

Financing the energy transition: A credit perspective on India's power sector

How scaling renewable debt finance reinforces financial market development

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Key findings

Annual investments in renewables, storage and transmission are estimated to surge from USD68 billion (INR6.18 trillion) by 2032 to as much as USD145 billion (INR13.19 trillion) by 2035. Given the capital-intensive, long-lived nature of renewable assets, transition planning is, at its core, a question of debt market planning. And in an era of heightened geopolitical instability, the shift to clean energy is equally a matter of national energy sovereignty.

Credit markets are already structurally differentiating between clean and thermal assets: Renewable platforms deliver stronger margins, lower variable costs, and broader access to capital than their thermal peers. New thermal investments risk crowding out balance sheet flexibility for renewable financing, compounding an already widening credit divergence.

With a sovereign-aligned credit rating and a planned capex of INR7 trillion (USD80 billion) through financial year (FY) 2032, NTPC Limited, India's largest state-owned power utility, is uniquely placed to anchor large-scale, low-cost transition financing and catalyse broader capital flows across the sector.

India's corporate bond market remains structurally underdeveloped, with loans the dominant funding channel. Over-reliance on more mobile international capital flows also exposes the energy transition to sudden foreign capital repatriation, making a greater role for long-term domestic institutional investors a matter of financial resilience, not just market development.



Executive summary

India's power sector is entering a decisive age in which the pace and shape of the energy transition will be determined as much by the structure of debt finance as by technology or policy. Meeting the Indian government's target of 500 gigawatt (GW) of renewable energy capacity by 2030 will require a steep, sustained increase in capital expenditure (capex), dominated by wind and solar assets that require long-tenor, amortising debt. The sector's ability to mobilise such debts at sustainable costs will ultimately determine whether India's transition succeeds or stalls.

We have assessed the credit risk profiles of India's eight key power generators — **Adani Green Energy Limited (AGEL), Adani Power, JSW Energy Limited (JSWEL), ReNew Power, NLC India Limited (NLCIL), NTPC Limited, SJVN Limited, and Tata Power** — which together account for around one-third of India's installed capacity and span a broad spectrum of ownership structures and fuel mixes, ranging from renewable pure-play energy companies and coal-heavy generators to mixed portfolios. The analysis maps their current financial positions and capex plans to identify which transition strategies are creating financial advantages vis-a-vis emerging stress points. As expansion accelerates, all issuers face near-term credit pressure, making existing financial differentials increasingly consequential for sustainable growth.

Renewable assets structurally outperform thermal on profitability. The absence of fuel costs gives renewable assets a durable margin advantage. AGEL consistently outperforms Adani Power on EBITDA margins within the same corporate group. Similarly, NTPC Green outperforms NTPC's legacy thermal operations. These are not cyclical differences — they reflect a structural shift in the economics of power generation that will compound over time as renewable portfolios mature and generate stable, contracted cash flows.

Renewable expansion is already heavily debt-financed, and leverage will rise further. Renewable pure-plays carry the highest debt-to-capital ratios in the sector. Seven of the eight companies analysed generated negative free cash flow in FY2025, reflecting capital-intensive buildouts that are funded predominantly through debt. With announced capex, aggregate leverage will continue to climb, near-term credit metrics will deteriorate across the sector, regardless of the energy mix. The key question is whether the assets being built can support sustainable debt service over time.

Meanwhile, domestic bond market remains a structural bottleneck. Despite annual issuances exceeding USD500 billion (INR47 lakh crore) in 2025, India's corporate bond market remains shallow with most of the growth being driven by public sector issuers. Issuances by the country's utility sector have been uneven over the years, reflecting that India's domestic debt market remains a relatively limited funding channel for corporates. The eight utilities analysed raise approximately 80% of their debt through loans, leaving significant untapped potential in bond markets as a financing channel.

Offshore bond markets offer a selective and fragile channel. Only renewable players are actively raising capital via USD-denominated bonds; thermal-linked credits are structurally absent, with Tata Power's 2021 bond repayment marking an effective exit. Even within the renewable segment, issuance has been highly episodic and macro-sensitive. India sovereign rating — essentially an assessment of a country's creditworthiness — receiving an upgrade in 2025 opens a potential re-entry point, enabling longer tenors and tighter spreads. But translating that into sustained offshore market access will require both issuer-level credit discipline and a degree of global funding stability that cannot be assumed.

A constructive macro window has opened and should be used. India's sovereign credit rating upgrade by S&P and cumulative repo rate reductions to 5.25% as of February 2026 have created more favourable conditions for debt issuance. Tighter sovereign spreads, improving fiscal fundamentals, and the related rating uplift for NTPC and Tata Power collectively narrow corporate spreads and support access to longer-tenor, lower-cost financing — precisely the kind of debt that renewable infrastructure requires. This window should be actively exploited through catalytic issuances and blended finance structures designed to draw in private and international capital.

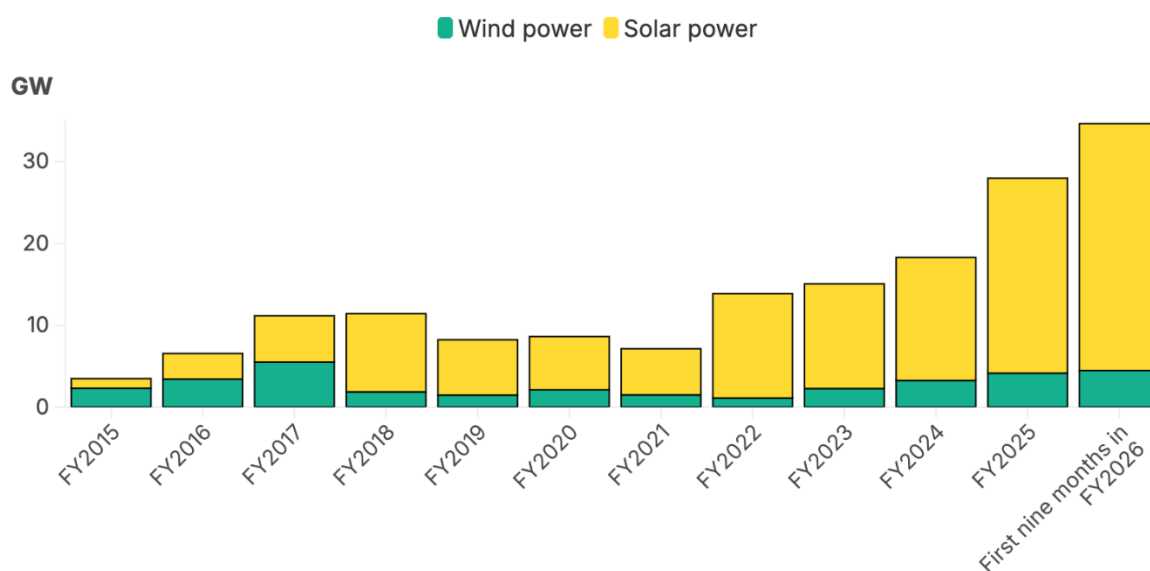
NTPC is central to unlocking transition finance. As India's largest integrated power utility, 51.1% government-owned and rated on par with sovereign debt, NTPC carries both the institutional standing and the balance sheet scale to function as a pricing benchmark and anchor issuers across domestic, Masala, and international debt markets. Its INR7 trillion (USD80 billion) capex plan through FY2032 positions it as the single most consequential capital allocator in the sector. If NTPC can demonstrate credible transition planning, it would facilitate broader capital flows via a coherent transition finance agenda alongside other catalytic efforts.

How utilities scale up and allocate incremental capital in India's energy systems will directly shape their transition risk, as well as their cost of capital and returns on investment. Done well, the transition could help strengthen debt capital markets, rather than be a source of systemic credit risk.

Power sector transition relies on debt finance

India is scaling clean power rapidly. The country has reaffirmed its goal of 500 gigawatt (GW) of renewable energy capacity by 2030, and further increased its Nationally Determined Contributions (NDC) for non-fossil fuel-based energy to 60% in the overall energy mix by 2035¹. Meeting that goal will require sustained acceleration in solar and wind buildouts. Momentum is already building, with non-fossil fuel-based power capacity expanding from 74.4GW in 2014² to 272GW as of January 2026³, dominating new capacity additions. Additions of wind and solar capacity have been accelerating particularly over the past five years (Figure 1), largely reliant on domestic borrowings.

Figure 1: India's wind and solar additions



Source: Ministry of New and Renewable Energy of India (accessed on 29 January 2026)

Note: FY = financial year ending 31 March

Renewable energy assets are capital-intensive infrastructure projects with long operating lives, making debt the natural form of finance. Investors provide most of the capital upfront and can be repaid gradually from project revenues. These characteristics fit non-recourse amortising term debt⁴ with a long-tenor of 15-20 years. By contrast, relying on equity financing would raise the overall cost of capital, as equity investors generally demand a higher return over a shorter horizon. Capital

¹ PIB: [Cabinet approves India's Nationally Determined Contribution \(2031-2035\) to be communicated to the United Nations Framework Convention on Climate Change](#), 25 March 2026.

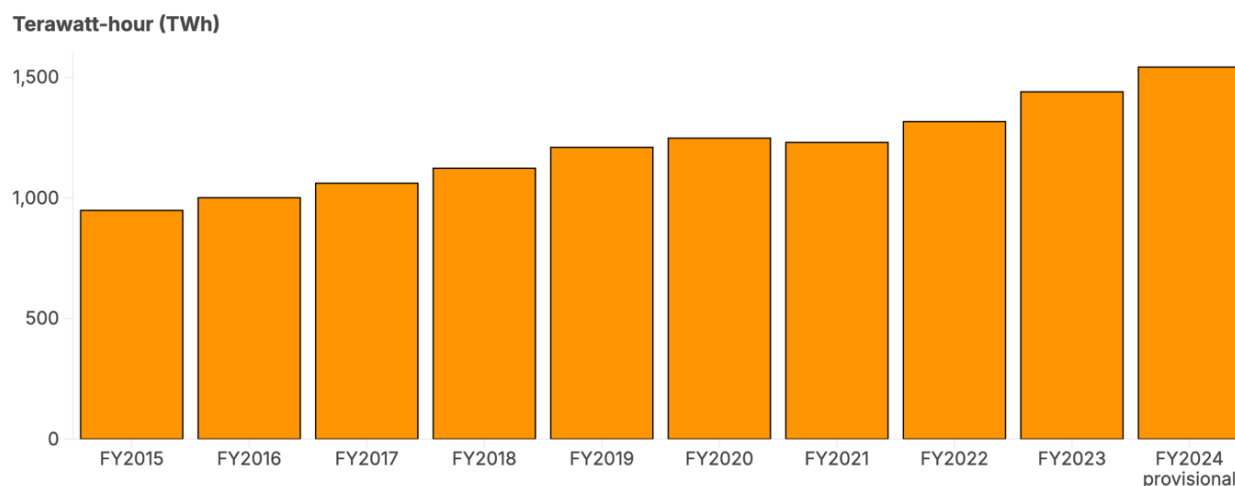
² PIB: [Installed capacity of Renewable Energy](#), March 2026.

³ PIB: [Capacity Addition Crosses 500 GW in FY 2025-26](#)

⁴ Non-recourse amortising debt: Non-recourse financing is a type of project financing where lenders have a claim only on the project's assets and cash flows, not on the borrower's other assets, if the project fails to meet debt obligations. In renewable energy project finance, this means the loan is secured by the Renewable Energy farm itself and its contracts (like PPAs), and the lender cannot pursue the parent company's or developer's broader assets in case of default. Non-recourse loans shift more risk to the lender, so lenders carefully evaluate project viability (power contracts, technology, permits) before lending.

expenditure (capex) in renewables will likely increase, driven by rising energy demand (Figure 2) and a largely favourable policy.⁵ A study by Ember indicates that in India, annual investment in renewables, storage and transmission must rise by 20% per year on average, reaching USD68 billion (INR6.18 trillion) annually by 2032.⁶ Meanwhile, Wood Mackenzie estimates average annual investments of USD145 billion (INR13.19 trillion) through 2035.⁷

Figure 2: India's electricity consumption trends



Source: Energy Statistics India 2025

The scale of financing required is large: An increase in cost of capital could potentially delay progress towards India's renewable energy targets.⁸ Given the sector's reliance on debt financing, the availability, tenor and costs of debt will decide how fast capacity can be added. Against this backdrop, this report takes a credit perspective on India's power sector transition, examining how the sector is financing this transition through debt at scale while maintaining resilient credit profiles that ultimately shape the overall cost of capital.

This report focuses on eight key Indian power corporates — Adani Green Energy Limited (AGEL), Adani Power, JSW Energy Limited (JSWEL), ReNew Power, NLC India Limited (NLCIL), NTPC Limited, SJVN Limited, and Tata Power — which exhibit diverse ownership structures and credit ratings (see [Appendix – Table 2](#)). It examines their fundamentals and status of debt finance to enable, or constrain, transition pathways from fossil-based capacity to renewables. Together, these

⁵ IEEFA. [POWERup: Update on India's electricity capacity, generation and investment](#). 3Q 2025.

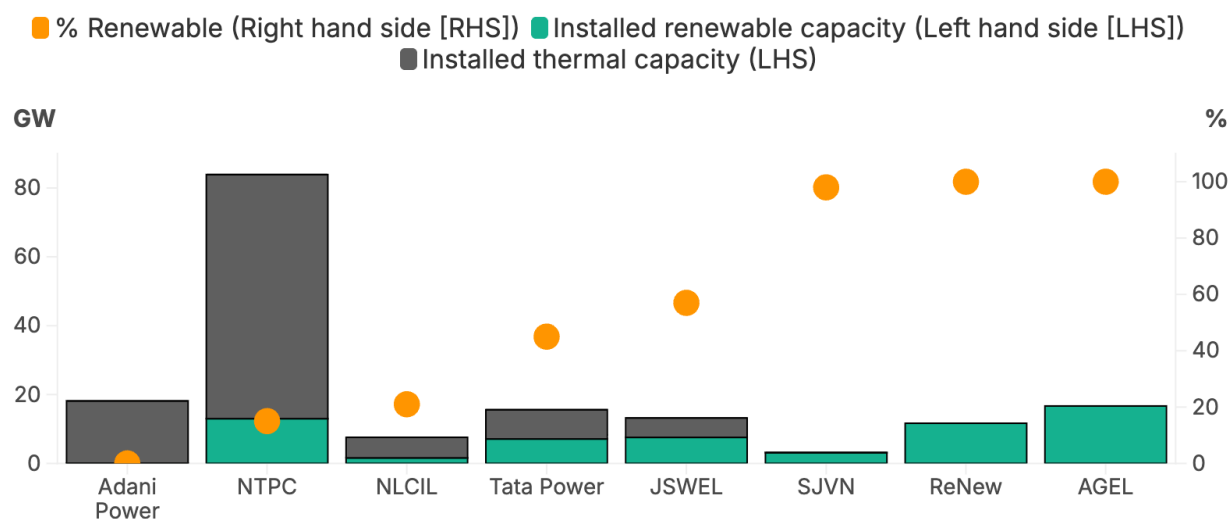
⁶ Ember. [Navigating risks to unlock India's 500 GW renewable energy target by 2030](#). 25 February 2025.

⁷ Wood Mackenzie. [India requires US\\$145 billion in annual energy investment to bridge growth and climate targets](#). 27 January 2026.

⁸ IEEFA. [Cost of capital for Indian renewable energy projects: A review of methodologies, risk drivers, and policy evolution](#). 22 December 2025.

issuers account for roughly a third of India's total installed capacities and represent a diverse spectrum of fuel mixes (Figure 3).⁹

Figure 3: Installed capacities by companies



Source: [IEEFA PowerPulse 2Q FY2026](#)

NTPC is the prominent state-owned incumbent with a large coal capacity and rapidly expanding renewables buildouts. It has a total installed capacity roughly equivalent to that of the other seven companies combined. Other state-owned players include NLCIL, a legacy lignite generator with some renewable capacity; and SJVN, a joint venture between the central government and the Himachal Pradesh government with a hydro base but growing mixed capacity. In the private sector, Tata Power is a large, diversified independent power producer (IPP) across thermal and renewable energy. Adani Power remains the largest coal IPP, providing a reference point for credit and transition risk comparison and interaction. JSWEL is a mixed fuel player, and AGEL and ReNew are leading pure-play renewable developers.

IEEFA's analysis of the eight issuers covered in this report considers the key factors that drive the credit profiles of power companies, consistent with the methodologies used by credit rating agencies and investors. These include:

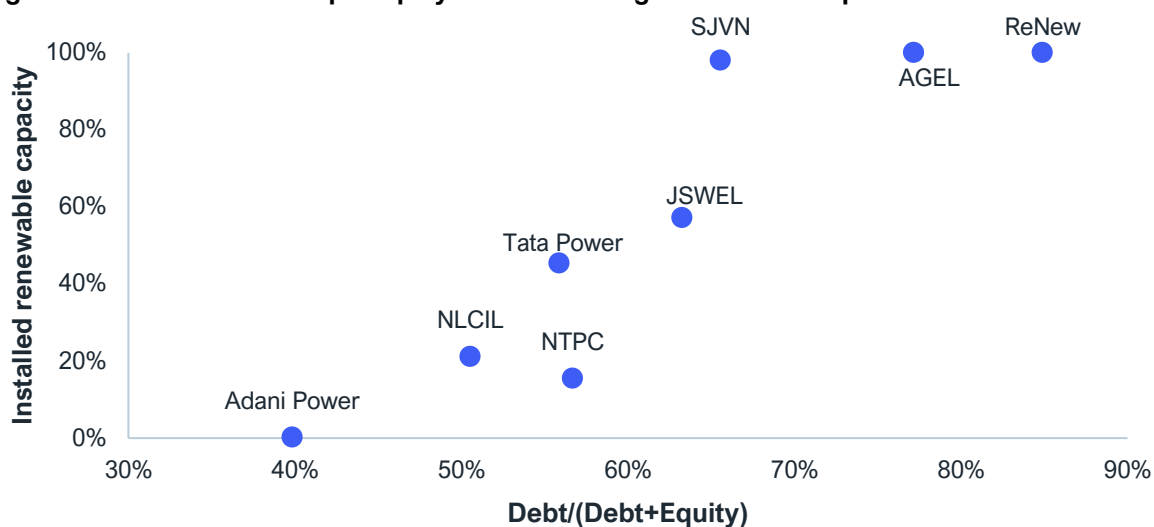
- Business profiles, including revenue visibility, counterparty strength, cost structures, operational reliability, capex plans and execution.
- Financial profiles, as reflected in debt leverage, cash flow metrics, liquidity and access to funding.

⁹ This report excludes a significant renewable developer, Greenko Energy Holdings with 6.6GW capacity as of 31 March 2025 (FY2025). The issuer is based in Mauritius and is backed by international sovereign wealth owners including GIC and Abu Dhabi Investment Authority.

- Financial policies, as well as corporate and governance structures.

Rather than modelling future scenarios, this analysis examines both current financial profiles and forward-looking capex plans of these utilities to identify whether and how climate transition strategies are already manifesting in balance sheet outcomes and may evolve as expansion accelerates. By evaluating present-day positions of leverage of the utilities, funding access, and operational performance alongside announced investment plans, the report aims to find which transition pathways appear to be creating financial advantages versus which are giving rise to emerging stress points. Capital structures among utilities already reflect that renewable expansion could drive an increased debt share (Figure 4). As installed capacity expansion accelerates dramatically, whether through thermal or renewable additions, all issuers will face near-term pressure on credit metrics due to increased debt and execution risk, making these existing financial differentials increasingly important for sustainable growth capacity.

Figure 4: India's renewable pure-players have the highest debt-to-capital ratios



Source: Company reports, IEEFA

Note: As of FY2025 = Financial Year ended 31 March 2025

The power sector is already one of the largest borrowers in India's domestic debt markets, and its role is likely to expand as investments accelerate. In this context, transition planning requires debt market planning. This will ensure continually mobilising long-dated loans and bonds at affordable coupons while maintaining a resilient financial profile at tolerable debt leverage level. This is essential for the sector to sustainably preserve capex capacity and access to funding and to provide a buffer against operating challenges resulting from delays and cost overruns.

India's climate policies, supported by clear national energy and decarbonisation targets, could contribute to investors and lenders systematically factoring climate risk into their investment decisions. This could lower the cost of financing for renewable energy projects. Meanwhile,

companies that fail to implement climate-aligned decarbonisation pathways could face increasing climate-related credit risk as carbon constraints tighten and capital markets factor in carbon exposure. The timing and magnitude of these risks depend on policy design, enforcement and pass-through. While the current phase of power sector transition planning remains largely debt-driven, maintaining prudent financial discipline and deploying innovative financing mechanisms are key to preserving business resilience and implementing climate transition plans.

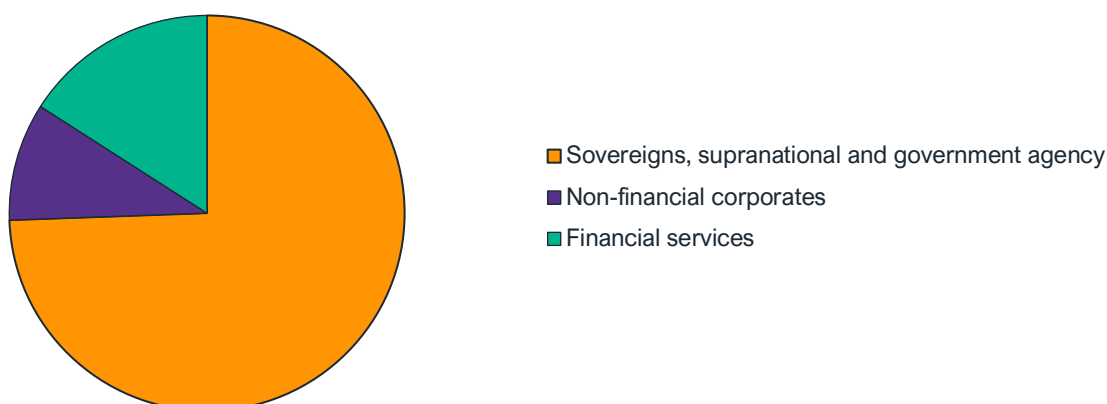
Bottlenecks: Market and fundamental constraints

India's renewable energy targets provide a clear direction for mitigating systemic credit risks associated with climate inaction. However, several constraints could limit the sector's ability to implement effective transition planning. For a majority of the utility issuers reviewed, their debt is raised through loans rather than bonds, indicating that debt capital markets remain underutilised as a key financing channel — a mechanism that could be significant in unlocking scale. Meanwhile, given the substantial debt funding required over the next five to 10 years to meet the national targets, underlying credit fundamentals will determine the sector's capacity to execute the transition.

Debt capital markets remain a limited source of funding

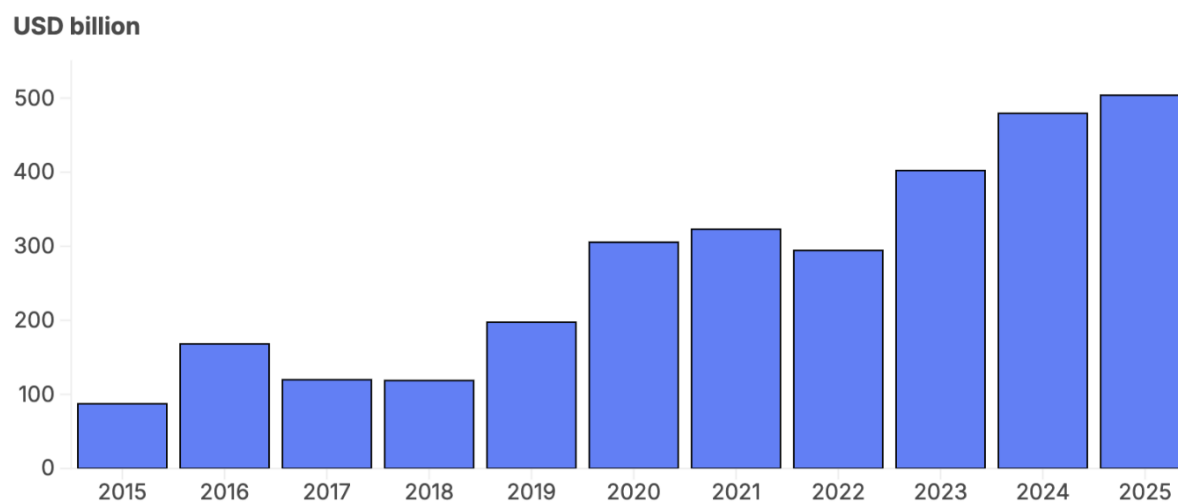
India's total overall bond market has continued to rise. Annual bond issuances exceeded USD500 billion in 2025 (Figure 6) and outstanding bond issuances crossed USD3.2 trillion.¹⁰ Yet public sector issuers dominate the bond market (Figure 5) and non-financial corporate issuers account for a comparatively small share of outstanding bonds. The utility sector accounts for a significant part of non-financial corporate issuances.

Figure 5: Public finance dominates the bond market- Total outstanding bonds in India



Source: London Stock Exchange Group (LSEG), accessed on 24 September 2025; IEEFA

¹⁰ Market data taken from London Stock Exchange Group (LSEG) Data and Analytics, accessed on 24 September 2025.

Figure 6: India's annual bond issuances continue to rise

Source: LSEG, IEEFA

Most of the capital market's growth has been driven by domestic currency issuances by public issuers, whereas issuances by the country's overall utility sector have been uneven from year to year (Figure 7).¹¹ This reflects that India's domestic debt market remains a relatively limited funding channel for corporates. India's corporate bond market, as a share of GDP, remains well below levels in countries such as South Korea, Malaysia or China,¹² albeit with relatively resilient funding conditions compared with some of the smaller emerging markets. Selected state-related players such as NLCIL and NTPC have been relatively consistent domestic bonds issuers, supported by AAA credit ratings — the highest rating category — reflecting very strong repayment capacity and minimal credit risk, which helps them access capital at favourable rates.

According to NITI Aayog, issuances continue to be dominated by private placements, driven by disclosure requirements and regulatory fragmentation.¹³ Also, limited legal, trading and secondary market infrastructure as well as underdeveloped mechanisms for distressed credits has constrained market breadth, depth, and liquidity.¹⁴ In particular, recovery rates under the Insolvency and Bankruptcy Code have declined from 43% in FY2019 to 27% in FY2024, reflecting delays and a rise in distressed cases. As of FY2025, the average resolution time of 713 days far exceeded the statutory 330-day limit.¹⁵ The domestic debt capital markets are not yet well-positioned to support the scale of substantial capex required for energy transition. Issuers continue to rely on state-backed lending, limiting the potential to attract a more diversified investor base.

¹¹ Market data for the utility sector is based on LSEG's [reference data business classification](#).

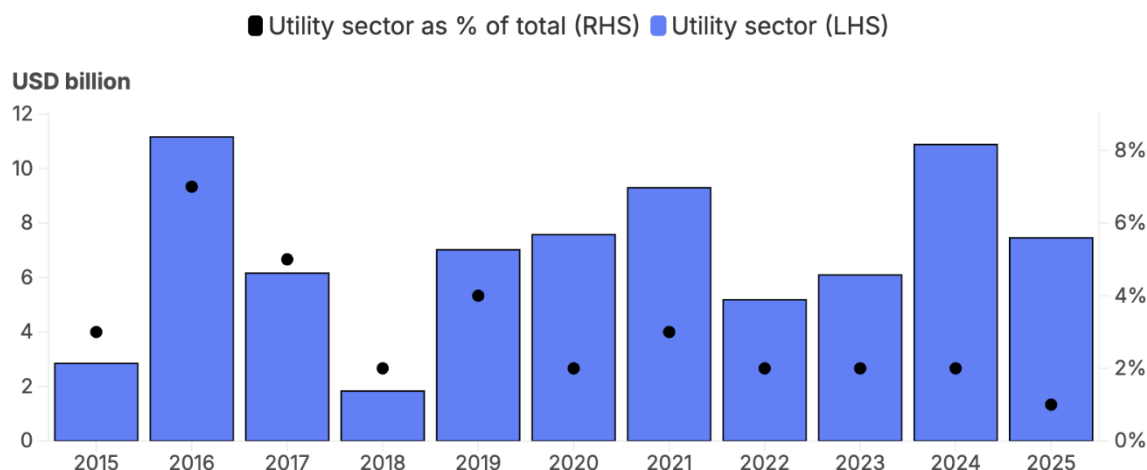
¹² NITI Aayog. [Report on deepening the corporate bond market in India](#). December 2025.

¹³ NITI Aayog. [Report on deepening the corporate bond market in India](#). December 2025.

¹⁴ NITI Aayog. [Report on deepening the corporate bond market in India](#). December 2025.

¹⁵ NITI Aayog. [Report on deepening the corporate bond market in India](#). December 2025.

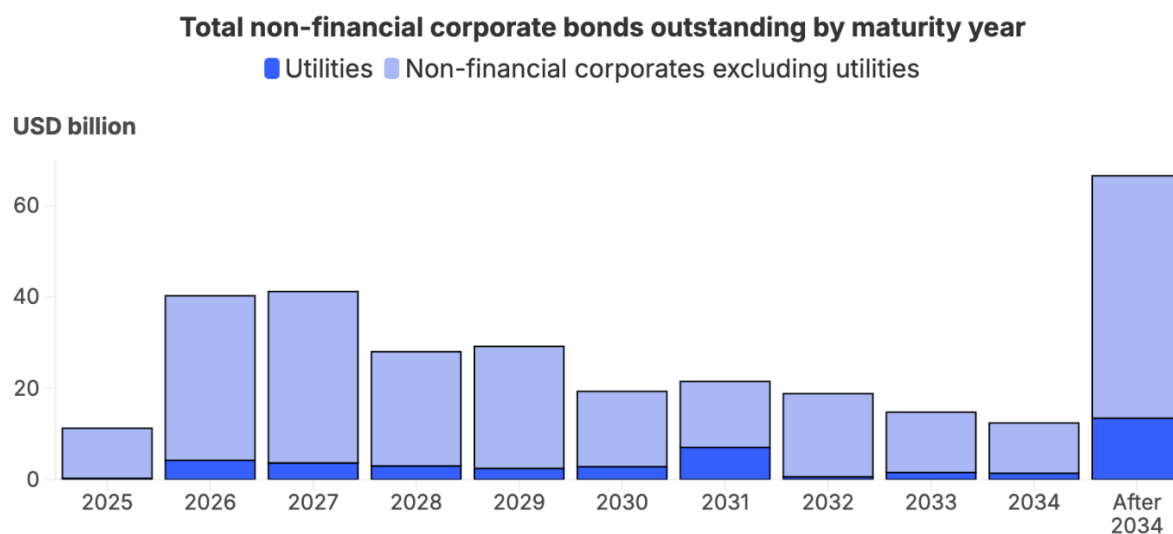
Figure 7: Annual bond issuances by India's utility sector have been bumpy



Source: LSEG, IEEFA

On a positive note, India's corporate sector exhibits a relatively healthy maturity profile with around one-fifth outstanding debt maturing after 2034 (Figure 8). As the overall market size remains limited, the availability of longer-tenor funding is particularly important for long-life assets like renewables. Aligning debt maturities more closely with contracted cash flows reduces refinancing needs, lowers exposure to maturity walls and enhances balance-sheet resilience over the life of the project. Longer tenors can also translate into lower annual debt service obligations, thereby increasing headroom under key credit metrics. That said, access to long-tenor debt may be concentrated among larger issuers. Those with weaker credit profiles may have to rely on shorter-tenor debt, exposing them to higher refinancing risk, potentially falling into a debt trap that limits their borrowing capacity.

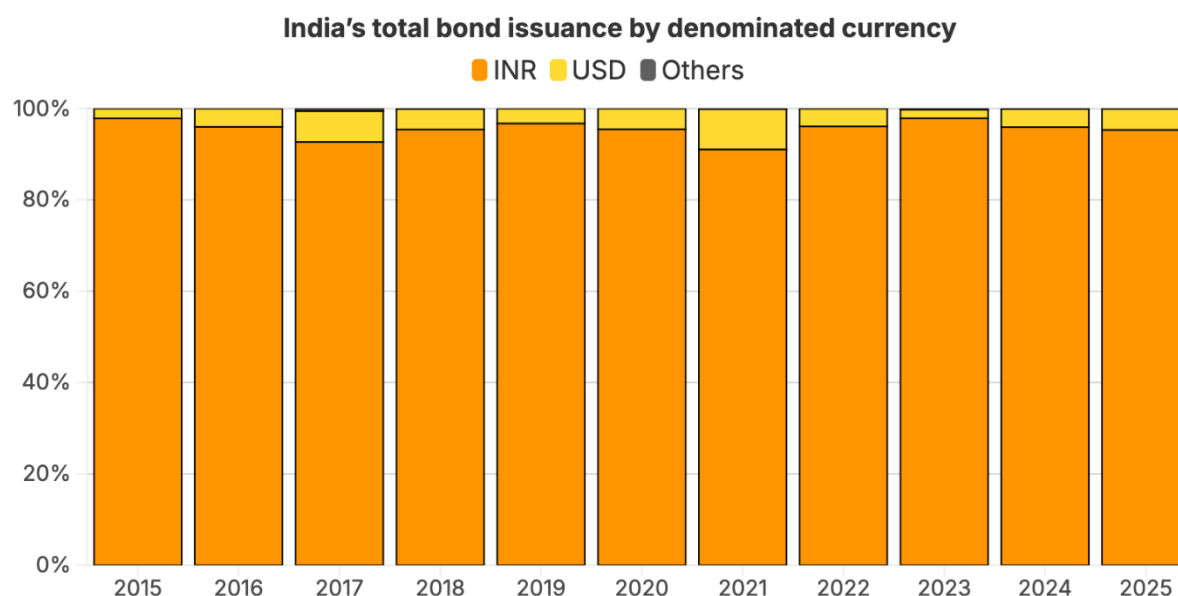
Figure 8: Non-financial corporates have a healthy debt maturity profile



Source: LSEG, IEEFA

India's overall utility sector, led by renewable companies, has historically accessed offshore bond markets more frequently than the broader market (Figure 9, Figure 10), which is dominated by sovereign and quasi-sovereign domestic issuances. For example, ReNew's renewable portfolio has shown strong access to USD bond markets, backed by an established base of long-term international investors. Canada Pension Plan Investment Board and Abu Dhabi Investment Authority are ReNew's key shareholders. AGEL's outstanding USD debt accounts for nearly one-tenth of total debt as of FY2025.¹⁶ In contrast, following Tata Power's full repayment of its offshore bonds, its thermal-linked offshore bonds outstanding are minimal. Still, renewable utilities issuance is not without headwinds as it is highly subject to global macro and funding conditions. There were no foreign currency bond issuances by the whole sector in the years 2022 and 2025.

Figure 9: India relies heavily on the domestic market



Source: LSEG, IEEFA

The upgrade during 2025 for India's sovereign credit ratings^{17,18} represents a positive development. This allows public institutions to play a more catalytic role through issuance at tighter spreads and longer tenors — enabling co-financing capacity. The better economic fundamentals of the country have directly lifted the credit profiles of key Indian companies. The credit ratings of NTPC and Tata Power were also upgraded.¹⁹ A lower country risk helps narrow corporate spreads, beginning with quasi-sovereigns and high-grade utilities, and supports renewed access to longer-tenor offshore and

¹⁶ Across the report, FY2025 refers to Financial Year ended 31 March 2025.

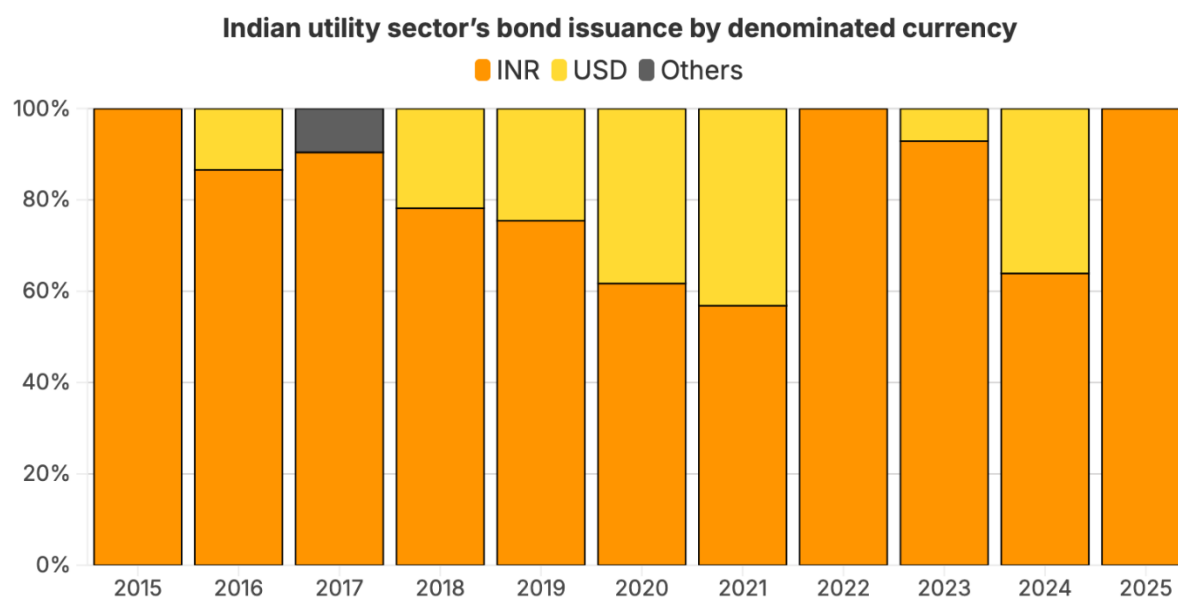
¹⁷ S&P Ratings. [Research Update: India Upgraded To 'BBB' On Economic Resilience and Sustained Fiscal Consolidation; Outlook Stable](#). 14 August 2025.

¹⁸ Morningstar DBRS. [Morningstar DBRS Upgrades India to BBB, Trend Changed to Stable](#). 8 May 2025.

¹⁹ S&P Ratings. [Ratings On Four Indian Corporates Raised Following India Sovereign Upgrade](#). 14 August 2025.

lower-cost rupee financing. These shifts could create greater scope for long-term, amortising debt, which is the kind of financing the transition needs.

Figure 10: Indian utility sector's offshore bond issuances have been bumpy



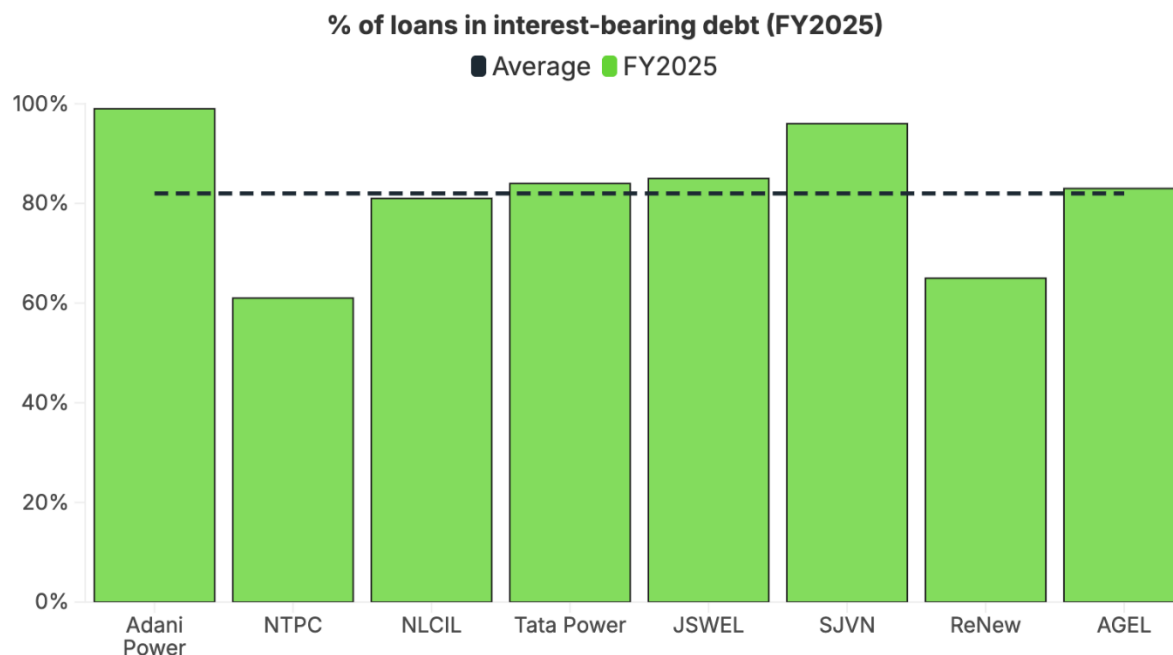
Source: LSEG, IEEFA

Within India's utility sector, the eight power utility issuers this paper focuses on have, on average, raised their debt in a roughly 80:20 mix of loans to bonds (Figure 11). This is in line with the overall sectoral trends, indicating significant room for the utilities to explore bond markets as a funding source. Developing a deeper domestic market would require broader structural reforms, including strengthening the legal and regulatory frameworks around distressed credits and the development of market-making mechanisms.²⁰ While further work on these systemic reforms largely fall outside the scope of this paper, it highlights ways to unlock the potential for issuers to raise comprehensive debt financing — both onshore and offshore — at the scale required to support renewable capacity growth (see [next section](#)). For power utilities, unlocking debt within their creditworthiness limits will also require a combination of sector-specific reforms and transition planning to ensure an integrated and effective approach.

Beyond limitations in debt capital market channels, rising sector debt levels add pressures on credit fundamentals. High interest burdens and persistent credit weaknesses among power sector off-takers remain material constraints to mobilising long-term debt financing.

²⁰ NITI Aayog, [Report on deepening the corporate bond market in India](#), December 2025.

Figure 11: The eight Indian utilities in focus rely mostly on bank loans versus debt capital markets



Source: Company reports, IEEFA calculations

Cost of debt set to weigh more on credit as leverage elevates

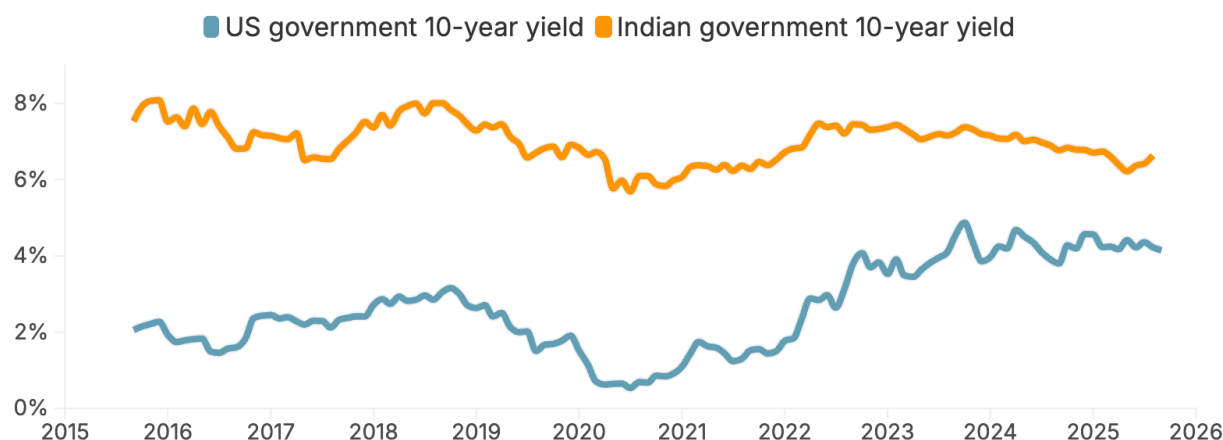
Structurally high base rates in India have made it difficult for highly leveraged issuers to service debt repayments. With their funds from operations (FFO) interest coverage²¹ below 1.5x (Figure 13), SJVN and ReNew demonstrate how elevated borrowing costs pressure financial flexibility when combined with large debt-funded expansion. Meanwhile, NTPC, thanks to its large scale and state-owned enterprise status, exhibits average costs of debt of around 6.5%-7% (Figure 14), broadly in line with government yields. Given its moderate leverage, the impact of borrowing costs on credit profile is manageable, resulting in FFO interest coverage of around 3x. For example, a 50-basis point increase in NTPC's borrowing rates would reduce its FFO interest coverage by about 0.2x, while its leverage — measured as FFO-to-debt — would deteriorate by roughly 0.5 percentage points; these effects are modest.

The recent monetary easing cycle provides temporary reprieve. The Reserve Bank of India (RBI) undertook a series of rate cuts over 2025, reducing the repo rate to 5.25%, combined with tightening sovereign spreads (Figure 12), creates more favourable funding conditions across the sector. This

²¹ FFO = funds from operations refers to cash flow from operations after interest and tax paid and before working capital changes; FFO interest coverage = (FFO + interest)/interest

could particularly benefit renewable project economics, where lower interest costs improve debt service coverage ratios.

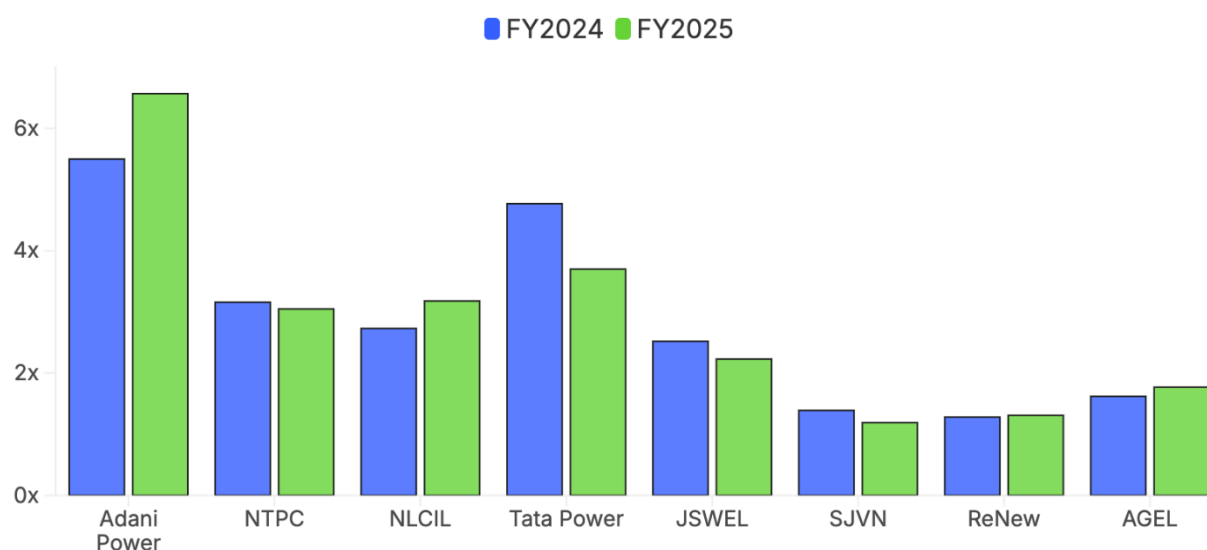
Figure 12: India's borrowing costs remain relatively high



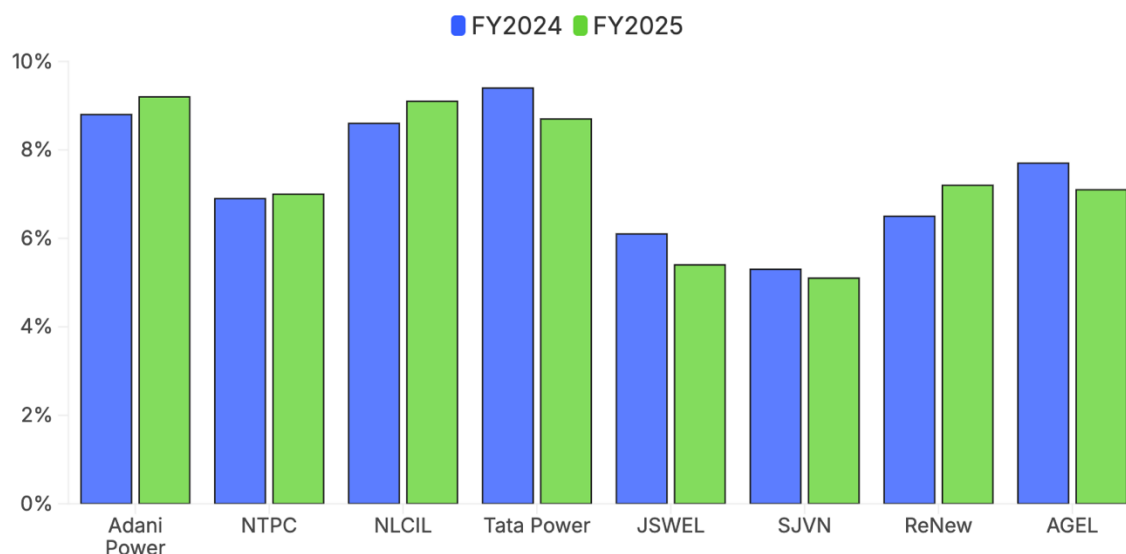
Source: LSEG

However, structural vulnerabilities remain as leverage continues rising. With planned capex representing multiples of existing debt across issuers (see [next section](#)), the sector's aggregate interest rate sensitivity could intensify regardless of current relief. This makes maintaining access to long-tenor, fixed-rate funding critical for sustainable expansion financing.

Figure 13: FFO interest coverage



Source: Company reports, IEEFA calculations

Figure 14: Average borrowing costs

Source: Company reports, IEEFA calculations

Cash collection is improving, but counterparty risk remains

A key credit-positive development in India's power sector is the strengthening of cash collection by power generators from their offtakers — the distribution companies (DISCOMs). Many state DISCOMs in India have had weak finances and delayed payments to power generators,²² causing a build-up of receivables and working capital constraints for power companies. The utilities studied in this report have material exposure to DISCOMs, although some exposure to stronger counterparties such as Solar Energy Corporation of India (SECI) and NTPC could balance that. This dynamic has improved since the introduction of Late Payment Surcharge Rules in 2022, the rule reinforces payment discipline with measures such as restricting defaulting DISCOMs' access to power exchanges and payment security mechanisms.

DISCOM payable days — the average time taken to pay suppliers — have shortened notably from 168 days in FY2022 to 132 days as of FY2024 (Figure 15).²³ As a result, receivable days for power producers dropped significantly from high levels in FY2022 (Figure 16), with the exception of JSWEL. A portion of JSWEL's power is supplied to the JSW group and related companies. A recent Ministry of Power study shows that in FY2025, the overall financial health of DISCOMs improved, resulting in better working capital efficiency and the achievement of an overall positive profit before tax for the first time.²⁴ The implementation of other schemes, such as the Revamped Distribution

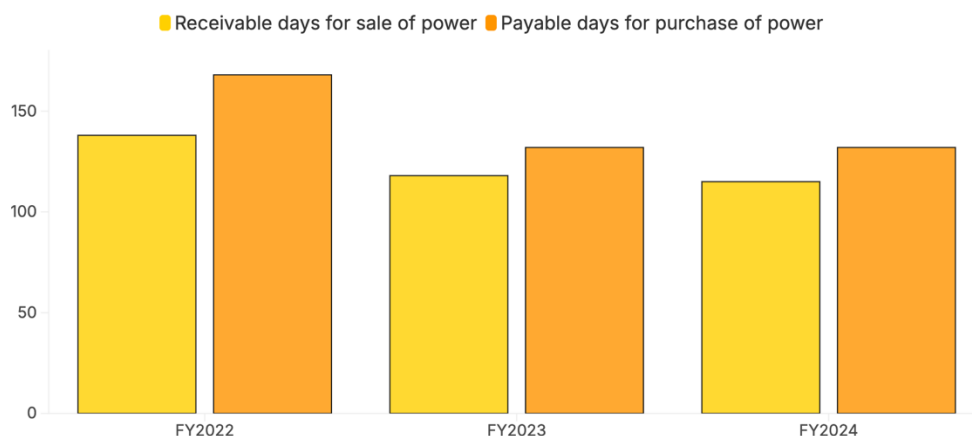
²² IEEFA. [Government drives power sector reforms with key financial initiatives](#). 25 August 2023.

²³ Power Finance Corporation. [Report on Performance of Power Utilities 2023-24 \(October 2025\)](#).

²⁴ Ministry of Power. [14th Annual Integrated Rating and Ranking of Power Distribution Utilities](#). January 2026.

Sector Scheme (RDSS) provides financial support for DISCOMs to modernise their distribution infrastructure, which has potentially helped improve payment discipline and operational efficiency.

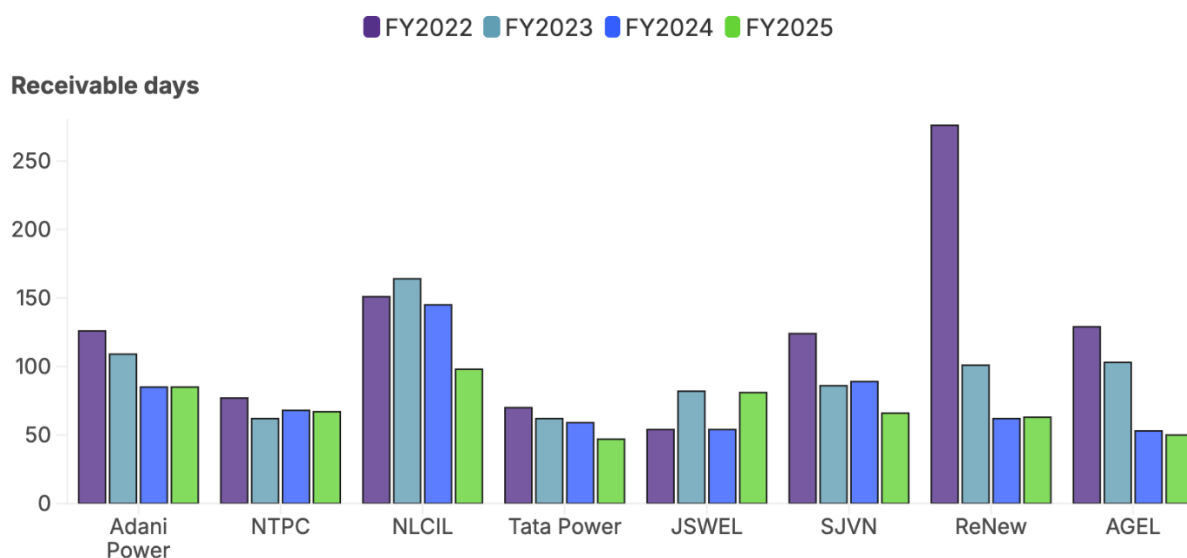
Figure 15: DISCOM payable days have shortened



Source: Power Finance Corporation

While recent developments have helped alleviate some credit risks for generators, performance still varies across DISCOMs.²⁵ Those with longer delays in payments to generators for the power supplied could pose cash flow instability and extend working capital cycles for the generators; those with relatively weak credit profiles tend to pose higher credit risk for the generators.

Figure 16: Power utilities have reduced their receivable days



Source: Company reports, IEEFA calculations

²⁵ Ministry of Power. [14th Annual Integrated Rating and Ranking of Power Distribution Utilities](#), January 2026.

Credit divergence across utilities

India's power generation issuers display divergent credit profiles, reflecting differences in their fuel mix. Companies that have undertaken recent capacity expansion — predominately in renewables — exhibit a higher leverage, typically considered as credit negative. That said, companies that execute a growing renewable share stand to benefit from lower operating costs, favourable policy incentives, and reduced exposure to fuel price volatility, supply constraints, and environmental compliance costs. This, in turn, would alleviate some of the credit pressure during construction stage. Research indicates that debt risk premiums are already generally lower for renewable projects versus for fossil fuel.²⁶

However, as debt levels climb, interest and repayment obligations are placing pressure on key credit metrics. Maintaining a tolerable level of debt leverage is critical as high leverage could limit access to additional funding and increase vulnerability to macro conditions, such as rising interest rate, and to operational and contractual risks, such as power purchase agreement (PPA) renegotiation, weaker enforceability, payment delays, and grid system constraints. All of these can compress debt service coverage ratios (DSCR), trigger covenant breaches and add to refinancing pressures.

Expansion is accelerating rapidly across debt issuers over the next 5 to 10 years, while most of this expansion is from renewable capacities, thermal capacities will remain material at least through 2030 for some companies, making the composition of capex increasingly important for long-term credit profiles.

Continued expansion of coal power has often been driven by India's significant baseload and peak electricity demand. Due to current limitations in flexibility solutions — such as battery storage technologies and demand response mechanisms — thermal power plants are regarded as essential for maintaining grid stability. However, a study from Ember reveals that “no new coal projects would be required beyond what is already under construction”.²⁷ This underscores that coal investments could be riskier than investing in renewables in adverse transition scenarios, although any debt-funded investment could pose similar near-term impacts on credit metrics due to debt increases. Coal-dependent power producers could face increasing competition from renewable energy in regions where technology costs decline, and storage and transmission capacities improve. This would likely result in lower load factors and operating hours for coal plants, weakening cost efficiency and, in turn, weakening cash flow. A study shows that this risk is transmitted into credit risk.²⁸

²⁶ University of Oxford. [ETRC – Cost of Capital and Investment Tracking](#). November 2024.

²⁷ Ember. [Coal's diminishing role in India's electricity transition](#). 29 October 2025.

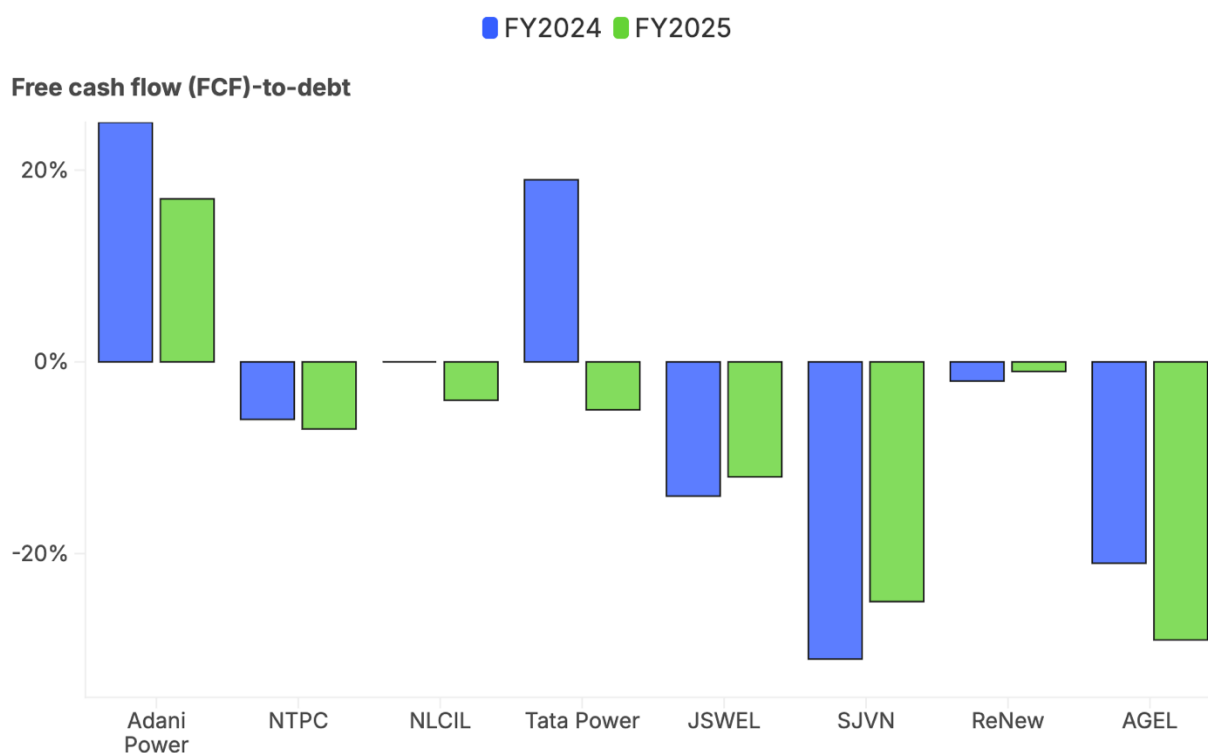
²⁸ Borsuk, Marcin and Shrimali, Gireesh. [Carbon Risk and Corporate Creditworthiness: Evidence from a Major Emerging Economy](#). 4 July 2025.

Capex is sharply accelerating; credit impacts vary

Renewable expansion has increased debt leverage

Of the eight companies considered in this report, seven exhibited negative free cash flow generation in FY2025 (Figure 17). This reflects capital-intensive expansion, primarily driven by renewable buildouts. Companies with a higher renewable share generally exhibit higher debt leverage, as reflected in higher debt-to-EBITDA and lower FFO-to-debt ratios (Figure 18 and Figure 19). These constrain companies' credit headroom and may lower the capacity to raise materially more debt for large-scale renewable investments in the near term.

Figure 17: Most companies have negative free cash flow resulting from large capex

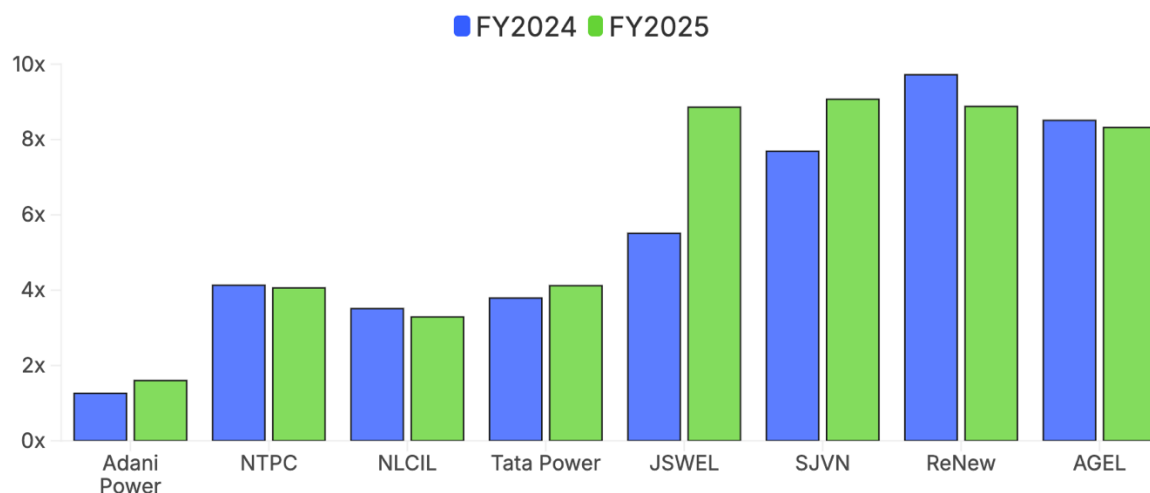


Source: Company reports, IEEFA calculations

Note: Free cash flow = cash flow from operations minus capex and dividends.

From a long-term perspective, however, higher debt leverage coupled with a portfolio of renewable assets is not inherently credit negative. Presence of long-term PPAs and support mechanisms generally aids relatively predictable revenue streams, which then supports steady cash flow generation and gradual deleveraging. Renewable assets typically have long operating lives and low variable costs, which eventually improve credit quality as projects mature and generate stable cash flows.

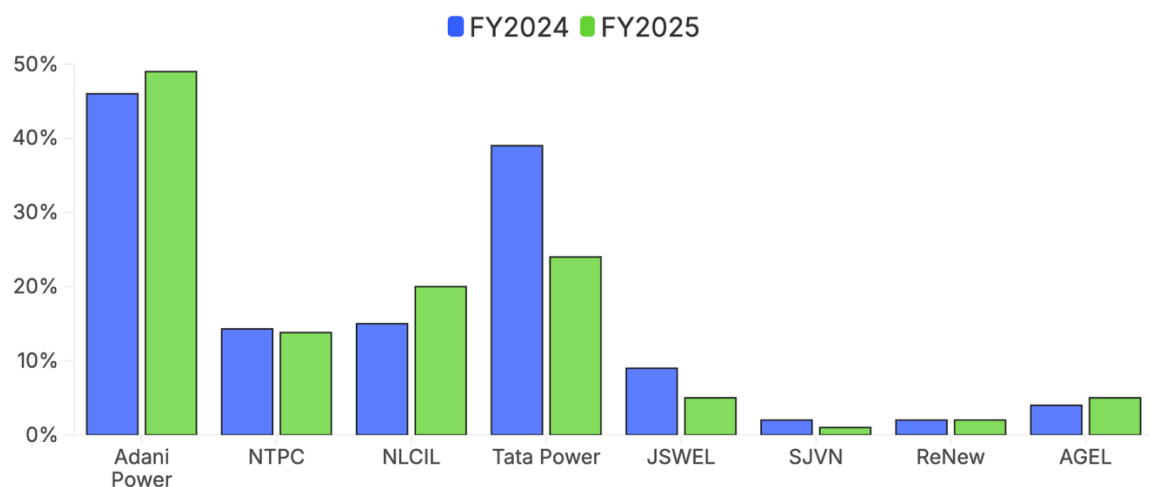
Figure 18: Companies' debt-to-EBITDA



Source: Company reports, IEEFA calculations

Despite higher near-term leverage, the companies generally maintain sound liquidity positions and manageable debt-maturity profiles. Continued access to funding markets also helps contain refinancing risk. At the project level, renewable assets often operate within ring-fenced structures, where long-term power purchase agreements (PPAs) support strong debt service coverage ratios (DSCRs). For example, an AGEL's restricted group, comprising 930 megawatt (MW) solar projects under a 50:50 partnership with TotalEnergies, has issued USD400 million (INR 36,400 crore) in 18-year amortising notes. The long amortising schedule has supported the credit metrics. IEEFA anticipates that the funding environment is more likely to favour renewable projects over time (see [next section](#)).

Figure 19: Companies' free cash flow-to-debt



Source: Company reports, IEEFA calculations

Planned capex will accelerate debt growth across all issuers

As all Indian power companies under review enter expansionary cycle, they have buildout plans that require substantial capex, suppressing future free cash flow generation. With expansion plans expected to accelerate further, IEEFA estimates that all companies will turn into negative free cash flow over the next few years and their debt levels will continue to rise as internally generated cash flows are insufficient to support the expansion. This will further weigh on the companies' near-term credit profiles before they can gradually deleverage through increased earnings from new and completed capacity over time. Renewables account for the majority of the eight power companies' capex plans, but not exclusively, as some companies also intend to add new thermal plants (Figure 20).

- **Adani Power is entering thermal capacity expansion cycle.** The company has seen relatively strong free cash generation over the past few years with limited new projects, resulting in the lowest debt leverage among the companies studied. However, the company is entering into expansionary phase, with its announced locked-in thermal capacity of 23.7 gigawatt (GW), bringing the target capacity to a total of 41.9GW by FY2032.²⁹ The company is forecasting a seven-year capex plan of INR2 trillion (USD22 billion);³⁰ this translates into an annual spend of INR290 billion (USD3.2 billion), compared with cash flow of operations³¹ of INR220 billion (USD2.4 billion) in FY2025. IEEFA estimates that this capex cycle will turn the company into negative free cash flow, reducing its rating headroom, while increasing its carbon lock-in.
- **NTPC is pursuing a large-scale, mix fuel expansion.** Significant capacity additions from the sector will come from NTPC. The company plans to invest INR7 trillion (USD80 billion)³² to increase its capacity by around 80% to 149GW by FY2032, including 60GW renewable (40% of total).³³ The plan is substantial, amounting to nearly three times its reported debt of INR2.5 trillion (USD27.5 billion) as of FY2025.
- **NLCIL is looking to increase renewable capacity share, but investments in thermal remain.** The company is aiming for 10GW of renewables by 2030 (up from 1.4GW as of FY2025), reaching renewable share of 50%.³⁴ Meanwhile, the company is also developing thermal capacity. This forms a significant capex plan of INR1.2 trillion (USD13.2 billion) by 2030, with 43% allocated to thermal projects and 36% to renewable energy.³⁵ The capex level represents over five times of its reported debt in FY2025.

²⁹ Adani Power. [Investor presentation](#). 15 November 2025.

³⁰ Adani Power. [Investor presentation](#). 15 November 2025.

³¹ Net of interest and tax paid.

³² NTPC. [Transcript of Annual Analysts & Institutional Investors Meet held on 18 August 2025](#). 25 August 2025.

³³ NTPC. [Diversified Growth](#). Accessed on 14 November 2025.

³⁴ NLCIL. [Corporate Presentation](#). November 2025.

³⁵ NLCIL. [Corporate Presentation](#). November 2025.

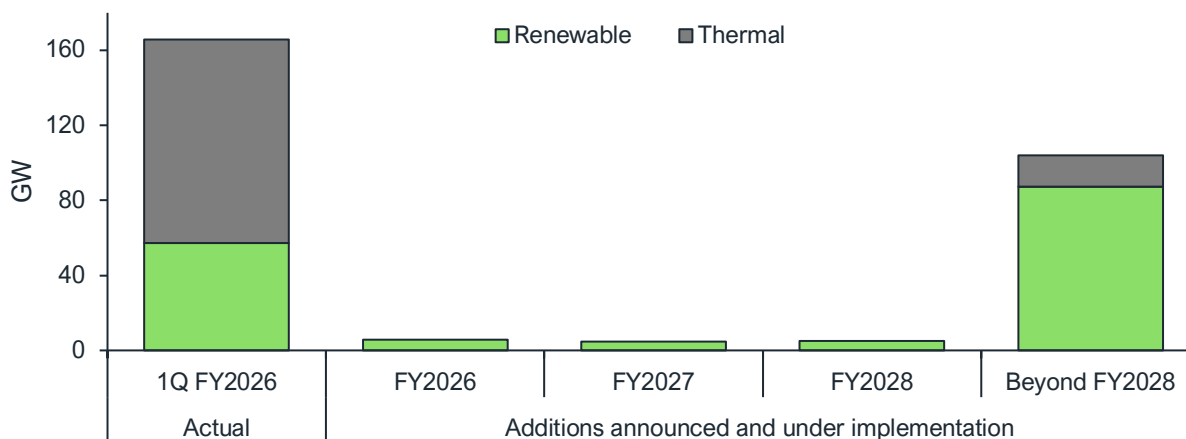
- **Tata Power will incur capex at levels substantially higher than in historic years.** The company is targeting a total capacity of over 30GW by 2030, with more than 20GW coming from renewables.³⁶ IEEFA estimates that this would imply total average annual investments of INR20 billion–INR30 billion (USD220 million–USD330 million) over FY2026 to FY2030, a level above FY2025 capex of INR17 billion (USD187 million) and materially higher than the INR7 billion–8 billion (USD77 million–USD88 million) spent annually during FY2022–FY2023.
- **JSWEL's debt leverage is on the uptick.** An increase in leverage in FY2025 reflects an increase in debt to fund the 3.6GW Mahanadi coal-fired plant. The trend is likely to continue as the company has 12.5GW capacity mix of thermal, wind, solar and hybrid under construction with another 4.6GW in the pipeline, progressing towards its total target of 30GW by 2030. The company plans to incur INR1.3 trillion (USD14.3 billion) capex between FY2026–FY2030, representing 2.6x of its debt in FY2025.
- **SJVN enters coal.** First half of the company's 1.3GW Buxar coal power plant commenced operations in November 2025. Furthermore, the company is developing five hydro projects in Arunachal Pradesh totalled 5.1GW. As a result, the company's debt levels increased by three-fold to INR270 billion (USD3 billion) as of FY2025 over a three-year period, and its debt/EBITDA reached a high level of 9x as of FY2025. The company's cash flow will remain weak in the next two years, with it guiding for a continued rise in annual capex to INR7.5 billion–8 billion (USD77 million–USD88 million).
- **Renewable pure players will see continued strong expansion plan, leading to prolonged negative free cash flow.** AGEL's renewable expansion plan remains large with a target of 50GW by 2030, from 16.7GW as of first half of FY2026.³⁷ Its guidance annual capex of INR300 billion–INR350 billion (USD3.3 billion–USD3.9 billion) over the next two years is materially higher than historic levels. ReNew will execute its 25GW pipeline on hand and continue to win new bids.³⁸ It has announced investment worth INR820 billion (USD9 billion) in major projects in Andhra Pradesh, comprising wind-solar hybrids, wafer and pumped hydro storage.³⁹

³⁶ Tata Power. [Annual Report 2024/25](#). Page 104.

³⁷ AGEL. [Investor Presentation](#). November 2025.

³⁸ ReNew. [Q2 FY26 Results Presentation](#). 10 November 2025.

³⁹ ReNew. [ReNew to invest ~INR 82,000 crore \(~ US\\$ 9.3 billion\) in Andhra Pradesh's green energy portfolio+](#). 13 November 2025.

Figure 20: The eight power companies are poised to expand their installed capacity

Source: Prowess (accessed on 14 November 2025); company reports; IEEFA

Note: Companies are likely to enter new expansions that are not yet captured.

Thermal: Transition planning will be key to credit resilience

Global stakeholders, from investors, lenders, and central banks, to policymakers and credit rating agencies, increasingly recognise the relevance of transition planning into credit considerations.⁴⁰ Moody's finds that a credible transition plan would mitigate credit risk from transition, boost investor confidence, and support access to funding.⁴¹ While ratings remain constrained by their relatively short horizon of three to five years,^{42,43} Fitch cites "elevated" climate transition risk for Asia Pacific power companies with more than a quarter of revenues coming from coal-fired power generation.⁴⁴ Fitch's Climate Vulnerability Signals (CVS) indicate that coal generation in Asia will face "climate-risk factors [that] pose existential or default-equivalent threat to the credit profile" by 2045, considering a "realistic stress scenario".⁴⁵

In IEEFA's view, power companies should put into effect a credible transition plan that entails science-based targets with well-refined timelines and achievement milestones, implementation measures, and meaningful capex allocation to renewables.⁴⁶ Well-defined decarbonisation levers supported by concrete actions and governance structures could facilitate an orderly business transformation and increase long-term business resilience. In the absence of such plans, companies may be exposed to underperforming assets, and the direct and indirect impacts of climate policies including carbon pricing.

⁴⁰ International Transition Plan Network. [Private Sector Transition Plans: A Critical Tool for Mobilising Finance](#). November 2025.

⁴¹ Moody's. [Credible transition plans boost investor confidence and support access to finance](#). 15 October 2025.

⁴² IEEFA. [Climate risks underplayed in recent credit rating actions](#). 19 March 2025.

⁴³ IEEFA. [European oil: Navigating credit risk towards net zero](#). 13 March 2025.

⁴⁴ Fitch. [APAC Thermal Power Utilities' Climate.VS - Peer Review 2024](#). 2 September 2024.

⁴⁵ Fitch. [Climate Vulnerability Signals](#).

⁴⁶ IEEFA. [Bridging the net-zero gap](#). 30 January 2026.

Non-performing assets weigh on creditworthiness

Thermal assets are exposed to risks of future weakening of operation performance. Back in 2019, IEEFA highlighted concerns with non-performing thermal projects, including Tata Power's Mundra, SJVN's Buxar and Adani Power's Godda.⁴⁷ Broadly speaking, projects that exhibit volatile operating performance will be dependent on sustained regulatory support for compensatory tariffs to pass through high and volatile imported fuel costs, which could give rise to contractual and market risks. Moody's has cited the uncertain financial viability of Tata Power's Mundra asset as a credit challenge.⁴⁸ Project execution risks, including delays and cost overruns, can materially increase levelised tariffs. For example, SJVN's Buxar has seen its original estimated cost rise from INR104 billion (USD1.1 billion)⁴⁹ to INR138 billion (USD1.5 billion).⁵⁰

These weak performances have weighed on the utilities' credit profiles. This illustrates the importance and relevance of a credible transition planning, which manages the risks of any sudden cost escalation, whether from any introduction of carbon prices, regulatory tightening, or compliance requirements.

Thermal generators face elevated exposure under carbon pricing scenarios

Companies with thermal capacity have shown high emissions profiles, which increases credit risk.⁵¹ NTPC accounts for large majority of the sector emissions, with scope 1 emissions reaching 327 million tonnes of Carbon dioxide equivalent (CO₂e) in FY2025. This is followed by Adani Power, whose scope 1 emissions reached 86 million tonnes of CO₂e in FY2025, significantly up from 73 million tonnes in FY2024 and 49 million tonnes in FY2023, reflecting the continued expansion of thermal capacity. This upward trajectory suggests that Adani Power's exposure to carbon transition is still expanding, locking in high emissions that may complicate future decarbonisation efforts.

Based on S&P Trucost Environmental Data and carbon price scenarios,⁵² the unpriced cost of carbon⁵³ for Indian power utilities with thermal capacity is substantial relative to the companies' profits. In practice, a significant portion of carbon costs — if a carbon market is implemented — may be passed through to their offtakers. Without factoring in pass-through, on average, carbon costs could represent one to four times of their EBITDA from low to high price scenarios in 2030. While the power sector is not yet included in the upcoming carbon market (Carbon Credit Trading Scheme) in

⁴⁷ IEEFA. [Seriously stressed and stranded: The burden of non-performing assets in India's thermal power sector](#). 18 December 2019.

⁴⁸ Moody's. [The Tata Power Company Limited: Update following outlook change to positive](#). 28 February 2025.

⁴⁹ Indian Government. [Cabinet approves investment approval for 1320 MW Buxar Thermal Power Project in Bihar](#). 7 March 2019.

⁵⁰ The Economic Times. [PM Modi inaugurates SJVN's ₹13,756 cr Buxar Thermal plant's unit](#). 23 August 2025.

⁵¹ Borsuk, Marcin and Shrimali, Gireesh. [Carbon Risk and Corporate Creditworthiness: Evidence from a Major Emerging Economy](#). 4 July 2025.

⁵² According to S&P Global Trucost Carbon Earnings at Risk Data Methodology Guide, a high price scenario refers to a 2-degree above pre-industrial levels by 2100; a medium price scenario refers to 2-degree in the long-term with action delayed in the short-term; a low-price scenario represents country's nationally determined contributions.

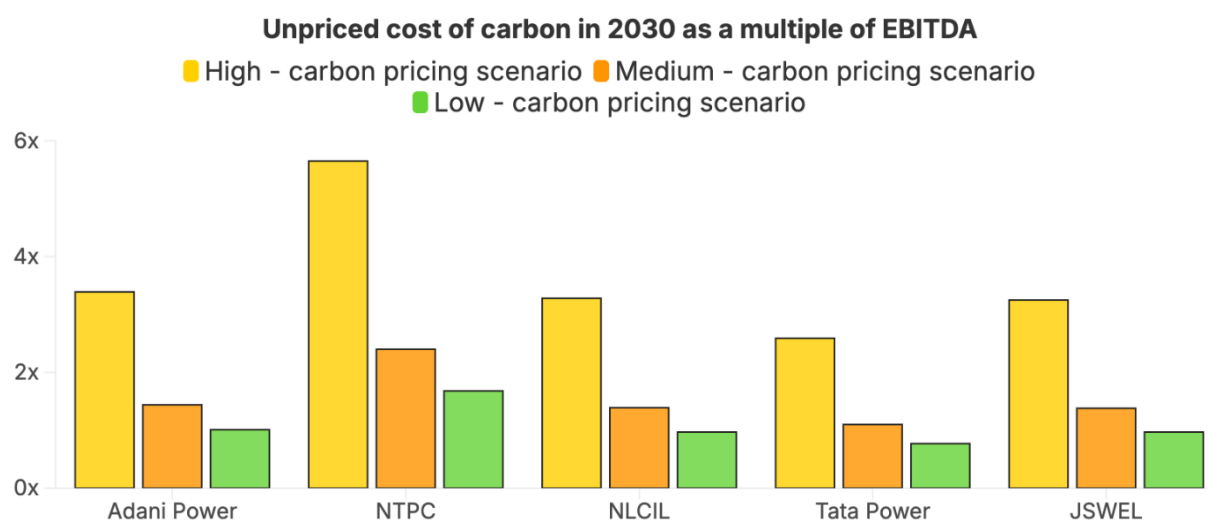
⁵³ S&P Global Trucost. [Trucost Carbon Earnings at Risk: Forward-looking Estimates of Financial Risk](#), 2019.

India, potential future inclusion could create downside risks to earnings and, over the medium term, credit profiles. The extent of impact will depend on evolving regulatory frameworks and tariff structures, with consideration of DISCOM financial health and end-user affordability.

Apart from the exposure to potential future carbon pricing, other carbon-related liabilities may materialise through business model transition, such as investments in carbon mitigation technologies, or accelerated retirement of high-emitting assets.

Comparing those with thermal exposure to renewable players with near-zero emission profiles, a study shows AGEL and ReNew will see net present value gains under various climate scenarios.⁵⁴ When incorporating these yet-to-materialise carbon costs into long-term economics, the effective cost of thermal generation would have been higher and less favourable compared to renewables even after accounting for system-integration costs. This could undermine the competitiveness of coal-based utilities and increase asset-impairment risk and refinancing pressure under carbon cost scenarios over time.

Figure 21: Staggering amount of EBITDA could be at risk under carbon pricing scenarios



Source: S&P Trucost (extracted on 2 June 2025); IEEFA

Note: EBITDA based on FY2023.

Transition planning is differing across issuers

As illustrated by scenarios such as asset underperformance and carbon pricing, thermal power generators will have to formulate and put in effect a concrete transition plan and reduce its emissions, and manage its long-term climate-related credit risks. Based on IEEFA's analysis, thermal

⁵⁴Jindal, A et al. [Examining Climate Transition Risk for Power Companies: Evidence from India](#). 5 February 2025.

power producers have yet to demonstrate concrete pathways to decarbonise, although some issuers are at a more advanced stage than others.

Thermal operations require ongoing capex to remain compliant and dispatchable. This would translate into weakened financial policy over time, a governance factor from a credit perspective. Decommissioning liabilities and the capital needed for emissions-mitigation measures, such as retrofitting and pollution-control systems, could add to the financial burden. Estimates based on the decommissioning of the NTPC Badarpur plant suggest costs are USD58 million per GW.⁵⁵ These liabilities are typically not reflected in total debt, but as PPAs are often not designed to cover decommissioning charge, they could weigh on cash flow generation, depending on the timing of the cost outlay and cost recovery mechanisms. The impact could be exacerbated if policy-driven early measures are required or if multiple retirements occur simultaneously.

Differing transition planning can translate into divergent long-term credit profiles, even where near-term metrics appear comparable. According to Fitch's CVS, issuers with prolonged reliance on thermal generation through 2045 could face "existential" or "default-equivalent" threats.⁵⁶ While these signals are scenario-based and do not imply near-term rating actions, assessing the credibility of an issuer's transition plan is critical in anticipating potential credit impacts and downgrade risks. Issuers with clear and credible planning to reduce emissions or phase out coal may mitigate these potential long-term impacts.

IEEFA finds that some companies continue to focus on long-life thermal assets without defined timelines for winding down operations. Expanding thermal capacity could further drive an increase in emissions, and debt-funded long-life thermal assets could lock in carbon-intensive generation. Even among issuers making efforts to increase their renewable share, absolute scope 1 and 2 emissions will likely remain at elevated levels. For companies such as NTPC, which are on track to increase the share of renewables in their generation mix but still expect the absolute emissions to be stagnant or increasing through to FY2032, only part of their businesses would face higher risks over time, under Fitch's signals.

Net zero commitments can help alleviate long-term credit concerns. For example, Tata Power's 2045 net-zero target, backed by targets of 70% clean and green capacity by 2030 and 100% by 2045, provides long-term creditors with the greatest comfort that transition-related credit impacts will be limited across climate scenarios; however, this assessment is contingent on successful execution.

Thermal assets' contractual obligations and useful life could influence decarbonisation outcomes. Companies such as Tata Power rely on achieving decarbonisation through implementation of carbon capture, utilisation, and storage technology across its operational fleet. However, IEEFA's global

⁵⁵ World Bank. [Coal Plant Repurposing for Ageing Coal Fleets in Developing Countries: Technical Report](#). 1 June 2021.

⁵⁶ Fitch. [Climate Vulnerability Signals](#).

research on CCS shows, this is subject to cost overlays, technological maturity and project scalability.⁵⁷ If implementation measures underperform, issuers' credit risk would increase.

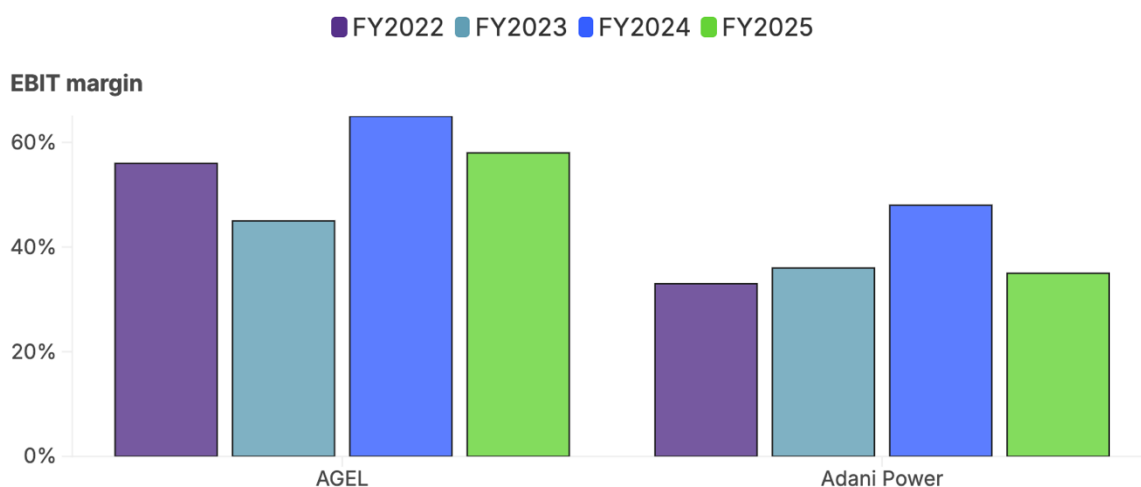
Renewables: Operational efficiency supports deleveraging and access to funding

Zero fuel costs support superior operational profitability

Renewable assets, once operational, typically exhibit stronger profitability than thermal assets, primarily because of no fuel costs, a key factor that underpins the renewables' credit quality. While a relatively short-term corporate credit lens tends to penalise the front-loaded capex without incorporating future cash flows in credit models, companies which execute renewable additions will see margin improvements over time, in turn strengthening the long-term credit profile. With a favourable levelised cost of energy (LCOE) for renewables,⁵⁸ the credit profile of non-recourse projects is supported by stable long-term cash flows and debt servicing capacity.

ReNew, AGEL and SJVN have shown better profitability than other companies with mixed fuel portfolios. Notably, NTPC Green, the renewable arm of NTPC, and AGEL show materially stronger profitability compared with, respectively, NTPC's rest of operations and Adani Power within the same parent groups. For example, generation performance exceeding P90⁵⁹ levels has contributed to a positive domestic rating action for an AGEL's restricted group.⁶⁰

Figure 22: AGEL has consistently exhibited better margins than its fossil fuel peer Adani Power



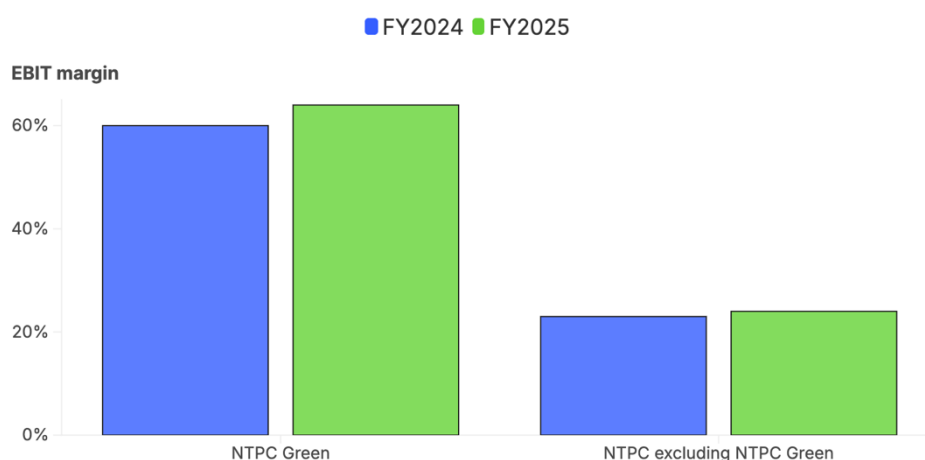
Source: Company reports, IEEFA calculations

⁵⁷ IEEFA. [Carbon Capture and Storage](#).

⁵⁸ IEEFA. [Overestimated financial viability of India's coal-fired power plants](#). 7 July 2021.

⁵⁹ The P90 value indicates the energy production level in 90% of cases exceeds the basic expected levels. It reflects a conservative estimate, typically used to assess risk for financing or investment purposes.

⁶⁰ Crisil Ratings. Adani Green Energy (UP) Limited: [Rating outlook revised to 'Positive'; Rating Reaffirmed](#). 5 February 2025.

Figure 23: NTPC Green has exhibited better margins than NTPC

Source: Company reports, IEEFA calculations

Expanding renewable energy capacity is, as previously discussed, capital intensive. Renewable pure-plays have largely relied on debt-funded investment to scale their asset base. While an increasing share of renewable power share can improve operating profitability, this does not necessarily translate into commensurate improvements in DSCRs or returns on invested capital. This indicates that earnings growth remains heavily dependent on continued capital deployment. In other words, significant upfront investments are still required to expand profitability, at least in the near- and medium-term, until the sector reaches a more mature stage of project completion. Over time, renewables' sustained profitability and growing earnings contributions as project reach completion will support deleveraging.

Meanwhile, renewables still face challenges of project underperformance and grid curtailment, which could lower cash flows. However, their must-run status and dispatch priority continues to support creditworthiness under current policy settings. As India attempts to address the challenges through measures to manage peak power deficits, such as demand-side response, expanded storage capacity and system capabilities strengthening,⁶¹ these measures should reduce curtailment and expand the role of renewables.

Renewables have a wider access to funding

State-owned utilities typically benefit from stronger credit support from implicit government backing and easier access to financing, while IPPs rely more on market-based funding. Meanwhile, as credit fundamentals diverge between renewable and thermal assets, renewables show broader funding access, reflecting strong policy support and sustained investor appetite.

⁶¹ IEEFA. [Green power transmission development in India](#). 24 September 2025.

Global financial institutions have established coal exclusion policies.⁶² The global trends of capital shifting away from coal assets continue, with implications for offshore funding access for renewable projects versus thermal. The offshore bond market access appears more readily accessible to non-thermal players or projects (ReNew, AGEL and hydro project of JSWEL [Appendix – Table 3]). Predominately thermal players or projects are absent from the funding channel. This follows Tata Power repaying its offshore bonds with domestic funding in 2021. The AGEL's restricted group notes illustrate how long-tenor amortising structures can better align debt maturities with the long operating lives of renewable assets. ReNew's issuance of USD600 million (INR54.6 billion) notes in January 2026 in the Gujarat International Finance Tec-City International Financial Services Centre⁶³ demonstrates the issuer's ability to refinance well ahead of its USD525 million (INR47.78 billion) bonds maturing in July 2026.

In addition, renewables have appeared to show stronger international banking relationships. ReNew is a key player to raise funds from several global banks, including Rabobank, Standard Chartered, MUFJ and SMBC. ReNew also announced it will receive funding of USD331 million (INR30.12 billion) from Asian Development Bank for its Andhra Pradesh project.⁶⁴ In 2023, AGEL completed fundraising through its USD3 billion (INR273 billion) financing from eight international banks for development in Khavda, Gujarat.⁶⁵

However, macro conditions play a role in access to funding. AGEL had scrapped its USD1.2 billion (INR109.2 billion) bond issue after investors demanded higher yields than the company was willing to offer, as reported. The company had built an order book of USD1.6 billion (INR145.6 billion) from investors in Hong Kong, Switzerland, and the US before cancelling the earlier bond.⁶⁶

Onshore fundings will remain open, supported by policy banks considering national policies towards renewable projects:

- Power Finance Corporation (PFC), a state-owned financier for the power sector, plays an increasingly important role in facilitating the funding towards renewables in line with national decarbonisation goal. As of FY2025, PFC has supported 60GW of renewable energy capacity across India. Its renewable loan book grew at annual rate of 17% over the past five years.⁶⁷ Its total renewable energy loans stood at INR810 billion (USD8.9 billion), accounting for 15% of total PFC loan.⁶⁸ In July 2023, on the sidelines of India's G20 presidency, PFC signed a memorandum of understanding (MoU) worth over INR2.37 trillion (USD26 billion) with 20 public and private sector companies — including Adani, ReNew, Continuum, Avaada, and

⁶² IEEFA. [200 and counting: Global financial institutions are exiting coal](#). 4 May 2023.

⁶³ The Economic Times. [ReNew gets \\$600 million via bond issue in GIFT City](#). 23 January 2026.

⁶⁴ ReNew. [ReNew and Asian Development Bank Announce US\\$331 million Deal for a Large-Scale Renewable Energy Project in Andhra Pradesh](#). 7 November 2025.

⁶⁵ AGEL. [Adani Green Accomplishes Its Construction Financing Framework At USD 3 Billion](#). 5 December 2023.

⁶⁶ The Economic Times. [Adani Green calls off \\$1.2-billion bond issue](#). 16 October 2024.

⁶⁷ Power Finance Corporation. [Annual Report 2024-25](#).

⁶⁸ PFC. [Annual Report 2024-25](#).

JBM Auto — spanning solar, wind, green hydrogen, battery storage, electric vehicles, and green energy equipment manufacturing. PFC enjoys a unique advantage in providing longer-tenure funding at competitive rates with capacity for larger exposures, and is actively looking to finance emerging segments such as offshore wind, pumped hydro storage, and solar module manufacturing.⁶⁹

- The Indian Renewable Energy Development Agency (IREDA), another state-owned financial institution, is established specifically to provide lending capacity for renewable projects. IREDA had an outstanding loan book of INR760 billion (USD8.4 billion) as of end-FY2025, representing an annual growth rate of 15% over the past four years. The growth momentum is likely to continue.

By contrast, some thermal assets with operational challenges may carry lower collateral value, which may in turn limit their access to secured financing. Some of Tata Power's loans' assets exclude the stressed Mundra Power plants from the collateral pool. The main exceptions are two facilities totalling INR7 billion (USD77 million), which carry only limited security — mainly a charge on movable assets and a negative lien on immovable assets rather than full collateral. In 2020, the company completed restructuring and repaid bank loans of its subsidiary Coastal Gujarat Power Limited, which operates the subsidiary of Mundra plants.⁷⁰ Also, Adani Power shows its major secured loans excluding Godda project at an average of 8.85%. By contrast, Godda assets are separately secured but carry a higher cost of debt at 11.5%, reflecting a substantially higher risk premium on the project.

Table 1 below summarises the key differences between the credit profile of the renewables and thermal power projects and their developers.

⁶⁹ PFC. [PFC signs MoU worth ₹ 2.37 Lakh Crore with 20 Companies in Clean Energy Space](#). 21 July 2023.

⁷⁰ Tata Power. [Tata Power completes financial restructuring of Coastal Gujarat Power Limited](#). 4 December 2020.

Table 1: Credit profile comparison — renewable vs thermal asset

Factors	Renewable assets	Thermal assets
EBITDA margins	Higher and more stable due to lower operating expenses (opex), primarily driven by absence of fuel costs. AGEL and NTPC Green outperform thermal counterparts within same corporate groups.	Subject to fuel price volatility, supply disruptions, and rising compliance costs. Tata Power's Mundra is dependent on regulatory approval for compensatory tariffs to pass through imported coal costs.
Leverage profile	Currently elevated during capacity expansion phase. AGEL and ReNew carry debt-to-capital ratios roughly double that of Adani Power. Long asset lives and contracted PPAs support gradual amortisation. AGEL's 18-year amortising notes match debt to asset duration.	SJVN's debt tripled over three years during Buxar development, pushing debt-to-EBITDA to 9x. Thermal assets require ongoing capex for maintenance and environmental upgrades, competing with debt reduction.
Offshore bond access	Outstanding USD bonds likely linked to renewable/hydro assets. Includes AGEL solar restricted groups, ReNew wind structures, JSW Hydro. AGEL's restricted group notes carry BBB- equivalent rating with 18-year tenor.	No offshore issuances from predominantly thermal players. Tata Power repaid USD bonds in 2021, refinanced domestically. Offshore market effectively closed to thermal-linked credit.
International banking	Strong relationships with global lenders. AGEL secured USD3 bn facility from eight international banks for Khavda (2023). ReNew obtained USD331 mn from ADB, maintains facilities with Rabobank, Standard Chartered, MUFG, SMBC.	Limited access as major global banks adopt coal exclusion policies. Adani Power relies primarily on domestic bank funding. NTPC's international facilities focus on renewable projects rather than thermal expansion.
Dedicated government-backed financial institutions	PFC's renewable loans reached INR810 bn (17% annual growth). IREDA outstanding loans at INR760 bn (15% growth). PFC signed INR2.37 tn MoUs for clean energy (July 2023).	State-owned banks maintain thermal funding, but priorities have shifted toward renewables. SJVN and NTPC continue accessing PFC/REC facilities for thermal projects but at slower growth rates than renewable portfolios.
Security and collateral	Project-level ring-fencing with long-term PPAs backed by SECI/NTPC enables strong debt service coverage. AGEL's restricted groups received positive rating actions due to generation exceeding P90 levels.	Challenged projects excluded from security packages. Tata Power's lenders largely excluded Mundra from security. Coastal Gujarat Power completed restructuring in 2020.
Cost of debt	AGEL and ReNew access competitive pricing for contracted renewable projects. Lower risk premiums reflect operational stability and predictable cash flows from PPA structures.	Higher pricing for stressed thermal assets. Adani Power's secured loans (ex-Godda): 8.85%. Godda assets: 11.5% - a 265 basis points (bp) premium reflecting project-specific risks including cross-border disputes.
Carbon exposure	Near-zero direct emissions across AGEL, ReNew portfolios. Aligns with 500GW target by 2030. Must-run status provides operational certainty under current regulations.	Significant and rising emissions exposure. NTPC: 327 mn tonnes CO ₂ e (FY2025). Adani Power: 86 mn tonnes (FY2025) vs 49mn (FY2023). S&P Trucost scenarios show unpriced carbon costs of 1-4x current EBITDA.

Asset performance risk	AGEL's generation exceeds P90 forecasts. ReNew maintains strong availability factors. Construction delays affect near-term cash flows but not long-term economics given contracted revenue structures.	Multiple challenged projects across issuers. Mundra, Buxar, Godda illustrate execution challenges. Buxar costs increased from INR104 bn to INR138 bn with delays. Godda faces Bangladesh payment disputes and arbitration.
Transition planning	Pure-play renewable developers have inherently aligned strategies. Asset economics support decarbonisation pathways without decommissioning liabilities or carbon mitigation capex requirements.	Varies significantly by issuer. Tata Power: Net-zero by 2045. Adani Power: No coal phase-out timeline disclosed. NTPC: Expects flat/increasing absolute emissions through FY2032 despite renewable additions.
Rating agency view	Generally positive view for contracted renewable portfolios. Fitch assigned BBB- to AGEL restricted group notes (investment-grade equivalent).	Climate transition risk increasingly flagged. Fitch CVS indicate coal generation faces "existential or default-equivalent threat" by 2045 under a "realistic stress" scenario. Elevated transition risk for companies >25% coal revenue exposure.

Source: IEEFA analysis based on company reports, announcements and credit rating agencies' reports

Financial constraint as transition risk amplifier

The credit differentiation shown above creates compounding effects for financially constrained issuers, who face a "double burden" during the energy transition: Reduced flexibility to adapt asset strategies combined with increasingly limited access to funding sources available to higher-quality credits. SJVN's debt leverage has risen as the company expanded in Buxar. By contrast, Tata Power maintains relatively diverse funding access despite the challenges at Mundra. Within the Adani group, AGEL's renewable focus enabled it to issue 18-year offshore bonds, compared to Adani Power's reliance on shorter-term domestic bank funding.

However, ownership structure can significantly dampen these effects. State-owned enterprises like SJVN and NTPC benefit from implicit government backing that provides refinancing flexibility unavailable to private issuers, while strong conglomerate parents may offer cross-support in case of transition stress. This suggests transition risks will be most acute for leveraged private issuers without diversified group backing, as they face the full impact of tightening fossil fuel funding conditions with limited financial or structural buffers to navigate sectoral transformation.

Debt finance and how to unlock scale

Unlocking debt financing requires more than incremental measures. A key structural financial market reform is the development of deeper and more liquid debt capital markets, but effective transition planning requires a funding framework that can attract not only domestic capital but also international and offshore investors. This report's core analysis highlights the diverging credit fundamentals of thermal and renewable assets, underscoring the need for targeted measures that

reinforce these differences. Strengthening fundamentals, particularly through improved management of counterparty credit risks, should remain a key priority in ongoing power sector reforms, as this underpins the issuers' creditworthiness amid growing debt levels. Promoting sustainable finance in parallel can broaden the investor base and enable companies to display coherent and credible transition plans that enhance transparency and creditworthiness.

Among the eight utilities analysed in this paper, NTPC stands out for its pivotal role in driving the sector's growth and transition objectives. By setting benchmarks in the debt markets and demonstrating credible transition planning, NTPC has the potential to serve as a reference issuer and anchor investor confidence in the sector's transition.

Boost onshore and offshore bonds for renewable funding

Debt capital markets serve as an important channel to broaden the capital base for renewable energy, tapping capital held by institutional asset owners such as pension and insurance funds. Corporate bond funding channel has the potential to develop towards global benchmarks, building a robust offshore and onshore debt architecture that can absorb large-scale, long-tenor renewable corporate and project financing. This requires growth in issuance volume, market liquidity, transparency, and a broad base of both investors and issuers.

First, unlocking domestic institutional capital represents a significant near-term opportunity. Restrictions on investing in bonds rated below AA limits⁷¹ institutional participation in the market.⁷² As India's insurance and pension funds tend to favour state securities, reforms should aim to increase investment thresholds for private corporate bonds and for better differentiation of renewable assets based on risk characteristics.⁷³ This should be combined with favourable approval processes that support infrastructure-linked or long-tenor issuances, which would better reflect the long-term credit profile of renewables.

Second, catalytic bond issuances by sovereigns and financial institutions play a dual role in setting benchmarks. Vanilla bond issuances from sovereigns, PFC or IREDA, not only attract institutional capital, but also provide crucial pricing reference and liquidity, creating a yield curve that helps price private corporate debt. Recent reforms such as "once listed", "always listed"⁷⁴ and Request for Quote platform⁷⁵ are steps towards better price discovery and transparency; enhanced market-making and repo access can make benchmarks tradable and more informative.⁷⁶ Institutions such as

⁷¹ Bonds rated below AA (such as A or BBB) are considered riskier than higher-rated securities (e.g. AAA or AA-) because they carry a higher likelihood of delayed payments or default.

⁷² NITI Aayog. [Report on deepening the corporate bond market in India](#). December 2025.

⁷³ IEEFA. [Domestic institutional capital can massively support India's energy transition ambitions](#). 23 January 2023.

⁷⁴ Once listed, always listed: The provision of the rule requires listed issuers with outstanding nonconvertible debt securities (as on 31 December 2023) to list all their subsequent issuances of such securities on the stock exchange.

⁷⁵ Request for quote platform: The platform aims to shift corporate bond trading from traditional over the counter (OTC) methods to electronic trading.

⁷⁶ NITI Aayog. [Report on deepening the corporate bond market in India](#). December 2025.

PFC and IREDA could increase the share of their funding base through both onshore and offshore debt capital markets. A catalytic goal should also be to encourage wider participation from a broad base of private financial institutions and debt investors, using capital markets to fund their loan books. This would facilitate renewable projects' alternative funding channels, such as direct lending and private credit, offering issuers more flexible debt solutions beyond traditional term loans.

Third, expanding the role of blended finance and facilitating international participation and integration can have complementary impacts. One way to achieve this is by growing the Masala bond market — offshore bonds denominated in Indian Rupees. These instruments are attractive for power companies as they shift currency risk from the issuer to the investor, while offering diversification strategies for investors. NTPC has successfully issued these bonds, but the market has remained small and immature. The setbacks of the market can be attributed to macro conditions and limited investor appetite for domestic currency exposure.

Support from multinational development institutions has not been consistent. Blended finance and credit enhancement mechanisms could help absorb or partially mitigate currency risk through guarantees, and first-loss tranches, among other mechanisms. Such support is particularly important to de-risk early-stage, small-scale, or lower-rated issuances to crowd in private capital. Market development requires a large flow of catalytic bond issuances, which could help improve the liquidity of the secondary market over time. For IPPs, targeted policy support, such as tax incentives and streamlined issuance rules, could make Masala bonds a scalable option for tapping global liquidity. Crucially, scaling credit enhancement and blended finance structures could encourage more issuers to enter the market through lifting the ratings of their renewable non-recourse debt.

Fourth, innovative financing and securitisation mechanisms could help recycle capital and manage asset-liability mismatches. Standardising project-level documentation and creating platforms to pool smaller renewable projects into diversified portfolios would allow these pools to be financed through structured bonds or asset-backed securities. The structured debt asset class can attract large institutional investors, enhance overall secondary-market liquidity, and free up bank balance sheets to support renewable growth. Besides, leveraging Infrastructure Investment Trusts (InvITs) allows developers to monetise operational projects by transferring them to the trust. Selling down equity stakes through financial structures is credit positive, enhancing debt issuance capacity to support further growth.

Manage counterparty credit risk

Credit assessments are driven by long term viability of business (renewable vs thermal), but one key factor that has hindered credit quality in the power generation sector is offtaker counterparty risk. This is particularly important as companies' credit quality is already limited by their debt headroom. Based on several studies and surveys, PPA counterparty appears to be one of the most important

factors in determining bankability of a project.⁷⁷ DISCOMs with weak credit profiles account for a significant portion of power offtakes for major power companies. DISCOM has an accumulated debt of INR6.84 trillion (USD75 billion), over 50GW of successfully auctioned capacity stalled due to delays in signing PPAs, and insufficient transmission infrastructure.⁷⁸ These issues could continue to weigh on the power generators' credit profiles, despite recent reforms showing progress.

Continued measures are required with an aim to improve operational and financial performance of DISCOMs. Policymakers can tie any financial assistance to concrete performance improvements and compliance measures to improve data transparency and accountability.⁷⁹ Other mechanisms to strengthen payment security would enable a more reliable payment schedule and working capital cycle. Meanwhile, mechanisms like energy-as-a-service could help developers diversify counterparty risk.⁸⁰

Improve accountability through sustainable finance

Channelling credible transition finance into emerging economics has gained momentum among international financiers and standard setters.⁸¹ Aligning debt financing with sustainability goals can attract a larger base of investors and enhance accountability and transparency in how funds are used. Green bonds introduce greater transparency and discipline by requiring issuers to report on the use of proceeds and environmental impacts. These tools are inherently fit-for-purpose for earmarking renewable development, as observed in Europe.⁸² Sustainability-linked debt goes a step further by linking coupons to an issuer's achievement of predefined performance targets. Such mechanisms ensure that companies remain accountable for delivering the transition outcomes, such as renewable capacity additions.⁸³

With India's financial regulators rolling out guidelines for enhanced corporate environmental, social, and governance (ESG) disclosures and taxonomy for green activities,⁸⁴ the domestic environment is maturing. This will facilitate the integration of companies' transition planning into a long-term credit view while promoting coherent actions by corporates. The progress will create an opportunity for India to build a comprehensive sustainable finance architecture that can serve as a blueprint for other developing countries.

⁷⁷ BNEF. [What Makes India's Renewables Attractive for Debt Funding](#). 22 July 2025.

⁷⁸ IEEFA. [Cost of capital for Indian renewable energy projects: A review of methodologies, risk drivers, and policy evolution](#). 22 December 2025.

⁷⁹ IEEFA. [Increasing state government accountability: Financial transparency is key](#). 1 October 2025.

⁸⁰ IEEFA. [De-risking can boost investment in India's renewable energy sector](#). 28 January 2025.

⁸¹ City of London Transition Finance Council. [Transition Finance Guidelines – Draft entity-level Transition Finance Guidelines](#). November 2025.

⁸² IEEFA. [Europe's clean power leaders: How green financing is enabling renewable growth](#). 20 June 2024.

⁸³ IEEFA. [Sustainability-linked bonds: Why Europe can reignite the market](#). 24 July 2025.

⁸⁴ IEEFA. [Building a climate finance ecosystem: India's draft taxonomy framework](#). 30 May 2025.

NTPC at the centre

NTPC is a reflection of India's transition and is central to unlocking debt finance in the sector. NTPC, 51.1% owned by the Indian government, is rated on par with India's sovereign debt. It has strong policy support and access to financing, and may also benefit from signs of improving fiscal position in India. As India's largest integrated power utility accounting for 17% of the nation's installed capacity, NTPC plays a critical role in facilitating the whole sector transition. NTPC can drive its role across three pillars:

- **Act as a debt market anchor and benchmark:** NTPC should position itself as a pioneer issuer with a diversified mix of issuances across both domestic and international debt capital markets, aiming to continually expand its investor base in each. Issuance should span a range of tenors and include both corporate and project finance structures. NTPC could also establish standard setting covenants that serve as a reference point for other issuers. As an anchor issuer, NTPC's funding activity could also catalyse growth through co-financing and partnerships in renewable projects
- **Demonstrate credible transition planning and transition finance:** While the company's legacy is rooted in thermal power, successfully implementing the company's climate transition plan will support its long-term creditworthiness, and help mobilise wider transition finance. This requires NTPC to deliver on concrete, time-bound short-, medium- and long-term actions to achieve net zero emissions by 2070, in line with national goals. In November 2024, its dedicated green energy subsidiary NGEL raised INR100 billion (USD1.2 billion) equity in its initial public offering, and can expand on credible transition finance closely aligned with its transition planning, supporting its renewable capacity growth. Besides, NTPC should play a key role in managing peak load demand. The company could demonstrate stronger transition credentials by investing in low-emission flexibility measures, including grid resilience and energy storage systems. Establishing a clear plan to phasing out coal could also increase the credibility of its transition plan.
- **Serve as an offtaker intermediary:** NTPC can use its strong credit profile (AAA domestic rating⁸⁵) to shoulder counterparty risk, providing small-scale IPPs with more certainty over cash flows. By targeting renewable projects and acting as the central offtaker in an aggregation model — signing PPAs with IPPs and then sell that power to DISCOMs — NTPC can help support projects' credit quality despite the weaker positions of many DISCOMs. This could in turn lower projects' cost of debt and support broader development.

⁸⁵ AAA credit rating is the highest rating possible for bonds and indicates a bond issuer's noteworthy creditworthiness and financial strength. It communicates to investors a minimal risk of default.

Conclusion: Transforming systemic risks into opportunities

Observed credit differentiation across India's power sector aligns with transition dynamics: Renewable-focused issuers are increasingly able to access longer-tenor and lower-cost funding, while companies with higher thermal exposure face more constrained financing conditions. Analysis of relative creditworthiness across India power utilities suggests that these dynamics will only become more pronounced over time, particularly for financially constrained issuers where transition pressures compound existing leverage and execution risks. Credit vulnerabilities could be amplified by India's financial system that remains highly leveraged and exposed to fossil fuel assets.⁸⁶

Financing new thermal plants could consume debt headroom and potentially limit capital that could otherwise support the clean energy ecosystem. Meanwhile, in adverse transition scenarios, coal plants' early closures or persistent under-utilisation could generate non-performing assets and loans, creating a negative feedback loop where fossil fuel-linked issuers could bear higher funding costs, further straining balance sheets and limiting investment in low-carbon alternatives. The extent of these outcomes would depend on energy demand growth, the pace of market and policy reforms, and how tariff support mechanisms evolve. In the absence of coherent transition planning, both the energy and financial sectors could face amplified exposure to the accelerating global shift toward clean energy.

However, this credit divergence also reveals emerging opportunities. Renewable projects with long-term, visible cash flows offer strong debt servicing capacity, creating attractive long-term investment opportunities for global and domestic investors. The funding patterns documented here suggest that renewable additions can serve as a building block for a deeper, more resilience debt market with lower climate-related systemic risk. In this sense, with multidisciplinary reforms that integrate the entire energy and finance ecosystems, debt finance is not just an enabler of India's energy transition, it represents a strategic opportunity to strengthen the country's financial markets while supporting sustainable economic growth.

⁸⁶ Colenbrander, S. et al. (2023) [Low-carbon transition risks for India's financial system](#). Global environmental change. [Online] 78.

Appendix

Table 2: Corporate structure and ratings for Indian power utilities

	Adani Power	NTPC	NLCIL	Tata Power	JSWEL	AGEL	ReNew	SJVN
Material government ownership	nil	51%	72%	nil	nil	nil	nil	55%
Listed (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y
Credit ratings (domestic)	AA/A+	AAA	AAA/A+	AA+	AA/A+	AA/A+	A	AA+
Credit ratings (offshore)	nil	BBB/Baa3/BBB-	nil	Ba1/BBB-	Ba1/BB+	RG BB+/Ba1/BBB-	Ba3/BB-	nil

Source: Company reports, Bloomberg [Accessed on 16 January 2026]

RG = restricted group

Table 3: Selected USD bond details

	JSWE	ReNew	AGEL*	AGEL*	ReNew
Issuer	JSW Hydro Energy Limited	ReNew Wind Energy (AP 2) Private Limited	Adani Green Energy (UP) Limited	Adani Renewable Energy (Rj) Limited	ReNew Private Limited – HoldCo
Project	Hydro 1400MW	Wind 750MW; Solar 50MW	Solar 930 MW (RG-1)	Solar 570 MW (RG-2)	N/A -- Holdco
Amount outstanding (USD million)	500	585	405	300	270
Bond Rating	Ba1/BB+	Ba3/BB-	Ba1/BBB-	Ba1 / BBB-	Ba3/BB-
Maturity	18 May 2031	14 July 2028	12 March 2043	15 October 2039	5 March 2027
Spreads (basis points)	192.8	253.5	320	249.2	253.8
YTM	5.715868	6.099353	7.5017	6.890719	6.048703

Source: Bloomberg (accessed on 16 January 2026); company reports

*Restricted subsidiaries of AGEL RG-1 and RG-2 are 50:50 joint venture between AGEL and Total Energies.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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