

# NTPC as a Force in India's Electricity Transition

Leading the Way Toward a New Energy Economy



Institute for Energy Economics  
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# Executive Summary

Despite its deep historical connection to coal-fired electricity generation technology, NTPC is poised today to facilitate India's drive toward ambitious national renewable energy targets. NTPC, already at the forefront of building India's energy system, in fact now stands to be one of the country's key new energy enablers.

As a state-owned utility in a developing country, NTPC must of course make providing power to citizens and support for India's rapidly developing economy its top priorities. Whilst this responsibility has arguably required expansion of coal-fired power generation in the past, times have changed—and indeed 2017 has already seen several watershed moments that have signaled a new era in India's electricity sector.

With the latest new solar tariff results in 2017 below NTPC's coal-fired power tariff for its existing fleet, it is clear that renewable energy offers a cheaper way to provide power. Importantly, solar is now cheaper than coal-fired power even before taking into account the externalities of coal (pollution, emissions and water use) that hold back the nation's development.

What NTPC does is of huge significance. The company provides 25% of India's electricity supply, and as such it plays a critical role in India's economic activity.

Encouragingly, it appears that a growing proportion of NTPC's investment plan is being redirected into building modern generation capacity that has a much lower emissions profile and significantly reduced externalities. Such transformation is key to sustaining India's economic growth prospects.

## Key findings of this report:

- **NTPC is a key stakeholder in India's ongoing energy transition.**

The latest capacity addition figures from the Ministry of New and Renewable Energy (MNRE) confirm the transformation that is taking place in India. Total renewable energy capacity additions matched thermal capacity additions for the first time in FY2016-17. The rate of thermal capacity additions declined 50% from the prior year. Indian solar installations doubled in 2015 and again in 2016; IEEFA forecasts that this will be repeated again in 2017. In addition to its own growing renewables capacity, NTPC has evolved into India's prime off-taker of the rapidly expanding private renewable energy generation sector.

India's draft Third National Electricity Plan (NEP3) for the next two five-year periods, to 2027, unambiguously concludes that beyond the half-built plants already under construction, India does not require any new coal-fired power stations. The 50 gigawatts (GW) of coal power currently under construction nationally will operate at barely 50% capacity, according to NEP3. Where these plants don't replace retiring capacity, they will essentially become stranded assets operating largely as reserve capacity. NTPC has 15GW of coal-fired capacity in development but plans to retire 11GW of older capacity.

- **Solar generation is now cheaper than NTPC's tariff for existing coal-fired power plants.**

In a landmark energy turning point, record low Indian solar tariff bids accepted in 2017 (as

low as Rs2.44/kWh or US\$38/MWh) mean that solar tariffs are now lower than NTPC's average tariff for its existing coal-fired fleet (Rs3.20/kWh). Whilst in the past a case could have been made that coal-fired power was vital to support India's development, it is now clear that increased ambition in renewable energy is a cheaper, more sustainable way to provide power.

- **NTPC leads India in the drive to cease imports of thermal coal.**

Energy Minister Piyush Goyal's energy transformation plan also stresses lower dependence on fossil fuel imports, and includes a target to end thermal coal imports by the end of the decade. In April 2017, Coal Secretary Susheel Kumar announced a policy by which no public sector undertakings (PSUs) would import any thermal coal in FY2017-18.

NTPC is entirely on board with this plan and indeed is leading the way; NTPC intended to cease importing thermal coal in FY2016-17, three years ahead of schedule, and will only source coal domestically going forward. This is an endorsement of the government's efforts to improve domestic coal logistics and increase production from Coal India. Such has been the progress on domestic coal supply that India is now considering becoming a thermal coal exporter itself. Total Indian coal imports in FY2015-16 of 200 million tonnes represented 16% of global seaborne trade. As such, a continued decline in imports, and a move to start exports itself, will have significant implications for the global market and thermal coal prices.

- **NTPC's strong balance sheet underpins renewable power off-take and is crucial for India's ongoing development.**

NTPC brings a strong balance sheet and earnings profile that is a critical element in underpinning many billions of dollars of investment required to build up India's energy infrastructure. NTPC's impact on the rise of renewables in India is further enhanced by its role as a key off-taker of power from private renewables installations. NTPC's underwriting of payment for such projects improves bankability, facilitating further renewables tariff reductions as clean generation technology leaves coal-fired power further behind on cost.

- **Overseas investors are seeking more opportunities in Indian renewables projects whilst abandoning the thermal power sector.**

India's renewables boom is attracting the attention of a diverse range of leading overseas investors including banks, utilities, pension funds and asset managers. They include Goldman Sachs, JP Morgan, Morgan Stanley, Macquarie Group, Sembcorp, Enel, EDF, Engie, SoftBank and Brookfield. Meanwhile, India's thermal power sector is receiving less overseas funding support. In April 2016, the world's largest sovereign wealth fund, (Norway's Government Pension Fund Global (GPF)) announced that NTPC was among seven Indian companies it was excluding from its portfolio. GPF is one of the largest foreign investors in India. NTPC's equity involvement in a coal project situated next to a World Heritage area in Bangladesh (Rampal) contributed to this divestment decision.

GPF is a global leader in taking climate and pollution risks into account when deciding upon investments, and its negative screening approach is seen now as an example for other major global investors to follow.

- **NTPC's current development pipeline represents its past more than its future.**

The thermal power developments on NTPC's future capacity development list (Annexure IV) have been on that list for years due to the long and regularly delayed implementation timeframes of coal-fired power plants. As they are completed and as they drop off the list they are unlikely to be replaced by new coal projects, especially now that the Central Electricity Authority has made it clear that no further thermal projects need to be started before 2027, at the earliest. An increasing number of renewable energy projects will come and go from the list as they are completed over the short timeframes such projects require.

- **NTPC would do well to focus its foreign investments on renewables.**

NTPC's goal of having a portfolio of foreign generation assets is one that IEEFA suggests needs to have its focus narrowed to renewable energy projects. The cancellation (Sampur, Sri Lanka) and ongoing delays and downsizing (Rampal, Bangladesh) of NTPC's first two attempts at expansion into foreign coal-fired power are indicative of a growing trend. Going forward, coal-fired power projects will be faced with considerable challenges regarding environmental concerns and the rise of responsible investment regardless of whether those projects are in developed or developing countries. Italy's Enel SpA demonstrates the model of successful overseas expansion in renewable energy.

- **Globally, electricity utilities that are leading the energy transition are outperforming those left behind.**

The poor performance of utilities such as Engie, E.On and RWE highlight the potential pitfalls of a belated or slowly implemented transition plan. These companies have suffered from noteworthy, sustained underperformance relative to their stock markets, representing significant destruction of shareholder wealth. They are being appreciably outperformed by transition leaders such as Enel SpA and NextEra Energy Inc.

With coal-fired power plant utilisation rates in structural decline in India, NTPC would benefit—and be better able to meet its corporate goals—from accelerating its renewable energy roll-out and further facilitating the Indian government's ambitious renewable energy targets, while avoiding the continued decline in utilisation rate of its existing 50GW generation fleet.

# Introduction

The Indian energy conglomerate **NTPC Ltd.** (formerly known as **National Thermal Power Corporation Limited**) is amongst the top 10 coal-fired power generators in the world. It ranks third in coal-fired capacity and seventh in generation). The government of India is the majority shareholder, holding 70% of NTPC. The company passed the 50,000MW generation-capacity milestone on March 31, 2017, of which the great majority (44,000MW) is coal-fired.

Clearly, coal mining and coal-fired power generation have significant negative externalities, particularly on local communities and in terms of water, air, particulate and waste coal ash pollution. Industry impacts include poorly implemented compulsory land acquisitions as well. However, NTPC provides some 25% of India's electricity supply, a critical input to existing economic activity. With decades of investment behind it, NTPC also brings a strong balance sheet and earnings profile that is critical to underpinning billions of dollars of much-needed annual investment in building up India's energy infrastructure.

Encouragingly, it appears that an increasing proportion of NTPC's investment plan is being redirected into building modern electricity generation capacity that has a much lower emissions profile and significantly reduced externalities relative to NTPC's history. This is critical for India's sustained economic growth prospects.

This report examines a potentially transformational shift in NTPC's leadership thinking over the past year that has accentuated how NTPC can take a positive role in India's electricity sector transformation. This report makes special note of NTPC's corporate objectives<sup>1</sup> and considers ways these goals will be affected by the ongoing Indian and global energy transition.

- “To further consolidate NTPC's position as the leading thermal power generation company in India and establish a presence in hydro power segment” (under Business Portfolio Growth).
- “To broad base the generation mix by evaluating conventional and non-conventional sources of energy to ensure long- run competitiveness and mitigate fuel risks” (under Business Portfolio Growth).
- “To diversity across the power value chain by considering backward and forward integration into areas such as power trading, transmission, distribution, coal mining, coal beneficiation etc.” (under Business Portfolio Growth).
- “To develop a portfolio of generation assets in international markets” (under Business Portfolio Growth).
- “Continuous and coordinated assessment of the business environment to identify and respond to opportunities and threats” (under Agile Corporation).
- “To maintain and improve the financial soundness of NTPC by prudent management of the financial resources” (under Financial Soundness).

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<sup>1</sup> NTPC Annual Report 2016-16, p. 1

# NTPC in Context: India's Energy Transition

Before focusing in on NTPC Ltd, it is worth outlining the Indian electricity sector context in which the company sits—a context that includes a national push toward a major transformation of India's electricity sector. This transition is occurring even as work goes on to extend services to those living without electricity and to rapidly expand electricity-generation and distribution capacities to sustain India's 7-8% annual economic growth target.

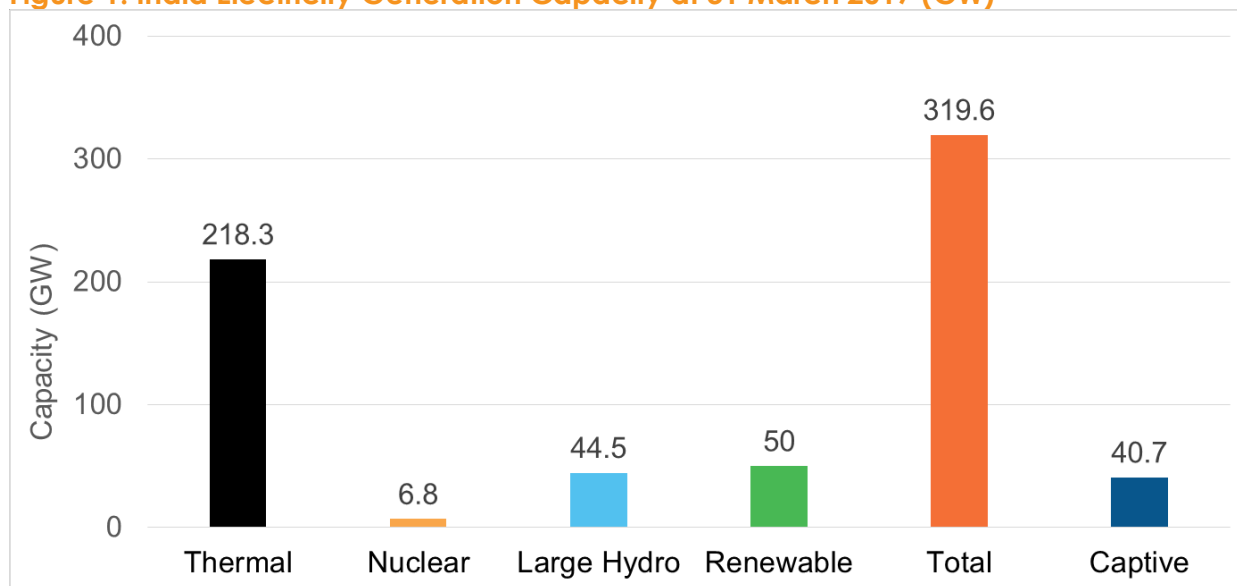
India's electricity-sector transition is happening at a rate that has caught almost everyone off guard, a major achievement by Prime Minister Narendra Modi's government.

## Renewable Energy

Historically dependent on coal-fired electricity generation, India's power sector is moving in a starkly new direction. The Indian energy ministry, led by Energy Minister Piyush Goyal, is driving this trend, pushing the nation toward targets that are highly ambitious but achievable.

The government has set a target of 175GW of renewable energy by 2022, including 100GW of solar and 60GW of wind<sup>2</sup>, up from just over 50GW (not including 44GW of large hydro) today. By 2027, the government is planning for 275GW of renewable energy capacity. Current solar capacity stands at 12GW (out of a total generating capacity of 320GW) although solar is expected to cross the 20GW mark during 2018, driven by impressive reductions in tariffs.

**Figure 1: India Electricity Generation Capacity at 31 March 2017 (GW)**



Note: Renewable capacity is as at 31 December 2016

Source: Central Electricity Authority (CEA)

<sup>2</sup> <http://energy.economictimes.indiatimes.com/news/renewable/renewables-to-account-for-over-60-per-cent-of-indias-power-capacity-piyush-goyal/57821397>

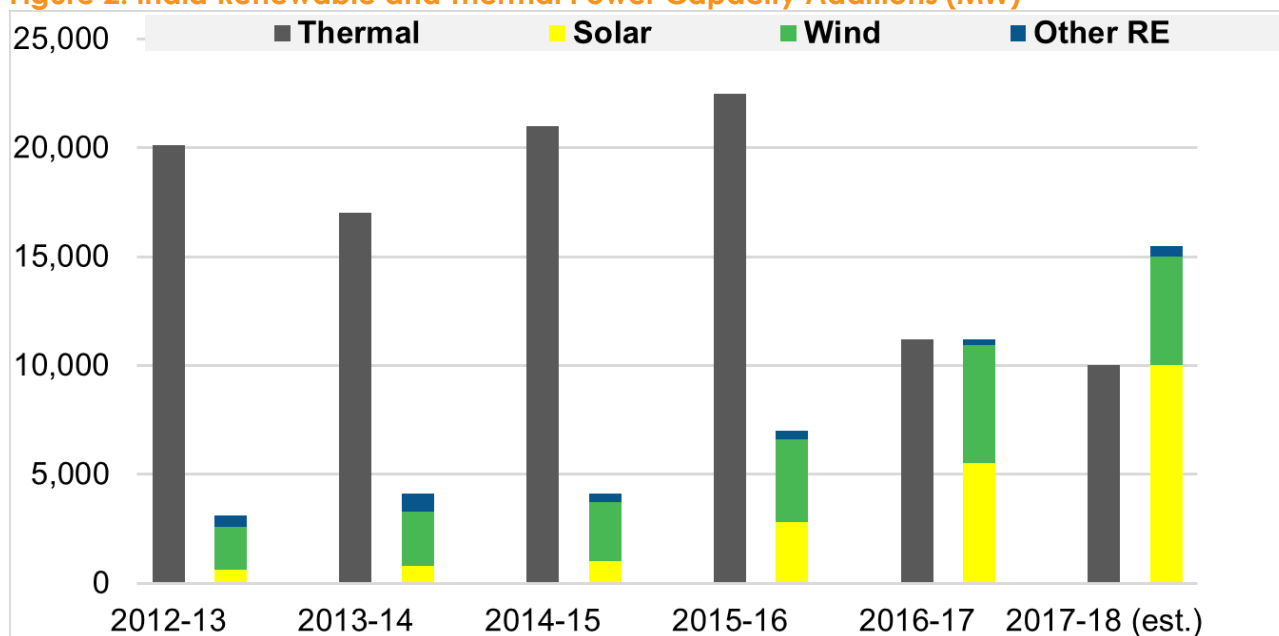
February 2017 saw a landmark event in India's energy transition when the previous record low solar tariff was broken in the Rewa solar project auction process. The levelised tariff of the project is Rs 2.97/kWh, more than a full rupee below the previous lowest tariff<sup>3</sup>. This event was followed, in April, by a new record low levelised tariff of Rs 3.15/kWh (lower than Rewa's levelised tariff of Rs 3.30/kWh), achieved at NTPC's own auction for the 250MW Kadapa solar project in Andhra Pradesh. The winning bid was from Solairedirect SA, the Indian arm of the French utility Engie SA. NTPC's press release noted, importantly, that "at current rates, solar power generation cost is at par with that of thermal power generation".<sup>4</sup>

The first sub Rs 3/kWh record did not last long; in May, the Bhadla, Rajasthan solar project attracted a tariff bid of Rs2.62/kWh. Within a week, the record was again broken with a bid of Rs2.44/kWh (US\$38/MWh), accepted at an auction for the same Bhadla solar park<sup>5</sup>.

Whilst these fast-paced solar tariff reductions have gained much of the attention, the more mature Indian wind power industry has also been seeing significant price reductions. In February, the same month in which the Rewa record was set, a new low tariff was set in the nation's first-ever auction for wind power, when Rs 3.46/kWh was achieved at the auction run by Solar Energy Corporation of India.

Responding to these record low solar and wind tariffs, Minister Goyal tweeted that "a green future awaits India."<sup>6</sup>

**Figure 2: India Renewable and Thermal Power Capacity Additions (MW)**



Source: Bridge to India, Central Electricity Authority, MNRE, IEEFA Estimates

Note: The renewables estimates exclude large scale hydro

<sup>3</sup> <http://www.livemint.com/Industry/zW5Lf1okn054cFug5yKGsL/Madhya-Pradesh-solar-bids-hovering-at-Rs3-per-unit-in-revers.html>

<sup>4</sup> <http://www.ntpc.co.in/en/media/press-releases/details/solar-power-tariff-hits-all-time-low-rs-315-unit-ntpc-auction>

<sup>5</sup> <https://www.pv-tech.org/news/yet-another-india-solar-tariff-record-of-2.44-rupees-in-rajasthan>

<sup>6</sup> <http://www.livemint.com/Industry/VAhOv1Tos5kINu06QQvA7I/India-wind-power-tariff-follows-solar-route-falls-to-record.html>



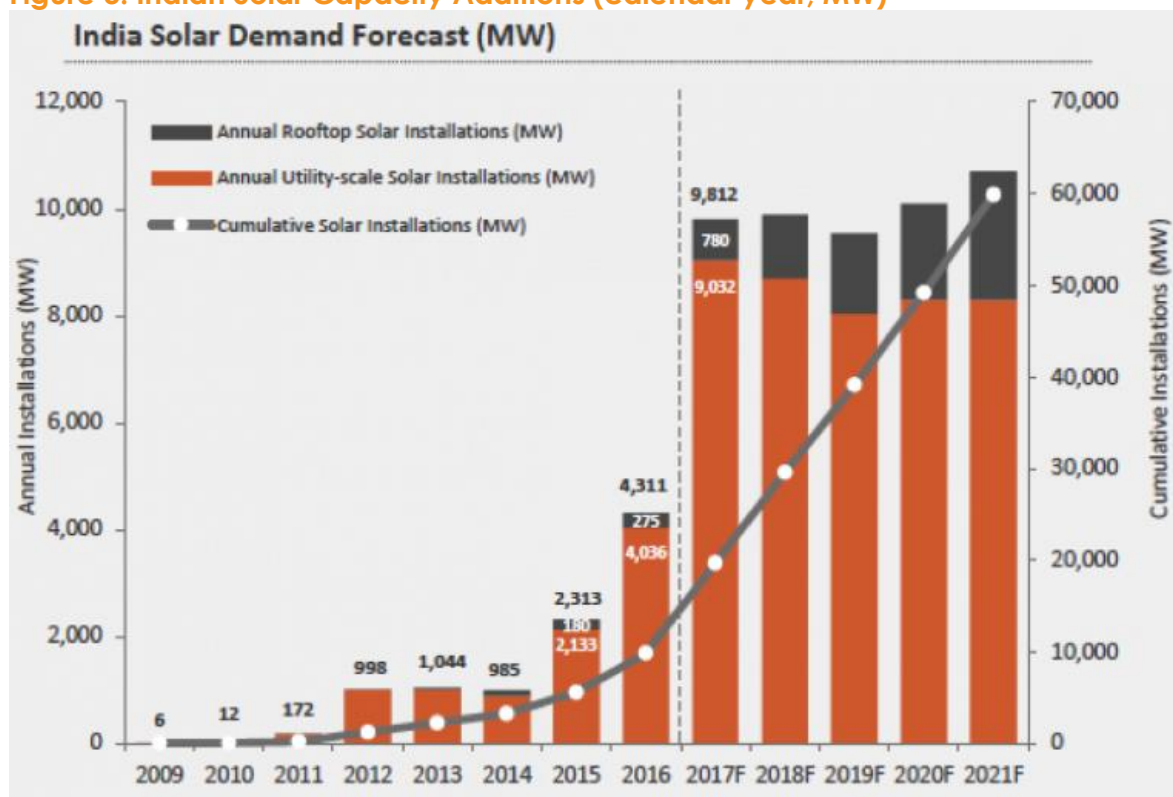
In March, Minister Goyal is targeting 60-65% of all generation capacity to come from the Indian clean energy sector.<sup>7</sup>

The latest capacity-addition figures from the Ministry of New and Renewable Energy (MNRE), for FY2016-17<sup>8</sup>, have renewable energy additions (including solar, wind, biomass and small-scale hydro) matching thermal capacity additions for the first time. Thermal additions declined by 50% from the prior year (refer to Figure 2 above). India added 5.5GW of solar capacity in FY2016-17 (an 83% increase over the prior year) and 5.4GW of wind (a 63% increase over the prior year).

IEEFA estimates renewables additions moving well ahead of thermal additions in FY2017-18.

Indian solar installations doubled in 2015 and then again in 2016. Indian research groups like Mercom are forecasting another doubling in 2017 (refer to Figure 3 below).

**Figure 3: Indian Solar Capacity Additions (calendar year, MW)**



Source: Mercom Capital Group.<sup>9</sup>

<sup>7</sup> <http://energy.economicstimes.indiatimes.com/news/renewable/renewables-to-account-for-over-60-per-cent-of-indias-power-capacity-piyush-goyal/57821397>

<sup>8</sup> <http://www.bridgetoindia.com/renewable-capacity-addition-catches-thermal-power-india/>

<sup>9</sup> <https://www.pv-tech.org/news/india-to-add-nearly-10gw-solar-in-2017-mercom>

# Coal

Beyond the rapid roll-out of renewable energy, Minister Goyal's energy transformation aim's to lessen India's dependence on fossil fuel imports to the point of ending thermal coal imports altogether by the end of the decade<sup>10</sup>. In April 2017, Coal Secretary Susheel Kumar reiterated the government's plans and said that the government intended no public sector undertakings (PSUs) to import any thermal coal in FY2017-18. Achieving this goal would reduce India's coal-import bill by around Rs17,000 crore (US\$2.6bn)<sup>11</sup>.

Efforts are under way to improve the quality and distribution of domestic coal produced by state-owned Coal India. NTPC is entirely on board with this plan and indeed is leading the way; NTPC intended to cease importing thermal coal in FY2016-17,<sup>12</sup> three years ahead of schedule, and will source coal entirely after that from state-owned Coal India, Singareni Collieries, or its own coal mines going forward (refer to Vertical Integration section on page 17 below). NTPC's achievement is a major endorsement of the Indian government's efforts to improve domestic coal logistics and increase production from Coal India.

The government's efforts, in turn, have allowed NTPC to reduce its cost of coal-fired electricity generation.

Meanwhile, private coal-fired power generators using imported coal have been shown to be exposed to higher fuel costs<sup>13</sup> to the point where some import-coal-fired power stations are now of questionable viability. With improved quality and supply of domestic coal, the government intends to persuade private power plant operators to replace imported coal with cheaper domestic supply. As a result, Indian imports of thermal coal will continue to fall rapidly toward the government's target of zero.

The implications for global thermal coal market are profound.

India imported 200 million tonnes (Mt) of coal in total in FY2015-16<sup>14</sup>, accounting for around 16% of the global seaborne coal trade. Given that India has been such a significant importer of coal, its planned, continued reduction in thermal coal imports will have a major impact on seaborne thermal coal prices, an effect likely to be magnified if India itself becomes a coal exporter—as is the plan.

With domestic supply scaling up rapidly and coal demand growth lower than expected, India is considering becoming a thermal coal exporter<sup>15</sup>. Energy Minister Goyal stated in April that “the Indian government is now looking for new consumers for surplus coal” and neighbouring Bhutan and Bangladesh, where NTPC is intending to develop the controversial Rampal import coal-fired power plant, have been identified as possible export markets.<sup>16</sup>

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<sup>10</sup> <https://www.bloomberg.com/news/articles/2016-04-25/india-s-energy-minister-wants-to-cut-coal-imports-to-nothing>

<sup>11</sup> <http://energy.economictimes.indiatimes.com/news/coal/govt-plans-to-cut-coal-imports-for-power-psus-to-zero-in-2017-18/58445963>

<sup>12</sup> <http://news.steel-360.com/coal/ntpc-shuns-coal-imports-fy17/>

<sup>13</sup> [http://www.business-standard.com/article/companies/rough-road-ahead-for-adani-group-over-paring-debt-117042601276\\_1.html](http://www.business-standard.com/article/companies/rough-road-ahead-for-adani-group-over-paring-debt-117042601276_1.html)

<sup>14</sup> <https://www.platts.com/latest-news/coal/newdelhi/indias-coal-imports-to-reach-160-million-mt-in-27712301>

<sup>15</sup> <http://energy.economictimes.indiatimes.com/news/coal/govt-asks-coal-india-to-expedite-coal-exports-to-neighboring-nations/58461661>

<sup>16</sup> <http://www.thefinancialexpress-bd.com/2017/04/26/68141/India-eyes-Bangladesh-to-export-its-surplus-coal>

Government action on air pollution from coal-fired power plants is also under way.

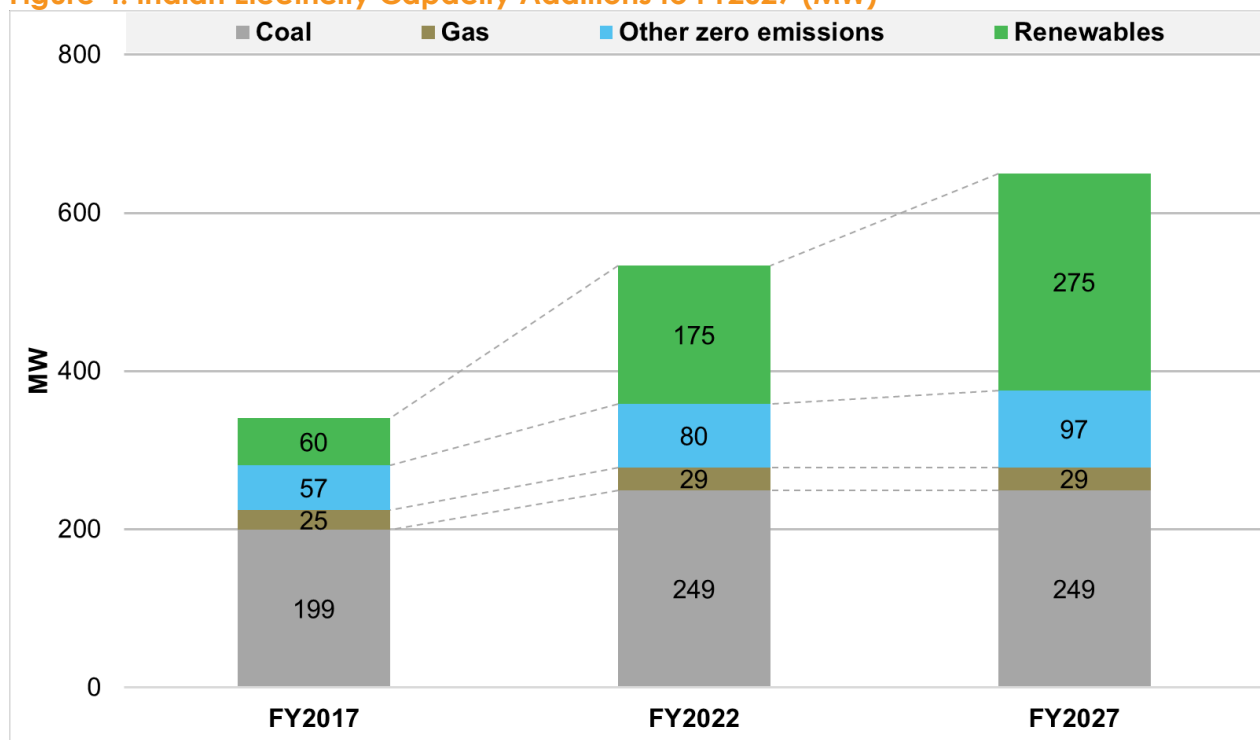
In March 2017, the Environment Ministry maintained that there will be no watering down or delay in the implementation of higher standards on emissions from thermal power plants<sup>17</sup>. The stricter emissions requirements were announced in December 2015 and will come into force as planned from December 2017, although they will need to be backed up with penalties to maximize effectiveness. Stricter controls on particulate matter, water use, sulphur dioxide, nitrogen oxides and mercury emissions will have a particularly high impact on older, less efficient coal-fired power plants, improving the case for closures of such plants.

NTPC itself intends to close down 11GW of its older, less efficient thermal power plants.<sup>18</sup>

## Third National Electricity Plan (NEP3)

India's draft Third National Electricity Plan (NEP3) for the next two five-year periods, to 2027 unambiguously concludes that beyond the half-built plants already under construction, India does not require any new coal-fired power stations.

Figure 4: Indian Electricity Capacity Additions to FY2027 (MW)



Source: Indian Central Electricity Authority, IEEFA estimates

<sup>17</sup> <http://timesofindia.indiatimes.com/home/environment/pollution/thermal-plants-must-meet-emission-norms-environment-ministry/articleshow/57928159.cms?from=mdr>

<sup>18</sup> <http://pib.nic.in/newsite/PrintRelease.aspx?relid=155395>

NEP3 calls for 57% of India's total electricity capacity to come from non-fossil fuels (372GW of the projected 650GW total) by 2027, a 42% increase that comes three years ahead of a 2030 schedule set only 12 months ago. By 2027, India aims to have 275GW of total renewables, plus 72GW of hydro and 15GW of nuclear (hydro and nuclear will account for 87GW of “other zero emissions” installs). The expansion of renewables capacity means no new coal-fired capacity expansion plans will be required until at least 2027<sup>19</sup>. The 50GW of coal power currently under construction will operate at barely 50% capacity, according to the new plan. Where these plants don't replace retired capacity they will essentially be stranded assets that are retained as reserve capacity.

## Overseas Investment in India's Power Sector

India's renewables boom is attracting the attention of overseas investors, particularly to its solar sector. From international banking, investors already include Japan's Softbank which has made a US\$20bn commitment to Indian solar power, as well as Goldman Sachs, JP Morgan, Morgan Stanley Infrastructure Partners and Macquarie Group<sup>20</sup>. Overseas electricity utilities are also now active in the Indian renewables space, including Engie and EDF of France and Enel of Italy. Dutch asset manager APG, and Canada's largest pension fund managers are also participating in Indian renewable infrastructure transactions, including Canada Pension Plan Investment Board (CPPIB), Caisse de dépôt et placement du Québec (CDPQ), and Ontario Teacher's Pension Plan (OTPP)<sup>21</sup>. Brookfield, Canada's largest asset manager, is actively seeking new renewable energy opportunities in India<sup>22</sup>.

IEEFA anticipates a majority of the US\$200-300bn likely to be invested in India's renewable capacity additions over the coming decade will be supported by overseas capital.

Global development banks have also been increasingly active in funding renewable energy supporting infrastructure (e.g. solar industrial parks) and grid development programs, with significant new investments in India by the World Bank, the Asian Development Bank, the European Investment Bank<sup>23</sup> and the likes of KfW of Germany. In May 2017, the Asian Infrastructure Investment Bank (AIIB) made its first Indian development loan, for US\$160m for grid infrastructure to support the “Andhra Pradesh – 24x7 Power for All” grid project.

Meanwhile, India's thermal power sector is receiving less overseas funding support. The world's largest sovereign wealth fund, Norway's Government Pension Fund Global (GPF), valued at over US\$900bn, continues to divest from companies involved in the production of coal or coal-based energy. In April 2016, the fund announced it was excluding seven Indian companies from its portfolio, including state-owned coal miner Coal India and private power generators Reliance Power and Tata Power. NTPC was also excluded<sup>24</sup>. The Indian companies were amongst exclusions around the world, and the list has expanded since then

<sup>19</sup> <http://energy.economictimes.indiatimes.com/news/renewable/in-10-years-half-of-indias-energy-capacity-will-be-from-non-fossil-fuel-sources/58258256>

<sup>20</sup> <https://www.pv-magazine.com/2017/04/12/macquarie-reported-to-have-acquired-330-mw-of-solar-pv-in-india/>

<sup>21</sup> <http://in.reuters.com/article/india-solar-global-pension-fund-idINKBN17W053>

<sup>22</sup> <https://www.bloomberg.com/news/articles/2017-05-03/brookfield-renewable-sees-opportunities-in-coal-fueled-india>

<sup>23</sup> <http://energy.economictimes.indiatimes.com/news/oil-and-gas/eib-makes-200-mn-euro-loan-to-sbi-for-mega-solar-projects/57955347>

<sup>24</sup> <http://www.financialexpress.com/economy/norways-pension-fund-not-to-invest-in-cil-ntpc-reliance-power/236969/>

with another 10 companies excluded beginning in March 2017.<sup>25</sup> GPFG divests when 30% or more of a company's activities are based on thermal coal (30% or more of revenue in the case of mining companies). GPFG is one of the largest foreign investors in India<sup>26</sup>.

GPFG is a global leader in taking climate and pollution risks into account when deciding upon investments. IEEFA notes that the GPFG divestment-screening approach is now being followed by other major global investors.

In April 2017, AXA Investment Management, with €717bn of assets under management, announced that it would divest from the companies most exposed to coal<sup>27</sup>. Specifically, AXA will be divesting from electricity companies and mining companies that derive more than 50% of their revenues from coal-related activities.

Japan's Government Pension Investment Fund (GPIF), the world's largest public pension fund, with US\$1.3tn in assets, is to allocate part of its portfolio to companies scoring highly on environmental, social and governance (ESG) merits<sup>28</sup>. Although this policy focuses on domestic companies, the move is likely to initiate a trend in Japan, a country previously regarded as less disposed towards ESG considerations in its investment decisions.

A 2015 study by fund management consultant Mercer<sup>29</sup> found that the inevitable rise in the consideration of climate risks in investment decisions will increase the flow of investment from polluting sectors and toward clean technology such as renewable energy. Coal was identified as the sector with most to lose as this transition progresses.

Impacts of this trend will be felt in India going forward. The Indian government is intending to sell down its stake in state-owned companies, including its holding of NTPC. The government currently owns 70% of NTPC, and its immediate intention is to divest 10% of this holding. Up to Rs35,000 crore (US\$5.5bn) could be raised from the sell down across all companies<sup>30</sup>. In the case of NTPC, this sell down would be easier if the company was to become more aligned with the increasingly stringent ESG requirements of major institutional investors.

With international investors actively seeking out infrastructure investment opportunities in India and an increasing focus on emissions-sensitive responsible investing, it is clear that ever more investment will flow into India's renewable energy space and away from thermal coal.

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<sup>25</sup> <https://www.nbim.no/en/responsibility/exclusion-of-companies/>

<sup>26</sup> <http://energy.economictimes.indiatimes.com/news/oil-and-gas/norway-wealth-funds-hoping-to-expand-footprints-in-india/55962677>

<sup>27</sup> <https://www.axa-im.com/en/news-archive/-/news/axa-investment-managers-divests-from-companies-most-exposed-to-coal/maximized/2wCz>

<sup>28</sup> <http://ieefa.org/ieefa-asia-japans-1-3-trillion-pension-fund-approaches-climate-risk-crossroads/?platform=hootsuite>

<sup>29</sup> <https://www.mercer.com/our-thinking/investing-in-a-time-of-climate-change.html>

<sup>30</sup> [http://www.business-standard.com/article/companies/govt-eyes-rs-35-000-cr-from-psu-stake-sale-117041500042\\_1.html](http://www.business-standard.com/article/companies/govt-eyes-rs-35-000-cr-from-psu-stake-sale-117041500042_1.html)

# NTPC: Financial and Operational Performance

For financial year (FY) 2015-16, NTPC reported a group profit after tax of Rs10,183 crore (US\$1,589m) on a consolidated basis, up 2% on the prior year. In its standalone FY2016-17 half-year financial disclosure as at Sept. 30, 2016, the company reported increased profit before tax of Rs6,296 crore (US\$983m), up 53% against the prior year on a 10% increase in gross sales.

NTPC has maintained a five-year average EBITDA margin of just under 25% and an average return on equity (ROE) of 13.4% over the same period (refer to Figure 5 below). In addition to running a consistently profitable operation, NTPC maintains a solid balance sheet with a low net debt to equity ratio and a more than adequate interest cover (earnings before interest and tax was 3.2 times interest expense in FY2015-16).

**Figure 5: NTPC Key Metrics**

FY	2015-16	2014-15	2013-14	2012-13	2011-12	5 year Average
EBITDA margin %	24.6%	21.8%	25.9%	26.0%	24.1%	24.5%
ROE %	11.9%	11.8%	13.5%	16.2%	13.7%	13.4%
Net debt/equity	1.2	1.1	0.7	0.6	0.5	
Interest cover (x)	3.2	3.5	4.9	5.4	7.2	

Source: Thompson Reuters, IEEFA estimates

The company is clearly a robust and profitable operator, one whose sensible gearing allows it to achieve the sustainable returns profile required to underpin the decades-long heavy investment program required within its industry.

The strength of NTPC's balance sheet is highlighted by comparison to one of India's private thermal power plant operators, Adani Power Ltd. Figure 6 below compares selected metrics of NTPC and Adani Power Ltd, an operator of coal-fired power plants that is in a considerably different financial position than NTPC. Financial losses at Adani Power have led to negative ROE in four of the last five years.

The state of Adani Power's balance sheet is currently a pressing worry for its lenders<sup>31</sup>. The company's net debt to equity ratio (7.2 in 2015-16) stands in stark contrast to NTPC's and its interest cover of 1.3 (its highest in five years) raises understandable concerns over how Adani Power will be able to service its huge debt. Such concerns have only increased since an

<sup>31</sup> [http://www.business-standard.com/article/companies/rough-road-ahead-for-adani-group-over-paring-debt-117042601276\\_1.html](http://www.business-standard.com/article/companies/rough-road-ahead-for-adani-group-over-paring-debt-117042601276_1.html)

Indian Supreme Court ruling went against Adani Power<sup>32</sup>; under that ruling the company will be required to write off hundreds of millions of U.S. dollars of previously booked revenue, degrading its balance sheet and profitability further still and leaving the company on the edge of a financial precipice. Adani Power reported a positive ROE in FY2015-16 for the first time in five years. However, FY2016-17 will be a return to negative ROE once the impact of the revenue write-off (possibly as much as US\$540m<sup>33</sup>) takes place.

Whilst the future of Adani Power is increasingly questionable, the stability and strength of state-owned NTPC is precisely what India requires from its major electricity generator as its economy rapidly expands. The financial strength of the company is borne out by its latest oversubscribed bond issuance. NTPC has become the only state-owned enterprise (SOE) to issue masala bonds (bonds issued outside India in rupees) for a second time. The Rs2,000 crore (US\$312m) raising was priced at a coupon of 7.25%, the lowest of any issuer of masala bonds to date<sup>34</sup>, with an investment grade BBB- rating.<sup>35</sup>

**Figure 6: NTPC Ltd Vs Adani Power Ltd - Key Metrics**

FY	2015-16	2014-15	2013-14	2012-13	2011-12
<b>NTPC Ltd</b>					
Net debt/equity	1.2	1.1	0.7	0.6	0.5
Interest cover (x)	3.2	3.5	4.9	5.4	7.2
ROE %	11.9%	11.8%	13.5%	16.2%	13.7%
<b>Adani Power Ltd</b>					
Net debt/equity	7.2	7.7	6.7	9.7	6.3
Interest cover (x)	1.3	0.9	0.8	-0.2	1.1
ROE %	7.5%	-21.2%	-3.6%	-44.4%	-4.7%

Source: Thompson Reuters, IEEFA estimates

Its strong financial position aside, NTPC's heavy reliance on coal-fired power generation has created balance sheet risks. Power utilities around the world that have not reacted quickly enough to a global energy transformation undermining outdated business models (refer to Global Utilities: Industry Trends and Energy Transition on page 30), run the risk of significant shareholder wealth destruction. There are indications that NTPC could be faced with similar headwinds if it does not further its alignment with Indian government energy policy.

<sup>32</sup> <http://www.livemint.com/Money/gi0zeExZLROJB9FKvhvIHN/Adani-group-should-move-quickly-to-limit-Adani-Power-damage.html>

<sup>33</sup> <http://www.zeebiz.com/companies/news-adani-power-may-have-to-write-down-rs-3500-crore-after-sc-order-on-compensatory-tariff-report-14808>

<sup>34</sup> <http://energy.economictimes.indiatimes.com/news/power/ntpcs-rs-2000-cr-masala-bond-issue-oversubscribed/58397389>

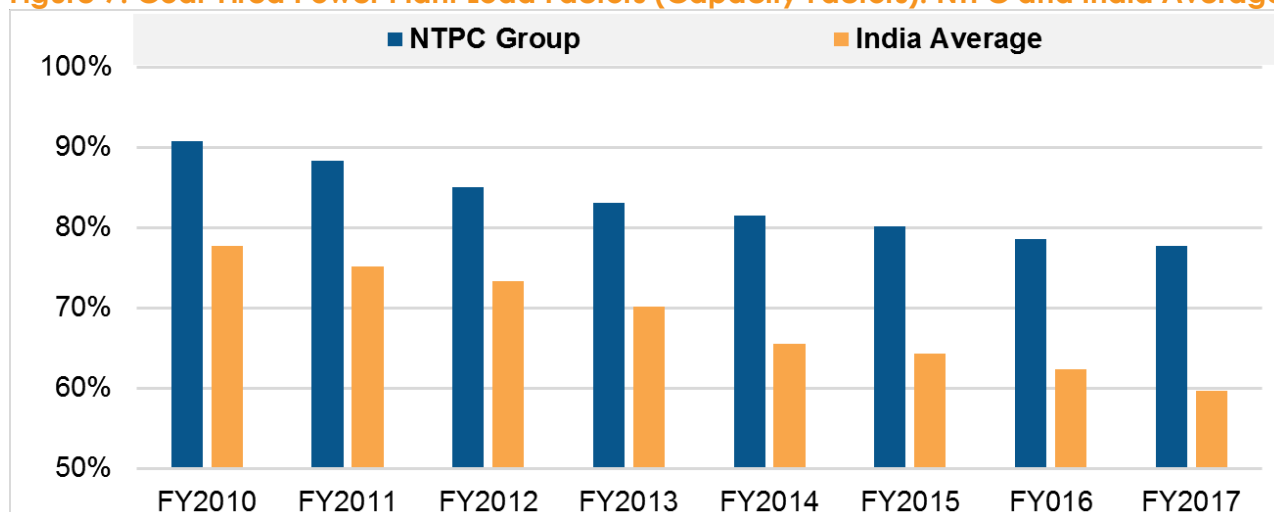
<sup>35</sup> <http://energy.economictimes.indiatimes.com/news/power/ntpc-and-hpcl-mittal-energy-tap-overseas-investors/58366081>

## Impact of Declining Capacity Factors

After four years of climbing revenues, 2015-16 saw revenue growth stall whilst return on equity, although still above the industry median of 11.5%, has declined from levels achieved in the early part of the decade. Figure 7 below helps explain the erosion of profitability at NTPC (as well as the dire financial situation at some private thermal power plant operators).

Capacity factors at Indian coal-fired power plants have fallen consistently since 2010, with the Indian average standing at 62% in FY2015-16 and below 60% through the first nine months of FY2016-17. Many power plants cannot be operated profitably at this utilisation rate. NTPC's average is better than the overall Indian figure but the company's average capacity factor dropped below 70% for the first time in FY2015-16, down from over 90% in FY2009-10.

**Figure 7: Coal-Fired Power Plant Load Factors (Capacity Factors): NTPC and India Average**



Source: NTPC, Indian Central Electricity Authority, Livemint.

Note: FY2017 figures are for the first nine months of FY2017.<sup>36</sup>

The fall-off in capacity factors has been driven by lower-than-expected electricity demand, which has failed to keep pace with thermal power capacity additions<sup>37</sup>. The Central Electricity Authority (CEA) is now forecasting that peak demand by FY2021-22 will be 235GW, 17% lower than it had forecast. For FY2026-27, 317GW is forecast, 21% lower than the previous figure. The lower-than-expected demand is already calling into question the viability of thermal power plants in parts of India<sup>38</sup>.

Water impacts are also playing an increasingly important role in assessments of coal-fired

<sup>36</sup> <http://www.livemint.com/Industry/fTLCfy76aYR5QiEke7woON/NTPC-eyes-entry-in-Indias-electric-vehicles-segment.html>

<sup>37</sup> <http://www.bridgetoindia.com/indias-problems-coal-sector-continue/>

<sup>38</sup> <http://energy.economicstimes.indiatimes.com/news/power/wavering-power-demands-scure-upcoming-projects-in-andhra-telangana/58440497>



power plant viability. Thermal power plants use 3.8 cubic metres of water per MW, compared to 0.1 cubic metres/MW for solar and almost zero for wind power<sup>39</sup>. Conflicts with communities over water are only going to increase going forward for thermal power plant operators. Adani Power was forced to temporarily shut down 2.6GW of coal-fired power in 2016 due to water shortages.<sup>40</sup>

The increasing penetration of renewable energy in India is also an important factor in driving down coal-fired capacity factors.

Importantly, with renewables targeted to reach 175GW by 2022 and 275GW by 2027, IEEFA sees no respite for coal-fired plant capacity factors. NTPC's capacity factors will continue the downward trend along with the rest of India's coal-fired electricity industry, which will undermine the sustainability of any business models based on coal-fired generation.

## NTPC Generation Costs

Government efforts to improve the quality and supply of domestic thermal coal are paying off for NTPC. With the company's use of imported coal now ceased, NTPC has become completely reliant on domestic coal, and improved quality and logistics has seen its cost of coal-fired power generation reduced by almost 40 paise to below Rs 2/kWh<sup>41</sup>.

This, in turn, has held down NTPC's tariff for coal-fired electricity to around Rs3.20/kWh<sup>42</sup>. Coal quality improvements and declining coal-fired power plant utilisation rates have reduced NTPC's coal consumption by 5.5% in FY2016-17<sup>43</sup>. Improved efficiencies across the Indian power sector, be it from coal freight logistics, energy efficiency or grid efficiency, is having a deflationary impact on electricity prices and a creating a major boost to India's sustained economic growth.

Whilst NTPC's reduction in coal-fired power costs has been impressive, it has not matched the decline in renewable energy costs, particularly in solar. Figure 8 below compares the rapid drop in solar power tariffs to NTPC's coal-fired electricity tariff since 2012. The year 2017 marks a major turning point within the Indian electricity sector—this is the year solar has become cheaper than coal-fired power from India's existing electricity-generation fleet. In a press release following the NTPC-conducted auction for the Kadapa solar park in April 2017—the auction that achieved a record low tariff of Rs3.15/kWh—NTPC stated that “At current rates, solar power generation cost is at par with that of thermal power generation”.<sup>44</sup> The latest record low bid of Rs2.44/kWh at the Bhadla solar power project puts the cost of solar well below NTPC's coal-fired power tariff.<sup>45</sup>

<sup>39</sup> <http://www.livemint.com/Opinion/SZAI8vdmvddKR3N2NMANQJ/An-evolving-risk-paradigm-in-the-power-sector.html>

<sup>40</sup> <http://indianexpress.com/article/business/companies/water-crisis-adani-power-shuts-2640-mw-units-at-tiroda-plant/>

<sup>41</sup> <http://energy.economictimes.indiatimes.com/news/power/ntpc-power-generation-cost-drops-39-5-paise-to-below-rs-2-per-unit/58221866>

<sup>42</sup> <http://www.livemint.com/Industry/4BjnumkEc1UhYwf7gv3UtN/Solar-power-bids-the-battle-for-low-tariffs.html>

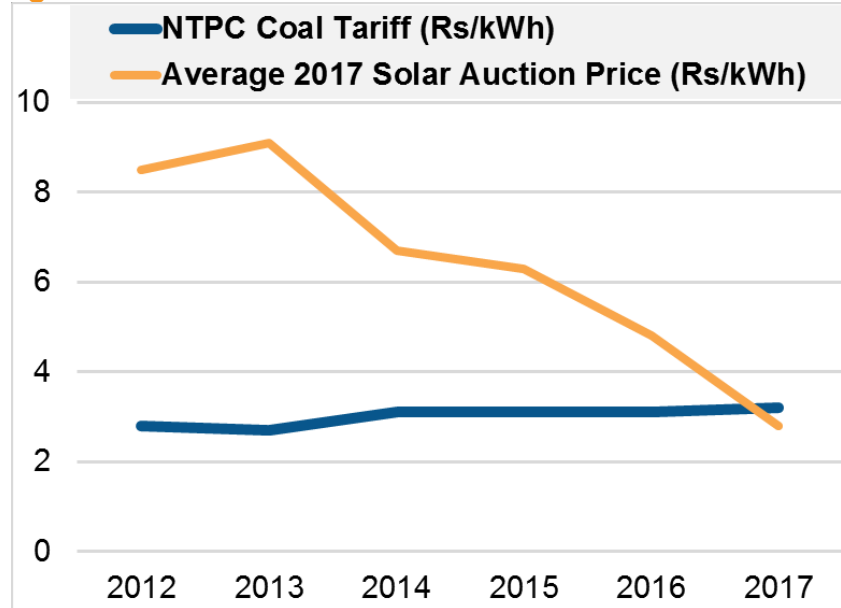
<sup>43</sup> <http://energy.economictimes.indiatimes.com/news/coal/ntpc-reduced-coal-intake-by-5-5-per-cent-in-2016-17/58215044>

<sup>44</sup> <http://www.ntpc.co.in/en/media/press-releases/details/solar-power-tariff-hits-all-time-low-rs-315-unit-ntpc-auction>

<sup>45</sup> <http://energy.economictimes.indiatimes.com/news/renewable/solar-power-tariff-continues-free-fall-hits-new-low-of-rs-2-62-a-unit/58602131>

NTPC is likely to continue to see the benefits of improved domestic coal logistics, which will allow it to hold down the cost of coal-fired power going forward—to the benefit of the Indian economy. However, the decline in the cost of solar power is far from over, and from this point onward, cost declines will move solar even further below the cost of coal-fired generation. As solar further proliferates across India in an expansion led by NTPC, the Indian economy will reap further benefits thanks to the deflationary nature of declining solar tariffs and long-term solar power purchase agreements, which will increasingly out-class coal on all measures.

**Figure 8: Indian Solar Tariffs Vs NTPC's Coal-fired Power Tariff**



Source: NTPC, Bloomberg New Energy Finance, Livemint, Bloomberg Gadfly, IEEFA estimates

## Vertical Integration

NTPC required 169 million tonnes of coal to supply its coal-fired fleet in FY2016-17<sup>46</sup>, with Coal India (responsible for 80% of Indian coal production) contracted to supply 154 million tonnes and Singareni Collieries Company Ltd 11 million tonnes<sup>47</sup>. However, NTPC see operation of its own coal mines as key to its fuel security strategy, and going forward NTPC aims to meet 25% of its coal requirement with its own mines.

In December 2016, the company reported significant progress at its first coal mine as it exposed the coal seam beneath the overburden at its Pakri Barwadih coal mining project in Jharkhand. The Indian government has allocated 10 mine projects to NTPC with a total potential production of 107Mtpa, capable of supplying 20GW of capacity<sup>48</sup>. In 2017, NTPC has upped the pace of its coal mining developments. In March, the NTPC board approved investment of Rs3,000 crore (US\$467m) for the Talaipalli coal mining project, which will have a capacity of 18Mtpa<sup>49</sup>. This follows NTPC board approval of Rs1,000 crore (US\$156m) for development of the Dulanga coal mining project in January 2017.<sup>50</sup>

<sup>46</sup> <https://www.snl.com/web/client?auth=inherit - news/article?id=37290923&KeyProductLinkType=7>

<sup>47</sup> NTPC Annual Report 2015-16, p. 34.

<sup>48</sup> <http://energy.economictimes.indiatimes.com/news/power/power-generator-ntpc-strikes-first-coal/55853537>

<sup>49</sup> <http://www.deccanchronicle.com/business/companies/280317/ntpc-okays-rs-3000-cr-investment-for-talaipalli-coal-mining-project.html>

<sup>50</sup> <http://energy.economictimes.indiatimes.com/news/coal/ntpc-approves-rs-1000-crore-investment-for-dulanga-mining-project/56491642>

In addition to opening up its own coal mines, NTPC is working to increase the efficiency of existing mine-to-power plant logistics in line with the Indian government's initiatives overseen by the ministries of power and transport. Efforts in FY2015-16 saw NTPC achieve annual cost savings of just under Rs36 crore (US\$5.6m).

## Thermal Coal Import Replacement

Consistent with Energy Minister Goyal's target for the country overall, NTPC set a target to virtually cease use of imported coal<sup>51</sup> in 2016-17, three years ahead of its original target date of 2020. In 2014-15, NTPC imported 16Mt; this total was almost halved to 9.5Mt in 2015-16.

Indian power utilities imported just over 60 million tonnes of thermal coal from April 2016 to February 2017, down almost 20% year on year<sup>52</sup>, after power utility import totaled 80 million tonnes in FY2015-16, down nearly 12% on the prior year. The new financial year has started with the same trend: April 2017 thermal coal imports into India are down 15% year-on-year<sup>53</sup>. With NTPC quickly opening up its own coal-mining capacity, Indian thermal coal imports are set to continue to decline—toward zero. Operators of a few private coastal power plants could remain an exception (Tata Mundra, Adani Mundra, and Adani Udipi may continue to rely on imported coal, subject to these plants remaining viable given the higher cost of imported coal).

The Indian government's attention is turning toward persuading private power companies to replace unnecessary thermal coal imports with increasingly available domestic coal. With Coal India, NTPC and private companies such as Adani Enterprises all increasing domestic coal production, there is a growing probability that there will simply be no room for thermal coal imports in a market with lower-than-expected power demand going forward and as India seeks to become an exporter of surplus thermal coal.

If NTPC achieves its target of fulfilling 25% of its own coal needs, it will have freed up approximately 42 million tonnes of mostly Coal India supply (based on NTPC's coal requirement for FY2016-17) for which alternative off-takers are now being sought.

## NTPC's Generation Portfolio

NTPC operates across all segments of India's power sector except nuclear power generation. Its 44GW of coal-fired generation capacity places it among the largest coal-fired power producers in the world. The company's 800MW of hydro capacity is a relatively recent addition to its portfolio whilst solar capacity, although currently making up a small percentage of NTPC's capacity, is expanding rapidly. At the end of FY2015-16, NTPC had only 110MW of solar capacity installed. More than 500MW has been installed since then. In April

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<sup>51</sup> <http://www.mydigitalfc.com/power/ntpc-cuts-coal-imports-nil-910>

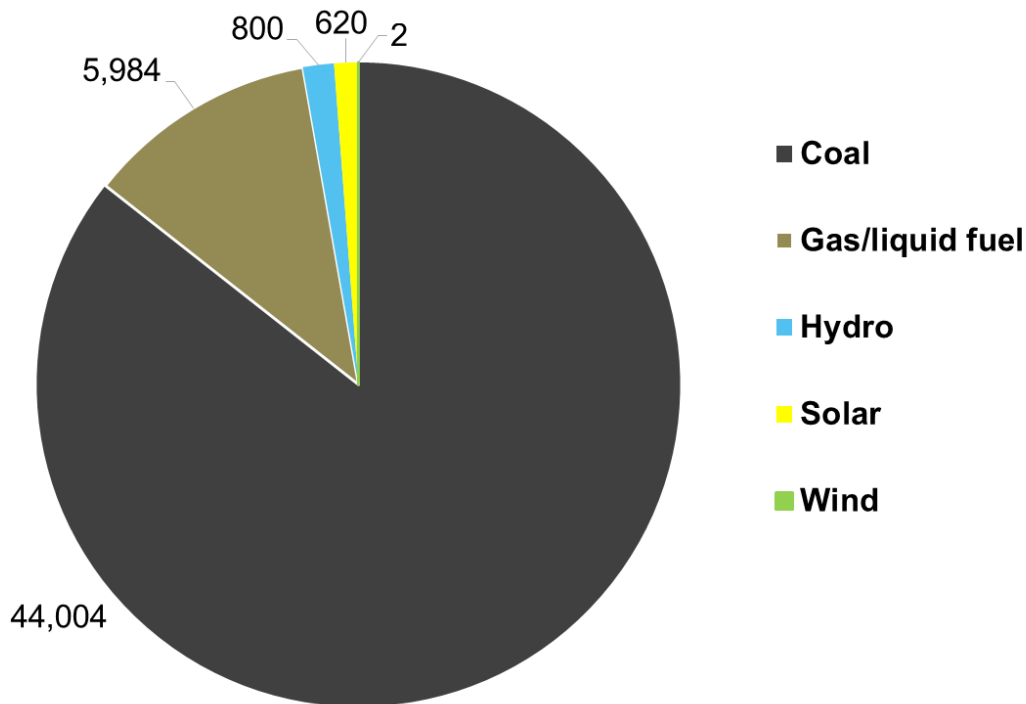
<sup>52</sup> <https://www.platts.com/latest-news/coal/newdelhi/indian-power-utilities-apr-2016-feb-2017-thermal-27794814>

<sup>53</sup> <https://www.platts.com/latest-news/coal/newdelhi/indian-power-utilities-april-coal-imports-fall-27834917>

2017, NTPC commissioned the initial 2MW turbine of its first wind power project in Gujarat, a plant that will have 50MW of capacity when complete.

The company announced it had passed 50GW of total generating capacity on April 1, 2017<sup>54</sup>, and further capacity additions since then have raised the total to 51.4GW (as at May).

**Figure 9: NTPC Generation Capacity by Source as at 1<sup>st</sup> May 2017 (MW)**



Source: NTPC

## Thermal Capacity

NTPC has direct ownership of 38.8GW of coal-fired generating capacity with interests in an additional 5.2GW through subsidiaries and joint ventures (refer to Annexure II). NTPC's total capacity of 44GW makes it by far the largest coal-fired power generator in India, four times the size of the second largest, Adani Power.

NTPC's newest coal-based plant is the 660MW Solapur power plant in Maharashtra state, commissioned in April 2017.

With the latest National Electricity Plan making clear that no new coal-fired generation will be needed beyond what is already planned, new NTPC coal-fired generation will largely replace old plants as they shut down. The Power Ministry has made it clear that 11GW of NTPC's older coal-fired plants will be shut down over the next five years, to be replaced by

<sup>54</sup> <http://www.ntpc.co.in/en/media/press-releases/details/ntpc-now-50498-mw-company>

new, super-critical plants in an effort to increase efficiency and reduce India's carbon footprint.<sup>55</sup>

NTPC has 6GW of gas-fired capacity, including joint ventures and subsidiaries, in its generation portfolio (refer to Annexure III).

## Renewable Capacity

Despite its history as a fundamentally coal-based power generation utility, NTPC is now rapidly rolling out in-house, utility-scale solar projects, and it is signing power purchase agreements for off-take of solar power from private solar operators. As at May 1, 2017, NTPC had a total of 620MW of in-house solar capacity. In addition to seven projects with a capacity of 15MW each or less, the NTPC Bhadla solar project has a currently installed capacity of 260MW<sup>56</sup>, the Rajgarh project has 50MW of capacity and the Ananthapuram solar park project has a capacity of 250MW.

**Figure 10: NTPC's Current Solar Capacity (May 2017, MW)**

Owned by NTPC	Name	State	Commissioned Capacity (MW)
	Dadri	Uttar Pradesh	5
	Port Blair	Andaman & Nicobar Island	5
	Ramagundam	Telangana	10
	Talcher Kaniha	Odisha	10
	Faridabad	Haryana	5
	Unchahar	Uttar Pradesh	10
	Rajgarh	Madhya Pradesh	50
	Singrauli	Uttar Pradesh	15
	Ananthapuram	Andhra Pradesh	250
	Bhadla	Rajasthan	260
<b>Total</b>			<b>620</b>

Source: NTPC

NTPC impact on the rise of solar in India is greater than its solar installations suggest. The record low levelised tariff of Rs3.15/kWh achieved at the Kadapa solar auction in April 2017 was achieved to a great extent because NTPC was the off-taker. As a state-owned entity with a strong balance sheet, NTPC is the strongest renewables power off-taker in India, and its de-risking presence is conducive to securing longer-duration loans at the most competitive borrowing rates, which in turn lowers tariffs<sup>57</sup>. Kadapa was the last of 3GW of solar tenders placed by NTPC.

Including offtake, NTPC is responsible for 3.6GW of the current 12GW of solar capacity in India.

<sup>55</sup> <http://pib.nic.in/newsite/PrintRelease.aspx?relid=155395>

<sup>56</sup> [http://www.business-standard.com/article/news-cm/ntpc-commissions-55-mw-of-bhadla-solar-power-project-117032700249\\_1.html](http://www.business-standard.com/article/news-cm/ntpc-commissions-55-mw-of-bhadla-solar-power-project-117032700249_1.html)

<sup>57</sup> <http://www.bridgetoindia.com/indian-solar-tariffs-meets-eye/>

NTPC is also leading the way with less well-developed forms of solar energy. For example, the company inaugurated India's largest floating solar PV plant in March 2017, a 100KW installation at the Rajiv Gandhi Combined Cycle Power Plant in Kerala<sup>58</sup>. NTPC reservoirs alone have potential for floating solar capacity of 800MW or more. The company is already working on scaling up the technology for megawatt-sized installations.

In April 2017, NTPC commissioned the first turbine of what is currently its only wind power plant (the Rojmal Wind Power Project in Gujarat). Upon completion, the plant will have a total capacity of 50MW<sup>59</sup>.

## Hydro Capacity

NTPC entered the hydropower segment in 2015 with the commissioning of the 800MW Koldam hydro-electric power station<sup>60</sup>. The company currently has further hydropower plants under development (refer to Development Pipeline section on page 22).

It has been reported that NTPC is intending to buy the Indian government's 64.5% stake in hydropower producer SJVN Ltd<sup>61</sup>. That stake is valued at around Rs87bn (US\$1.3bn). SJVN Ltd owns two hydropower plants with a combined capacity of 1.9GW and has plans to build a 900MW hydro plant in Nepal. In addition, SJVN owns a 48MW wind power plant in Maharashtra state. The acquisition would help NTPC achieve its target of reducing reliance on fossil fuels for power generation to 70% by 2032, down from the current 97%.

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<sup>58</sup> <http://www.ntpc.co.in/en/media/press-releases/details/ntpc-installs-india's-largest-floating-solar-pv-plant-rgccpp-kayamkulam-kerala>

<sup>59</sup> <http://energy.economictimes.indiatimes.com/news/renewable/ntpc-commissions-first-wind-capacity-of-2-mw/58007929>

<sup>60</sup> <http://energy.economictimes.indiatimes.com/news/renewable/koldam-hydro-power-station-achieves-record-plf-in-india/53943523>

<sup>61</sup> <https://www.bloomberg.com/news/articles/2017-03-23/ntpc-said-to-propose-buying-india-s-1-3-billion-stake-in-sjvn>

# NTPC's Development Pipeline

NTPC's list of projects already under implementation includes 20GW (refer Annexure IV) of capacity. While this list is dominated by coal-fired plants, it does not necessarily represent the direction NTPC is moving.

From initial planning to construction, coal-fired plants take many years to complete. As such, the current NTPC list represents NTPC's past more than its future.

Renewable energy projects, by contrast, are relatively quick to implement, and the few renewables projects on the list represent only those currently in progress. These project will drop off the list as they are completed. As NTPC's renewable energy capacity scales up, new projects will be added to the list during their short implementation phase.

NTPC aims to expand overall capacity to 130GW by 2032<sup>62</sup> up from just over 51GW presently. As a result, many more projects will come onto the implementation list going forward. As per the latest National Electricity Plan, which sees no need for new coal plants beyond those already being implemented until at least 2027<sup>63</sup>, NTPC's capacity additions list will increasingly feature renewable and hydro-electric energy.

The list in Annexure IV shows a clear commitment by NTPC to diversify into hydro power. Once completed, the current projects will double NTPC's hydro capacity.

## Renewables Additions

While the list of under-development power-capacity projects shown in Annexure IV includes only three renewable energy projects totalling 306MW, the list only represents projects already under way in one form or another.

Further, it does not include private renewables projects in which NTPC will be the electricity off-taker, an area where NTPC will have a major impact on the future of renewable energy in India thanks to its strong balance sheet, which de-risks private projects.

Importantly, the current development list does not encapsulate the scale of NTPC's renewable energy targets.

The Indian government has a target of 175GW of renewable energy capacity by 2022, including 100GW of solar. NTPC has previously committed to contributing 10GW of solar capacity to the overall 100GW<sup>64</sup> government national target. The great majority of the projects that will contribute to meeting this target are not yet on the development list due to

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<sup>62</sup> <http://www.ntpc.co.in/en/about-us/future-capacity-additions>

<sup>63</sup> <http://energy.economictimes.indiatimes.com/news/renewable/in-10-years-half-of-indias-energy-capacity-will-be-from-non-fossil-fuel-sources/58258256>

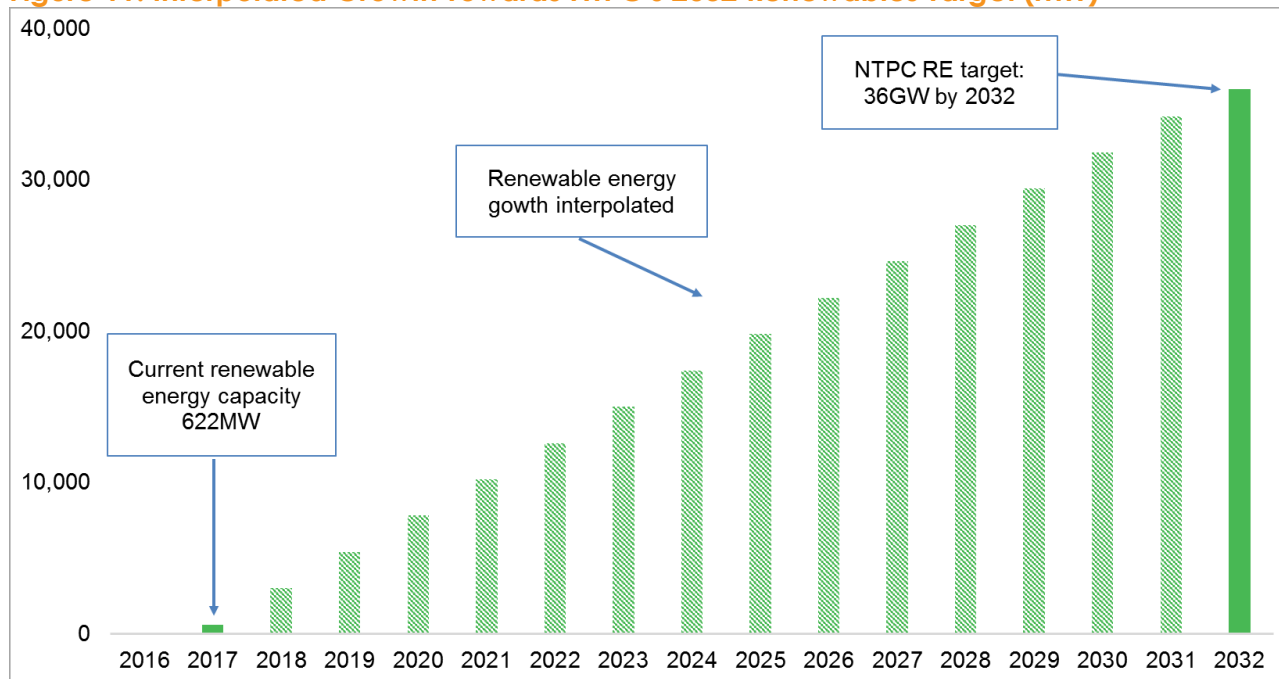
<sup>64</sup> <http://www.livemint.com/Industry/6ZnJZuEye8TOXRURxHcWRM/NTPC-Group-targets-50000-MW-installed-capacity-by-March-201.html>

the short turnaround of solar projects. The company also has an initial wind power target of 1GW, up from no wind capacity at all until very recently<sup>65</sup>.

In addition, NTPC has a long-term ambition to achieve 128<sup>66</sup> to 130GW<sup>67</sup> of total capacity by 2032, of which 28% would be renewable capacity (around 36GW) up from just over 1% currently. Although this is a long-dated target, scaling up toward 36GW of renewable capacity from a very low base would represent a major turnaround for NTPC, whose original name, after all, was the National Thermal Power Corporation.

NTPC, in short, stands to be a cornerstone in India's national electricity transformation.

**Figure 11: Interpolated Growth Towards NTPC's 2032 Renewables Target (MW)**



Source: NTPC, Economic Times, IEEFA Estimates

Note: The year is installed capacity as at March of the stated year.

NTPC has launched a tender process at what is reportedly India's largest solar park<sup>68</sup>. Six blocks of 125MW each are being offered to developers at the Pavagada solar park, which is to have an eventual capacity of 2.7GW when completed. NTPC has now tendered for a total of 1GW of the park's capacity, although the process was not without delays. The capacity was originally tendered in February 2016 but infrastructure delays led to a re-tendering in March 2017<sup>69</sup>. This is among the projects have yet to appear on NTPC's list of projects under development (Annexure IV).

<sup>65</sup> <http://economictimes.indiatimes.com/news/industry/energy/power/ntpc-to-explore-more-addition-of-renewable-energy-to-portfolio/articleshow/52629261.cms>

<sup>66</sup> <http://economictimes.indiatimes.com/news/industry/energy/power/ntpc-to-explore-more-addition-of-renewable-energy-to-portfolio/articleshow/52629261.cms>

<sup>67</sup> <http://www.firstgreen.co/2017/03/ntpc-commissions-45-mw-capacity-at-rajasthan-solar-project/>

<sup>68</sup> <https://cleantechnica.com/2017/03/23/ntpc-limited-announces-fresh-750-megawatt-solar-tender-indias-largest-solar-park/>

<sup>69</sup> <http://taiyangnews.info/markets/ntpc-pv-tender-for-750-mw/>



NTPC also plans to expand its floating solar installations at the site of its Kayamkulam gas-fired power plant.<sup>70</sup> The existing floating solar installation of 100kW is already the largest in India. The company has plans to extend floating solar capacity to 175MW, including through further use of water bodies around the plant. This move would transform the output of the seldom-used Kayamkulam gas-fired power plant, which generates at a high cost and has only been utilised over four days in the past year. The plant currently survives on a subsidy in the form of a fixed capacity charge.

The Indian solar market is dominated by private developers who are able to achieve lower tariffs than public companies like NTPC. As a result, NTPC is often finding it difficult to find off-takers for its own solar installations in competition with private companies, which are increasingly backed with overseas funders who can bid very aggressively.<sup>71</sup> This is despite NTPC being able to attract financing as low as 7.25% for its masala bond issuances. Whilst at the moment this is slowing NTPC's progress toward its 10GW-by-2022 solar target, NTPC is still able to make a major impact on Indian solar growth by acting as an off-taker to private solar projects.

The company's strong balance sheet is in contrast to alternative off-takers such as state distribution companies, meaning that NTPC's financial de-risking presence helps private companies achieve their aggressively low tariffs. NTPC is aiming to become the off-taker of 15GW of renewable generation capacity in addition to its target of installing 10GW of its own capacity.<sup>72</sup>

NTPC's involvement as an off-taker helped Engie's Indian arm Solairedirect bid Rs3.15/kWh for the Kadapa solar project in Andhra Pradesh, the lowest levelised tariff yet achieved in India and the second under-five-U.S.-cents/kWh<sup>73</sup> tariff. Another recent announcement also from April 2017, was for a 118MW solar project from Azure Power and Hareon Solar; again, NTPC is the off-taker.<sup>74</sup>

The company's first foray into wind power, announced in April 2017, will only be the beginning. Once completed, the under-construction Rojmal wind power plant will have a capacity of 50MW. Beyond this, NTPC has an initial target of reaching 1GW of wind power<sup>75</sup>. The Indian government is targeting 60GW of wind power as part of its target to achieve 175GW of renewable energy by 2022. After India's first, record-breaking wind power auction, in February 2017, the government is now stepping up the pace with a target of 4GW of wind power auctions in FY2017-18.<sup>76</sup> The government asserts that 5-6GW of wind power can be added each year, allowing the 2022 target to be met.

It is clear that NTPC is having a significant impact already on the uptake of renewables in India in the medium-term, and well ahead of its own 2032 target date for installing 36GW. Figure 12 below outlines the status of renewables at NTPC over the past few years and estimates the 2022 renewables capacity figure, including the capacity for which NTPC is the

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<sup>70</sup> <http://www.thehindu.com/news/national/kerala/ntpc-plans-expansion-of-solar-power-generation-capacity/article17745708.ece>

<sup>71</sup> <http://www.bridgetoindia.com/public-sector-struggling-compete-private-sector-solar-power-generation/>

<sup>72</sup> <http://www.livemint.com/Industry/FTLCfy76aYR5QiEke7woON/NTPC-eyes-entry-in-Indias-electric-vehicles-segment.html>

<sup>73</sup> <https://www.pv-tech.org/news/indian-solar-tariff-records-toppled-again-in-andhra-pradesh>

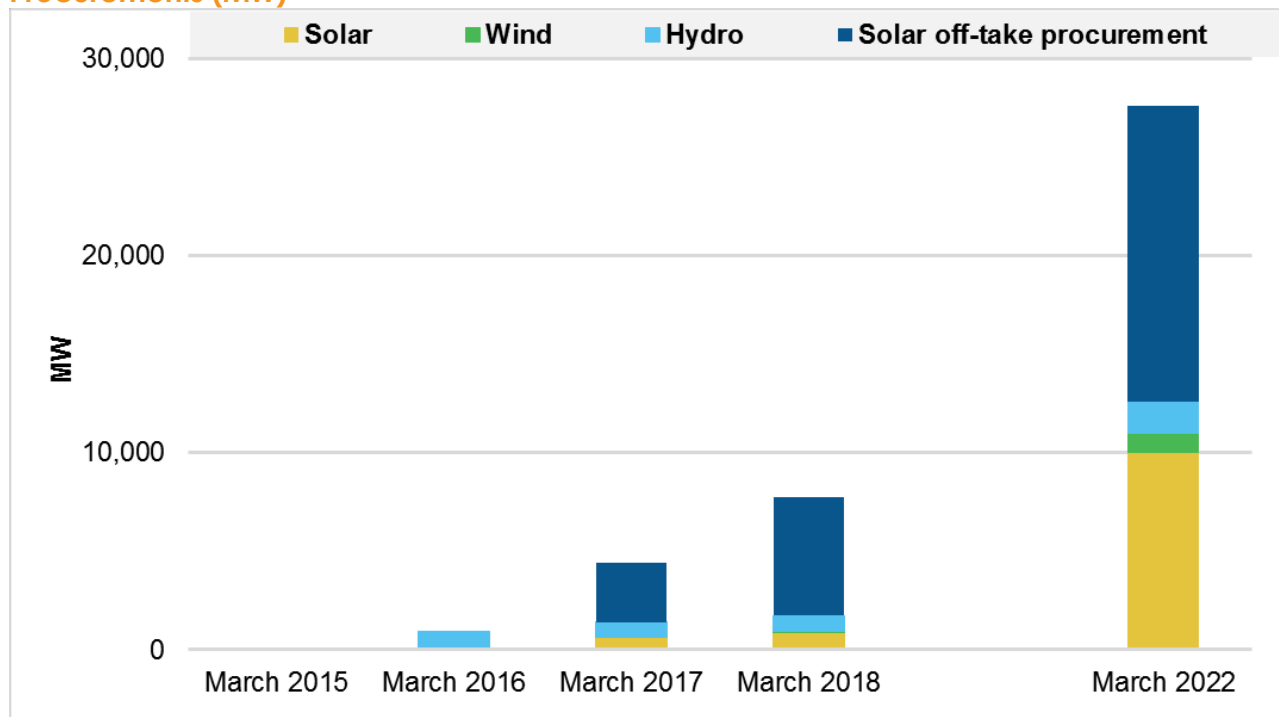
<sup>74</sup> <https://www.pv-tech.org/news/hareon-solar-azure-power-to-invest-in-118mw-solar-installation-in-india>

<sup>75</sup> <http://economictimes.indiatimes.com/news/industry/energy/power/ntpc-to-explore-more-addition-of-renewable-energy-to-portfolio/articleshow/52629261.cms>

<sup>76</sup> <https://www.bloomberg.com/news/articles/2017-04-21/india-plans-auctions-for-4-gigawatts-of-wind-power-this-fy>

off-taker and its target of 10GW of solar capacity and 1GW of wind. Its ongoing hydro projects are expected to be complete by this time too, almost doubling NTPC's hydro capacity.

**Figure 12: NTPC's Estimated Renewable Capacity Progress to 2022 Including Solar Off-take Procurements (MW)**



Source: NTPC, IEEFA Estimates

NTPC also looks set to lead India into the offshore wind sector. In Europe, offshore wind has made significant strides as rapidly-increasing capacity has driven record low tariffs through economies of scale. In a landmark development in Europe, the latest auction for offshore projects in Germany attracted bids of \$0/MWh, meaning that developers will receive no subsidy at all and only receive the market price for the electricity they produce<sup>77</sup> (currently around €30/MWh). Major countries around the world, including China, the U.S., and Japan, now look set to gain from the progress made in Europe.

Indian Energy Minister Goyal has stated a desire to begin research and development on offshore wind projects and has mentioned NTPC as a likely vehicle to lead such efforts. The ambition is to establish major offshore capacity that makes use of the higher capacity factors achieved by offshore wind whilst avoiding the social impacts of land-based energy generation<sup>78</sup>.

NTPC is also beginning research and development projects for concentrated solar thermal (CSP). In November 2016, NTPC awarded the first contract for an integrated CSP plant in

<sup>77</sup> <http://www.windpowermonthly.com/article/1431441/dong-enbw-break-records-subsidy-free-german-bids>

<sup>78</sup> <http://www.livemint.com/Industry/r0ujY5jgRKqPaVU2PB8dkI/Govt-to-experiment-with-offshore-wind-projects-Piyush-Goyal.html>

Asia<sup>79</sup>. As an integrated project, the installation will be connected to NTPC's existing Dadri coal-fired power plant, increasing its efficiency. Whilst standalone CSP plants are still expensive relative to the rapidly declining cost of solar PV, a wave of similar projects around the world is serving to bring down the cost via learning-by-doing gains. Countries such as China, South Africa, Morocco<sup>80</sup> and now Australia<sup>81</sup> are pushing CSP developments forward. Global CSP developer SolarReserve has already secured a project in Chile at a generation cost of US\$63/MWh.<sup>82</sup>

Whilst CSP in India is very much in the R&D and demonstration phase, knowledge and cost reductions gained elsewhere over the next five years will materially change the role of CSP in India. IEEFA expects CSP to play an increasingly important grid-stabilisation and balancing role by 2025 as renewables become a more significant part of the overall generation mix of India.

NTPC is also weighing up geothermal technology. NTPC has signed a memorandum of understanding with the government of Chhattisgarh state with a view to developing a geothermal plant at Tattapani. Feasibility studies for the project are reported to be under way involving the Geological Survey of India<sup>83</sup>.

In addition to offshore wind and CSP development, NTPC is preparing for the rollout of the next generation of technology, which is beginning to approach price parity and will further drive electricity generation away from fossil fuels. NTPC has signed a memorandum of understanding, for instance, for the installation of 50MW of solar with battery storage on Andaman and Nicobar islands<sup>84</sup>. Construction has already begun on 25MW<sup>85</sup>, and this is in addition to the 5MW of solar without storage that NTPC already has on the islands.

India has fallen behind countries like China in realising the transformative potential of battery storage and electric vehicles (EVs) on electricity systems<sup>86</sup>. However, this now looks set to change. NTPC is seeking to set up EV charging stations to capture the significant potential for EVs in India whilst securing further demand for its electricity production<sup>87</sup>. The Indian government is hoping to develop a major uplift to the EV market, which can assist with grid balancing and storage in an electricity market with higher renewable energy capacity. It will also lower India's need for fossil fuel imports.

EV sales in India are currently low, but the government is targeting six million EVs and hybrids on the road by 2020 under its National Electric Mobility Mission Plan (NEMMP) 2020 and the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) initiative.

More recently, Energy Minister Goyal has stated an ambition for all vehicles sold in India to be electric by 2030<sup>88</sup>. In contrast to the plans of other countries, India is proposing doing away with subsidies in favour of a battery-leasing scheme that would involve the sale of EVs without

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<sup>79</sup> <https://www.pv-tech.org/news/ntpc-awards-asias-first-integrated-solar-thermal-contract-in-india>

<sup>80</sup> <http://en.cspplaza.com/global-csp-installed-capacity-increased-to-5017-mw-by-the-end-of-2016.html>

<sup>81</sup> <http://reneweconomy.com.au/solar-towers-on-fast-track-after-coalition-tips-in-extra-110m-43219/>

<sup>82</sup> <http://reneweconomy.com.au/solarreserve-unveils-450mw-solar-tower-and-storage-project-in-chile-31449/>

<sup>83</sup> <https://www.thedollarbusiness.com/news/ntpc-board-approves-rs32335-cr-for-50-mw-wind-power-project/48755>

<sup>84</sup> <https://www.pv-tech.org/news/ntpc-plans-50mw-solar-with-battery-storage-in-andaman-and-nicobar-islands>

<sup>85</sup> <https://www.pv-tech.org/news/construction-starts-on-25mw-solar-on-indias-andamana-and-nicobar-islands>

<sup>86</sup> <http://www.bridgetoindia.com/india-not-enough-capture-energy-storage-opportunity/>

<sup>87</sup> <http://www.livemint.com/Industry/fTLCfy76aYR5QiEkE7woON/NTPC-eyes-entry-in-Indias-electric-vehicles-segment.html>

<sup>88</sup> <http://energy.economictimes.indiatimes.com/news/power/modi-government-plans-major-policy-push-to-promote-e-vehicles/58353196>

batteries (currently the most expensive component of EVs). India's EV strategy, expected to be initiated in 2017, counts the respected energy efficiency and technology advocate Amory Lovins of the Rocky Mountain Institute amongst its advisors.<sup>89</sup>

## Hydro Additions

In order to strengthen India's energy security through greater system diversity and to support greater variable generation from wind and solar, the government is also driving hydro capacity expansions. With a renewable energy capacity target of 175GW by 2022, adding targeted hydro capacity expansion takes the target to 225GW.<sup>90</sup>

Having recently expanded into hydro power with the commissioning of the Koldam plant, NTPC is currently developing three more projects that will almost double its hydro capacity<sup>91</sup>. The company has two projects under development in the state of Uttarakhand; Tapovan Vishnugad (520MW) and Lata Tapovan (171MW). The latest available Central Electricity Authority (CEA) report on hydro-development progress discloses commissioning dates for these projects of FY2019-20 and FY2020-21, respectively<sup>92</sup>. In addition, NTPC is developing the 120MW Ramman in West Bengal, with an expected commissioning date of FY2019-20.

## Thermal Additions

NTPC's current project development list is dominated by coal-based projects. However, it is worth recognizing that many of these projects have been significantly downgraded and/or delayed. Across India, 24GW of under-construction coal-fired power projects are facing viability issues due to logistics<sup>93</sup>, exacerbated by lower-than-expected electricity demand growth.

The Bongaigaon coal-fired power project, currently on NTPC's development list (shown in Annexure IV) was originally meant to have an additional Stage II phase on top of the 250MW to be constructed. This stage now appears to have been abandoned. Similarly, the 1,600MW Lara coal-fired power project was originally envisaged as a 4,000MW plant; the 2,400MW Stage II on this project appears to have been set aside.

The Darlipali project was originally intended as a 4,800MW project to be constructed over three stages of 1,600MW each. While the first stage is currently on NTPC's development list, it is hobbled by ongoing land-acquisition issues, and the final two stages are not on the list.

NTPC has two units of 800MW each in operation at the Kudgi coal-fired plant with another 800MW on the development list. Expectations that this would be expanded to 4,000MW now

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<sup>89</sup> <http://reneweconomy.com.au/backing-new-coal-power-like-defibrillating-corpse-90543/>

<sup>90</sup> <http://economictimes.indiatimes.com/industry/energy/power/adding-hydro-can-take-indias-clean-power-to-225-gw-by-2022/articleshow/54332470.cms>

<sup>91</sup> <http://www.ntpc.co.in/en/power-generation/hydro-based-power-projects>

<sup>92</sup> CEA, Monthly Hydro Reports, State wise note on Hydro Power Development, March 2017.

<sup>93</sup> <http://energy.economictimes.indiatimes.com/news/power/power-projects-of-24000-megawatt-capacity-facing-viability-issues/54957603>

seem to have been abandoned<sup>94</sup> as NTPC looks toward expanding solar generation<sup>95</sup>. The proposed Bilhour power plant, a 1,320MW super-critical installation, no longer appears on NTPC's project development list.

NTPC has been maintaining that it will commission 4GW of power capacity in FY2016-17 despite have reach only 1.4GW by December 2016<sup>96</sup>. The great majority of the shortfall is attributed to delayed or suspended coal-fired power plants and suggests that management is growing increasingly cautious about coal-fired capacity expansions in a market with lower-than-expected demand growth coupled with expanding rates of installation of solar, which as of 2017 has clearly reached grid parity with existing coal-fired plants.

The draft third National Electricity Plan has made it clear that India will not need to build any more coal-fired power plants (beyond the 50GW already being constructed) until at least 2027. As a result, it can be expected that the number of coal-fired projects on NTPC's development list will decrease gradually as these projects are commissioned. In fact, NEP3 does not take into account the number of plant closures that are planned to take place. With NTPC to close down 11GW of coal-fired power plants<sup>97</sup>, the net coal-fired capacity to be added until 2027 is more like 39GW, not 50GW. Much of the capacity under implementation and on NTPC's development list will replace these retiring plants.

NTPC has some capacity plans that are not on its development list, including a second attempt to build a coal-fired power station outside India, in the controversial Rampal (Maitree) power project in Bangladesh. First proposed in 2010, the project has seen a number of delays and has had its expected commissioning date pushed back (again) to July 2020, according to the latest Annual Report of the Bangladesh Power Development Board.

IEEFA's June 2016 report<sup>98</sup> on the Rampal project identified a number of serious financial risks with the project proposal, including an excessive reliance on government subsidies, ongoing delays and repeated capital cost blow-outs. The 2016 Annual Report from BPDB appears to confirm IEEFA's research. The expensive, heavily subsidised electricity that would be produced by this plant runs the risk of being completely outclassed by solar power within a few years if Bangladesh fully commits to solar technology in the same way India has done.

The Rampal project is the key reason behind why Norway's Government Pension Fund Global (GPF), the world's largest sovereign wealth fund, divested from NTPC. In May 2017, GPF announced further plans to divest, from Bharat Heavy Electricals Ltd (BHEL) due to environmental concerns over its involvement in the Rampal project<sup>99</sup> (sited next to the Sundarbans World Heritage Area). This is despite BHEL itself also now taking its first steps into the solar generation sector<sup>100</sup>.

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<sup>94</sup> <http://economictimes.indiatimes.com/news/industry/energy/power/ntpc-may-drop-further-expansion-plans-of-kudgi-thermal-project-in-karnataka/articleshow/57859308.cms>

<sup>95</sup> <https://www.bloomberg.com/news/articles/2016-10-04/india-s-ntpc-to-expand-solar-goal-slow-thermal-power-bnef-says>

<sup>96</sup> <http://www.livemint.com/Money/98SkA1oIxibecP6r0FUgDN/Power-utilities-eye-on-key-milestones-helped-investors-over.html>

<sup>97</sup> <http://pib.nic.in/newsite/PrintRelease.aspx?relid=155395>

<sup>98</sup> <http://ieefa.org/rampal-coal-fired-proposal-bangladesh-puts-ratepayers-investors-risk-relies-outdated-technology-step-times/>

<sup>99</sup> <http://www.thedailystar.net/business/rampal-plant-norway-withdraws-fund-from-indias-bhel-1401142>

<sup>100</sup> <http://energy.economictimes.indiatimes.com/news/renewable/solar-energy-portfolio-of-bhel-crosses-370-megawatt-mark/58532863>

The message here from GPF—that it will divest from companies involved in environmental destruction of World Heritage areas—is likely to be taken up by other major investors as ESG considerations become ever more of a priority. The Rampal situation is a lose-lose for shareholders and management of any companies implicated.

Importantly, as NTPC further scales up its renewables ambition, global institutional investors will take notice. However, controversial projects such as Rampal will likely prove an obstacle to investing.

NTPC's first attempt to build a coal-fired power plant of foreign soil was scrapped on environmental grounds. The Sampur Coal Plant in Sri Lanka was proposed as a joint venture between NTPC and the Ceylon Electricity Board (CEB) in 2006 but was eventually cancelled by the Sri Lankan Ministry of Power and Energy due to ongoing delays relating to the project's expected environmental impacts<sup>101</sup>. The Ministry is now engaging with NTPC to explore alternative electricity sources such as solar and wind power<sup>102</sup>. The cancellation of the project after a protracted, 10-year development process does not bode well for the Rampal project, itself now seven years old and facing further delays and challenges on environmental grounds.

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<sup>101</sup> <http://www.thehindubusinessline.com/companies/lanka-not-to-go-ahead-with-coal-power-plant-with-ntpc/article9104393.ece>

<sup>102</sup> <http://www.thehindu.com/business/Sri-Lanka-scraps-NTPC's-plan-to-build-coal-plant/article14637833.ece>

# Global Utility Industry Trends and Energy Transition: Six Examples

NTPC is obviously not the only electricity utility company coming to terms with the energy transition taking place globally. Utilities in many countries are at various stages of business-model transformation in response to a rapidly-changing technology environment. Much can be learned from the six examples—of both success and missed opportunity—noted below.

Progress in transitioning electricity generation business models is linked to financial performance and outlook. Those companies that are at the forefront of the transition and who made their move early have avoided destruction of shareholder wealth (e.g. NextEra, Enel). Despite significant progress in some cases, those that identified the need to transition late have suffered shareholder wealth destruction as a result of their delay (e.g. Engie, RWE, E.On). Meanwhile Eskom, a South African state-owned utility, is actively resisting a transition to renewable energy and its continued firm attachment to baseload power will result in a significantly worsening financial situation over the next five years.

Italy's **Enel SpA** has a presence in more than 30 countries with a total generating capacity of around 83GW. Around half of the electricity Enel generates is from non-carbon-emitting sources, including 36GW of renewable and hydro capacity, making the company one of the world's leading producers of clean energy. It plans to cut fossil fuel-based generating capacity by 39% by 2019<sup>103</sup>, reducing stranded asset risk. Enel has outperformed the Italian FTSE MIB Index over the last 10 years (refer Annexure V).

Enel has shifted its focus from Europe toward emerging markets<sup>104</sup>, especially Latin America, which is seeing major commitments to renewables from countries like Argentina, Chile, and Mexico. Recent moves include Enel entering sub-Saharan Africa and the Australian market in April 2017. In the U.S. and Canada, Enel Green Power North America has 3.2GW of renewable capacity across 23 states and 2 provinces<sup>105</sup> with more capacity under construction.

Despite the difficulties involved in transitioning a major power utility from fossil fuels toward renewable energy, Enel has done so whilst outperforming the market. Key to its success has been the early identification of an energy transition in progress and the realigning of the company in preparation for the new energy economy.

Florida-based **NextEra Energy Inc.** is another global transition leader that has a focus on providing long-term shareholder value through investment in clean energy. With around 46GW of generation capacity in total, the company is the world's largest generator of electricity from wind and solar. It added a record 2.5GW of solar and wind capacity to its

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<sup>103</sup> <https://www.bloomberg.com/news/articles/2017-01-15/enel-ceo-targeting-renewable-energy-business-in-middle-east>

<sup>104</sup> <http://www.windpowerengineering.com/clean-energy-standard/enel-betting-developing-economies-will-go-big-wind-solar-hydro-power/>

<sup>105</sup> <https://www.enel.com/en/media/press/d201703-enel-begins-operation-in-usa-of-its-largest-wind-farm-.html>

portfolio in 2016<sup>106</sup>. The company was first in the electric and gas utilities industry in Fortune's "World's Most Admired Companies" rankings for 2017<sup>107</sup>, an accolade it has won 10 out of the last 11 years. NextEra is North America's largest operator of wind power capacity, with 13GW of such capacity disclosed in its 2016 sustainability report, spread across 19 U.S. states and 4 Canadian Provinces. The company's wind capacity has quadrupled over the last decade.

NextEra's early expansion into renewable energy, and its continued leadership in that area, has allowed the company to outperform the S&P 500 (see Figure 13 below). In Q1 of 2017, NextEra took over the number one spot in the SNL-covered U.S. top 20 energy companies by market capitalization<sup>108</sup>. NextEra's market capitalization increased 7.7% over the quarter to March 31, 2017, to more than US\$60bn and the company has maintained that it will achieve earnings growth targets of 6-8% through 2020.

**Figure 13: NextEra Share Performance (Orange) Vs S&P 500 Index (Purple) Over 10 Years**



Source: Thompson Reuters

**Engie SA** is the second-largest electricity generator in France (after EDF), and one of the largest European-based electricity utilities with a presence in 70 countries. As with many other fossil fuel electricity generators, large debts and the rise of increasingly cheap renewable energy has proved to be a drag on Engie's performance.

In early 2016, Engie announced a three-year transformation plan aimed at making the company a world leader in the energy transition. The plan aims to have low carbon dioxide activities accounting for more than 90% of earnings by 2018<sup>109</sup>. The transformation plan will

<sup>106</sup> <http://www.prnewswire.com/news-releases/nextera-energy-named-no-1-in-its-industry-on-fortunes-list-of-most-admired-companies-for-the-10th-time-in-11-years-300409026.html>

<sup>107</sup> [http://fortune.com/worlds-most-admired-companies/list/filtered?industry=Electric and Gas Utilities&sortBy=industry-rank](http://fortune.com/worlds-most-admired-companies/list/filtered?industry=Electric+and+Gas+Utilities&sortBy=industry-rank)

<sup>108</sup> <https://www.snl.com/web/client?auth=inherit - news/article?id=40330288&keyproductlinktype=4>

<sup>109</sup> <https://cleantechica.com/2016/02/26/engie-launches-three-year-transformation-plan-lead-world-energy-transition/>



see Engie invest €22 billion in new technologies that include renewable and distributed energy.<sup>110</sup>

The company's acceptance of the energy transition now occurring has come too late for Engie's share price performance, however, which has significantly underperformed the market over the last five years (refer Annexure V).

Germany's **E.On SE**, based in a country that is a pioneer in transitioning towards renewables, has decided to spin off its struggling coal, gas and hydro generation assets as Europe-wide wholesale power prices drove E.On shares to record lows<sup>111</sup>. These assets were spun off into a new company (Uniper) in 2016, allowing E.On to focus on renewable energy.

E.On holds 47% of Uniper but is now considering a quicker-than-planned sell down of Uniper in the face of enormous losses reported by E.On in 2016. That €16bn net loss, largely crystallised as a result of the spin off, was one of the largest ever losses reported in German corporate history<sup>112</sup>. E.On is also faced with sizeable costs related to the shutdown of its nuclear capacity, which it was required to retain. Its nuclear plants are to be shut down by 2022.

The chart in Figure 14 below illustrates the significant E.On shareholder wealth destruction that has occurred over the last 10 years. Even with new carbon emission and nuclear regulations by the German government clearly indicating the future direction of electricity generation, E.On waited too late to spin off its legacy thermal assets,<sup>113</sup> and it missed an opportunity to rid itself of its nuclear obligations. Although now re-focused on renewables, by waiting so long it has been hit with billions in lost value.

**Figure 14: E.On Share Performance (Orange) Vs DAX Index (Purple) Over 10 Years**



Source: Thompson Reuters

<sup>110</sup> <http://www.reuters.com/article/engie-strategy-idUSL5N1E24UV>

<sup>111</sup> <http://www.reuters.com/article/us-e-on-uniper-divestiture-idUSKBN0UI0PK20160104>

<sup>112</sup> <http://www.reuters.com/article/us-e-on-agm-uniper-idUSKBN1860V4>

<sup>113</sup> [http://reneweconomy.com.au/utilities-guide-brown-green-transition-34798/?utm\\_source=RE+Daily+Newsletter&utm\\_campaign=c94fbefcef-EMAIL\\_CAMPAIGN\\_2017\\_04\\_20&utm\\_medium=email&utm\\_term=0\\_46a1943223-c94fbefcef-40324105](http://reneweconomy.com.au/utilities-guide-brown-green-transition-34798/?utm_source=RE+Daily+Newsletter&utm_campaign=c94fbefcef-EMAIL_CAMPAIGN_2017_04_20&utm_medium=email&utm_term=0_46a1943223-c94fbefcef-40324105)

The response of **RWE AG** to Germany's ongoing electricity generation transition was different from E.ON's in that RWE chose to spin off its renewable assets into a separate company (Innogy) whilst holding onto its troubled thermal and nuclear generation capacity<sup>114</sup>. The company's coal-fired generation headwinds have not been limited to Germany, as value write-downs have occurred on new capacity in the Netherlands<sup>115</sup> as well. In addition, as its struggles continue, Germany's third-largest energy group is considering selling its majority stake in the second-biggest power plant in Hungary and its related lignite mines<sup>116</sup>.

RWE has had to shut down or mothball almost 12GW of capacity in the face of low wholesale power prices across Europe. The company's capacity currently stands at 42GW. With a net loss of €5.7bn reported in 2016, RWE is being kept above water by its 77% stake in its renewable energy spin-off. Given that Innogy's market value is double that of RWE, it is clear that RWE's nuclear and coal generation assets have a negative value<sup>117</sup>.

Unsurprisingly, RWE has significantly underperformed the German market (refer to Annexure V).

**Eskom**, the state-owned electricity generator of South Africa, produces around 95% of the nation's electricity and around 45% of all electricity in Africa. Coal-fired generation accounts for 90% of South Africa's electricity. For a number of months, Eskom has defied the government by refusing to sign new renewables power purchase agreements, misguidedly claiming that the prices of renewable energy are too high for South African consumers<sup>118</sup>.

The utility has sought to increase coal-based capacity and is building two huge coal-fired plants at Kusile and Medupi, both with 4.8GW capacity at a cost of at least US\$22 billion<sup>119</sup>, and probably significantly higher, while at the same time demand has been declining. In a recent announcement, Eskom stated that it has 5.6GW of excess capacity at peak<sup>120</sup>.

Eskom has said it will take on another ZAR327 billion of debt up to 2021<sup>121</sup>, a doubling of debt that will drive up interest expenses significantly once the associated projects have been completed. With declining electricity demand and renewables increasing their capacity, there is a strong possibility that Eskom's sales will not generate profits. In April 2017, Standard and Poor's downgraded Eskom's foreign and local currency long-term corporate credit rating, pushing it even deeper into junk status chain to B+ with a negative outlook on concerns that the South African government's ability to support Eskom's growing debt has weakened<sup>122</sup>.

The lessons from the examples outlined above are clear: Electricity utilities considering their path towards renewable energy must accelerate their transition toward sustainable business models if they are to avoid the financial damage incurred by late movers.

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<sup>114</sup> <http://uk.reuters.com/article/uk-rwe-innogy-idUKKCN0ZG1JQ>

<sup>115</sup> <http://ieefa.org/ieefa-europe-fallout-around-dutch-coal-stranded-asset-mistake/>

<sup>116</sup> <http://www.reuters.com/article/hungary-powerstation-rwe-idUSL5N1HD1D7>

<sup>117</sup> <https://www.bloomberg.com/gadfly/articles/2017-03-14/away-with-the-fairies-innogy-tilt-is-a-franco-german>

<sup>118</sup> <https://www.bloomberg.com/news/articles/2016-07-27/biggest-africa-renewable-power-plan-endangered-by-utility-review>

<sup>119</sup> <https://www.bloomberg.com/news/articles/2016-07-27/biggest-africa-renewable-power-plan-endangered-by-utility-review>

<sup>120</sup> <http://www.eskom.co.za/news/Pages/Jann24.aspx>

<sup>121</sup> <http://city-press.news24.com/Business/eskom-debt-to-rise-to-r500bn-plus-20160713>

<sup>122</sup> <https://www.businesslive.co.za/bd/companies/energy/2017-04-06-sampp-downgrades--eskom-corporate-credit-ratings/>

# Conclusions

NTPC, India's biggest electricity generator, is increasingly choosing to pursue future capacity growth through renewable energy.

However, with coal-fired power plant utilisation rates in structural decline in India, NTPC would do well to accelerate its renewable energy roll-out and to step up its facilitation of the Indian government's ambitious renewable-energy targets.

As a state-owned utility in a developing country, NTPC must of course prioritize the provision of power to its citizens and support India's rapidly developing economy. Whilst the case could have been made in the past that this responsibility meant that a continued focus on, and expansion of coal-fired power generation was necessary, times have changed—indeed 2017 has already seen several watershed moments that have signaled a new era in India's electricity sector. With the average new solar tariff in 2017 below NTPC's coal-fired power tariff for its existing fleet, it is clear that renewable energy offers a cheaper way to provide power. Importantly, solar is now cheaper than coal-fired power even before taking into account the externalities of coal (pollution, emissions and water use) that have held back the nation's development.

While it is true that NTPC's current new capacity development list is dominated by coal-fired projects, this list represents the company's past more than its future. These coal-fired developments have been in the pipeline for years due to the long implementation timeframes required for coal-fired power plants. As these projects are completed and drop off the list they are unlikely to be replaced by new coal projects now that the Central Electricity Authority has made it clear that no further thermal projects are required before 2027 at the earliest. Instead, an increasing number of renewable energy projects will come and go from the list as they are completed in the shorter timeframe that such projects require.

NTPC's impact on the rise of renewables in India will continue to be magnified by its role as an off-taker of power from private renewables installations. NTPC's backing of such projects will facilitate further renewables tariff reductions as clean generation technology leaves coal-fired plants even further behind on cost.

If NTPC is to maximize its role of key facilitator to India's renewable energy transition, IEEFA recommends a review of some of the company's corporate objectives outlined in the introduction of this report. Indeed, NTPC's commitment to continuous assessment of the business environment in a way that allows a prudent response to opportunities and threats, requires such a review.

NTPC will do well to continue broad-basing its generation mix via what have historically been considered non-conventional energy sources, although IEEFA would note that solar PV, wind and, increasingly, offshore wind and concentrated solar thermal should no longer be considered non-conventional. Such energy sources are now either fully mainstream or rapidly approaching that status.

Meanwhile, NTPC's goal of further consolidating its status as India's leading thermal power generator can be de-prioritized in a market where the government sees no need for new coal-fired capacity before 2027 at the earliest.

NTPC can narrow the focus of its goal to develop a portfolio of generation assets overseas so that it is concentrating on renewable energy projects. With major investors now seeking opportunities in renewable energy globally, NTPC will find overseas expansion in this sector is not encumbered by the headwinds facing thermal power developments. Setbacks in NTPC's first two attempts at expansion into overseas coal-fired power—the cancellation of the Sampur project in Sri Lanka and ongoing delays around the Rampal project in Bangladesh—are indicative of a growing trend. Going forward, coal-fired power projects will be faced with considerable challenges around environmental concerns and responsible-investment standards regardless of whether those projects are in developed or developing countries.

By taking such steps and further embracing the energy transition happening now, NTPC can become the single most important facilitator in achieving India's ambitious renewable energy targets.

By doing so, it will also go a long way toward fulfilling its company objective of maintaining and enhancing financial soundness.

# Annexure I

## NTPC Stock Performance Vs S&P BSE Sensex (2007-17)

It is noteworthy that although NTPC has materially underperformed on a 10-year view, in the last five years the rate of underperformance relative to the overall market has narrowed and it is the hypotheses of IEEFA that if NTPC accelerates the rate of transformation over the coming decade, the share price relative performance has the potential to reflect more like ENEL or even Nextera if Chairman and Managing Director Gurdeep Singh is able to deliver on the new aspirational targets of NTPC and Energy Minister Goyal. Taken far enough, and subject to a positive resolution of the Rampal proposal in Bangladesh, it is even foreseeable that the Norwegian Sovereign Wealth Fund could re-evaluate NTPC for investment again in the future as NTPC's track record builds.

NTPC Share Performance (Orange) Vs S&P BSE Sensex Index (Purple) Over 10 Years



Source: Thompson Reuters

## Annexure II

### NTPC Current Coal-Fired Generation Capacity (MW)

Owned by NTPC	Name	State	Commissioned Capacity (MW)
	Singrauli	Uttar Pradesh	2,000
	Korba	Chhattisgarh	2,600
	Ramagundam	Telangana	2,600
	Farakka	West Bengal	2,100
	Vindhyachal	Madhya Pradesh	4,760
	Rihand	Uttar Pradesh	3,000
	Kahalgaoon	Bihar	2,340
	Dadri	Uttar Pradesh	1,820
	Talcher Kaniha	Orissa	3,000
	Feroze Gandhi, Unchachar	Uttar Pradesh	1,550
	Talcher Thermal	Orissa	460
	Simhadri	Andhra Pradesh	2,000
	Tanda	Uttar Pradesh	440
	Badarpur	Delhi	705
	Sipat	Chhattisgarh	2,980
	Mauda	Maharashtra	2,320
	Barh II	Bihar	1,320
	Bongaigaon	Assam	500
	Kudgi	Karnataka	1,600
	Solapur	Maharashtra	660
Total			38,755
JVs/Subsidiaries	Name	State	Commissioned Capacity (MW)
	Durgapur	West Bengal	120
	Rourkela	Orissa	120
	Bhilai	Chhattisgarh	574
	Kanti	Bihar	610
	IGSTPP, Jhajjar	Haryana	1,500
	Vallur	Tamil Nadu	1,500
	Nabinagar - BRBCL	Bihar	500
	PUVNL (Patratu)	Jharkhand	325
Total			5,249
<b>Grand Total</b>			<b>44,004</b>

Source: NTPC

## Annexure III

### NTPC Current Gas-Fired Generation Capacity (MW)

Owned by NTPC	Name	State	Commissioned Capacity (MW)
	Anta	Rajasthan	419
	Auraiya	Uttar Pradesh	663
	Kawas	Gujarat	656
	Dadri	Uttar Pradesh	830
	Jhanor-Gandhar	Gujarat	657
	Rajiv Gandhi CCPP Kayamkulam	Kerala	360
	Faridabad	Haryana	432
Total			4,017

JVs/Subsidiaries	Name	State	Commissioned Capacity (MW)
	RGPPL	Maharashtra	1,967

<b>Grand Total</b>			<b>5,984</b>
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Source: NTPC

# Annexure IV

## NTPC Future Capacity Additions

Owned by NTPC	Name	Type	State	Commissioned Capacity (MW)
	Barh I	Coal (supercritical)	Bihar	1,980
	Kudgi (3rd Unit)	Coal (supercritical)	Karnataka	800
	Solapur (2nd Unit)	Coal (supercritical)	Maharashtra	660
	Bongaigaon (3rd Unit)	Coal	Assam	250
	Lara	Coal (supercritical)	Chhattisgarh	1,600
	Gadarwara	Coal (supercritical)	Madhya Pradesh	1,600
	Darlipali	Coal (supercritical)	Odisha	1,600
	North Karanpura	Coal (supercritical)	Jharkhand	1,980
	Tandao (Stage II)	Coal (supercritical)	Uttar Pradesh	1,320
	Khargone	Coal (ultra-supercritical)	Madhya Pradesh	1,320
	Telangana (Ramagundam)	Coal (supercritical)	Telangana	1,600
Total				14,710
	Tapovan Vishnugud	Hydro	Uttarakhand	520
	Lata Tapovan	Hydro	Uttarakhand	171
	Rammam	Hydro	West Bengal	120
Total				811
	Singrauli CW Discharge	Small hydro	Uttar Pradesh	8
	Mandsor	Solar	Madhya Pradesh	250
	Rojmal	Wind	Gujarat	48
Total				306
JVs/Subsidiaries	Name	Type	State	Commissioned Capacity (MW)
	Meja	Coal (supercritical)	Uttar Pradesh	1,320
	Nabinagar-BRBCL	Coal	Bihar	500
	Nabinagar-BSEB	Coal (supercritical)	Bihar	1,980
	Rourkela-NSPCL	Coal	Odisha	250
	Durgapur-NSPCL	Coal	West Bengal	40
Total				4,090
<b>Grand Total</b>				<b>19,917</b>

Source: NTPC



# Annexure V

## Global Utilities Stock Performance Vs Home Market (2007-17)

Enel Share Performance (Orange) Vs FTSE Milan Italian Bourse (Purple) Index Over 10 Years



Source: Thomson Reuters

Engie Share Performance (Orange) Vs CAC 40 Index (Purple) Over 10 Years



Source: Thomson Reuters

## RWE Share Performance (Orange) Vs DAX Index (Purple) Over 10 Years



Source: Thompson Reuters

# Institute for Energy Economics and Financial Analysis

The Institute for Energy Economics and Financial Analysis (IEEFA) conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy and to reduce dependence on coal and other non-renewable energy resources.

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