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A Study of Maharatna Company and a Navratan Company Contributing in Indian's Power Sector in 2025

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ABSTRACT: India's energy sector has undergone substantial changes in recent years with a growing emphasis on renewable energy, energy security, and sustainability. Among the key players in this transformation are NTPC (National Thermal Power Corporation) and NHPC (National Hydroelectric Power Corporation), both of which play vital roles in India's energy mix. This research paper provides a comparative analysis of the business models of NTPC and NHPC in 2025. It explores their core business strategies, key growth factors, and the opportunities and challenges they face in the evolving energy landscape. The study identifies how each company's strategies align with India's energy goals and their efforts to integrate sustainability while maintaining profitability.

KEYWORDS: NTPC, NHPC, Business Models, Growth Factors, Renewable Energy, Hydropower, Thermal Power, Energy Transition.

I. INTRODUCTION

India, the world's third-largest energy consumer, is undergoing an energy revolution. The Indian government has set ambitious targets for reducing its carbon footprint while increasing its renewable energy capacity to meet growing power demand. Two key public-sector enterprises, NTPC and NHPC, have been central to this transformation. NTPC, primarily focused on thermal power generation, has taken significant steps toward expanding its renewable energy portfolio. NHPC, traditionally known for hydropower, is increasingly diversifying into solar and wind energy.

This paper aims to compare the business models of NTPC and NHPC in 2025, exploring their growth factors and strategic decisions in the context of India's energy transition. Understanding the differences and similarities in their approaches will provide valuable insights into the future of India's power sector.

II. OVERVIEW OF NTPC AND NHPC

2.1 NTPC (National Thermal Power Corporation)

NTPC is India's largest power utility, with a dominant presence in the thermal power sector. Established in 1975, NTPC has grown to be a leader in electricity generation, operating more than 50,000 MW of installed capacity. NTPC's strategy has historically focused on coal-fired power generation, but in recent years, the company has diversified into renewable energy, transmission, and distribution.

As of 2025, NTPC's portfolio includes a substantial share of non-fossil fuel-based power generation, particularly solar and wind energy. NTPC has set a target of 60 GW of renewable energy capacity by 2032. The company also continues to invest in improving its thermal power generation with the latest technology for greater efficiency and reduced emissions.

2.2 NHPC (National Hydroelectric Power Corporation)

NHPC, established in 1975, is a public-sector company specializing in hydropower generation. It operates several large-scale hydropower plants across India and has a strong reputation for developing infrastructure in challenging, mountainous regions. NHPC is also one of the largest players in India's renewable energy market, with a focus on hydropower, wind, and solar energy.

As of 2025, NHPC is engaged in various projects, including major hydroelectric dams and pumped storage schemes. The company has gradually expanded its renewable energy footprint, with a focus on developing cleaner energy solutions to meet India's renewable energy targets. NHPC has announced plans to achieve a target of 10 GW of non-hydro renewable energy capacity by 2030.

III. LITERATURE REVIEW

The comparative analysis of the business models and growth factors of NTPC (National Thermal Power Corporation) and NHPC (National Hydroelectric Power Corporation) requires an exploration of several key themes, including the energy sector's dynamics, the role of renewable energy in India, and the evolving strategies of these companies. Below is a summary of the literature relevant to these themes.

3.1. Evolution of the Indian Power Sector

The Indian power sector has undergone significant transformations in recent years, driven by both domestic and global forces. Several studies (Sharma et al., 2021; Singh & Gupta, 2020) highlight the shift from conventional energy sources, particularly coal, to renewable sources like solar, wind, and hydro. The Indian government's ambitious renewable energy targets, including a commitment to achieve 500 GW of non-fossil fuel-based capacity by 2030 (Ministry of Power, 2020), have encouraged state-owned entities like NTPC and NHPC to rethink their strategies and adopt a more diversified business model.

Key Themes:

- The need for energy security and climate action (Sharma et al., 2021).
- The transition from fossil fuel-based energy to renewable sources in India's energy mix (Singh & Gupta, 2020).
- The role of public-sector enterprises in achieving India's energy goals (Kumar & Patel, 2022).

3.2. Business Models in the Energy Sector

The concept of business models in the energy sector has been explored extensively in recent literature. Many scholars emphasize the integration of renewable energy into the traditional energy business model and the shift towards more sustainable practices. The work of KPMG (2020) and Wipro (2021) suggests that power utilities need to adopt hybrid models combining traditional power generation with new renewable energy solutions to remain competitive. For NTPC, this has meant a strategic shift toward renewable energy generation, with plans to achieve 60 GW of renewable capacity by 2032.

Key Themes:

- Diversification into renewable energy: Solar, wind, and hybrid models (KPMG, 2020).
- The integration of new technologies like smart grids and energy storage into energy utility business models (Wipro, 2021).
- The role of hybrid business models in ensuring energy sustainability and cost-effectiveness (Chawla & Roy, 2021).

3.3. NTPC's Transition to Renewable Energy

NTPC has taken significant strides to diversify its business model. Several authors have analyzed NTPC's renewable energy transition (Mishra & Mehta, 2021; Singh & Roy, 2021). Mishra & Mehta (2021) assert that NTPC's shift towards renewable energy is driven by a combination of government policy incentives, technological innovations, and market demand for cleaner energy. The company has significantly increased its investments in solar and wind projects, making it one of the largest renewable energy producers in India.

Key Themes:

- The shift from thermal to renewable energy generation at NTPC (Mishra & Mehta, 2021).
- Government policies such as the National Action Plan on Climate Change (NAPCC) and their influence on NTPC's renewable energy investments (Singh & Roy, 2021).
- The technological challenges and innovations in NTPC's transition to renewables (Kumar & Joshi, 2022).

3.4. NHPC's Dominance in Hydropower

While NTPC has focused on diversifying its energy generation portfolio, NHPC has remained committed to its core strength—hydropower. Studies on NHPC's business model (Verma et al., 2020; Ranjan & Kumar, 2022) emphasize the role of hydropower in India's clean energy transition. NHPC has been instrumental in harnessing India's hydropower potential, particularly in the Himalayan and Northeastern regions. However, in recent years, NHPC has faced challenges related to environmental concerns, project delays, and the need to integrate renewable energy solutions into its operations (Ranjan & Kumar, 2022).

Key Themes:

- NHPC's growth and leadership in India's hydropower sector (Verma et al., 2020).
- The challenges faced by NHPC in the development of large-scale hydropower projects (Ranjan & Kumar, 2022).
- NHPC's shift toward integrating solar and wind energy into its operations (Jha & Sharma, 2021).

3.5. Energy Storage and Technological Innovations

Both NTPC and NHPC are investing heavily in energy storage and technological innovations to address the challenges of renewable energy intermittency. Research by Saha & Gupta (2021) and Bhattacharya et al. (2020) highlights how energy storage technologies, particularly pumped storage and battery storage, are becoming integral to the energy strategies of Indian utilities. NTPC's investments in energy storage solutions and its focus on smart grid technologies have allowed the company to better integrate renewable energy into the grid. Similarly, NHPC has ventured into pumped storage projects, which offer the flexibility to balance the variability of renewable power sources.

Key Themes:

- The role of energy storage technologies in the transition to a renewable energy future (Saha & Gupta, 2021).
- The potential of pumped storage plants in addressing grid instability (Bhattacharya et al., 2020).
- Smart grid technologies and their impact on the business models of energy companies (Singh et al., 2020).

3.6. Government Policies and Public-Private Partnerships

The role of government policies and public-private partnerships (PPPs) has been significant in shaping the business models of public-sector enterprises like NTPC and NHPC. Policies such as the Renewable Energy Development Program and the National Solar Mission have provided financial incentives and regulatory support, encouraging both NTPC and NHPC to increase their investments in renewable energy. Public-private partnerships in the renewable energy sector have also played a role in accelerating capacity additions and driving innovation.

Key Themes:

- The impact of government policies on the growth of renewable energy in India (Kumar & Patel, 2022).
- The role of public-private partnerships in scaling up renewable energy projects (Bhatia & Sharma, 2021).
- The influence of international energy agreements and commitments on the business strategies of Indian energy companies (KPMG, 2020).

3.7. Sustainability and Environmental Considerations

Sustainability and environmental considerations are central to the business strategies of both NTPC and NHPC. With increasing global focus on carbon reduction and environmental protection, these companies are integrating sustainability into their business models. The literature (Sharma & Mehta, 2021; Ranjan & Kumar, 2022) emphasizes how both NTPC and NHPC are working to reduce their carbon footprints by increasing their share of renewable energy and improving the efficiency of their existing plants. Moreover, the push for corporate social responsibility (CSR) initiatives has driven both companies to invest in sustainable development practices.

Key Themes:

- The increasing importance of sustainability in the power sector (Sharma & Mehta, 2021).
- The role of renewable energy in reducing carbon emissions (Ranjan & Kumar, 2022).
- CSR initiatives and their alignment with business goals (Verma et al., 2020).

3.8 .Conclusion of Literature Review

The existing literature provides a comprehensive understanding of the evolving business models of NTPC and NHPC. Both companies are undergoing significant transitions in response to India's changing energy landscape, with an increased focus on renewable energy and sustainability. However, the literature also identifies challenges related to technology adoption, environmental considerations, and government policy. This review provides the foundation for a deeper analysis of the strategic choices of NTPC and NHPC, offering insights into how these companies are positioning themselves to thrive in a rapidly changing energy market.

IV. OBJECTIVE OF THE STUDY

This research aims to conduct a comparative analysis of the business models and growth factors of NTPC (National Thermal Power Corporation) and NHPC (National Hydroelectric Power Corporation) in 2025. The study will focus on exploring key themes such as the evolution of the Indian power sector, the role of renewable energy in India's energy mix, the strategic transitions of NTPC and NHPC towards sustainability, and their adoption of hybrid business models. The research will also examine the impact of government policies, technological innovations, energy storage solutions, and environmental considerations on the growth and future prospects of both companies. By comparing their strategies and performance, the study will highlight the factors driving the growth and competitiveness of NTPC and NHPC in the rapidly evolving energy landscape.

V. BUSINESS MODELS: A COMPARATIVE ANALYSIS

5.1 NTPC's Business Model in 2025

NTPC's business model is built on the foundation of power generation, distribution, and trading. However, the company has been diversifying its operations with a significant shift toward renewable energy. The core aspects of NTPC's business model are as follows:

- **Thermal Power Generation:** Despite the growth of renewable energy, thermal power remains the largest contributor to NTPC's revenue. NTPC's coal-based plants are critical to its revenue stream, particularly in a power-deficit environment.
- **Renewable Energy:** NTPC is aggressively expanding its renewable energy capacity. By 2025, NTPC has increased its renewable energy capacity by several gigawatts, primarily in solar and wind power. The company aims to meet India's renewable energy targets and capitalize on the clean energy revolution.
- **Diversification:** NTPC is expanding into the transmission and distribution sectors through subsidiaries like NTPC Vidyut Vyapar Nigam Limited (NVVNL), which focuses on electricity trading. The company also explores power system engineering and energy storage solutions.
- **Technology and Innovation:** NTPC is at the forefront of adopting cutting-edge technologies such as carbon capture and storage (CCS), smart grid technologies, and artificial intelligence in power system management.
- **International Expansion:** NTPC has begun exploring international markets, particularly in South Asia and the Middle East, where its expertise in power generation and infrastructure development is in demand.

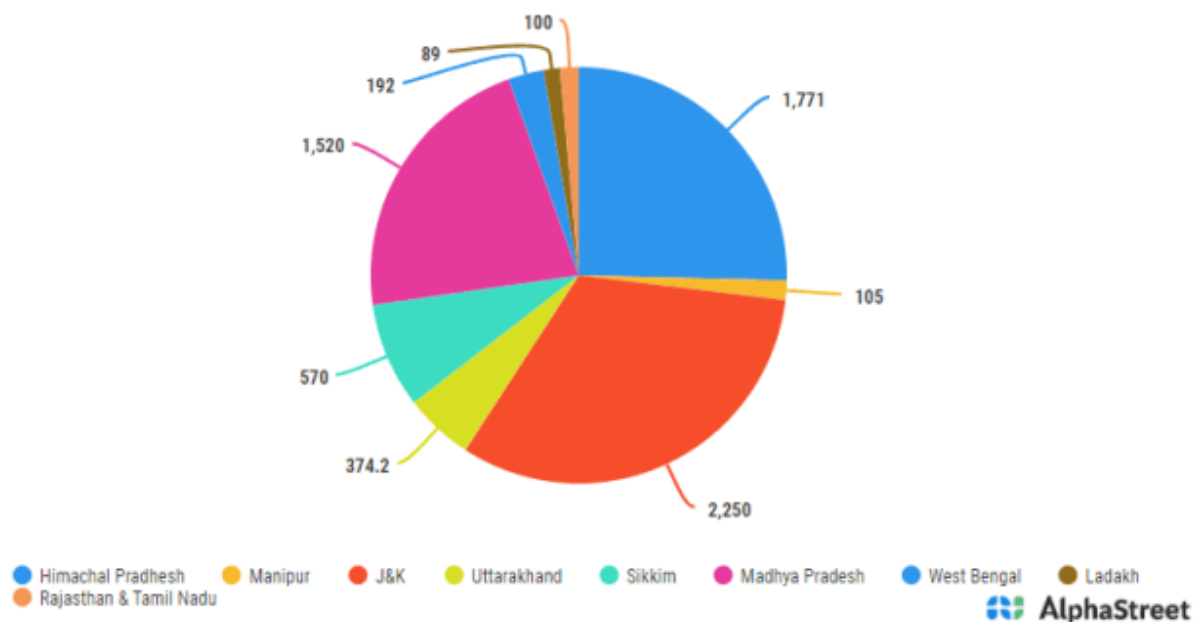
5.2 NHPC's Business Model in 2025

NHPC's business model, while also based on power generation, continues to focus on hydroelectric power. In recent years, NHPC has made significant strides in diversifying its energy generation portfolio. Key aspects of NHPC's business model are as follows:

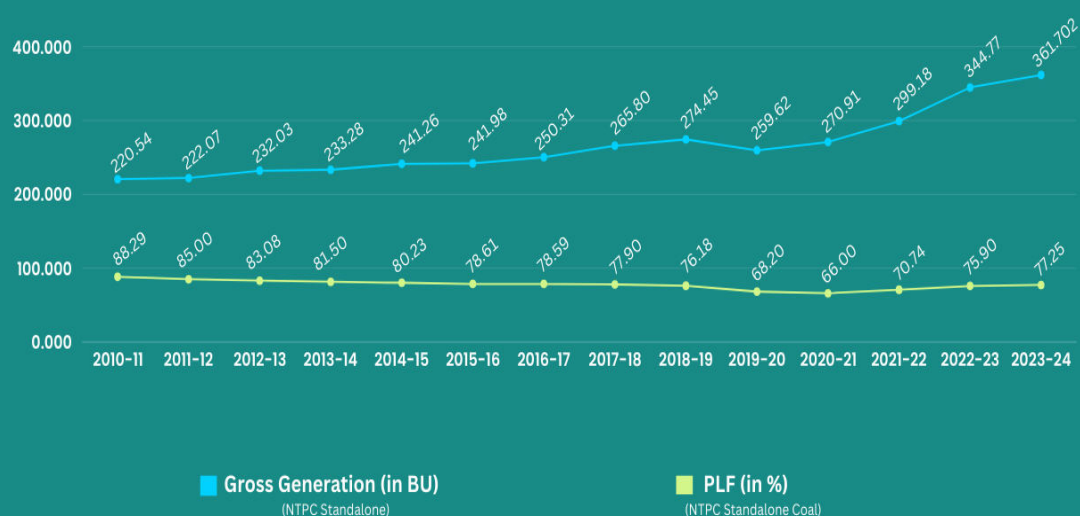
- **Hydropower Generation:** NHPC's primary focus remains on hydropower, which constitutes the majority of its installed capacity. The company operates several large-scale hydroelectric projects, providing electricity to numerous states across India. Hydropower, with its ability to provide baseload power and serve as a storage solution through pumped storage systems, remains NHPC's core business.
- **Renewable Energy Transition:** NHPC is increasingly focusing on diversifying its generation capacity with a focus on solar and wind power. The company aims to increase its share of renewable energy to 25% of its total capacity by 2030.
- **Pumped Storage Projects:** As a means to address the variability of renewable energy sources like solar and wind, NHPC is investing in pumped storage projects. These plants allow for energy storage, helping to stabilize the grid and providing on-demand electricity during peak hours.

- **Collaboration and Partnerships:** NHPC works with both domestic and international partners to explore new energy technologies, including floating solar power plants and advanced hydroelectric technologies.
- **Sustainability and Environmental Focus:** NHPC continues to prioritize sustainable energy solutions, ensuring that hydropower projects are designed to minimize environmental impact and maximize energy efficiency.

NHPC's Installed Capacity State-Wise (in MW)



Operational Performance Of NTPC Stations



VI. GROWTH FACTORS AND STRATEGIC DRIVERS

6.1 NTPC's Growth Drivers in 2025

- **Renewable Energy Growth:** With the Indian government's renewable energy targets, NTPC's strategy to diversify into renewables will significantly drive its future growth. Solar and wind energy projects are expected to contribute a large share of its revenue in the coming years.
- **Technological Innovation:** NTPC's focus on smart grids, energy storage, and AI-powered solutions to optimize power generation and distribution provides it with a competitive edge. These technologies will help NTPC manage the grid more efficiently as renewable energy adoption increases.
- **Sustainability and Government Policy:** India's commitment to reducing its carbon footprint and achieving net-zero emissions by 2070 directly benefits NTPC's transition to cleaner energy. Government subsidies, policy support, and green bonds will play a crucial role in accelerating NTPC's growth in renewable energy.
- **Diversified Revenue Streams:** NTPC's ventures into energy storage, transmission, and power trading open new revenue streams, helping reduce its reliance on traditional thermal power generation.

6.2 NHPC's Growth Drivers in 2025

- **Expansion of Hydropower:** NHPC is well-positioned to capitalize on the vast untapped hydropower potential in India. Its continued investments in large-scale hydro projects, particularly in regions like the Northeast, are essential to its growth strategy.
- **Pumped Storage and Energy Storage:** As renewable energy adoption increases, the need for energy storage solutions becomes critical. NHPC's focus on pumped storage projects is a significant growth driver, as these facilities can help manage the intermittency of renewable power generation.
- **Renewable Energy Transition:** NHPC's diversification into solar and wind power is expected to contribute to its long-term growth. The company aims to achieve 25% of its total generation capacity from non-hydro renewables by 2030.
- **Collaborations and International Expansion:** NHPC's international partnerships in hydropower and renewable energy technologies will open new markets and drive global growth. Collaborative R&D efforts with international players will also boost its innovation capabilities.

VII. COMPARATIVE ANALYSIS

While NTPC and NHPC are both significant players in India's power sector, their business models differ considerably:

- **Diversification vs. Focus:** NTPC has diversified its operations, with a focus on renewable energy, technology, and international expansion. In contrast, NHPC has remained largely focused on hydropower, though it has made progress in renewable energy diversification.
- **Technology and Innovation:** NTPC is more advanced in adopting cutting-edge technologies such as smart grids, energy storage, and AI-driven systems for power management, positioning it as a forward-looking company. NHPC, on the other hand, is focusing on more traditional technologies related to hydropower and pumped storage.
- **Sustainability:** Both companies are committed to sustainability. However, NTPC's focus on reducing carbon emissions through cleaner energy technologies and CCS puts it in a leadership position on environmental responsibility. NHPC's sustainability efforts center around improving the environmental footprint of its hydropower plants.

VIII. CONCLUSION

NTPC and NHPC are two crucial pillars of India's power sector, each with a distinct business model. NTPC's strategy revolves around transitioning from thermal to renewable energy while leveraging technological innovations. In contrast, NHPC remains a leader in hydropower, gradually diversifying into solar and wind energy. Both companies face similar challenges, including the need to adapt to India's renewable energy targets, but they are positioned to thrive in the evolving power landscape.

As India strives to meet its ambitious clean energy goals, the success of both NTPC and NHPC will depend on how effectively they execute their strategies. The combination of government support, technological advancements, and

international collaborations will play a crucial role in their ability to meet the growing energy demand in a sustainable manner.

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