------|-----------------------------|-------|-----------------------------|-------|
|                                                   | Rs. Cr                        | %     | Rs. Cr                      | %     | Rs. Cr                      | %     |
| <b>Restated Consolidated Financial Statements</b> |                               |       |                             |       |                             |       |
| H1FY25                                            | 509.5                         | 47.1% | 897.9                       | 83.0% | 1,060.2                     | 98.0% |
| FY24                                              | 975.5                         | 49.7% | 1,723.0                     | 87.8% | 1,916.1                     | 97.6% |

## Peer Comparison

| Companies              | Mcap<br>(Rs. Cr) | EPS<br>(FY24) | PE Ratio<br>(ttm) | Total Installed<br>Capacity (GW) | Renewable<br>Energy Capacity<br>(GW) | Est 2030e<br>Capacity (GW) | ROE%<br>FY24 | ROCE%<br>FY24 |
|------------------------|------------------|---------------|-------------------|----------------------------------|--------------------------------------|----------------------------|--------------|---------------|
| NTPC Green Energy Ltd  | 88,299.5         | 0.73          | 255               | 3.3                              | 3.3                                  | 26.0                       | 6.3%         | 6%            |
| Adani Green Energy Ltd | 1,42,174.8       | 6.94          | 129.2             | 11.6                             | 11.6                                 | 50.0                       | 14.7 %       | 9.65%         |
| JSW Energy Ltd         | 76,971.7         | 10.47         | 41.9              | 8.1                              | 4.6                                  | 20.0                       | 8.4%         | 8.6%          |
| Tata Power Company Ltd | 1,08,513.7       | 11.57         | 29.4              | 15.6                             | 6.3                                  | 25.6                       | 11.3%        | 11.1%         |

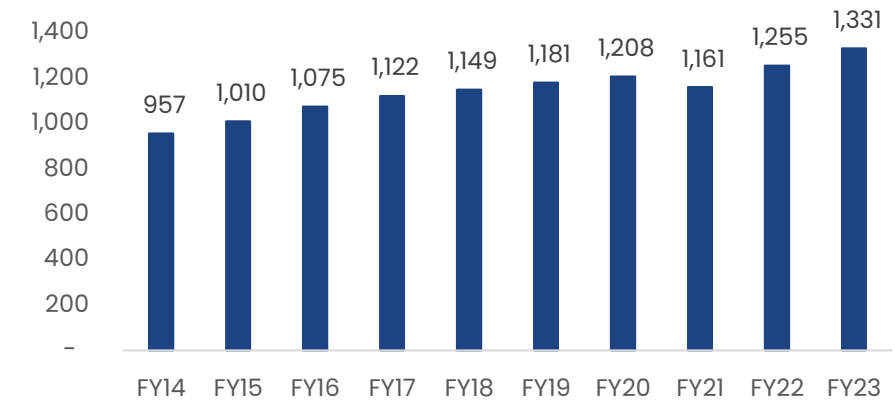
- Adani Green Energy Ltd:** Adani Green Energy Limited, incorporated in 2015, is a holding company of several subsidiaries carrying business of renewable power generation within the Adani group and is primarily involved in renewable power generation and other ancillary activities. The company sells the power generated from wind power projects under long-term Power Purchase Agreements (PPA). It is also engaged in the sale of solar & wind power equipment, Project Management Consultancy Services, and other related ancillary activities.
- JSW Energy Ltd:** The company and its subsidiaries are primarily engaged in the business of generation of power from its power assets located at Karnataka, Maharashtra, Nandyal and Salboni. It is the holding company for the JSW group's power business. The company also has a JV company engaged in mining activities and an associate engaged in manufacturing of turbines.
- Tata Power Company Ltd:** Tata Power is primarily involved in the business of the generation, transmission and distribution of electricity. It aims to produce electricity completely through renewable sources. It also manufactures solar roofs and plans to build 1 lakh ev charging stations by 2025. The company is India's largest vertically-integrated power company. The company is omnipresent in the industry with operations in the field of generation of electricity from thermal and renewable sources, transmission and distribution of electricity & other services like EPC, O&M, etc.

# Industry Overview

## Analysis of Per Capita Electricity Consumption in India

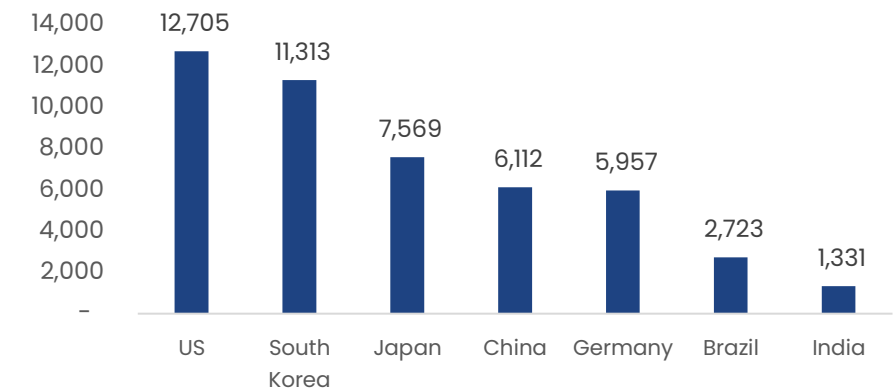
- India's per capita electricity consumption has demonstrated a consistent upward trajectory, increasing from 957 kWh in FY2014 to 1,331 kWh in FY2023, reflecting a CAGR of 3.73%. This growth is attributed primarily to significant capacity additions across the country, coupled with enhancements in the transmission and distribution (T&D) network. Despite this progress, India's per capita electricity consumption remains considerably lower when compared with other major economies.
- When compared to other developing nations such as Brazil and China, India's electricity consumption per capita reveals a stark disparity. For instance, in CY2023, Brazil's per capita electricity consumption was approximately 2.5 MWh—nearly double that of India's 1.3 MWh. Similarly, China's per capita consumption stood at 6.1 MWh, which is about four times that of India. This comparison extends to developed nations as well, with the United States recording a per capita consumption of 12.7 MWh in the same year, highlighting a gap of nearly tenfold relative to India.
- Forecast and growth drivers: Looking ahead, India's per capita electricity consumption is projected to grow at a CAGR of approximately 5-7% between FY2023 and FY2029 as per a CRISIL report. Several factors are poised to drive this growth, including:
  - Enhancements in the quality and reliability of electricity supply, particularly through ongoing rural electrification efforts, are expected to unlock latent demand, especially from residential sectors.
  - As India's economy continues to expand and per capita income rises, higher consumption rates are likely, fueled by increased usage of electrical appliances and air conditioning systems.
  - Intensive electrification projects such as railway electrification and the broader adoption of electric vehicles (EVs) are set to further stimulate electricity demand.
- India's per capita electricity consumption could reach between ~1900 to 2100 kWh by 2030e. This projection is based on the current trends of infrastructure development, policy support, and socioeconomic factors driving electricity usage.

India Per capita electricity consumption (kWh)



Source: Central Electricity Authority of India (CEA)

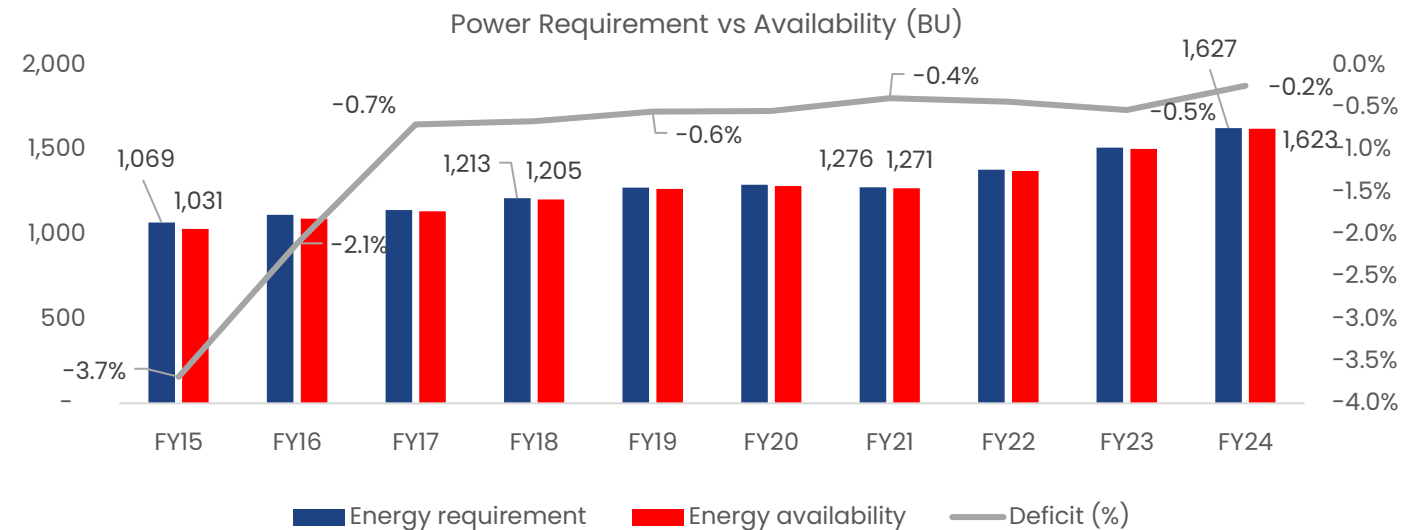
Per Capita Energy Consumption: 2023 (kWh)



Source: IEA – International Energy Agency

### Analysis of Total Energy Demand and Installed Capacity in India

- From FY 2013-14 to FY 2022-23, India's total energy consumption increased from 26,822 Petajoule (PJ) to 35,159 Petajoule (PJ), representing a CAGR of 3.05%. Specifically, between FY 2021-22 and FY 2022-23, there was a significant increase of 6.48% in energy consumption, showcasing an acute demand for energy driven by various sectors of the economy. Notably, the consumption of Coal and Lignite saw the highest growth rate of approximately 8.63% during FY 2022-23, underscoring the ongoing reliance on fossil fuels despite global shifts toward renewable sources.



Source: Central Electricity Authority of India (CEA)

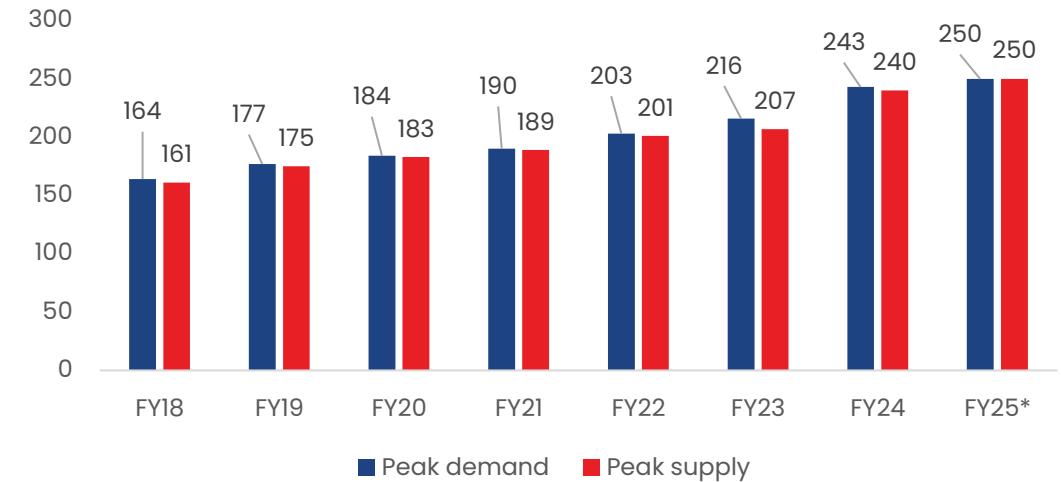
- In 2020, the International Energy Agency (IEA) ranked India as the third-largest global energy consumer, following China and the United States. Under the Stated Policies Scenario, India is projected to surpass the European Union by 2030, positioning itself as the third-largest energy consumer worldwide. This forecast is indicative of India's increasing energy demands which will continue to fuel the country's economic growth and necessitate expansive energy policy reforms and investment in energy infrastructure.

### Historical Trends in Power Demand and Energy Requirements in India

- From FY21 to FY24, India's electricity requirement grew at a CAGR of approximately 8.4%, while power availability increased at a slightly higher CAGR of about 8.5%. This close alignment between demand and supply growth is largely attributable to significant capacity additions in both generation and transmission segments. Such strategic enhancements have effectively addressed historical deficiencies and met rising electricity demands from an expanding economy and population.
- The concerted efforts to boost generation and transmission capacities have yielded tangible results in reducing India's energy deficit. From a deficit of 0.7% in FY18, the gap narrowed to 0.5% in FY23 and further improved to 0.3% in FY4. By FY25, preliminary data as of September 2024 indicated that the deficit was further reduced to an impressive 0.1%. The strengthening of inter-regional power transmission capacities over the past five years has played a critical role in this achievement by alleviating supply constraints caused by congestion and limited transmission corridor availability.
- The peak electricity demand in India has also seen a significant upward trend, growing from 164 GW in FY18 to 243 GW in FY24, reflecting an average annual growth rate of 6.8% over six years. As of May 2024, during FY25, peak demand further escalated to 250 GW. Notably, the seasonal pattern of peak electricity demand has shifted in the post-pandemic years; while demand typically peaked during the monsoon season (August-September) prior to the pandemic, due to high humidity increasing domestic and commercial cooling loads, recent years have seen peak demand shifting to the summer months (April-July) attributed to extreme heatwave conditions.
- The strategic growth in installed capacity has ensured that the growth in energy availability has consistently outpaced demand growth. This dynamic has significantly narrowed the gap between demand and supply, both in terms of energy and peak demand. Specifically, the peak demand shortage decreased sharply to 1.4% in FY24 from 4.7% in FY15, while the energy shortage reduced to 0.3% from 3.6% over the same period. Looking forward, while a base deficit is expected to persist at a minimal range of 0.3-0.5% over the medium term, this is primarily anticipated in under-penetrated areas with weaker distribution infrastructure. As these regions gradually develop and more underserved populations gain access to the grid, it is expected that these deficits will diminish further.

Source: Central Electricity Authority of India (CEA)

Energy and peak demand shortage trend



## Overview of the Renewable Energy Sector in India

- As of December 2024, India's total installed renewable energy capacity, including large hydro projects, reached approximately 212 GW, a substantial increase from about 63 GW in March 2012. This increase represents a CAGR of around ~9% from fiscal 2018 to 2025. As of December 2024, renewable energy sources accounted for about 45% of India's total installed generation capacity, highlighting the country's significant shift towards greener energy sources.
- The growth of India's renewable energy capacity has been predominantly driven by solar power, which surged from a mere 2.6 GW in March 2014 to 100 GW by Dec 2024.
- Globally, India ranks fourth in total renewable energy capacity and is a major player in both wind and solar installations. In the Asia-Pacific region, India stands as the second largest renewable energy market, trailing only China. According to the International Renewable Energy Agency (IRENA) statistics for 2023, while China led the world by adding about 298 GW in one year, the United States and European nations like Germany and Brazil also made substantial additions. India's contribution of approximately 15 GW during fiscal 2023 underscores its active participation in the global renewable energy expansion, though it contributes about 3% of the global renewable capacity added in that year, compared to China's 63%.
- The adoption and integration of renewable energy vary significantly across Indian states, influenced by factors such as state-specific policies, geographic and climatic conditions, and economic incentives. States with higher renewable penetration typically exceed the national average in both installed capacity and consumption of renewable energy. This regional variability is crucial for policy makers and investors as it highlights the differentiated approach needed to enhance RE adoption across India.

## Current Installed Capacity in India:

| Particulars (MW)                | Jan-25 (MW)     | % share       |
|---------------------------------|-----------------|---------------|
| <b>Sector</b>                   |                 |               |
| Central Sector                  | 1,05,773        | 22.7%         |
| State Sector                    | 1,09,807        | 23.6%         |
| Private Sector                  | 2,50,671        | 53.8%         |
| <b>Total</b>                    | <b>4,66,251</b> | <b>100.0%</b> |
| <b>CATEGORY</b>                 |                 |               |
| <i>Fossil Fuel</i>              |                 |               |
| Coal                            | 2,13,873        | 45.9%         |
| Lignite                         | 6,620           | 1.4%          |
| Gas                             | 24,818          | 5.3%          |
| Diesel                          | 589             | 0.1%          |
| <b>Total Fossil Fuel</b>        | <b>2,45,900</b> | <b>52.7%</b>  |
| <i>Renewable Energy Sources</i> |                 |               |
| Hydro                           | 46,968          | 10.1%         |
| Wind                            | 48,365          | 10.4%         |
| Solar                           | 1,00,330        | 21.5%         |
| BM Power/Cogen                  | 10,743          | 2.3%          |
| Waste to Energy                 | 663             | 0.1%          |
| Small Hydro Power               | 5,101           | 1.1%          |
| <b>Renewable Energy Sources</b> | <b>2,12,170</b> | <b>45.5%</b>  |
| Nuclear                         | 8,180           | 1.8%          |
| <b>Total Non-Fossil Fuel</b>    | <b>2,20,350</b> | <b>47.3%</b>  |
| <b>Total Installed Capacity</b> | <b>4,66,251</b> | <b>100.0%</b> |

## Overview of the Solar Sector in India

- As of January 2025, solar power constitutes approximately 47% of the renewable energy basket (including large hydro) in India, highlighting its dominant role in the country's transition towards sustainable energy sources.
- From FY28 to Jan 2025, the solar sector has seen an impressive expansion, with approximately 78 GW of capacity added, reflecting a CAGR of 25%+. This rapid growth has been facilitated by a combination of governmental initiatives and a significant decrease in capital costs, which have together spurred widespread adoption and investment in solar technologies across various states.
- Government Policies and Initiatives: The Indian government has played a crucial role in accelerating the growth of solar energy through several strategic policies and incentives:
  - Solar Renewable Purchase Obligations (RPOs): Implemented across Indian states since 2011, these obligations have been critical in driving the states to adopt solar energy solutions.
  - National Institute of Solar Energy: Estimates the country's solar potential at 748 GW, assuming 3% of the geographical surface is covered with solar PV modules. This highlights the vast potential for solar energy generation in India, given its favorable geographic and climatic conditions.
  - Fiscal and Regulatory Incentives: Various schemes such as PM Surya Ghar Muft Bijli Yojna, CPSU Scheme Phase I and II, and the annual bidding trajectory for RE power bids are designed to support the development of solar projects with viability gap funding and streamlined project approvals.
- Economic and Operational Drivers
  - Declining Module Prices: The global average solar module price has fallen dramatically, from \$1.78 per watt-peak in 2010 to \$0.22 per watt-peak by the end of August 2019. This decline has been driven by technological advancements, economies of scale, and a global supply-demand imbalance in the solar module manufacturing industry.
  - Operational Support: The Government of India has also facilitated the execution of solar projects through the development of solar parks and ultra-mega solar power projects. This initiative aims to address land acquisition and transmission challenges, thereby accelerating the commissioning of solar projects.
- Geographical Advantages: India benefits from an ideal solar geographic setup, with about 300 days of sunshine per year and varying levels of solar irradiance across the country that make regions like Gujarat, Rajasthan, and Madhya Pradesh particularly suitable for solar installations. The daily average Global Horizontal Irradiance (GHI) ranges from 5 kWh/m<sup>2</sup> in northeastern areas to about 7 kWh/m<sup>2</sup> in the western regions, providing a strong foundation for solar energy projects.

## Overview of the Wind Sector in India

- As of January 2025, India's installed wind power capacity stands at approximately 48.4 GW, constituting about 23% of the total renewable power generation capacity. The capacity has grown at a CAGR of roughly 7%+ since fiscal 2016, indicating robust development driven by technological advancements and strategic initiatives. The majority of this capacity is distributed across the wind-rich states of Tamil Nadu, Gujarat, Maharashtra, Rajasthan, and Karnataka.
- In FY25, India added approximately 2.48 GW of wind capacity in nine months, compared to 3.25 GW throughout FY24. The southern, western, and northwestern regions, particularly the states of Gujarat, Tamil Nadu, and Karnataka, have led these additions, comprising about 84% of the total installed capacity as of March 2024. This geographical concentration is due to the higher wind potentials in these areas, which have historically attracted more investments and projects.
- The financial landscape for wind energy in India has been characterized by declining tariffs and improving investment returns. For FY24, the weighted average discovered tariff for competitively bid projects was Rs 3.4/kWh. This rate reflects a gradual increase from the previous fiscal year's average of Rs 3.0/kWh, accounting for rising commodity costs and execution risks. However, the most recent auctions in February 2024 saw a slight uptick in tariffs to Rs 3.63/kWh, suggesting a recalibration of market expectations concerning costs and returns.
- Governmental and Policy Support: The Indian government has implemented several key initiatives to foster growth in the wind sector:
  - Annual Bidding Trajectory: The Ministry of New and Renewable Energy (MNRE) has set a clear pathway for capacity additions by mandating annual bids of 50 GW per year for renewable capacity, with specific targets for wind energy.
  - Renewable Generation Obligation (RGO): This policy mandates thermal power generators to produce a certain percentage of their capacity from renewable sources, integrating wind energy into broader power generation strategies.
  - Solar Parks and Ultra Mega Solar Power Projects: Aimed at addressing land acquisition and transmission challenges, these initiatives facilitate the rapid deployment of renewable energy projects, including wind.
- Technological Advancements and Future Outlook: Technological innovations in turbine design, such as higher hub heights and advanced blade technologies, have enabled the utilization of sites with lower wind densities, expanding the potential geographical scope for wind energy projects. These advancements are crucial for driving down the levelized cost of energy and enhancing the viability of wind projects across less windy regions.
- Challenges and Strategic Directions: Despite the optimistic outlook, the sector faces challenges such as site and land availability, grid connectivity issues, and the viability of sustaining low tariffs amid fluctuating capital costs. To address these issues, the government's continued support through schemes like large-scale central allocations and the implementation of payment security mechanisms will be vital.

- **Green Hydrogen**

- Hydrogen is often categorized by color codes based on its production method and the types of fuel used, with green hydrogen emerging as a critical player in the transition to sustainable energy systems. Green hydrogen is produced through the electrolysis of water using electricity derived from renewable energy sources such as solar, wind, or hydropower. This process splits water into hydrogen and oxygen without any greenhouse gas emissions, making green hydrogen a sustainable and clean energy carrier.
- India's commitment to achieving energy independence by 2047 and a net-zero carbon footprint by 2070 positions green hydrogen as a pivotal element. The Indian government has recognized the potential of green hydrogen in enhancing energy security, reducing reliance on imported fossil fuels, and supporting stable energy supply. This has led to the launch of the National Green Hydrogen Mission, which aims to develop a production capacity of 5 million metric tons (MMT) per annum of green hydrogen. The mission is backed by an investment of Rs. 197.44 billion and includes significant initiatives to boost the domestic production and use of green hydrogen.
- In July 2023, the Solar Energy Corporation of India (SECI) issued a tender under the SIGHT Scheme (Mode-I-Tranche-I) to establish 450,000 TPA production facilities for green hydrogen, demonstrating the government's proactive approach to fostering this sector. Following this, guidelines were notified for Tranche-II of the scheme in July 2024, with the tender process anticipated to conclude shortly thereafter. These efforts are part of broader pilot schemes initiated by the government for utilizing hydrogen in critical sectors such as shipping, steel, and transportation, highlighting the versatile applications of green hydrogen.
- The National Green Hydrogen Mission is not only a strategic component of India's energy policy but also a catalyst for economic growth. It is expected to attract over Rs. 8 trillion in investments by 2030, significantly impacting the green hydrogen sector's development. The mission also aims to add approximately 125 GW of associated renewable energy capacity, further boosting green energy infrastructure.
- As of March 2024, India ranks as the third largest consumer and producer of hydrogen globally, with substantial demand originating from the fertilizer and refinery sectors. The transition towards green hydrogen could reshape these industries by reducing their carbon footprint and enhancing their sustainability. By 2030, the green hydrogen demand from refineries and fertilizers alone is projected to reach approximately 1.4-1.8 MTPA, with the potential market value estimated between USD 3-4 billion, considering the projected production costs.

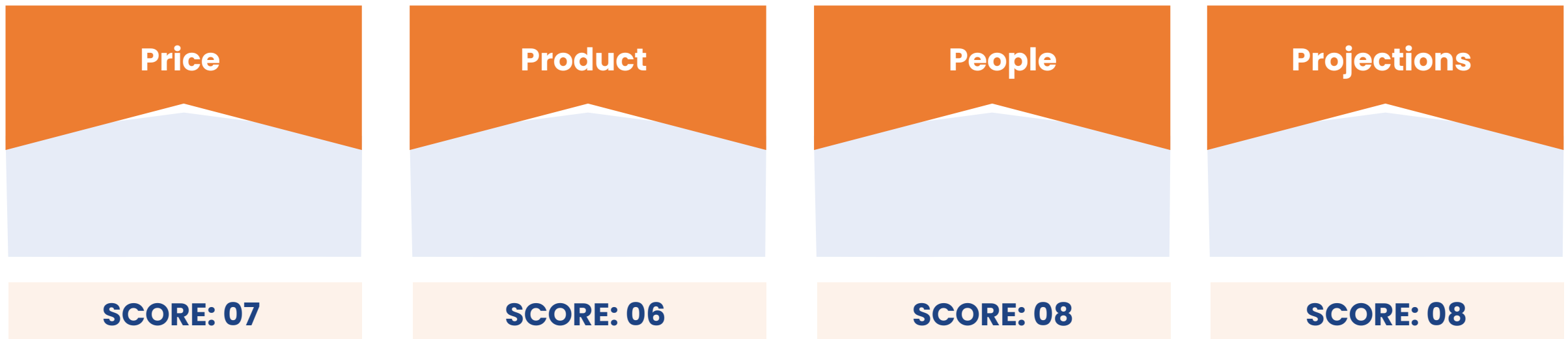
- **Electrolyser Technologies**

- Electrolysers are crucial for the production of green hydrogen, using various technologies that differ in cell design, component variations, and technological maturity. Among these, alkaline and proton exchange membrane (PEM) electrolyzers are the most widely adopted due to their advanced development stage, reliability, and efficiency. Conversely, solid oxide (SOEC) and anion exchange membrane (AEM) electrolyzers, though promising in efficiency and potential, are still in the earlier stages of commercial deployment.
- India is poised for significant growth in electrolyser demand, projected to reach 20 GW by 2030, according to NITI Aayog. This forecast aligns with India's ambitious targets for green hydrogen production, necessitating substantial advancements in electrolyser technology and manufacturing capacity.
- Key industry players are actively expanding India's electrolyser manufacturing capabilities:
  - Adani New Industries Limited (ANIL) is setting up an integrated 5 GW electrolyser plant, collaborating with Cavendish Renewable Technology (CRT) to produce electrolyzers using AE, PEM, and SOEC technologies.
  - Ohmium has established a PEM electrolyser production facility with a current capacity of 500 MW per year in Karnataka, with plans to expand this to 2 GW.
  - Greenko and John Cockerill initiated a partnership in March 2022 to establish a 2 GW electrolyser manufacturing facility in Andhra Pradesh.
  - H2E Power Systems is developing a 1 GW electrolyser plant in phases, exploring all four electrolyser technologies to diversify their production capabilities.
  - Reliance, in partnership with Stiesdal, and L&T, in collaboration with HydrogenPro, are each setting up AE-based electrolyser manufacturing facilities in Gujarat and Maharashtra, respectively.
- Globally, China currently leads in electrolyser manufacturing, with significant contributions from companies such as LONGi, PERIC, and Sungrow Power. However, the competitive landscape is evolving rapidly as American and European firms announce substantial capacity expansions. These developments are expected to enhance the global supply chain for electrolyzers and make these regions competitive in the near future.
- The expansion of electrolyser manufacturing capacity in India is not just a response to domestic demands but also part of a broader strategy to position India as a leader in the global green hydrogen economy. By advancing electrolyser technology and expanding production capabilities, India aims to reduce its dependency on imports, support its energy transition goals, and capture a significant share of the global market for electrolyser technology and green hydrogen production. This strategic shift towards domestic manufacturing is expected to foster innovation, reduce costs, and create new employment opportunities, reinforcing India's commitment to achieving its ambitious clean energy targets.

- **Energy Storage Technologies and Projects**

- Battery Energy Storage Systems (BESS) are emerging as a pivotal technology in the energy sector, known for their high energy density which is crucial for providing ancillary services to the power grid. The versatility of BESS enables their use in a myriad of grid support activities, including energy time shifting, distribution deferral, and energy arbitrage. Despite its potential, the technology faces challenges such as high initial investment costs, the ongoing evolution of technology, and the inherent risks associated with new technologies. Additionally, the lifecycle of batteries, typically ranging from 10 to 12 years, introduces challenges related to degradation, capacity reduction, and eventual disposal or recycling.
- Projects and Policy Initiatives for BESS: The Indian government has recognized the strategic importance of advancing BESS technology and has initiated several projects and policies to foster its deployment:
  - Viability Gap Funding (VGF) Scheme: In September 2023, the government approved the VGF scheme to support the development of 4,000 MWh of BESS capacity by fiscal 2031. The scheme, backed by an initial outlay of Rs. 94 billion, aims to cover up to 40% of the capital costs of BESS projects from fiscal 2024 to 2026.
  - Production Linked Incentive (PLI) Scheme: Launched by the Ministry of Heavy Industries in June 2021, the PLI scheme targets the establishment of Advanced Chemistry Cell (ACC) battery storage manufacturing, including a provision for grid-scale battery storage. With an outlay of Rs. 181 billion, the scheme aims to catalyze direct investments of around Rs. 450 billion in ACC manufacturing projects. By December 2023, 30 GWh of the 50 GWh capacity had been allocated through a competitive bidding process.
- Cost Dynamics and Market Adoption: The cost of battery storage solutions is projected to decline significantly, driven by ongoing advancements in technology, economies of scale, and increasing global production capacities. The National Renewable Energy Laboratory forecasts a reduction in the price of lithium-ion battery solutions, anticipating that four-hour utility-scale lithium-ion battery costs will decrease to \$90-100 per kWh by 2030, down from \$130-140 per kWh in 2023.
- The integration of BESS is expected to expand across all segments of the energy sector, from generation and transmission to distribution and end-consumer applications. The Central Electricity Authority (CEA) of India, in its April 2023 report on the optimum power generation mix, underscored the need for substantial BESS and pumped hydro storage (PHS) capacity to meet future energy storage demands. Specifically, the report estimates a requirement of at least 41.7 GW/208 GWh of BESS and 18.9 GW of PHS by fiscal 2030, highlighting the critical role of energy storage in stabilizing and supporting India's growing renewable energy infrastructure. These developments reflect a robust commitment to enhancing grid reliability, facilitating the integration of renewable energy sources, and promoting sustainable energy solutions across the country.

## Stock Selection Criteria – P<sup>4</sup> (PPPP) = A Winning Grid





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