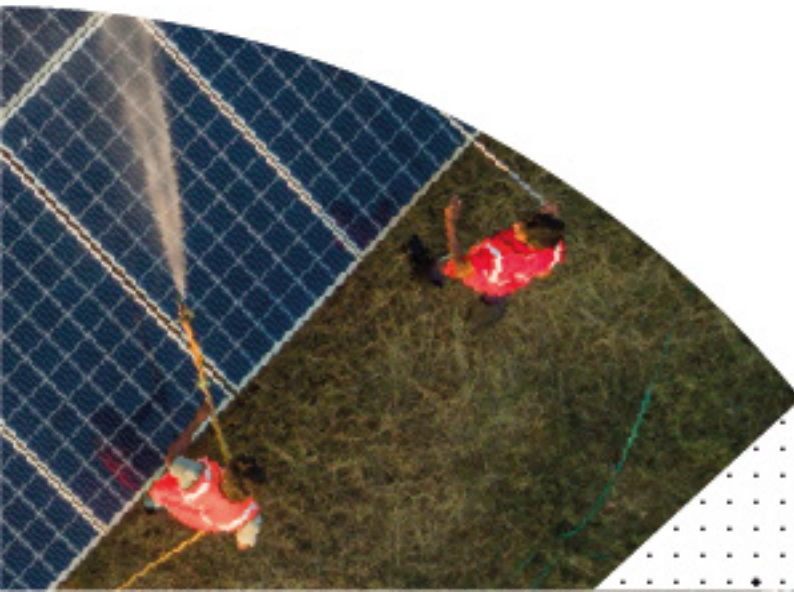


Financing India's 2030 Renewables Ambition

White Paper

Shantanu Jaiswal

Rohit Gadre



June 22, 2022



| BloombergNEF

Financing India's 2030 Renewables Ambition

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Foreword

The Glasgow Climate Pact aims to turn this decade into collective climate action and to urge all stakeholders to work together to reduce greenhouse gas emissions. Accelerating the pace of clean energy transition remains one of the core agenda items to meet the objectives of the Paris Agreement, which was reaffirmed in COP26. To limit global warming to around 1.5 degree Celsius, countries have set up aggressive targets for expediting the deployment of clean energy technologies on a massive scale. These will clearly require huge financing requirement.

India is pioneering a new model of economic development and has emerged as a leader in energy transition. The country has made remarkable progress in providing access to electricity and clean cooking while implementing a range of energy market reforms and integrating a high share of renewable energy sources into the grid. India has been undertaking one of the world's largest renewable energy expansion programmes in the world and this transition to clean energy is an enormous economic opportunity for the country.

Transitioning to a clean energy infrastructure can help mitigate climate change and India has embarked to set itself a huge target of achieving 50% generation capacity from non-fossil fuels by 2030. The period from now till 2030 will be critical for India's energy transition. Financing is a crucial element of such a transition and India must address the major challenge of ensuring low-cost financing to meet its climate goals.

If the country is to achieve its renewable energy installation commitment by 2030, an average of USD 27.9 billion will be required annually from 2022 to 2029. Growth in power generation capacity will also require parallel investments in the transmission and distribution grids.

Although conventional asset financing continues to be a major source of funding for renewable energy assets in India, new financing paradigms need to be leveraged to meet India's renewable targets by 2030. Enabling financing instruments in both debt and equity spaces can potentially help mobilize domestic capital and foreign investment, while improving risk management. Ultimately, the selection of the most appropriate instruments to address India's renewable energy financing challenges depends on policy priorities and the feasibility of implementation.

Power Foundation of India (PFI), in association with BNEF, has published a report titled ***Financing India's 2030 Renewables Ambition*** which has assessed total investments required for India to reach 500GW non-fossil fuel power generation capacity by 2030, along with the existing renewable energy market challenges faced by investors and project developers. The report has drawn upon the experiences from emerging markets and developing economies and has briefly outlined the innovative financing techniques for India to achieve its target by 2030.

I would like to thank the entire team of PFI and BNEF for their vital contributions in bringing out this report and look forward to their continued support in the years ahead.

Sanjiv N. Sahai, Director General, Power Foundation of India

Executive summary (1/2)

India wants non-fossil fuel power sources to provide half of its electricity supply by 2030. To achieve this target, India needs to massively scale up funding for renewables. This white paper, commissioned by the Power Foundation, estimates a requirement of \$223 billion over the next eight years just to meet the solar and wind capacity targets. It also explores the options to mobilize this funding.

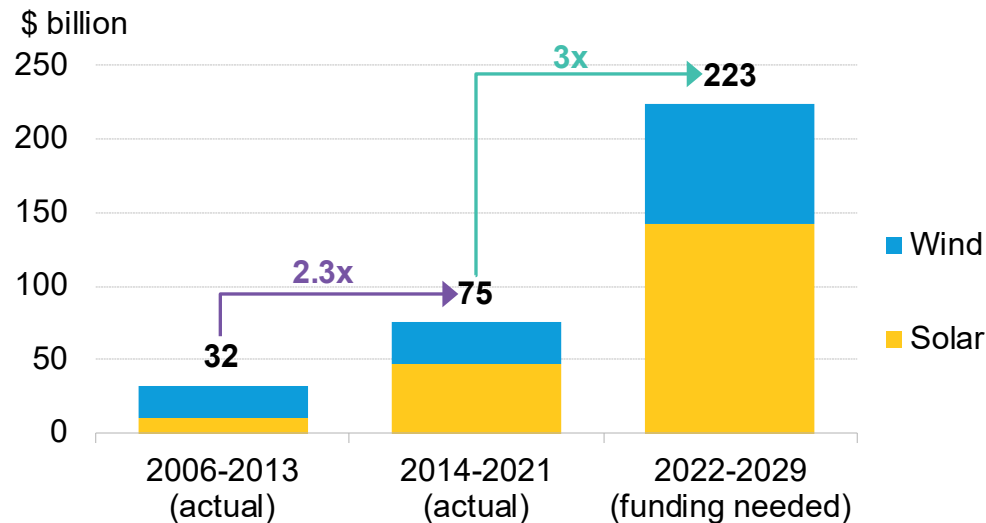
- At COP26 in November 2021, Prime Minister Narendra Modi announced India plans to reduce emission intensity by more than 45% by 2030 below 2005 levels. To achieve this target, the Prime Minister called for increasing non-fossil power capacity to 500GW. The Prime Minister also announced a net-zero by 2070 target.
- Funding for Indian renewable projects has come from a diverse set of sources. Debt providers assess several factors, such as offtake counterparty and the track record of the borrower. Refinancing has become more common. Patient capital providers such as pension funds are also increasingly taking equity stakes in Indian renewable energy projects.
- Environmental, social and governance (ESG) factors are increasingly a focus of investors. Project developers are starting to face higher ESG disclosure standards than those required by government rules.

\$223 billion Investment needed between 2022-2029 to meet India's wind and solar capacity targets

8 Number of sovereign wealth and pension funds with equity stakes in India's clean power producers

50% Share of overseas financiers in all disclosed debt for new-build projects from 2019 to 2021

India wind and solar funding

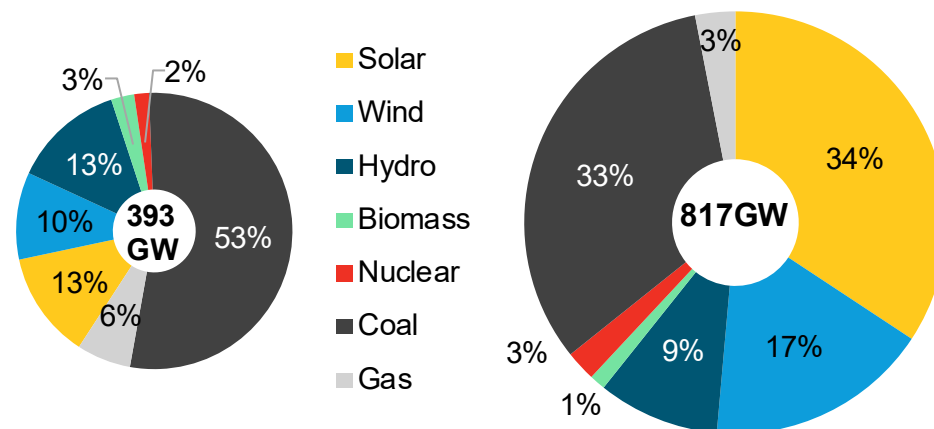


Source: BloombergNEF, Central Electricity Authority. Note: Values are by year of financing, assuming financing happens one year before the projects are commissioned. Forecast investments are calculated based on CEA's projection of commissioned capacity by 2030. Assumes an inverter loading ratio of 1.4 for new solar projects.

Executive summary (2/2)

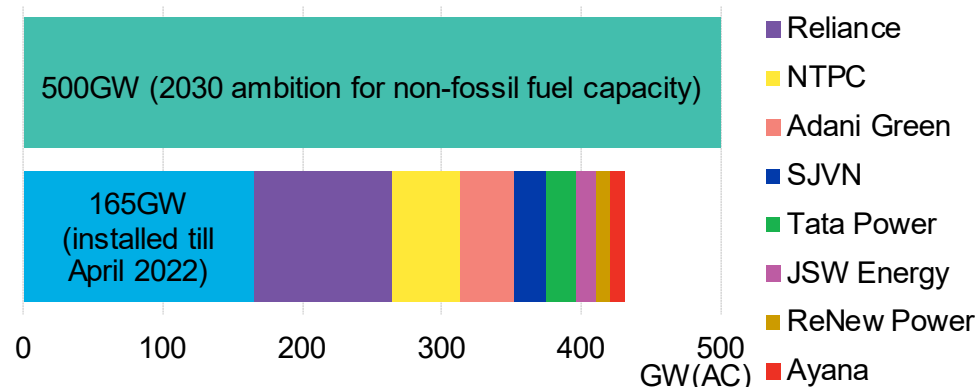
- Renewable developers face regulatory, project and financing risks. Power purchase agreement renegotiation requests, difficulties in land acquisition and payment delays were ranked as the top risks in a survey of 17 industry stakeholders. Rising interest rates and inflation, coupled with the depreciation of the rupee against the US dollar are creating new challenges. Regulatory tweaks to banking laws, dedicated funds for clean energy and liberalized rules for external commercial borrowing could help lessen these challenges.
- Project developers need to tap into new or underutilized sources of capital to raise funding to meet the 2030 targets. The report examines eight potential approaches to scaling up funding by, for example, increased usage of revolving construction debt, and improved regulatory certainty for infrastructure investment trusts.
- India is one of the largest renewable energy markets in the world and its rising power demand coupled with government's support for clean power makes it the most attractive investment destination for renewables among emerging markets. The country now needs to scale up its financing activities by tapping into alternative sources of financing and by learning from international experiences to raise \$223 billion in the next eight years.

India power capacity, 2021 actual and 2030 forecast



Source: BloombergNEF, Central Electricity Authority. Note: 2030 values are from CEA's report on optimal power generation capacity.

Plans of corporates are in line with India's 2030 ambition



Source: BloombergNEF, company disclosures, news reports. Note: NTPC's 2032 target is linearly interpolated to 2030. Some targets are for years before 2030 and these are not extrapolated.

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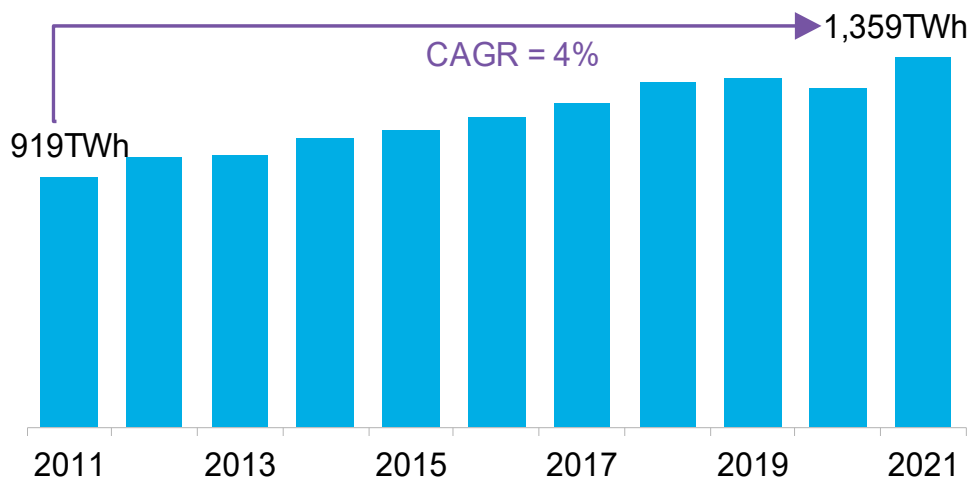
Introduction



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India's power demand has grown steadily over the past decade

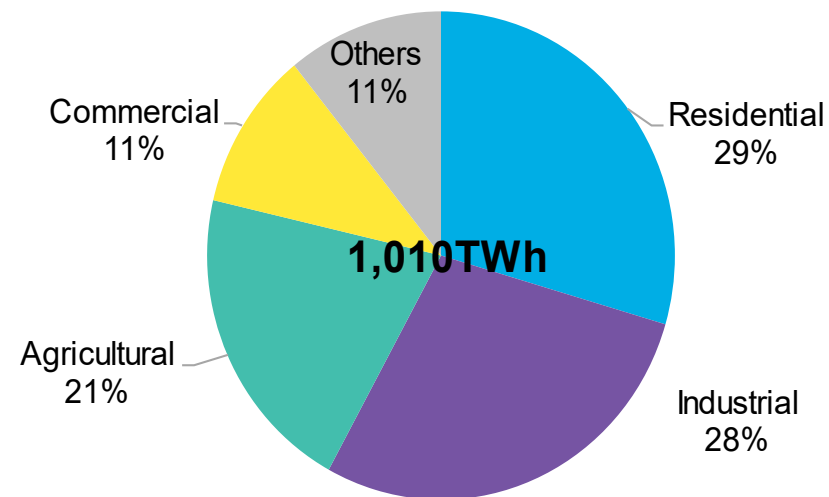
Electricity consumption grew 1.4 times in the past decade



Source: BloombergNEF, Central Electricity Authority. Note: CAGR –Compound Annual Growth Rate. Consumption is shown at utility periphery.

- After annual power demand fell 3% in 2020 due to the Covid-19 pandemic, India's electricity consumption jumped back quickly to surpass the 2019 level. The country's power consumption in 2021 was 1,359TWh, 48% higher than 2011.
- Economic growth, population rise and 100% household electrification (achieved in March 2019) has led to increased power demand.

Residential consumers are the largest power users

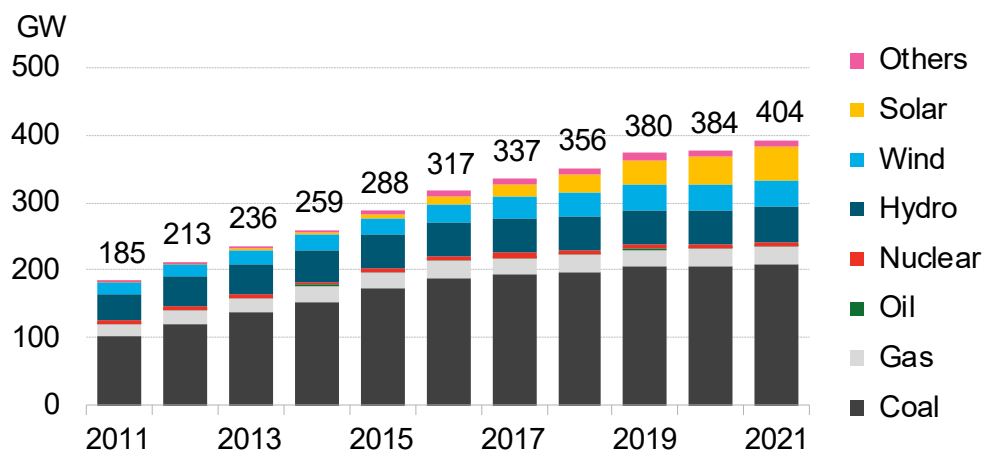


Source: BloombergNEF, Power Finance Corporation. Note: Data for the financial year from April 2019 to March 2020. 'Others' category includes agriculture, railways, public water works, public lighting and bulk supply.

- Residential users are the largest consumers of electricity in the country. Their share of power demand was 30% in FY2020, followed by industrial consumers at 28% and agricultural users at 21%.
- The government is now aiming to improve the reliability of electricity supply by reducing service interruptions and outages. Plans to upgrade the power transmission and distribution network are already underway.

Power capacity more than doubled, led by renewables in the recent years

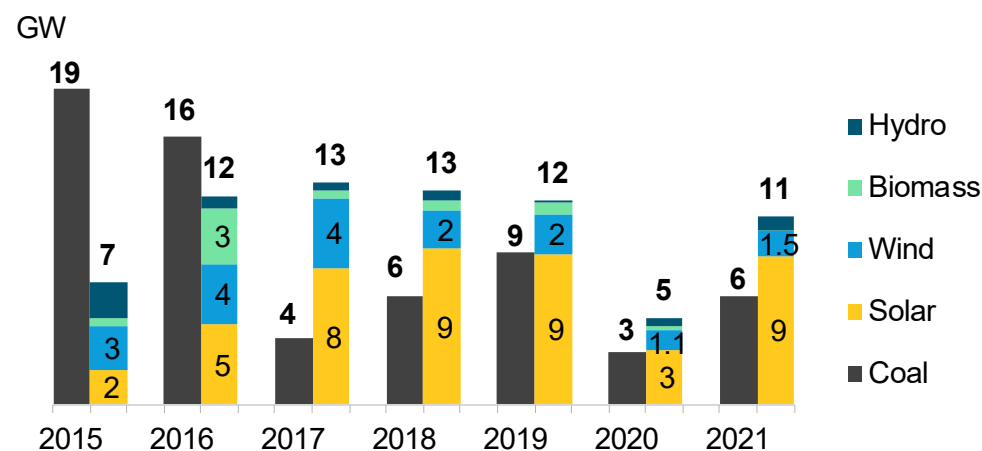
Installed capacity is dominated by coal but renewables are steadily gaining ground



Source: BloombergNEF, Ministry of New and Renewable Energy, Central Electricity Authority.

- India's power generation capacity grew by 118% between 2011 and 2021. Renewables share of capacity reached 37% in 2021 from 31% in 2012. Solar power has expanded the fastest reaching 60GW in 2021 from less than 1GW in 2011.
- The growth in renewables can be attributed to a combination of improving economics and supporting policies. India aims to have 500GW of non-fossil fuel power generation capacity by 2030, compared to 158GW at the end of 2021.

Annual renewable capacity additions have outpaced coal



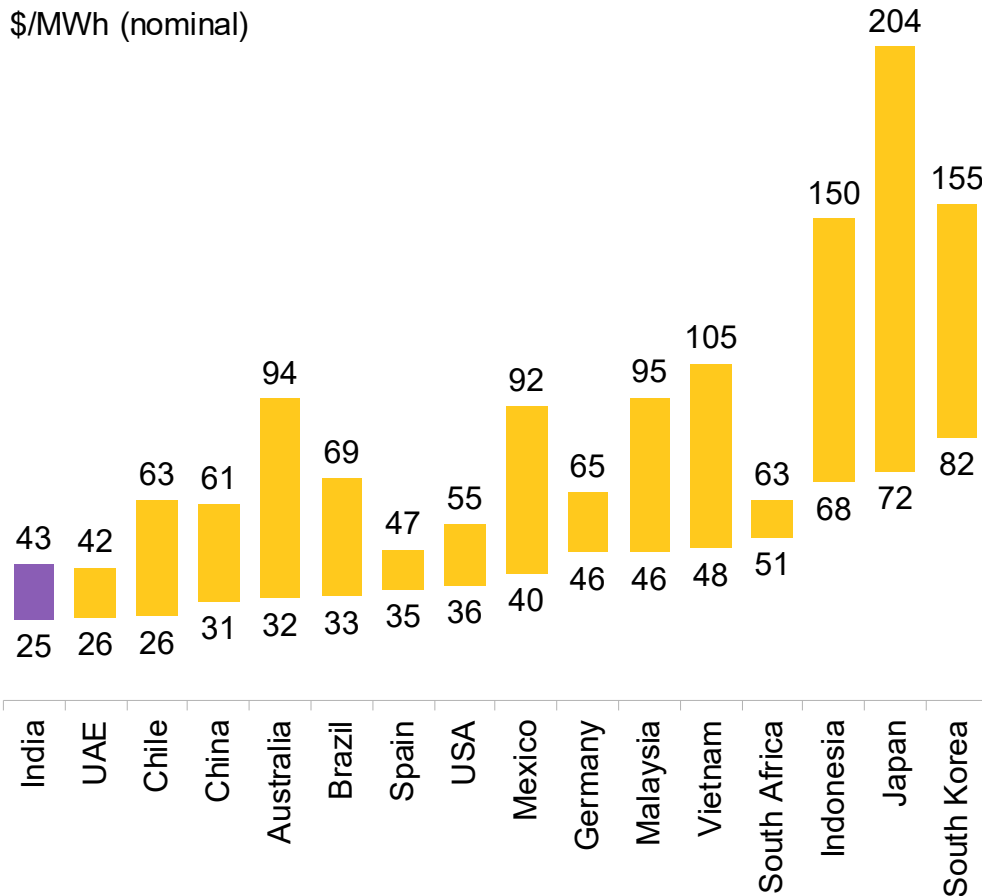
Source: BloombergNEF, Central Electricity Authority, Ministry of New and Renewable Energy.

- Annual coal capacity additions have fallen sharply from 19GW in 2015, to just 4GW in 2021. At the same time, annual renewable capacity additions have grown. Since 2017, annual additions of renewable capacity have outpaced those from coal power.
- New solar and wind projects in India have among the lowest costs in the world because of the increased scale and competition.

India's renewables are among the cheapest in the world

Levelized cost of electricity for fixed-axis PV, 2H 2021

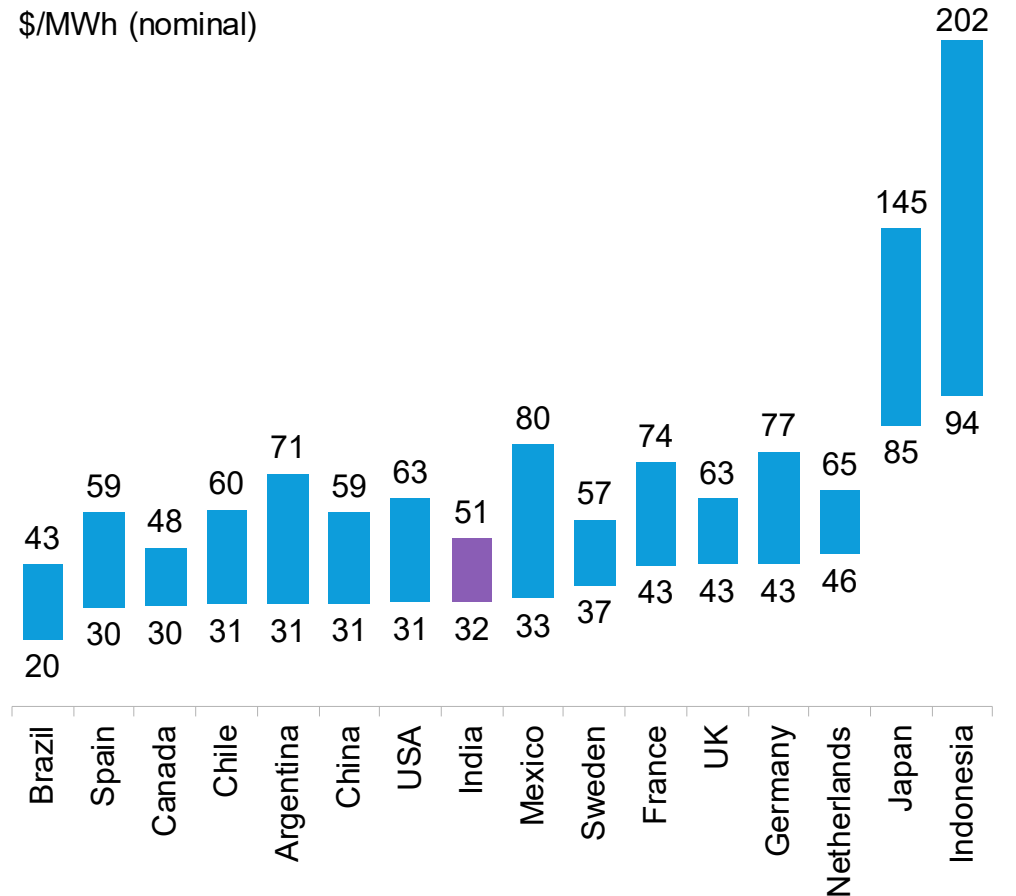
\$/MWh (nominal)



Source: BloombergNEF. Note: The range of the LCOE represents a range of costs and capacity factors. All LCOE calculations are unsubsidized and exclude curtailments and tax-credits.

Levelized cost of electricity for onshore wind, 2H 2021

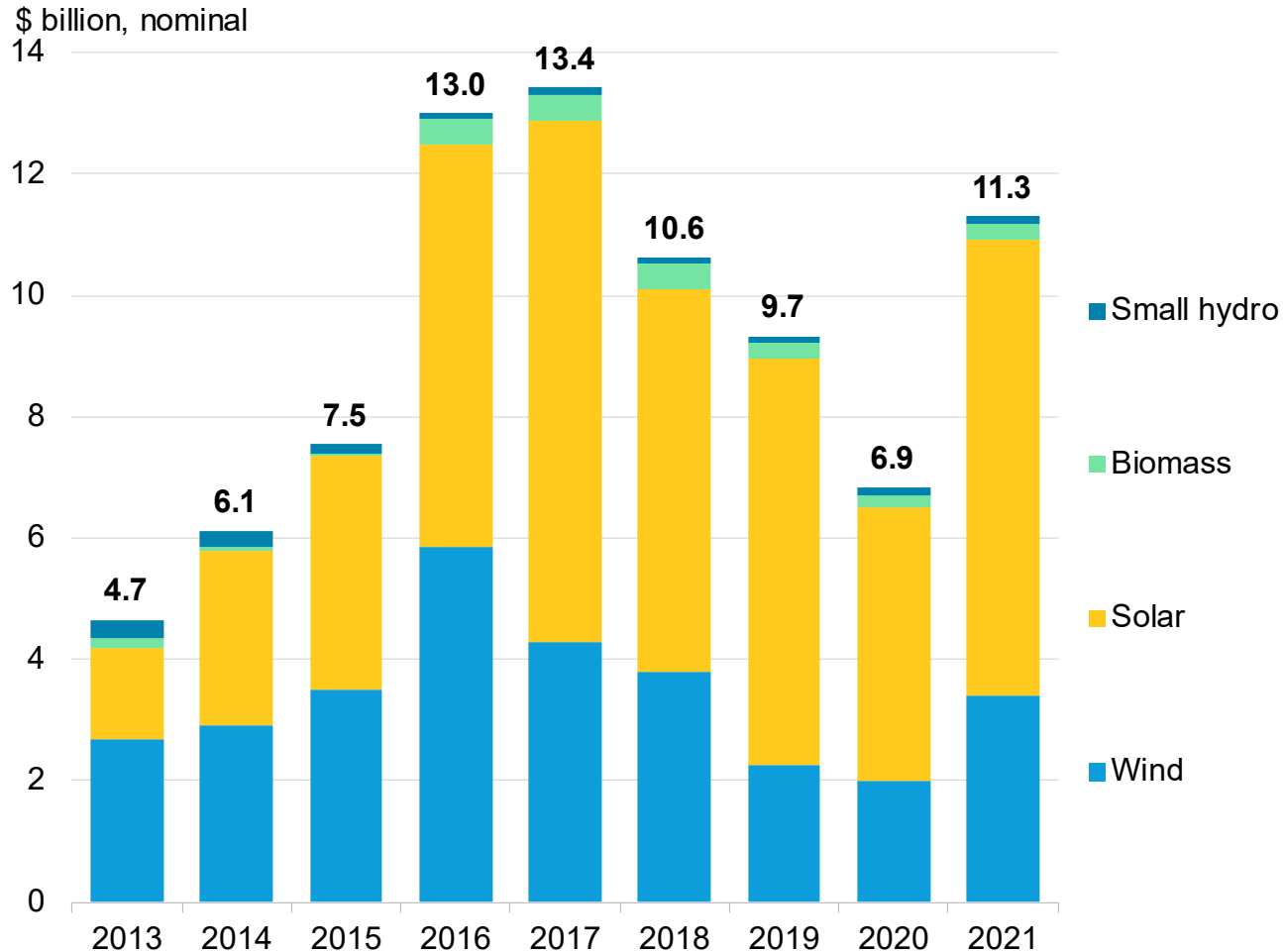
\$/MWh (nominal)



Source: BloombergNEF. Note: The range of the LCOE represents a range of costs and capacity factors. All LCOE calculations are unsubsidized and exclude curtailments and tax-credits.

Asset finance for India's clean power projects bounced back in 2021

India annual new-build renewables asset finance, by technology

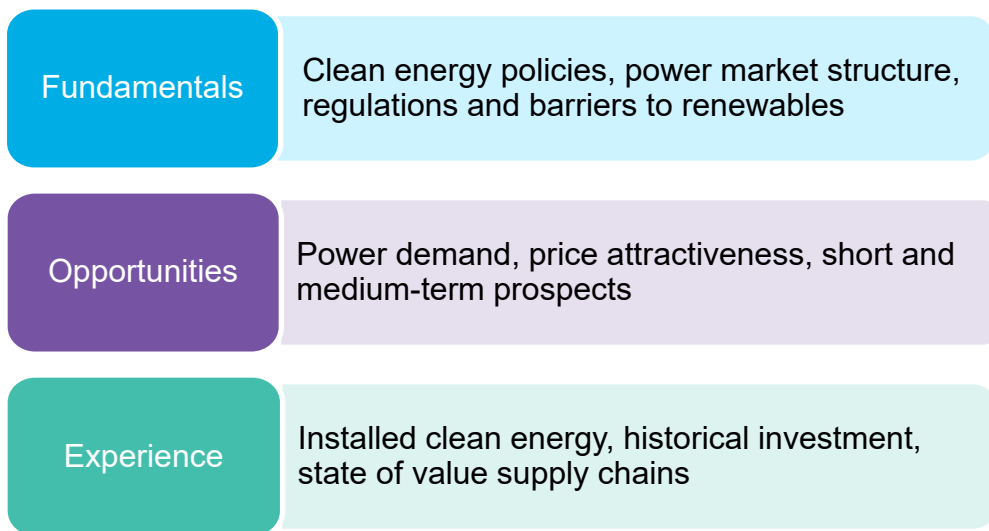


- **2013 - 2017:** Rapid growth in funding for driven by policy incentives creating demand for increased renewable capacity.
- **2017 - 2019:** The capex of wind and solar projects declined due to the fall in prices of key equipment as well as strong competition among developers.
- **2020:** Covid-19 lockdowns caused uncertainty on economic growth, power demand trajectory and project timelines. Asset financing fell as many projects received development timeline extensions.
- **2021:** Asset financing surged as some previously delayed projects secured funding.

Source: BloombergNEF. Note: Chart shows estimated debt and equity investments made for greenfield projects.

India was the most attractive emerging market for clean power investment in 2021

Climatescope sector evaluation pillars

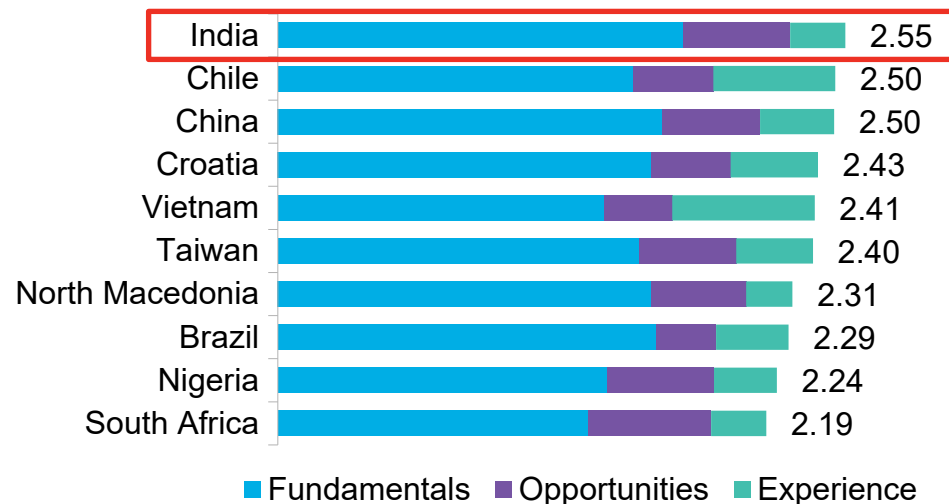


Source: BloombergNEF.

- India has consistently ranked among the top-10 emerging markets covered by Climatescope, BNEF’s flagship report analyzing market attractiveness for energy transition investment.
- In 2021, India ranked first in the power category among 107 emerging markets. Transparent market mechanisms, supportive policies and ambitious government targets have attracted many domestic and international players to India’s renewables market.

India took the top spot in the Climatescope 2021 ranking for the power sector

Climatescope score (max=5)

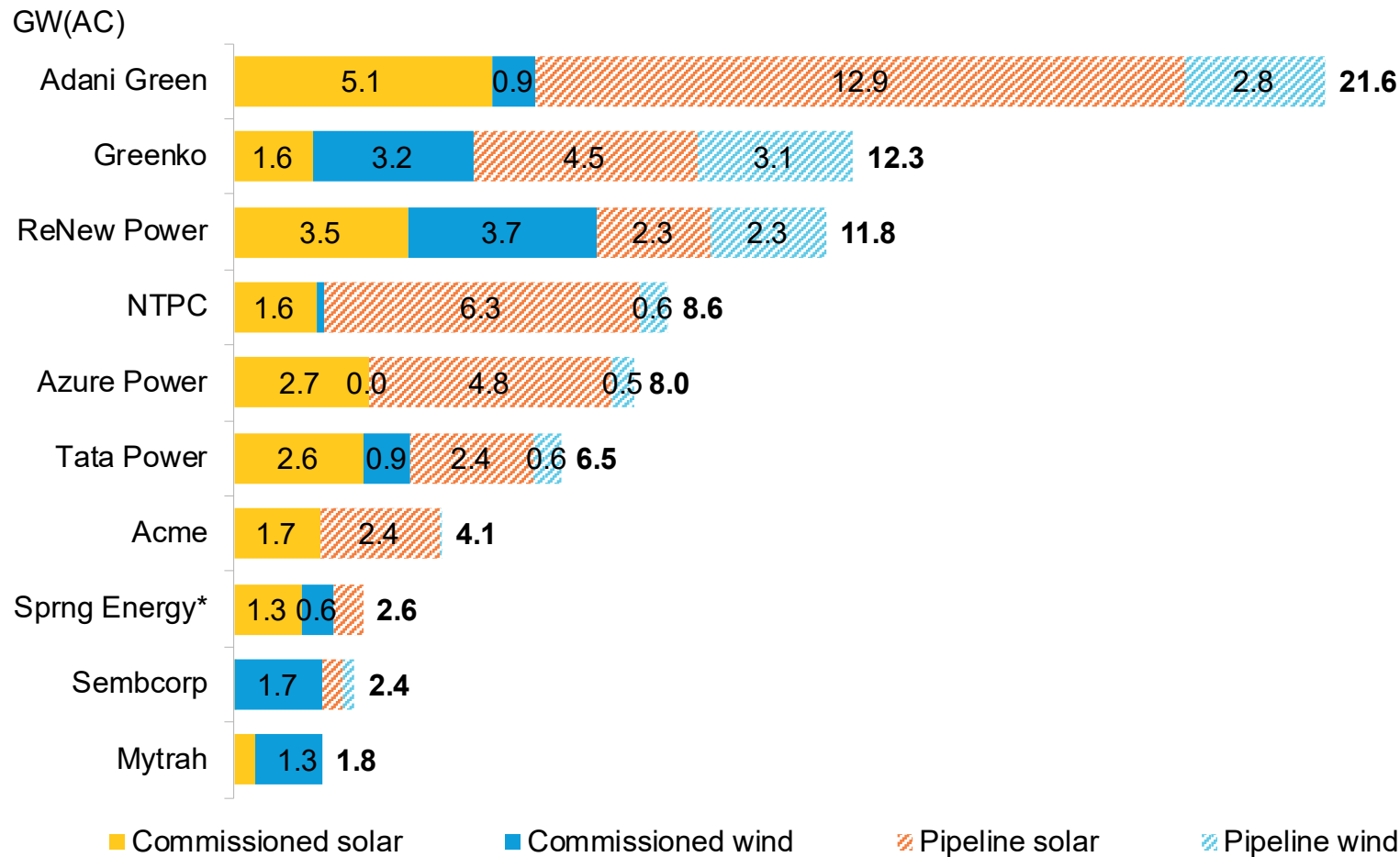


Source: BloombergNEF.

- India’s first nationally determined contributions to the Paris Agreement called for reducing emission intensity by 33-35% below 2005 levels by 2030. At COP26 in November 2021, Prime Minister Narendra Modi announced a strengthened 2030 target to reduce emission intensity by more than 45% below 2005. To achieve this target, the Prime Minister called for increasing non-fossil power capacity to 500GW. The Prime Minister also announced a net-zero by 2070 target.

The top-10 IPPs have 33GW renewables commissioned and 46GW in the pipeline

Wind and solar portfolio of India's leading clean power IPPs



Source: BloombergNEF. Note: *In April 2022, Shell announced the acquisition of Sprng Energy. The deal is yet to close.

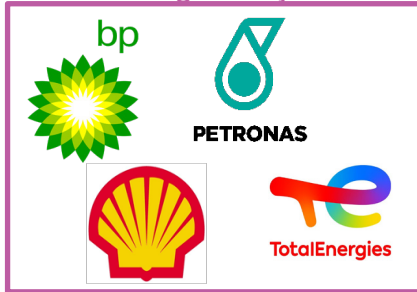
Financing has come from a wide variety of domestic and international entities

Equity investors in India's wind and solar projects

Global investment funds



Oil & gas majors



Debt financiers for wind and solar in India

International banks



Government banks



Long-term, patient capital providers



Foreign utilities



Indian private banks



Non-banking finance companies



Indian conglomerates



Government companies



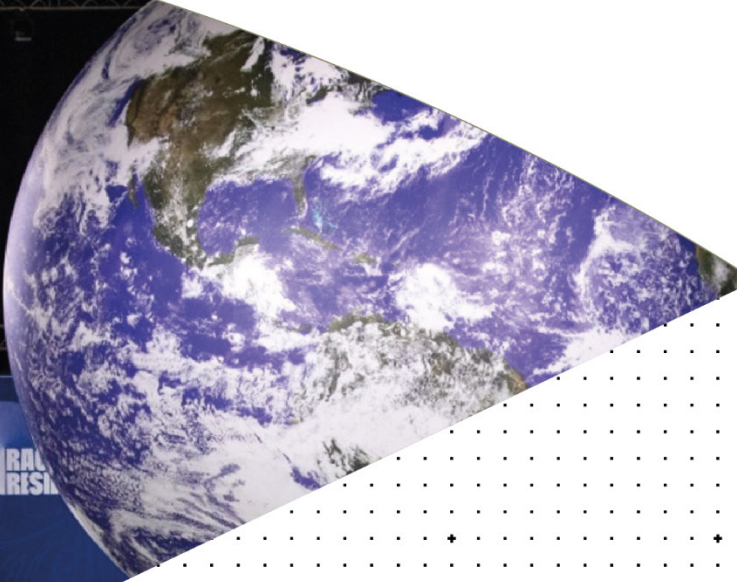
Development finance institutions



Source: BloombergNEF, company logos

Source: BloombergNEF, company logos

India's 2030 ambition



BloombergNEF

Renewables are at the heart of India's climate commitments

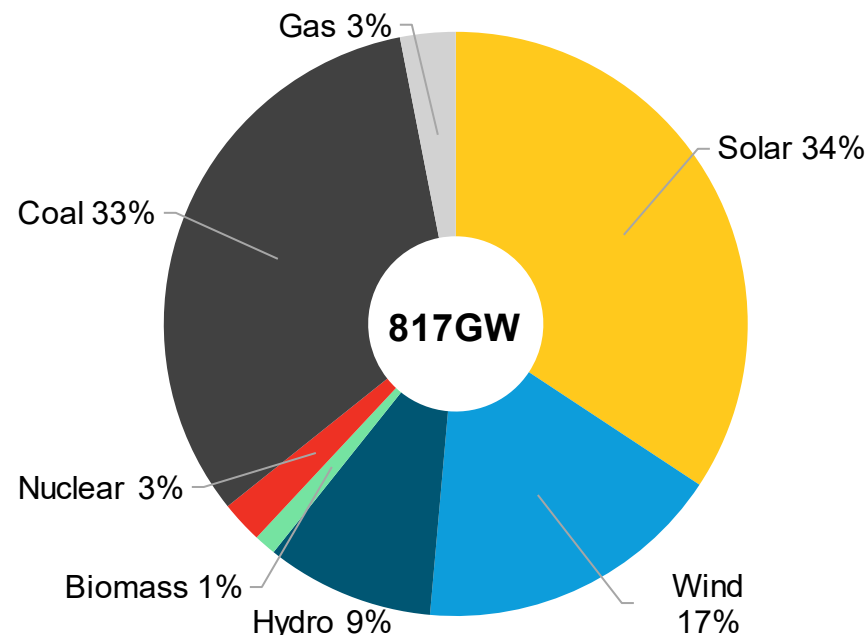
India's climate commitments announced at COP26

Capacity	Install 500GW of non-fossil fuel power capacity by 2030	Growth of solar and wind capacity is crucial to meet these goals
Generation	Meet 50% of electricity requirement from renewable energy in 2030	
Emissions	Reduce the total projected carbon emissions by one billion tonnes from now till 2030	"Clean power helps decarbonize other sectors of the economy"
Carbon intensity	Reduce the carbon intensity of the economy by more than 45% by 2030	
Net Zero	Achieve net-zero by 2070.	

Source: *Ministry of External Affairs, BloombergNEF*

- At COP26 in November 2021, Prime Minister Narendra Modi announced five decarbonization targets. Increasing wind and solar installations will be crucial to directly and indirectly meeting these goals.

CEA's projected installed capacity, 2030

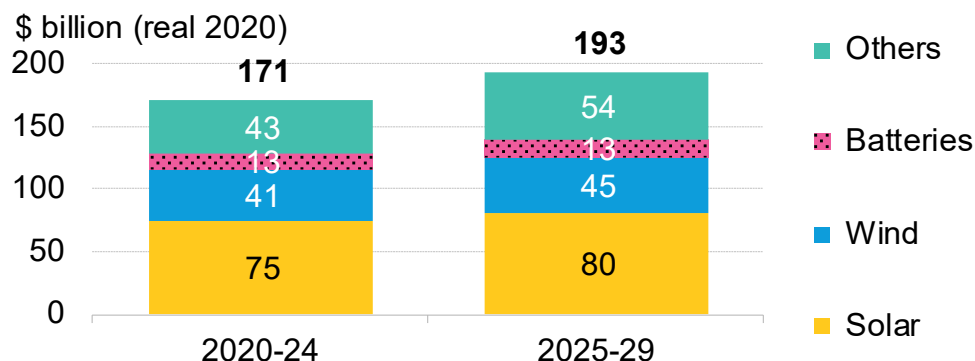


Source: *Central Electricity Authority, BloombergNEF*. Note: Hydro capacity includes imports of 5.9GW from neighboring countries.

- India's Central Electricity Authority (CEA) has modeled the 2030 optimal generation capacity mix for the country. According to the CEA model, India would need 280GW of solar and 140GW of wind by 2030. Two-thirds of the installed capacity would be zero-carbon sources, while 267GW of coal and 25GW of gas plants would remain in the mix.

India's renewables need \$241 billion of investments from 2020 to 2029

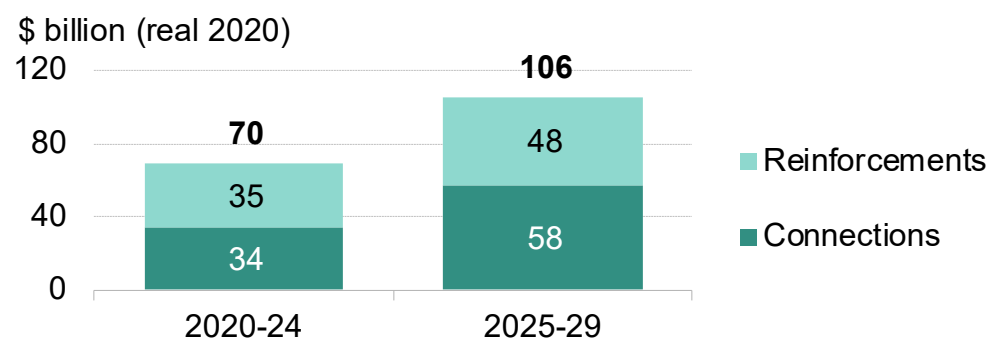
Investments needed in new-build power generation capacity to meet CEA targets (2020-29)



Source: BloombergNEF. Note: Chart shows data by year of financing, assuming commissioning happens one year after financing. Some of the investments needed for capacity to be built this decade have already been made in 2020 and 2021. Assumes an inverter loading ratio of 1.4 for new solar projects. Others include coal, gas, hydro, biomass and nuclear. Numbers may not add up due to rounding.

- **\$363 billion** of investments would be needed in building new power projects and batteries between 2020 and 2029 to meet the CEA's 2030 optimal capacity mix.
- Out of this, from 2020 to 2029 **\$241 billion would be needed to build solar and wind power plants and another \$26 billion to build battery storage projects.**
- In 2020 and 2021, new-build wind and solar together secured \$17.4 billion of asset financing. So, an average of \$27.9 billion is required annually from 2022 to 2029 to meet the 2030 targets.

Investments in transmission and distribution grid (2020-29)

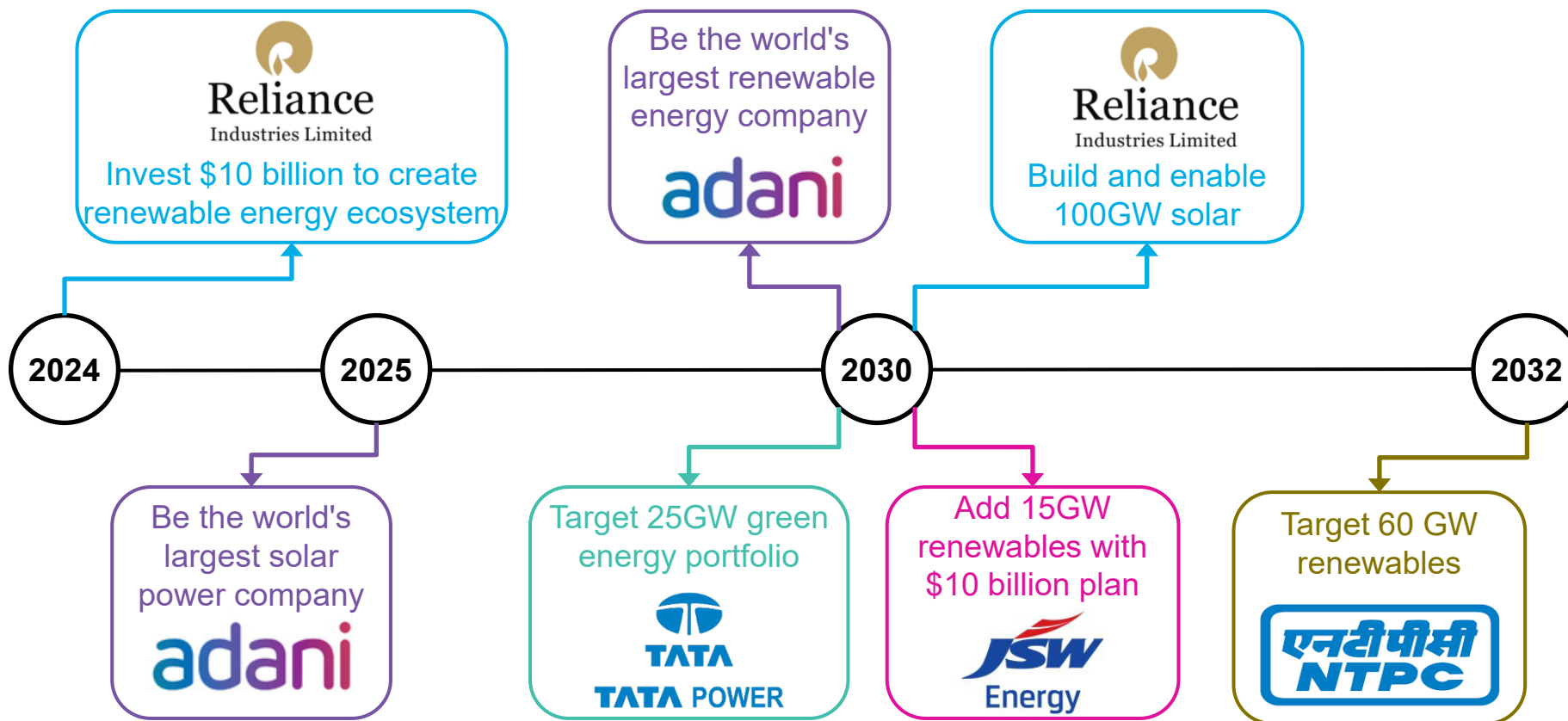


Source: BloombergNEF. Note: Chart shows data based on BNEF's Economic Transition Scenario. Some of the investments needed for grid capacity to be built this decade have already been made in 2020 and 2021. Numbers may not add up due to rounding.

- The growth in power generating capacity requires concurrent investment in the transmission and distribution grids. The main factors driving grid investments are:
 - Increase in generation capacity to meet rising demand
 - Replacement of ageing infrastructure
 - Making grids smarter and reliable by adding sensors and software at nodes and end points
- **\$175 billion is needed from 2020 to 2029 towards transmission and distribution grid** to support new capacity additions and reinforcements of the existing network.

India's top corporates are stepping up to support the 2030 targets

Renewable energy development goals of selected Indian companies



Source: BloombergNEF, company announcements, news reports, company logos.

Debt financing



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Key messages in debt financing

50%

Share of overseas financiers in debt origination from 2019 - 2021

90-180bps

Fall in lending rates for Indian renewable energy projects in 2021 compared to 2017

\$9.7 billion

Green bonds (listed and unlisted) issued by Indian companies in 2021

Renewable project developers have raised debt from several different sources

PPA counterparty is the most important metric in the assessment of project bankability

Lenders also consider companies' historical track record along with other factors such as equipment provider

In recent years, lower interest rates benefited developers

Pure non-recourse finance and long tenor loans are uncommon

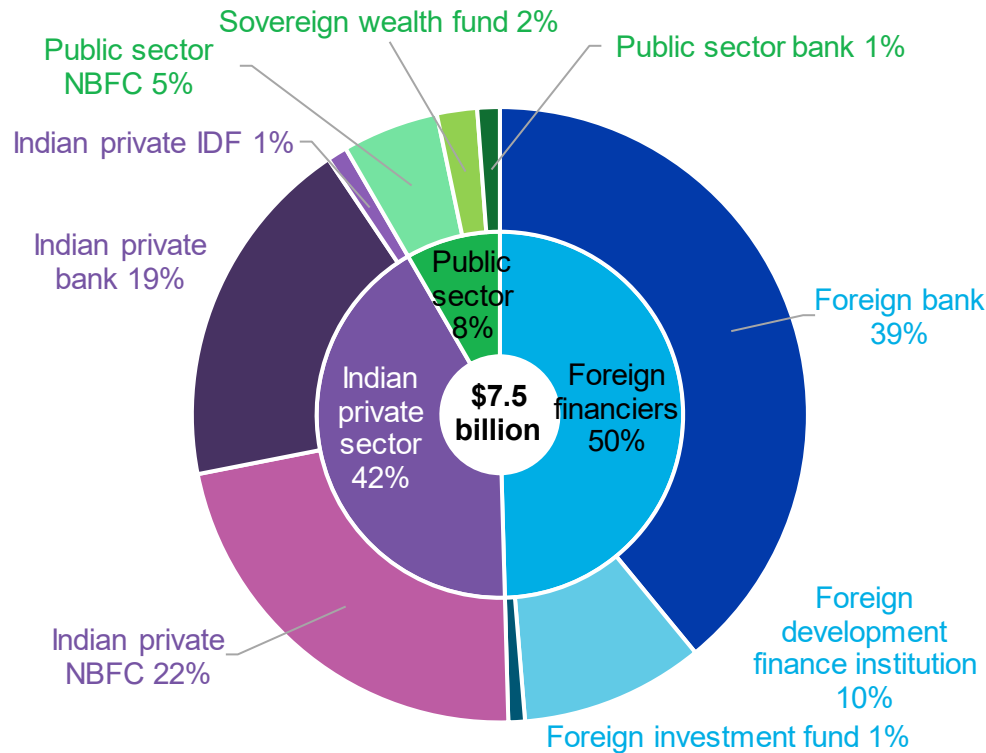
Refinancing has been a base-case assumption for wind and solar projects in India

Bond market has become the preferred route for refinancing operational projects

Bonds are backed by diversified asset portfolios with co-obligor structure

Renewables have managed to raise debt from several different sources

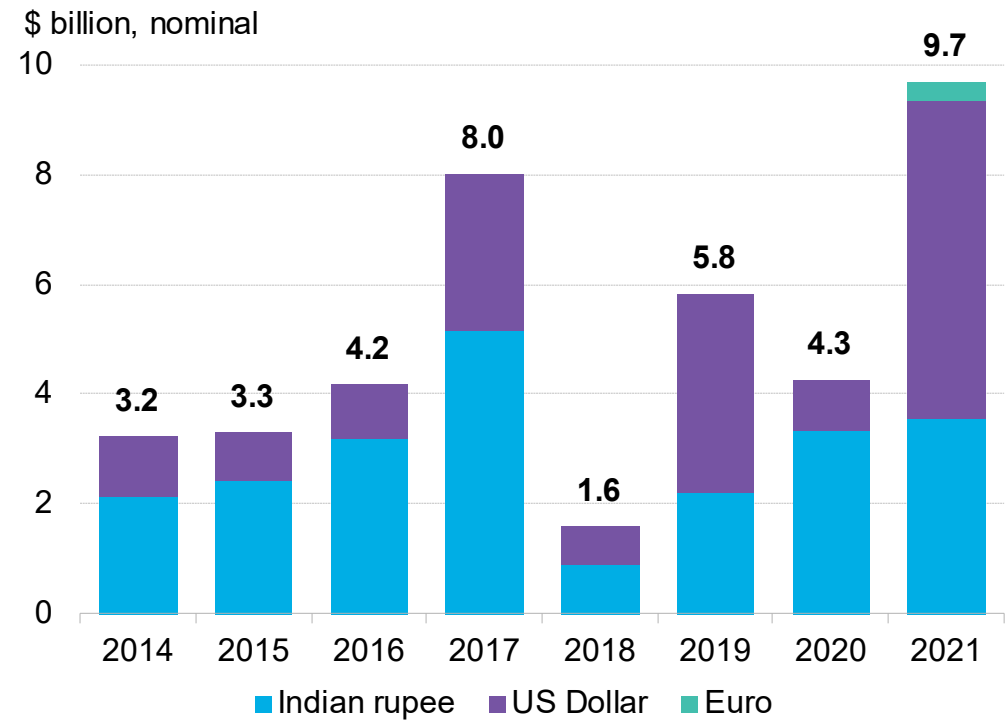
Sources of debt for new-build renewable energy projects in India (2019 – 2021)



Source: BloombergNEF. Note: Chart shows deals captured in the BNEF database by date of financing. NBFC – Non Banking Finance Company, IDF – Infrastructure Debt Fund.

- IPPs have secured loans from a wide variety of institutions, with international financiers lending 50% of the total amount tracked between 2019 to 2021.

Annual green bond volumes in India, by currency of bond issue

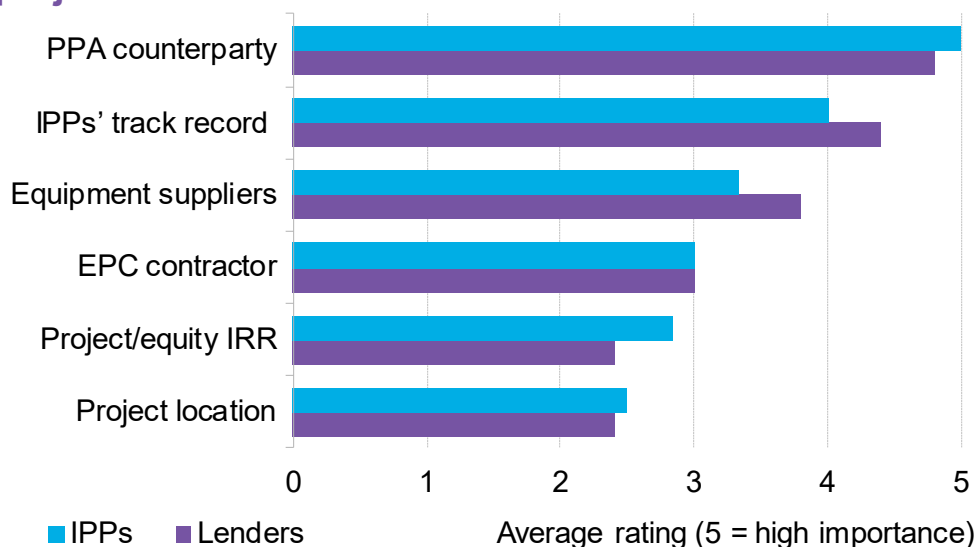


Source: Bloomberg, BloombergNEF. Note: Data includes labeled and unlabeled green bonds.

- Green bonds for renewables touched a new high in 2021, as more IPPs turn to bonds for refinancing portfolios of commissioned projects.

PPA counterparty is the most important metric in the assessment of bankability

Scoring of metrics assessed by lenders for greenfield projects



Source: BloombergNEF. Note: Survey respondents were asked to rate these parameters on a scale of 1-5 with 1-least important and 5-most important. IRR is post-tax internal rate of return.

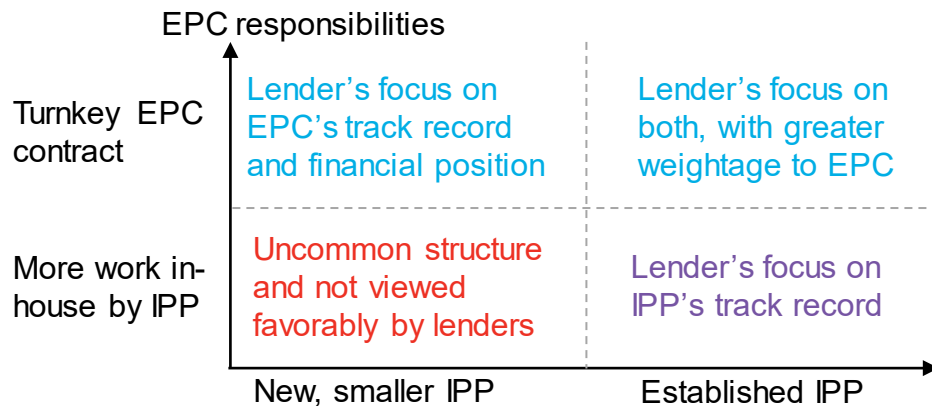
- Bankability is the willingness of financial institutions to fund a project with reasonable terms and conditions.
- Renewable projects in India have a high reliance on debt, with 75:25 debt to equity structure being the norm. Banks closely evaluate several parameters to assess a project's financial viability when make lending decisions.

Counter party risk assessment

- The counterparty determines the **risk of payment delays, curtailment, and contract renegotiations** – all factors critical to the project's revenue hence the IPPs' ability to service the debt.
- Lenders take a favorable view of projects contracting with federal agencies, such as Solar Energy Corp of India (SECI), because of its **track record of timely payments**. Some international banks have completely stopped lending to new projects contracting directly with state-owned utilities (referred to as "discoms") as such entities have at times delayed or missed payments.
- For states that do not have a long history of directly contracting with renewable IPPs, lenders are **looking into proxies** such as discoms' financial situation, payment delays to thermal power generators, and the extent of the state's business-friendly policies.
- Apart from counterparty, lenders are also looking into the details of the PPA clauses. Terms viewed favorably include additional payment security mechanisms, compensation to IPP for grid unavailability, and financial protection in case of offtaker default.

Lenders also focus on developers' track record

Lender's scrutiny of EPC and IPP for financing



Source: BloombergNEF. Note: EPC - Engineering, Procurement and Construction; IPP - Independent Power Producer.

- Lenders evaluate the track record of the project developer by looking at the commissioning timeline and performance of its past projects, as well as its prior fund-raising performance and past sponsors' credibility.
- For new IPPs without a track record, lenders look at the credibility and industry experience of the company's management team. They demand for a full/partial recourse on the sponsor and further protect their interest by asking for a put option in case the promoter exits the platform. In addition, lenders focus more on the track record and financial strength of the EPC contractor.

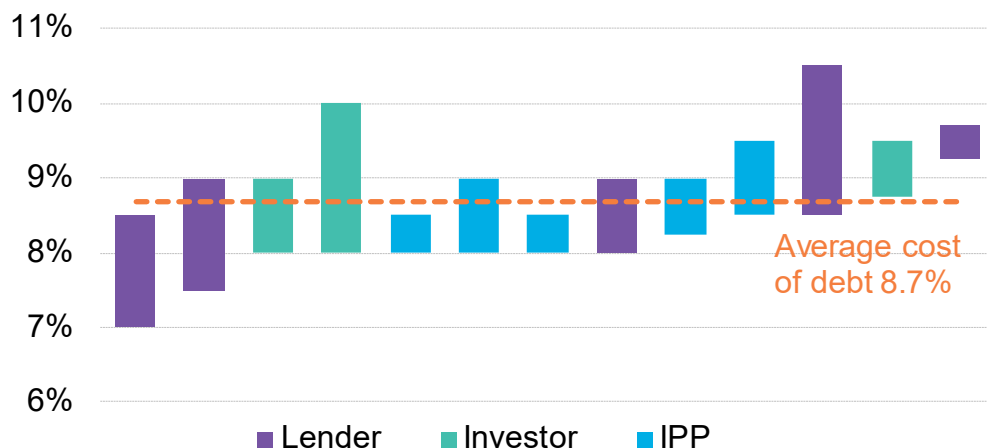
How are other factors evaluated for financing?

- **Equipment supplier:** For solar, most lenders insist on procurement of modules from an approved list of suppliers such as those listed on the BloombergNEF PV Module Tier 1 list. Some IPPs find that lenders take a long time to approve new manufacturers. In the wind sector, the IPPs and lenders use the RLMM¹
- **Location:** This metric matters only when the chosen site has environmental challenges, such as bird conservation litigation involving the Great Indian Bustard in areas of Rajasthan and Gujarat. Land acquisition is the biggest challenge faced by IPPs in developing renewables and this has led to cancelation of many wind projects. Lenders typically require 100% land acquisition as a condition for loan disbursements, but they recognize this is not practical to implement in India.
- **Internal rate of return:** Lenders are concerned about the serviceability of debt, so they scrutinize financial projections to ensure that the Debt Service Coverage Ratio of 1.2 or higher is achievable.

¹Revised List of Models & Manufacturers (RLMM) is the list of wind turbine models that are eligible for installation in India

Falling interest rates have benefited India's renewables

Cost of debt for new-build wind and solar in 2021



Source: BloombergNEF. Note: Data is from a primary survey conducted by BNEF and average is a simple mean of reported values.

Impact of project-specific factors on debt rates

Criteria	Effect on cost of debt
Sponsor is established Indian conglomerate	50-75bps lower ↓
Offtaker is state discom (except Gujarat)	50bps higher ↑
Standalone wind project	30-100bps higher ↑
Round-the-clock/peak power renewables	60-150 bps higher ↑

Source: BloombergNEF. Note: Figures are for a base case of standalone solar PV with a federal offtaker getting debt at 8-9%. Ranges are indicative based on industry interaction. Bps is basis points which is one hundredth of 1 percentage point

Key reasons for lower debt rates

- Macroeconomics** Central banks adopted loose monetary policy to boost post-pandemic economic recovery. RBI kept benchmark repo rate at historic low of 4% for 2 years from March 2020. As a result, lending rates of banks in India declined.
- Lowering of technology risk** India's total wind and solar installations are nearly 100GW and grid parity is firmly entrenched. Now, lenders have a good understanding of the technologies and thus the associated risk premium has gone down.
- Shift in lenders' focus** Banks are facing increasing pressure to improve their ESG ratings and the climate transition scores of their portfolios. There is greater focus on lending to clean power as more banks divesting away from coal mining/power.
- Competition among banks** India's 2030 targets make it the largest renewables market in Asia (excluding China where international banks play a limited role) therefore international lenders see it as an important market for growth and diversification.
- Reduced business risk** There are 15 IPPs with over 1GW(AC) of renewables built in India and most of these have foreign equity backing. Lenders derive intangible comfort from the resulting improvement in IPPs' governance and standardization of working practices.

Source: BloombergNEF

- The cost of debt for greenfield renewables in 2021 was 90-180 basis points lower compared to 2017, according to BNEF's conversations with industry players.

Pure non-recourse finance and long tenor loans are uncommon

Examples of support offered in limited recourse borrowings

Firm support

- **Debt Service Reserve Account** to cover for additional three to six months of future debt payments over and above six months of DSRA.
- The parent company promises **financial support to the project in its stabilization phase**, that is till the project consistently meets P75 or P90 annual generation.

Possible future obligations

- IPP to fund up to 25% of project cost overruns before the lender steps in.
- In case of cost increase due to **'Change in Law' event**, the increase is to be funded by IPP. Lender steps in only after the petition for cost passthrough is filed.
- **Corporate guarantee letter** to the lender stating that the project will ensure timely payments and a default on the obligations will not be allowed.

Source: BloombergNEF

- Most loans in India consist of limited amount of recourse. Pure non-recourse project finance is still uncommon in India. Most lenders demand some form of guarantee.
- Smaller IPPs without strong financial backing use recourse loans, with lenders demanding first right on the assets in case the IPP defaults on its obligations.

Limited availability of long-tenor loans

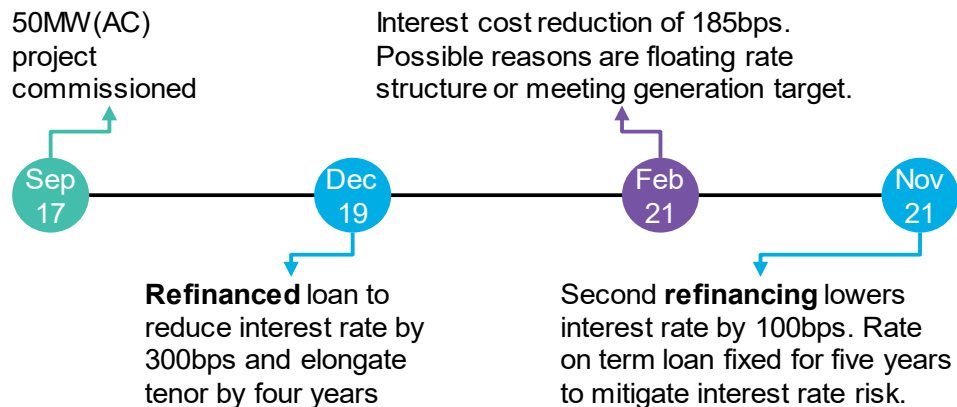
- Most wind and solar projects in India get **loans with a tenor around 15 years**. Banks arrive at their numbers based on 25-year cash flow projections, but the legal term of the loan is shorter.
- There are two other reasons for the lack of popularity of long-tenor loans:
 - Locking in \$-debt for 20 years is expensive, as affordable long-term currency hedges are not available.
 - Domestic banks would suffer from asset-liability mismatch if they give 20-year loans as the bank's borrowings are typically for less than 5 years.
- **Development finance institutions** like Asian Development Bank (ADB) and International Finance Corp (IFC) also offer 20-year loans. Typically, these do not have recall options but there is a repricing clause. This means the terms of the loan, including interest rate can be amended but the borrower cannot ask for premature payment.
- **Specialized domestic power sector lenders**, Power Finance Corp. and REC (formerly Rural Electrification Corp.), were offering loans with clauses to reset after 10 years but this now seems to be discontinued.

Refinancing is a base-case assumption for wind and solar projects in India

The benefits of refinancing

- Refinancing is done for two reasons:
 - **Longer tenor:** IPPs want to elongate their loan repayment period, to at least 80% of the economic life, to increase free cashflow for themselves rather than spend all the revenue on debt repayment.
 - **Lower interest burden:** The cash outflow for financing activities is lesser after a project gets new loans at lower rate.

Example of Azure Power's multiple refinancing



Source: ICRA, BloombergNEF. Note: This is a 50MW solar plant in Uttar Pradesh selling power to NTPC at 4.78 rupees/kWh.

Lender's assessment of projects at refinancing

- The project's track record of payment realization is the primary metric assessed by lenders during refinancing and is made up of three parts:
 - **Actual generation** is compared to the targeted P90¹ capacity factor at the time of initial debt sculpting. Any shortfall in generation suggests poor equipment performance, engineering design/work or O&M practices and all three are red flags for future output.
 - **Curtailement** can severely reduce the revenue. PPAs should have clauses to compensate IPPs for any backdown, other than those for grid safety.
 - **Timeliness of payments** from offtakers is critical. Long pending dues are viewed negatively as they directly affect debt serviceability.
- Lenders also assess the **promoter's credibility** at the time of refinancing in order to gauge ability to provide additional equity support to the project.
- Finally, lenders are also taking a negative view of **regulatory risks**, such as threat of PPA renegotiation by certain state owned discoms.

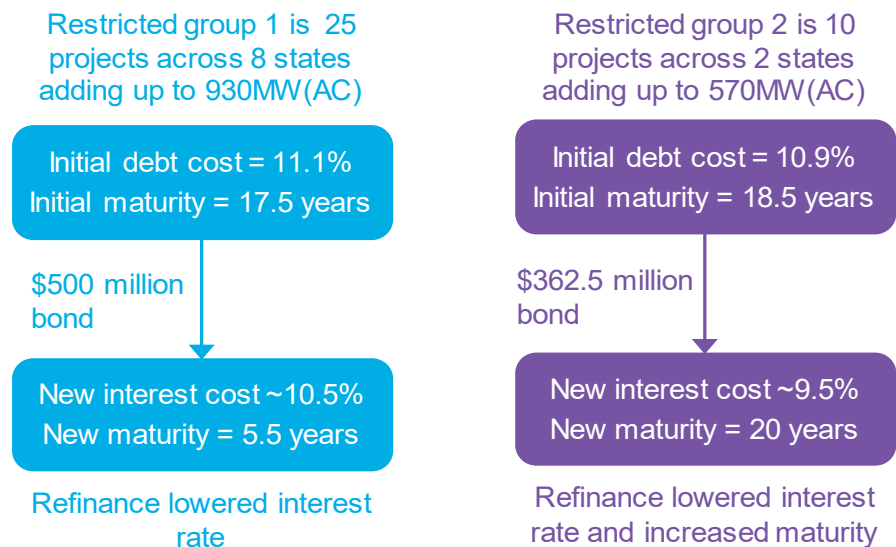
¹P90 is annual energy production which is expected to be met or exceeded 90% of the time.

Bond market is the preferred route for refinancing operational projects

Green bonds are best suited for operating projects

- Once the project development risks are eliminated, renewable energy projects have low operating costs and their long-term PPAs provide stable revenue. This aligns with bondholders' requirement of low volatility and predictable cash flows. Thus, green bonds are well suited for refinancing.

Example of Adani Green refinancing via bonds

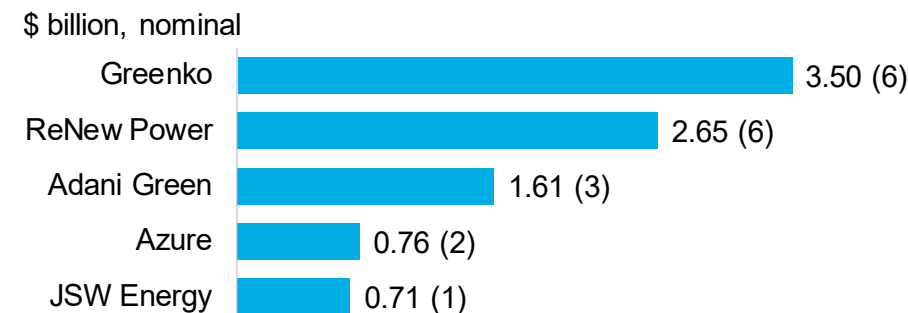


Source: Adani Green Energy, BloombergNEF. Note: Coupon rates of bonds are fixed but hedging costs of dollar denominated bonds may change. A restricted group is a ring-fenced pool of projects that raises the debt together and each project cross-guarantees debt servicing for others in the group.

Green bonds vs loans for refinancing

- The three advantages of green bonds over loans are:
 - Tradability:** Listed bonds can be traded in the secondary market, unlike loans. This is attractive to investors as it allows them to alter their holdings in an issuance according to their evolving strategy.
 - Fixed payment:** Most loans for renewables have a floating rate, leaving IPPs exposed to higher interest burdens in a rising rate environment. In contrast, 85% of India's green bonds have fixed coupons.
 - Diversification:** Debt availability from domestic banks and NBFCs may be limited due to sectoral limits and high ratio of bad-loans. Bonds give access to a wider pool of capital, including foreign investors.

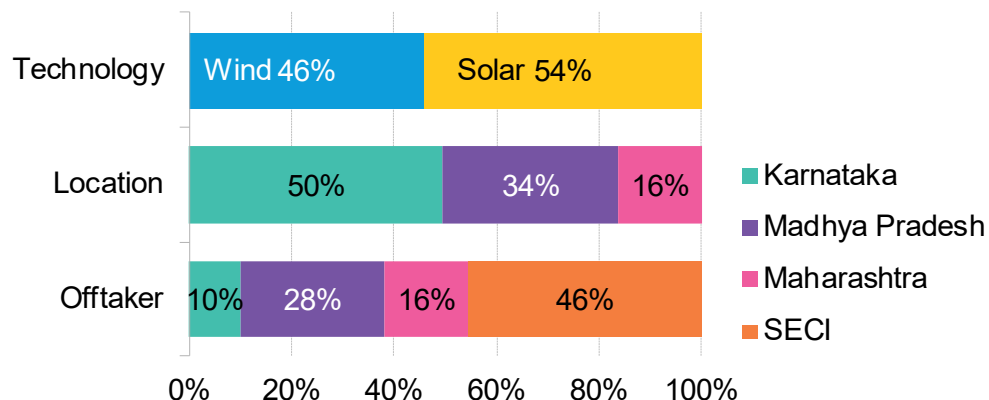
Top Indian IPP issuers of \$ green bonds (2019-21)



Source: Bloomberg, BloombergNEF. Note: Number of bond issues are shown in brackets. Data includes labeled and unlabeled green bonds.

Bonds are backed by diversified asset portfolios with co-obligor structure

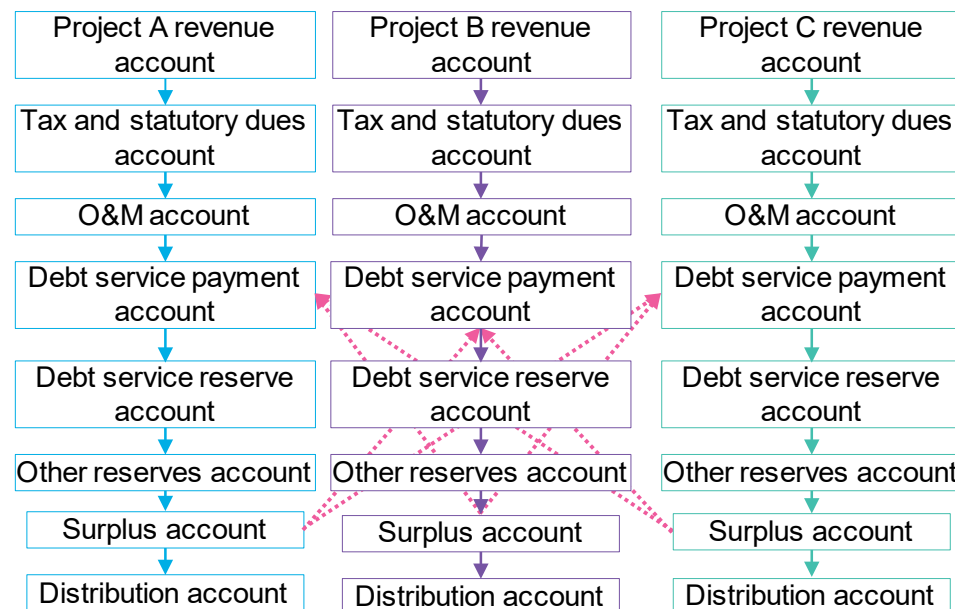
Diversification in Hero Future's green bond



Source: Hero Future Energy, BloombergNEF. Note: The \$363 million bond was priced by Clean Renewable Power (Mauritius) Pte. Ltd in March 2021.

- Pooling multiple projects together with diversity of technology, location and offtaker reduces potential volatility in cash flows that service the debt. As India's top IPPs now have large operational portfolios, they can create ring-fenced groups of diverse assets.
- The project companies (known as Special Purpose Vehicles or SPVs) jointly raise debt in a **co-obligor structure**. Each SPV gives cross-guarantees to every other SPV in the ring-fenced group, but the ownership of the assets is not shared. Once debt is paid off at one SPV, the surplus money is made available for debt-servicing of other SPVs if required.

Illustration of co-obligor structure for bond raise



Source: Fitch, BloombergNEF. Note: O&M is operations & maintenance. Note: Chart shows one possible variant of a co-obligor structure. Developers also consider taxation when deciding on the specific debt and equity instruments to use

- The co-obligor structure ensures that any shortfall in one project, for example due to payment delays or unfavorable weather, can be covered by the cash flows of other projects.
- Previously, the parent IPP gave guarantees for debt repayment. Now, bonds have formalized structures to give legal clarity on cash flows within and between SPVs.

Equity investments



| BloombergNEF

Key messages in equity financing

13.3%

Average post-tax equity internal rate of return expected for solar projects

\$3.5 billion

Largest exit from India renewables when Adani Green acquired SB Energy's India portfolio in 2021

8

Number of sovereign wealth and pension funds that have equity stakes in India's renewables power producers

IPPs are taking multiple measures to meet equity returns' expectations

Expected equity IRRs have fallen, and actual returns may be lower than forecast

IPPs move to protect returns in the face of increasing competition from Public Sector Undertakings (PSU)

Multiple approaches are being adopted to raise and unlock equity capital

Infrastructure Investment Trusts (InvITs) are an attractive avenue for IPPs to monetize operational projects

Patient capital is entering India's renewables sector

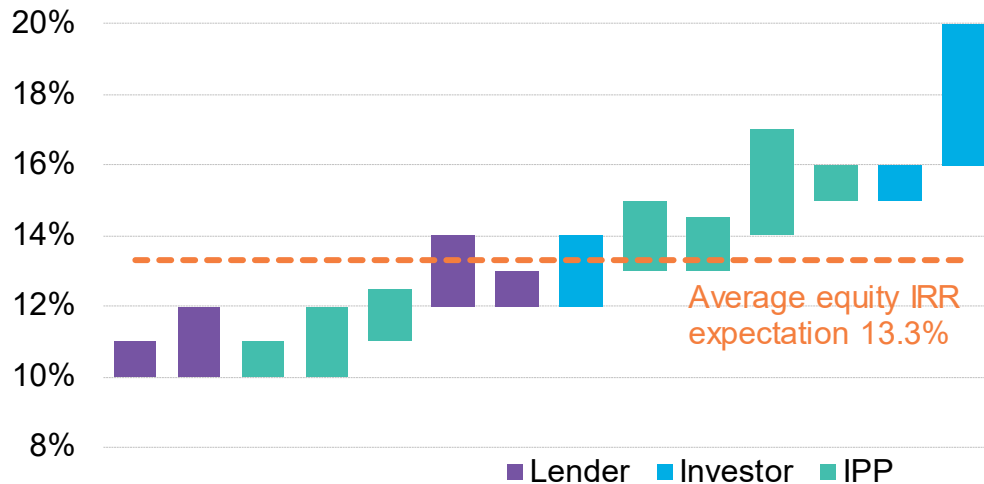
Investors value exit opportunities; exits are a sign of the market's maturity

There is increasing scrutiny of ESG metrics for renewable energy projects

A wide variety of ESG data is being assessed by lenders and investors

IPPs are taking multiple measures to meet internal rate of return expectations

Expected post-tax equity returns for renewables



Source: BloombergNEF. Note: Data is from a primary survey conducted by BNEF and average is a simple mean of reported values. IRR – Internal Rate of Return

- The return expectations are dependent on the strategy of the IPP. IPPs backed by long-term capital providers, typically have a hold-to-maturity approach for their projects. These IPPs have reported expected IRRs in the range of 10-13%.
- Other IPPs have a build-to-flip approach where they are looking to sell-off their commissioned projects; their main investors have a 5–7-year timeline to exit the company. Such IPP respondents in our survey reported expected IRRs of 13-17%.

Strategies adopted by IPPs to maximize equity IRR

Financing

- Factor in **multiple rounds of refinancing** to reduce the cost of debt and progressively reduce the share of equity
- Reduce pure equity contribution by **using quasi-equity instruments** such as non-convertible debentures raised by the IPP which then infuses money into the project companies (special purpose vehicles)

Generation

- Use **P50 or P75 generation forecasts** to increase forecasted revenue.
- **Anticipate operational/generation improvements** after commissioning that will reduce plant downtime, such as using machine learning for predictive maintenance and more accurate forecasting.

Capex

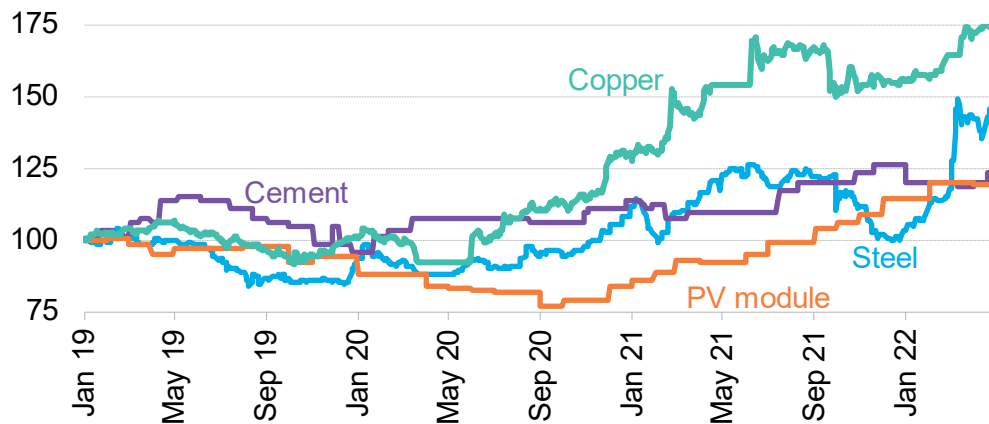
- Make **aggressive assumptions on low equipment costs**
- For solar projects, some IPPs have **deployed additional modules** after commissioning without changing the grid connection capacity. This strategy was adopted when the cost of modules was falling year-on-year.

Source: BloombergNEF. Note: P50 is annual energy production which is expected to be met or exceeded 50% of the time

- IPPs are regularly evaluating financing, generation, and capex estimates to achieve high IRRs.

Expected IRRs have fallen, and actual returns may be lower than forecast

Equity premiums may be squeezed if IPPs absorb some of the capex rise (Jan 1, 2019 = 100)



Source: Bloomberg, NNS, Sinoimex, BloombergNEF. Note: Steel prices are for 2.5-to-3-inch billets. Cement prices are for Ultratech Cement in Mumbai. Copper prices are for wire scrap. Module prices are capacity-weighted average excluding all taxes.

- The expected IRRs in have fallen by as much as 200bps in 2021 compared to 2017, for four main reasons:
 - The **fall in cost of debt** in 2020 and 2021
 - **Competition among IPPs** in India has forced them to accept lower IRRs in order to keeping winning projects
 - **Lower risk perception** of standalone wind and solar due to increased deployment and proactive relief measures taken by government during Covid-19
 - **Competition among investors** seeking low-carbon investments in emerging markets

Reasons realized returns may fall below expected values

- Refinancing** IPPs often forecast that the cost of debt will keep falling at each refinancing event. This may not hold true in a rising rate environment.
- Payment delays** Projects contracting directly with state discoms are often paid late. This requires higher equity infusions from the IPP to support loan repayment leading to a fall in equity returns.
- Unfavorable weather** Wind speeds in 2020 and 2021 and solar irradiation over the last four years have both been below normal. Continuation of this trend will lead to lower revenues.
- Regulatory risks** Any increase in curtailment or higher than expected costs/penalties from tightening scheduling rules put downward pressure on IPP's returns.
- Equipment defects** Faster than expected equipment degradation or defects in installation will both lead to lower revenue realization

Source: BloombergNEF. Note: Analysis of wind speeds and solar irradiation is from ArcVera and SolarGIS, respectively.

IPPs move to protect returns in the face of increasing competition from PSUs

Strategies of private IPPs to counter competition from government-owned companies

Integrate supply chain (FIGHT)



Setting up a 2GW cell and module manufacturing facility in Gujarat



Adani Solar (group company) has 3.5GW of solar cell and module manufacturing capacity

Supply for in-house demand (ADAPT)



Building 958MW of renewables for supply to JSW Steel



Potential to supply clean power to the 10,000 EV charging stations planned by 2025

Newer project designs (ADAPT)



Pipeline of 6.4GW/49GWh of pumped hydro storage projects to provide firm renewable power



Developing 1.2 million tons per annum green ammonia facility in Oman

Target C&I offtakers (FLIGHT)



A member of PETRONAS group



Source: Company disclosures, news reports, company logos, BloombergNEF. Note: Chart shows examples of strategies adopted and is not an exhaustive list. C&I is commercial and industrial users.

- India's government-owned companies, known as public sector undertakings (PSUs) have ambitious plans for renewables expansion and have started competing aggressively in the auctions. This is part of their diversification strategy in support of the government's push to accelerate the deployment of renewables.
- Energy-sector PSUs are generally profitable firms with access to lower cost of borrowing because of their sovereign ownership. These factors are allowing them to compete aggressively in renewables auctions. Private IPPs are responding by adopting the above approaches to differentiate themselves in the market.

Multiple approaches are being adopted to raise and unlock equity capital

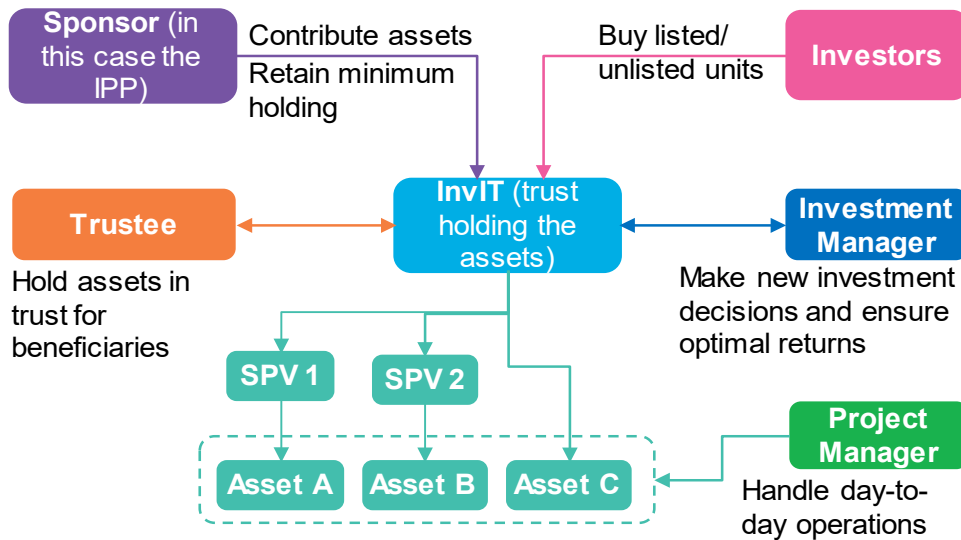
Common equity fund raising options for renewable IPPs in India

Measure	Public listing	Selling minority stake in the entire IPP	Selling individual operational projects	Forming Infrastructure Investment Trust (InvIT)
Volume of capital raised	Large . Depends on size of portfolio and extent of dilution.	Medium since smaller pool of potential investors.	Small to medium . Since investors usually acquire a small part of the entire portfolio or a small SPV.	Medium to large . Only large and experienced IPPs will be able to list an InvIT.
Speed of process	Slow . Requires hiring bankers, conducting roadshows, and securing regulatory approvals	Medium . Buyer evaluates entire firm. Can become slow if shortlisted party decides to pull-out	Fast . Buyer conducts due diligence on a single/smaller project.	Slow since regulatory approvals and market appetite take long to build.
Compliance burden	High . Needs detailed disclosures in the prospectus and quarterly updates after listing	Medium . Needs approvals from the competition regulator. Minimal change in level of public disclosure	Lowest . No requirements for any public disclosure	High for listed InvIT, similar to public listing and lower for unlisted InvIT.
Suitability	Mature IPP that has secured several other funding options in the past and can absorb cost of compliance	Suitable for growth stage IPPs that want to remain private yet have marquee investors on-board. Potential for future IPO	IPPs looking to build and flip or only retain certain specific projects. Can also be a sign of IPP's desire for equity but not able to avail first two options	Monetize existing assets with freedom to add more projects to the trust in the future.
Examples	Adani Green, Azure, ReNew	Greenko, Hero Future Energies	Acme, Fortum, Shapoorji Pallonji	Virescent Renewable Energy Trust

Source: BloombergNEF. Note: **Green** shows attribute most favorable for IPP, **red** is least favorable, and **orange** is medium. The funding options are not mutually exclusive. For example, listed IPP Adnai Green Energy sold 20% stake in the company to TotalEnergies in 2021.

InvITs are an attractive avenue for IPPs to monetize operational projects

Structure of Infrastructure Investment Trust (InvIT)



Source: ETMoney, BloombergNEF




- An infrastructure investment Trust (InvIT) pools multiple operational projects into a single entity into which individual or institutional investors can directly invest small amounts of money. In return, investors get regular dividends as InvITs must ensure that they distribute 90% of their net cash flows to unitholders.
- The original sponsors can retain some control over the InvIT's assets by having a majority stake in the project manager and investment manager companies.

Benefits and shortcomings of InvITs

- An InvIT allows the IPP to raise money from multiple retail and institutional investors. The freed-up capital can be used to pay off other debts, and/or invested in building new projects or acquisitions.
- Institutional investors see InvIT as the best tax neutral way of investing in a diversified and defined pool of infrastructure projects that give regular cash returns. For retail investors, the structure allows direct exposure to the renewable energy sector.
- Currently, renewable InvITs have three shortcomings
 - Investors view these less favorably compared with road and transmission sector InvITs due to payment delays and variation in generation
 - Sponsors are unsure about the extent of control they want to exert post-dilution of their equity since the assets will be under a trust
 - Lenders are concerned about lack of 100% clarity on rules for calculation of a key metric: the net distributable cash flow
- Virescent is currently the only renewables InvIT in India. Many IPPs are closely watching the first-mover before deciding on whether to monetize assets via this route.

Long-term, patient capital is entering India's renewables sector





Major pension and sovereign funds invested in India's IPPs

Country	Name of fund	Investee IPP
	Canada Pension Plan	ReNew Power
	Caisse de Dépôt et Placement du Québec	Azure Power, Apraava Energy
	Ontario Municipal Employees' Retirement System	Azure Power
	GIC	Greenko
	Temasek Holdings	O2 Power, Sembcorp Green Infra
	Abu Dhabi Investment Authority	ReNew Power, Greenko
	Mubadala Investment Company	Tata Power Renewable Energy, Hero Future Energies
	National Investment and Infrastructure Fund	Ayana Renewable Power

Source: BloombergNEF.

- The increase in investments by patient capital investors and a move away from reliance on private equity/venture capital funding is a sign of India's renewables market maturing. Renewables with long-term PPAs are a good fit for pension and sovereign wealth funds who are looking to build diversified portfolios with low cashflow volatility.

Global O&G presence in India renewables

Company	Presence in India renewables
	Lightsource BP and Everstone Capital jointly setup EverSource Capital. Current equity stakes in Ayana Renewables and Radiance Renewables
	Full acquisition of Amplus Energy Solutions, a renewables IPP serving commercial and industrial users
	Acquired 2.9GW(DC) India renewables portfolio of Sprng Energy from Actis. Holds equity in stake in Orb Energy, Husk Power and Punjab Renewable Energy Systems
	Acquired 50% of Adani Green's operational solar projects and 20% stake in the company. Total is part of Eden Renewables, which has won 1.4GW of projects.

Source: BloombergNEF, company logos

- The other prominent category of long-term investors in Indian IPPs are oil & gas companies. They have large, profitable core operations but need to diversify their revenue sources to minimize energy transition risk.
- Investing in renewable energy projects can bring new revenue sources while addressing investors' ESG concerns.

There is potential to attract even more equity from providers of patient capital

Foreign equity investor perspective on India renewables

Strengths

- Reasonably stable in terms of **rule of law** and enforcement of contracts by the judiciary
- Clean power's growth trajectory makes it the **largest emerging market** (ex-China)
- Diversity of offtakers (federal, state and private) allows for **creation of balanced portfolio**
- India's **rising power demand** coupled with government's support for clean power
- India's renewables well placed at a time when investors are facing pressure to take **more action on climate change**











Weaknesses

- Investors want **certainty on regulations** (taxation, PPA renegotiation) even if they are not always in their favor
- High inflation and depreciation** lowers real returns for foreign investors
- Lower returns** in India compared to some markets due to high competition
- Bigger renewable energy portfolios** will attract more long-term investors
- Lack of coordination** and policy cohesion between federal and state governments

Source: BloombergNEF

- Global investors have several options, across geographies and sectors, to invest their capital. From the perspective of these money managers, there are several factors working in favor of India's renewables market. There are also a few limitations, which if addressed have the potential to attract even more long-term patient capital.

Top global pension and sovereign wealth funds

Country	Fund name	AUM (\$ billion)	GSR score
	Government Pension Investment Fund	1,733	84%
	Norges Bank Investment Management	1,362	96%
	China Investment Corporation	1,222	68%
	Abu Dhabi Investment Authority	829	44%
	SAFE Investment Company	813	12%
	GIC	799	60%
	Federal Retirement Thrift Investment Board	795	-
	National Pension Service	757	92%
	Algemene Pensioen Groep	720	80%
	Kuwait Investment Authority	693	32%

Source: Global SWF, news reports, BloombergNEF, country flags. Note: Data accessed on May 1, 2022. Assets under management (AUM) are latest year-end figures where available, estimation otherwise. GSR is Global SWF's 2021 scoring of Governance, Sustainability and Resilience efforts. Funds highlighted in bold have existing equity investments in Indian renewables.

- Eight of the world's top 10 pension/sovereign wealth funds have not yet invested equity in India's renewables.

Investors value exit opportunities, exits are a sign of an industry's maturity

The importance of exits and asset-sale opportunities

Objective	Implementation	Example
Strengthen IPP	Bring in fresh equity for accelerating growth in existing or new areas	Adani Green sold 20% <u>stake</u> in the platform to TotalEnergies
	Bring new expertise on board from new investors	Goldman Sachs brought its deal making expertise when it invested in ReNew Power
	Inorganic growth of established IPPs that are unable to grow their portfolios fast enough via auctions	Ayana Renewables acquired solar projects from <u>Renew Power</u> and <u>Acme</u>
New business	Creation of a construction-focused IPP that follows a build-to-flip strategy , not long-term asset ownership	<u>Engie</u> sold a majority stake in 813MW(DC) portfolio in India to focus on building new renewables
	Market entry into India renewables by foreign investors with a long-term growth focus	<u>Shell</u> tripled its operational renewable capacity globally by acquiring Sprng Energy
Divest	Sell non-core assets to repay debt or invest freed-up equity in other projects	<u>Azure</u> sold its rooftop PV projects to improve overall cost structure
	Allow exit of early investors if there is a change in their investment strategy, business focus or risk perception	<u>SB Energy</u> exited India by selling its renewables portfolio to Adani Green

Source: BloombergNEF.

Notable operational asset deals (Jan 21 – Mar 22)

Acquirer	Seller	Type	Capacity (MW)	Value (\$m)
Greenko	ORIX [^]	Wind	817	961
Edelweiss	Engie	Solar	813*	Undisclosed
Sprng Energy	Fortum	Solar	500	294
Ayana	Renew Power	Solar	300	Undisclosed
Renew Power	Undisclosed	Solar	260	251
Ayana	Acme Solar	Solar	250	Undisclosed
Torrent Power	Surya Vidyut (CESC)	Wind	156	107
Radiance	Azure Power	Solar	152	74
Adani Green	SkyPower	Solar	125	Undisclosed

Source: BloombergNEF, company disclosures. *Engie retains 26% stake in the 813MW(DC) portfolio. ^ORIX integrated its entire wind power generation business in India into Greenko in exchange for approximately 21.8% of Greenko. Excludes two complete exits highlighted on the left side of this slide

- IPPs focusing on growth have pursued acquisitions as hyper-competitive auctions make it difficult to rapidly add greenfield capacity to their portfolios.
- Selling assets allows IPPs to unlock equity invested, which they can then choose to invest in other growth opportunities, including building new renewable projects.

There is increasing scrutiny of ESG metrics for renewable energy projects

Indian IPPs' motivations for focusing on ESG

Access to capital	Foreign banks and overseas investors have mandates and so they use ESG as a negative screening in their investment decision making
Tangible benefits	IPPs recognize that proper action on ESG criteria, such as water use, reduces the risks to their own business operations
Trumping peers	IPPs are competing strongly to raise capital for portfolio growth so some see better ESG scores as a way to differentiate themselves from peers
Future-proofing	IPPs are preparing for the future where importance of ESG will only increase due to higher scrutiny by all lenders, investors and Indian regulators.

Source: BloombergNEF

- Environmental, social and governance, or ESG, criteria is a term used to identify metrics that allow stakeholders to assess a company's sustainability and associated future risks. Bloomberg Intelligence estimates ESG assets will rise to \$50 trillion by 2025 from about \$35 trillion in 2020.
- In India's renewables sector, the emphasis on ESG started gaining traction over the last two years. Now almost all IPPs measure their ESG performance and are constantly looking to improve their scores.

Inconsistent reporting impedes comparison

Measure	Adani Green	Azure Power	ReNew Power
Emissions	Scope 1, 2 and 3	Scope 1, 2 and 3	Scope 1 and 2
Water use	Reports O&M and construction data	Data for domestic use, module cleaning, office	Total water consumption without breakdown
Safety	Reports fatalities, LTI, LTIFR and medical treatment cases	Reports extensively on metrics such as fatalities, LTI, number of audits and LTIFR and TRIFR	Reports injury incident, LTIFR and TIFR but low-resolution charts without data tables
Hazardous waste	Total hazardous waste disposed but no breakdown	Data on disposal of broken PV modules	Data on used oil, broken modules and used batteries
Employee mix	By age and gender for board and two types of employees	By gender at board and four levels of employees	Number by function but no breakdown by age or gender

Source: Sustainability reports for year ending March 2021 of Adani Green, Azure Power and ReNew Power compared by BloombergNEF. Note: LTI – Lost Time Injury, LTIFR - Lost Time Injury Frequency Rate, TRIFR - Total Recordable Injury Frequency Rate. Definitions of these safety reporting metrics can be found [here](#).

- Investors and lenders need standardization of reporting to fully incorporate ESG data into their decision-making when assessing opportunities across different IPPs.

A wide variety of ESG data is being assessed by lenders and investors

Top ESG metrics assessed by funders for India's IPPs

Environmental	Social	Governance
<ul style="list-style-type: none">• Water use• Biodiversity protection• Waste disposal	<ul style="list-style-type: none">• Land acquisition• Safety track record• Gender balance	<ul style="list-style-type: none">• Ethics policies• Litigation• Diversity of board

Source: BloombergNEF

- ESG compliance of lenders often holds IPPs to a higher standard than government rules. IPPs are being asked to produce mitigation plans where they cannot meet requirements of lenders.

Great Indian Bustard's wake-up call

- In April 2021, the Supreme Court of India ruled that power lines must be put underground in large areas of Rajasthan and Gujarat that are habitat of the critically endangered Great Indian Bustard. This ruling has led to project delays. State governments appear reluctant to share the financial burden arising from new ESG risks and compliance guidelines.
- Lenders and investors are now doubling down on analyzing biodiversity risks of project sites. IPPs are going for third-party environmental impact assessments to identify and prepare for similar threats.

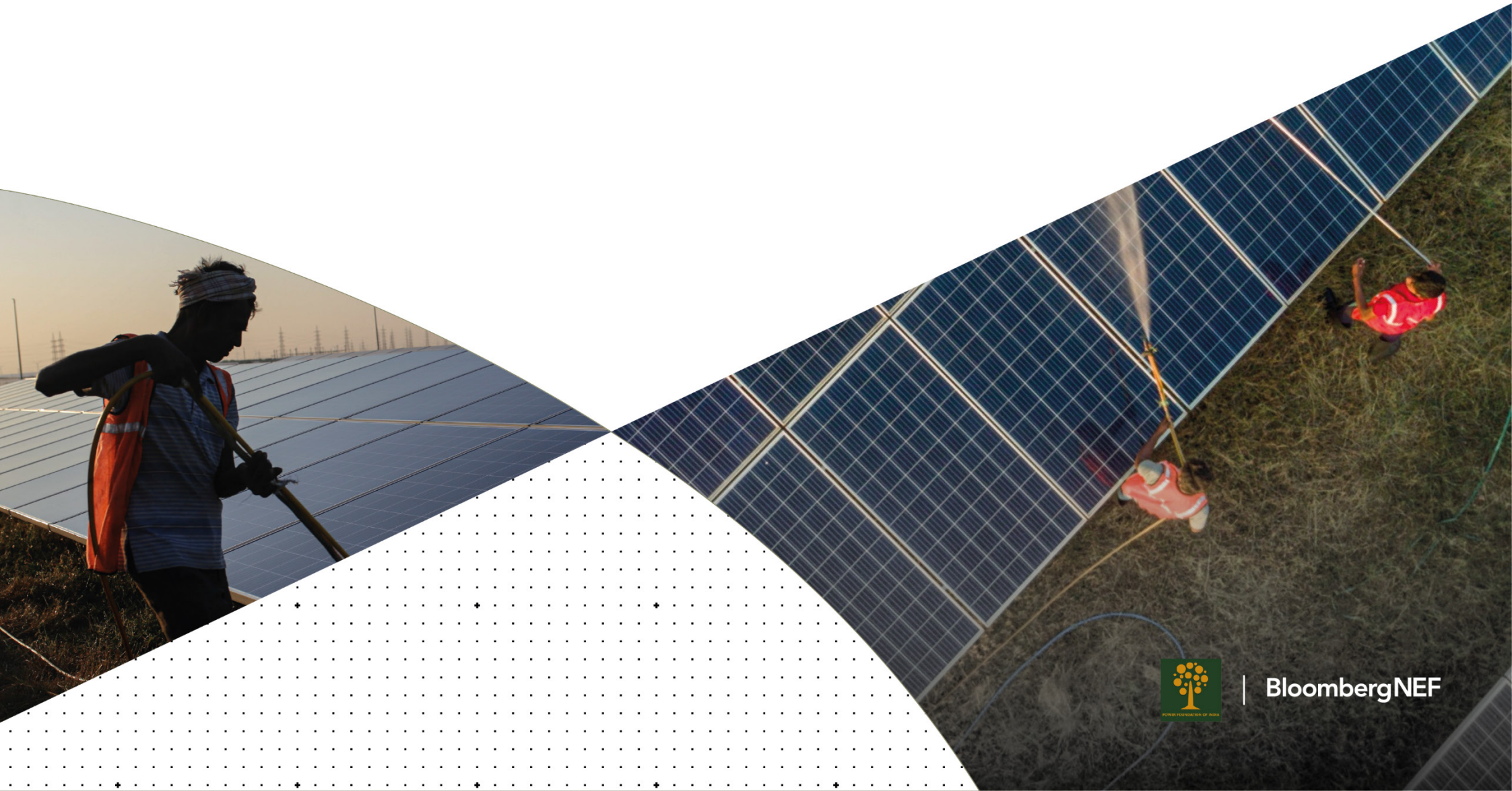
Focus on reducing water consumption in PV plants

- Regions of India with higher insolation such as Rajasthan, Gujarat, parts of Karnataka and Telangana are unfortunately facing worsening water stress. Solar projects in these regions will find it difficult to get access to freshwater for module cleaning. Dirty panels can lower power generation.
- For operational projects, IPPs are implementing rainwater harvesting and groundwater recharge initiatives. For new projects, many lenders insist on using robotic dry cleaning which has led to emergence of many such technology providers in India.

Minimizing the fallout from land acquisition

- As areas with high insolation or wind speeds become scarcer, competition for land acquisition is getting fiercer.
- Capital providers are increasingly strictly requiring IPPs or land aggregators to follow all due process during land acquisition, pay fair compensation and provide proper rehabilitation where necessary. Some investors try to reduce the risk of future litigation arising from claims over land by third parties by preferring solar parks and staying away from projects where land titles are murky

Risks and mitigation strategies



Key messages in risks and mitigation strategies

\$2.5 billion

Amount overdue from discoms to renewable IPPs at the end of April 2022

4 out of 5

Largest banks in India have increased their marginal cost of funds-based lending rate in the first five months 2022

6.71%

Average India year-on-year consumer price inflation in the first four months of 2022

Renewable projects in India face regulatory, project and financing risks

Some regulatory risks are hard to mitigate for operational projects

Planning is essential to manage future risks of a high-renewables market

Policy certainty helps IPPs in their financial planning

Land and grid unavailability are the top reasons for delays in commissioning

Resource estimation error and extreme weather have emerged as big concerns

Higher borrowing costs are the biggest financial risks for renewables in the near-term

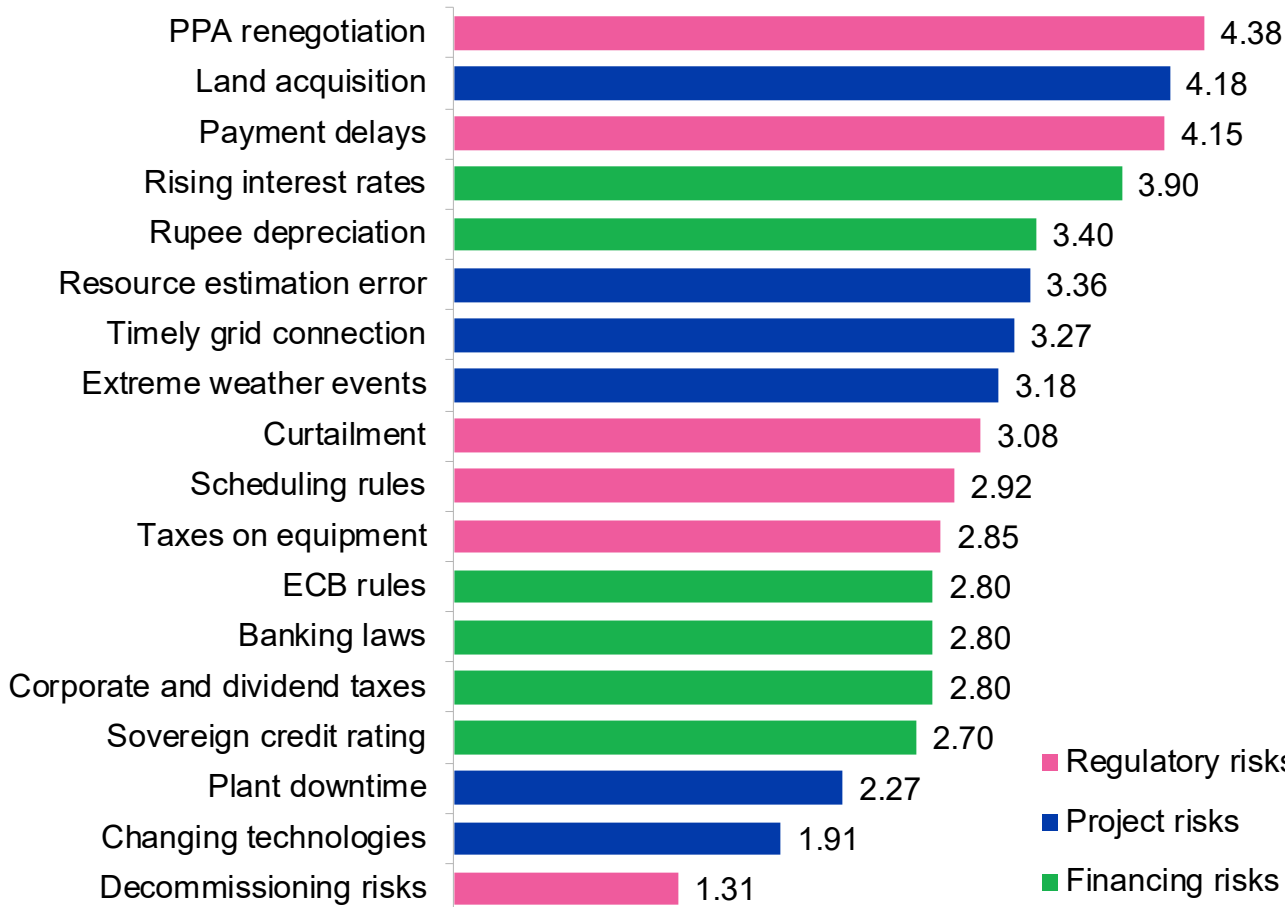
Renewables sector is facing macroeconomic headwinds

Debt financing is constrained by India's banking regulations

Renewable projects in India face risks along three dimensions

Risk scores for renewables in India across three categories

Average score (1 = low risk, 5 = high risk)

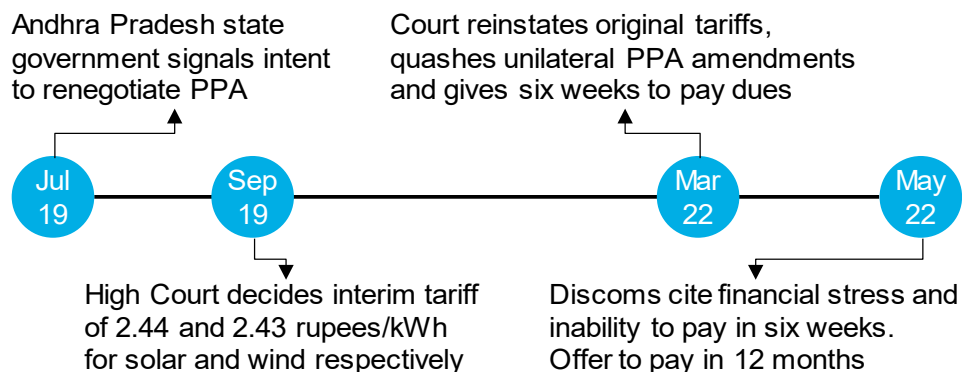


- BloombergNEF conducted a survey of 17 industry stakeholders including large foreign IPPs, large domestic IPPs, mid-sized domestic IPPs, international lenders, Non-banking financial companies (NBFCs), an Indian bank, a sovereign wealth fund, a pension fund and private equity funds.
- Respondents were asked to score each risk on a scale of 1 to 5, where 1 was a low risk and 5 was very high. There were 18 risks across three categories:
 - **Regulatory** risks are changes to rules that can affect revenue of an entire portfolio
 - **Project** risks are factors that affect buildout or operation of individual plants
 - **Financing** risks are potential threats to an IPPs ability to raise capital at attractive terms

Source: BloombergNEF. Note: Chart shows results of a primary survey conducted by BNEF among 17 industry stakeholders. S&F - scheduling and forecasting, ECB - External Commercial Borrowing.

Some regulatory risks are hard to mitigate for operational projects

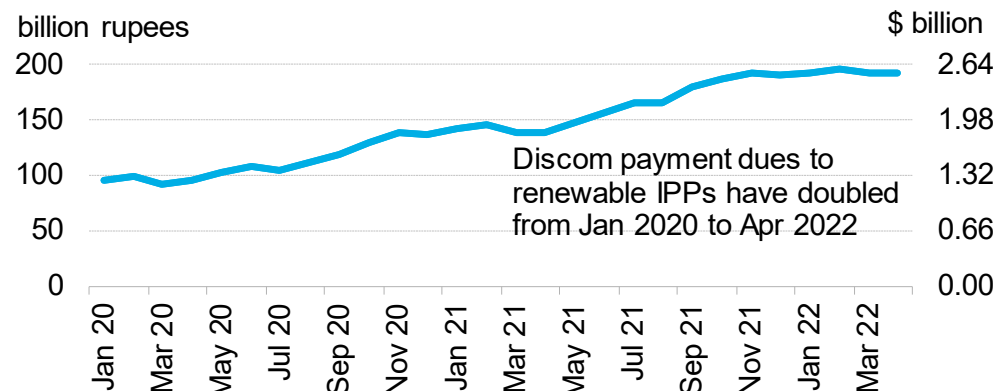
Timeline of PPA renegotiations in Andhra Pradesh



Source: BloombergNEF, news reports

- **Risk 1:** Multiple states, such as Andhra Pradesh, Punjab, Gujarat and Karnataka have attempted to renegotiate PPAs signed with the IPPs to lower the tariffs. Projects can become financially unviable due to retroactive tariff cuts.
- **Mitigation 1:** No state has yet succeeded in its attempts. IPPs are confident of continued backing from the federal government and **courts upholding the sanctity of signed contracts**. However, they see legal remedy as a long-drawn process during which they continue to suffer from reduce or no payment.
- **Mitigation 2:** Some IPPs have stopped bidding at state renewable energy auctions, **pivoting to federal tenders and C&I projects**.

Amount of overdue payments to renewable IPPs

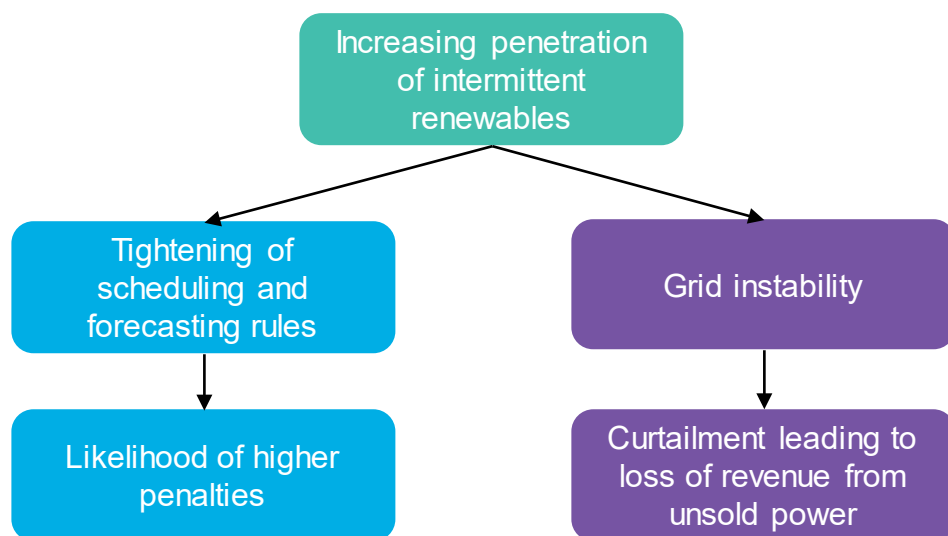


Source: PRAAPTI (as of May 25, 2022), BloombergNEF.

- **Risk 2:** Projects contracting directly with state discoms are facing long payment delays, putting pressure on debt servicing and IPP's working capital.
- **Mitigation 1:** In the short-term IPPs are managing the situation by continuous engagement with the discoms, infusing **additional equity**, prioritizing critical expenses, securing high-cost short-term loans and **negotiating with lenders** for options such as shifting principal repayments.
- **Mitigation 2:** Many IPPs are **staying away from state tenders** as they want a larger share of their portfolio to be with federal agencies that make timely payments. A few lenders have stopped financing state PPA projects to avoid stressed loans.

Planning is essential to manage future risks of a high-renewables market

Two potential risks with increasing share of renewables



Source: BloombergNEF

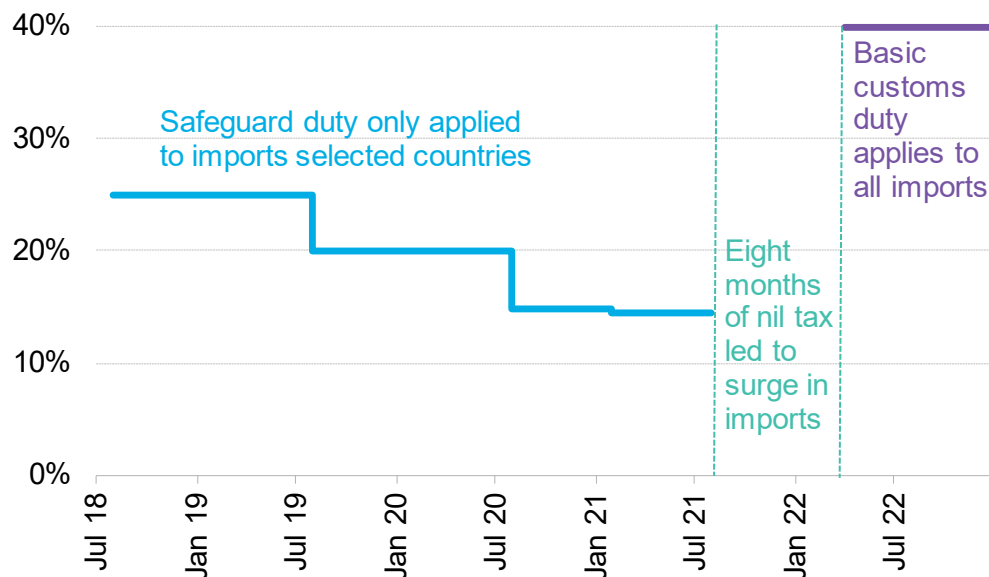
- **Risks 3 and 4:** The increasing share of intermittent renewables creates two future risks for IPPs – curtailment, and stricter scheduling & forecasting rules.
- These are not major problems yet, as discoms are largely abiding by the ‘must-run’ status given to wind and solar projects. Even during the large demand drop during the first Covid-19 lockdown of 2020, the federal government remained firm in requiring priority dispatch for renewables.

Five measures to prepare for the future

- **Mitigation 1:** IPPs recognize that they may be able to reduce the intermittency of their generation by building wind-solar hybrids and round-the-clock renewables projects. Here, the **combination of wind, solar and energy storage** allows the plant to start resembling the firm and dispatchable nature of thermal power plants.
- **Mitigation 2:** Federal agencies (SECI and NTPC) have invited **tenders for standalone energy storage projects**. Large-scale deployment of such systems can help the grid balance demand-supply on different time scales without the need for curtailment.
- **Mitigation 3:** Expanding and **strengthening the grid** is key to ensure that sufficient transmission capacity is available. In March, the government approved funding for building transmission lines to connect 20GW of renewables from seven states.
- **Mitigation 4:** IPPs are stepping up the use of onsite data monitoring, centralized control and **big data analytics** to improve forecasts.
- **Mitigation 5: Greater digitalization** in the operation of the power grid, including distribution networks will give enable improved dispatching and forecasting.

Policy certainty helps IPPs in their financial planning

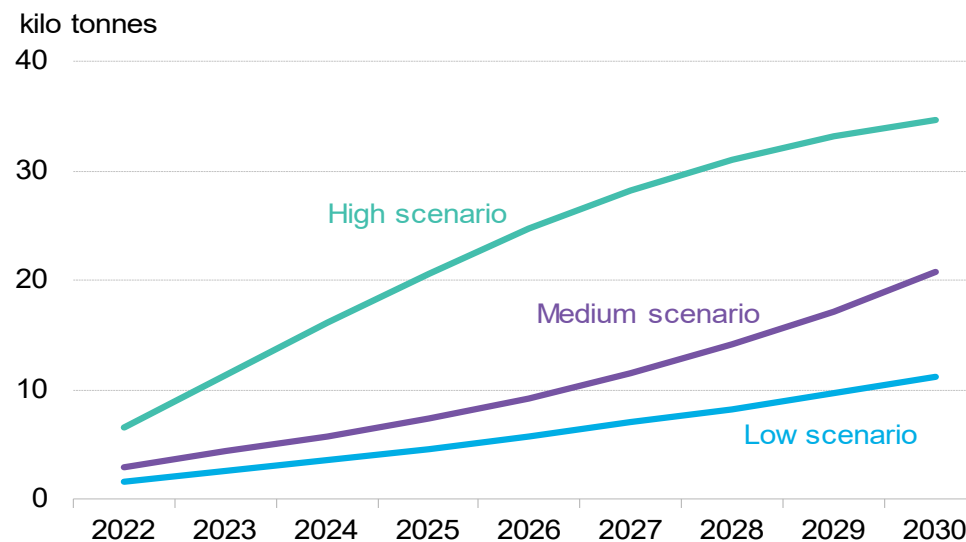
India's import taxes on solar modules



Source: Ministry of Finance, BloombergNEF.

- **Risk 5:** The import tax on solar modules in 2018 led to many cases of litigation with IPPs asking regulators to approve cost-passthrough from offtakers. The new 40% tax from April 2022 forced IPPs to import high volumes in 1Q 2022 despite elevated global prices.
- **Mitigation:** Some IPPs are planning to set up their own domestic solar production facility to cut dependence on imports and third-party manufacturers.

Forecast of cumulative solar module waste in India

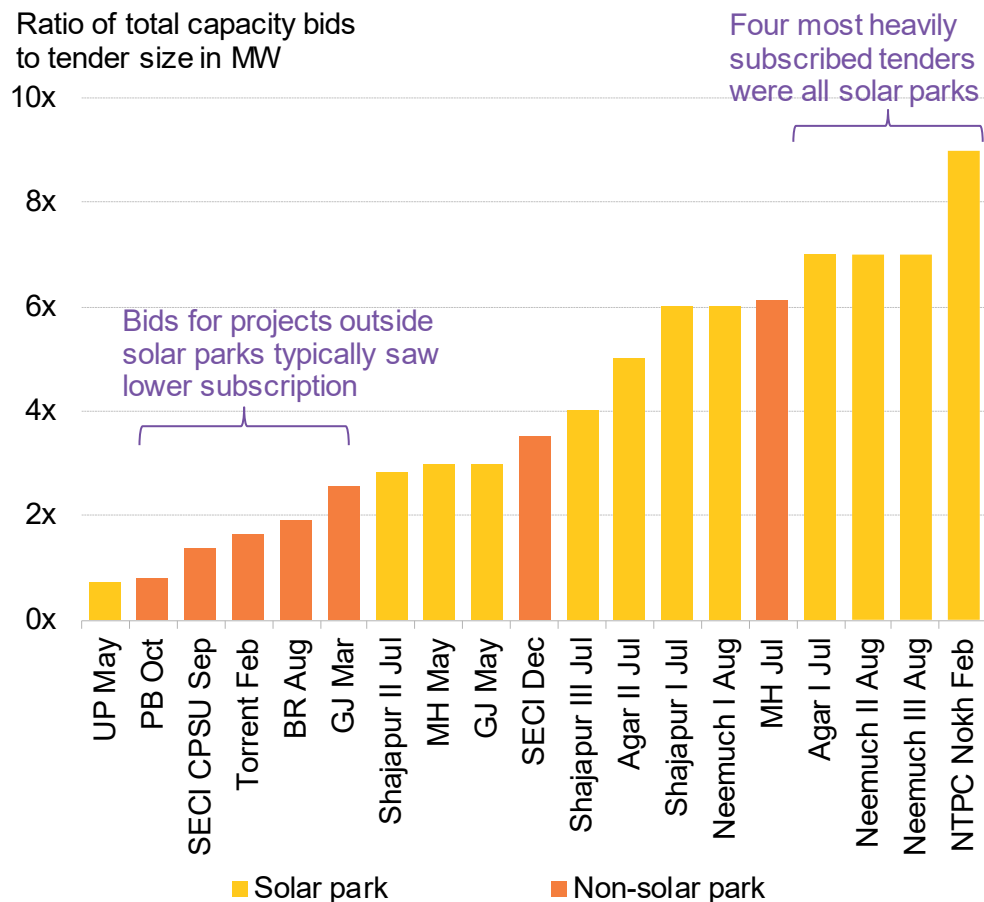


Source: National Solar Energy Federation of India, BloombergNEF

- **Risk 6:** India's cumulative solar module waste could reach as much as 34,600 metric tonnes and 5.6GW of wind turbines could be decommissioned by 2030. The government may introduce new rules on disposal, which is a new end-of-life cost for the IPPs.
- **Mitigation:** Some manufacturers, such as First Solar offer a recycling service agreement to their customers, for which the module buyers pay an additional fee. Most IPPs in India have not accounted for any disposal costs.

Land and grid unavailability are the top reasons for project delays

Bidding trends at India's 2021 solar auctions

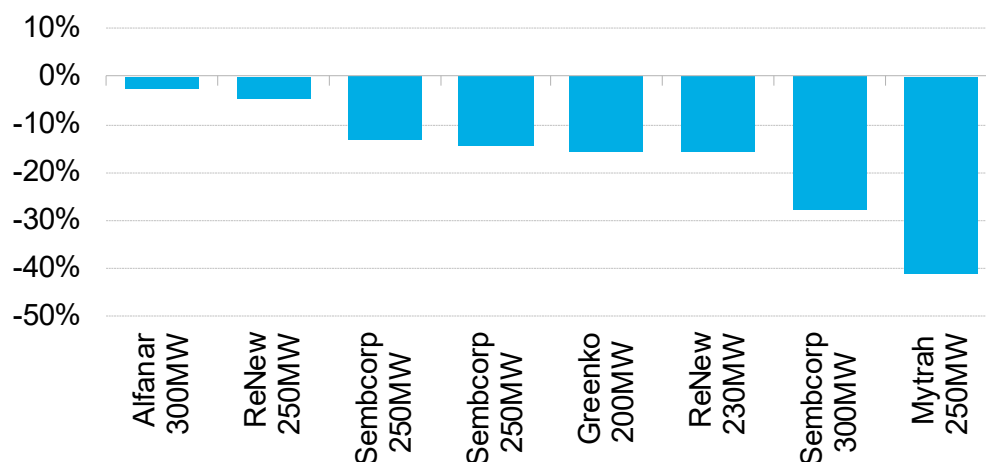


Source: BloombergNEF. Note: Excludes rooftop, off-grid and EPC auctions. GJ – Gujarat, MH – Maharashtra, PB – Punjab, BR – Bihar, UP – Uttar Pradesh. CPSU are auctions exclusively for participation of government-owned companies.

- Risks 7 and 8:** Acquiring large area of contiguous land is a slow process as small land holdings and poor land records lead to delays and disputes. Procedures for land acquisition and land taxes vary by state. In addition, IPPs also need to ensure that the project location is close to a transmission substation with sufficient capacity to avoid curtailment of their project output.
- Mitigation 1:** IPPs have shown a strong preference for bidding at auctions for government planned **solar parks**. As the government takes care of securing land and grid connectivity, two critical elements of project execution for IPPs are de-risked.
- Mitigation 2:** IPPs have used **specialized land aggregators** to outsource land acquisition. These firms possess land banks and liaise with landowners in renewable resource rich areas.
- Mitigation 3:** Government-owned companies are using their **relationships with state governments** to secure government-owned land. For example, NTPC is developing a 925MW project with the help of Rajasthan Solarpark Development Co.; it has also secured land in Gujarat to build a 4.75GW solar park.

Resource estimation error and extreme weather have emerged as big concerns

Deviation of selected wind power plants from P90 capacity factors in 2021



Source: BloombergNEF, Central Electricity Authority, credit rating reports. Note: Results based on BNEF's analysis of CEA daily generation data. P90 is annual energy production, which is expected to be met or exceeded 90% of the time.

- **Risk 9:** The actual output from wind and solar projects is often below the values projected at the time of project financing. This is due to several issues, such as optimistic capacity factor assumptions, variation in weather, sub-par installation and equipment degradation.
- **Mitigation:** Lenders are increasingly scrutinizing the **credibility of the data source**, the **number of years of past data** used in the analysis and reputation of the third-party carrying out the energy resource assessment.

Cyclone damage to a solar project in Diu

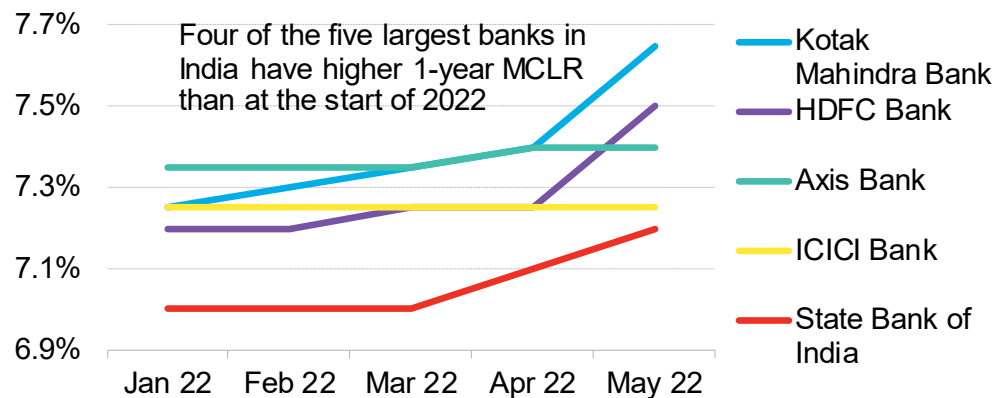


Source: Sky News

- **Risk 10:** Renewable projects are built for 25-30 years of operational life. Over this period, climate change could increase the frequency and intensity of extreme weather events, such as floods, dust storms and cyclones. Such occurrences can lead to heavy damages to the project and may even lead to total loss of revenue.
- **Mitigation:** IPPs are investing more upfront to **future-proof projects**, for example with stronger foundations. They are also buying insurance products for such events.

Higher borrowing costs are the biggest financial risks for renewables

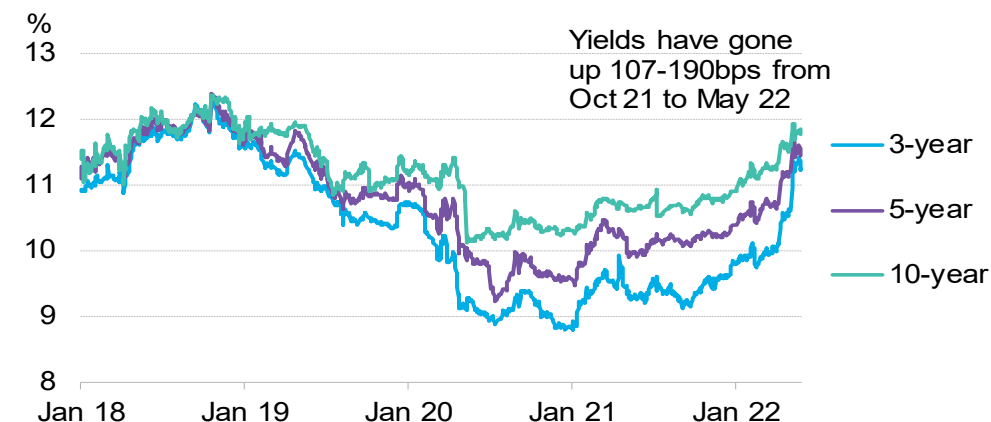
Lending rates of top banks in India



Source: Reserve Bank of India, BloombergNEF. Note: MCLR is marginal cost of funds-based lending rate, which is the basis for interest rates charged by the banks.

- **Risk 11:** India's macroeconomic policies have an oversized impact on financing terms and availability. In May 2022, the Reserve Bank of India (RBI) raised its benchmark repo rate by 90 basis points up from the record low of 4% it had kept for two years. This is in response to high inflation and the withdrawal of Covid-19 recovery stimulus. The repo rate is expected to rise to 6% by March 2024, according to a survey of 41 economists by Bloomberg.
- The RBI lends money to commercial banks at the repo rate, so bank loan rates are now on an upward trajectory. Bond yields are also rising in expectation of more RBI interest rate hikes.

Yields on Indian BBB-rated corporate bonds

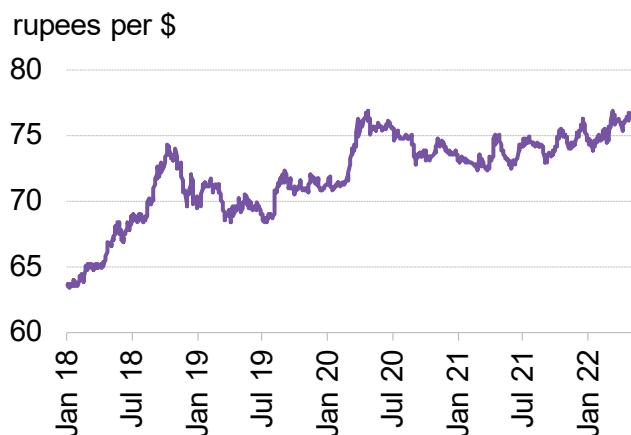


Source: Bloomberg, BloombergNEF.

- **Mitigation 1:** IPPs have tried to **diversify their sources of debt**, such as non-banking finance companies, domestic banks, overseas banks, multilaterals and bonds to make sure that there is no large and sudden increase in loan repayments.
- **Mitigation 2:** In 2021, many IPPs tried to **lock-in fixed interest rate loans** in expectation of future rate increases. However, long-term fixed-rate loans also have reset and re-pricing clauses that lenders can use to increase rates.
- **Mitigation 3:** About 85% of bonds issued by Indian IPPs have **fixed coupons**, so IPPs' repayments on outstanding notes will not be affected by rising yields.

Renewables sector is facing macroeconomic headwinds

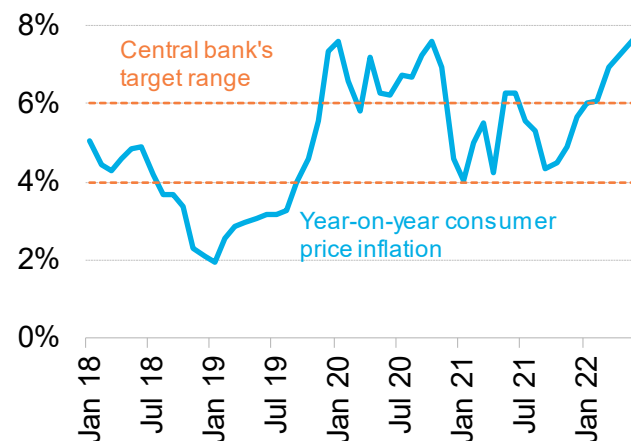
Depreciating currency hurts IPPs with foreign currency obligations



Source: Bloomberg, BloombergNEF

- **Risk 12:** Indian rupee depreciation raises the costs of importing equipment and servicing dollar denominated debt since PPAs are fixed for 25 years in nominal rupee terms.
- **Mitigation:** IPPs try to manage currency risks by using hedge instruments but these can often be expensive and are not commonly available for long-terms.

High inflation eats into real returns of investors



Source: Bloomberg, BloombergNEF

- **Risk 13:** Higher inflation lowers the real returns realized by investors because PPAs are fixed for 25 years in nominal rupee terms. Some of the operations and maintenance costs may also end up being higher-than-expected.
- **Mitigation:** There is limited scope to protect against higher inflation except for taking conservative assumptions at the financing stage.

Sovereign credit rating is at the lowest investment-grade

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Markets

Highest Debt Among Peers Keeps India Outlook Negative at Fitch

- India's government debt to GDP ratio was 89.6% in last FY
- Higher debt levels may crowd out financing for private sector

By [Rahul Satija](#) +Follow
November 17, 2021, 6:54 AM GMT+5:30

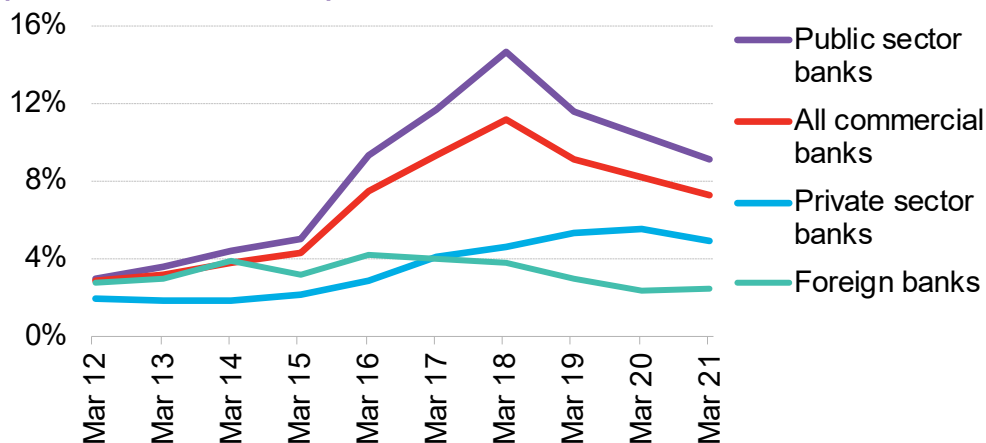
Fitch affirmed the country's sovereign rating at BBB-, the lowest investment grade. Moody's and S&P also [rate India just one step above junk](#), at Baa3 and BBB-, respectively.

Source: [Bloomberg News](#)

- **Risk 14:** India's sovereign credit rating is just at investment grade, according to the three major rating agencies (Fitch, Moody's and S&P). Any downgrade will lead to many global funds reducing India exposure, in line with their internal rules.
- This is a low-probability, high-consequence event which the IPPs are unable to mitigate.

Debt financing is constrained by banking regulations

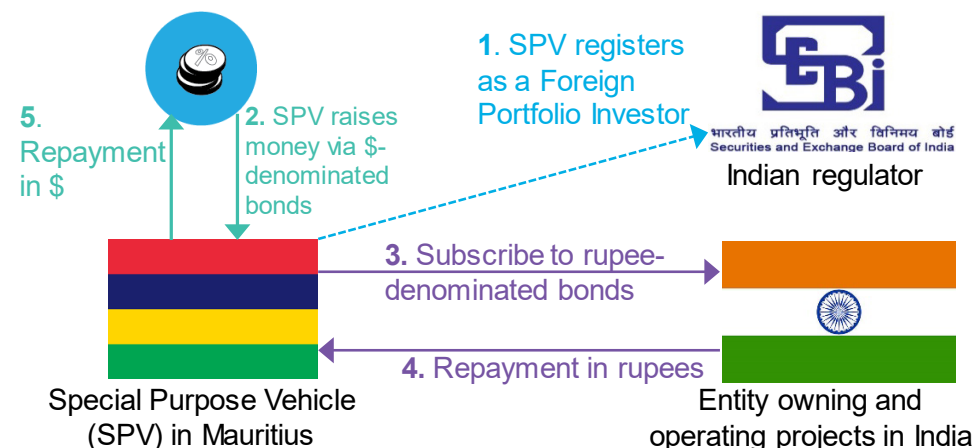
Gross non-performing loan ratio of banks in India (across all sectors)



Source: Reserve Bank of India, BloombergNEF. Note: The RBI uses the share of outstanding credit of each bank as at the end of the relevant quarter as weights in calculating the weighted average.

- Risk 15:** Debt availability from banks and NBFCs in India is sometimes constrained by their bad loans' situation. Lending to IPPs may also be restricted by the RBI's prudential limits on sectoral exposure as renewables are not a separate sector, but part of power infrastructure, which includes power transmission and distribution companies.
- Mitigation:** IPPs are using bonds, which give access to a **wider pool of capital**, including foreign investors that are targeting emerging markets and/or have ESG mandates.

IPPs infusing debt via bonds issued overseas



Source: BloombergNEF

- Risk 16:** RBI rules require external commercial borrowing (ECB) to have an all-in cost, which is less than the benchmark rate (used to be Libor) + 450bps. There are also other limits, such as end-use restrictions and minimum average maturity period.
- Mitigation:** IPPs are **issuing bonds via foreign entities** to get around limits on yield. This carries a low probability but high consequence risk of default because of forex volatility, interest rate movements or any capital controls measures adopted by India. Bond holders prefer dollar denominated notes issued directly by the Indian entity.

Scaling up financing



Summary of section on scaling up financing

To meet 2030 capacity targets, wind and solar need \$233 billion of investment from 2022-2029. This is three times the investment flows into new-build wind and solar from 2014-2021. This requires a scaling up of financing from all the different sources.

New or underutilized sources of financing

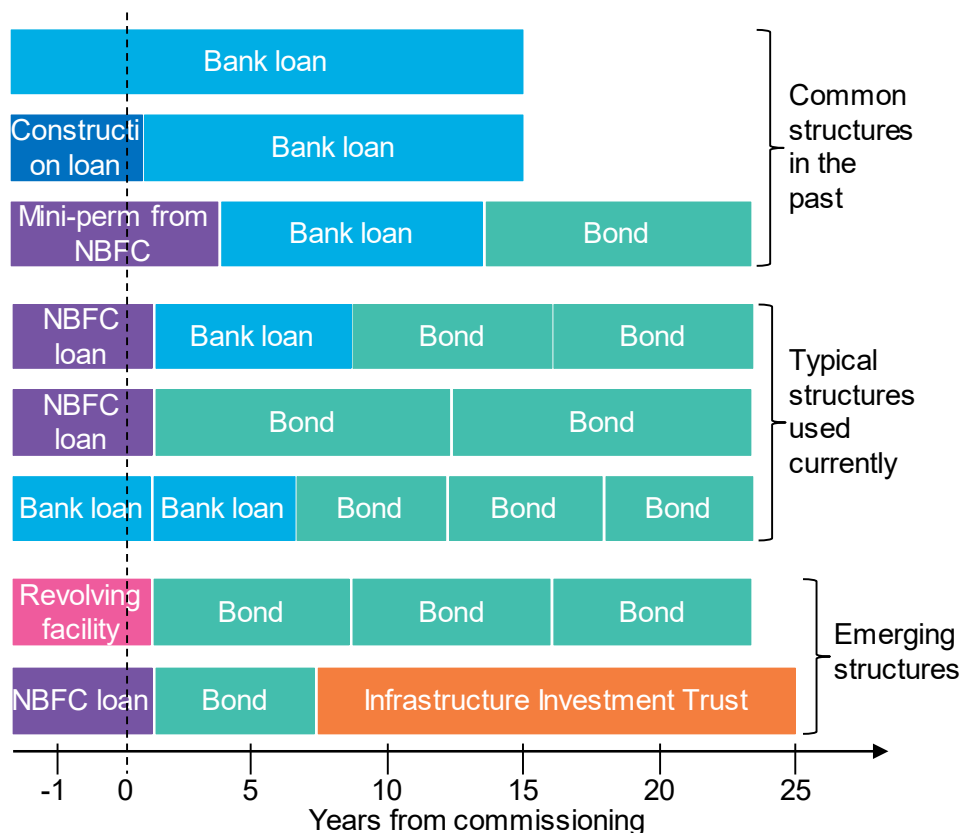
- Increase usage of revolving debt facilities
- Improve regulatory certainty for Infrastructure Investment Trust
- Streamline group captive implementation for corporate clean power procurement
- Increase usage of credit enhancement products
- Set up a clean energy fund by taxing polluters
- Issue tax saving renewable infrastructure bonds
- Provide concessional loans from government banks
- Relax norms for insurance firms and pension funds

Measures to increase availability of financing

- Raise priority sector lending limit for renewables
- Liberalize external commercial borrowing rules
- Relax NPA rules for projects contracted with discoms
- Separate lending category for renewables
- Utilize land held by government companies
- Increase accelerated depreciation benefit
- Use credit lines from multilaterals
- Provide additional payment security mechanisms
- Use termination compensation clauses in PPAs
- Ensure that the offtaker is identified before auctions

New or underutilized sources of financing: debt facilities and InvITs

Evolution of financing structures for renewable projects in India



Source: BloombergNEF. Note: NBFC is Non-Banking Finance Company

1. Increase usage of revolving debt facilities

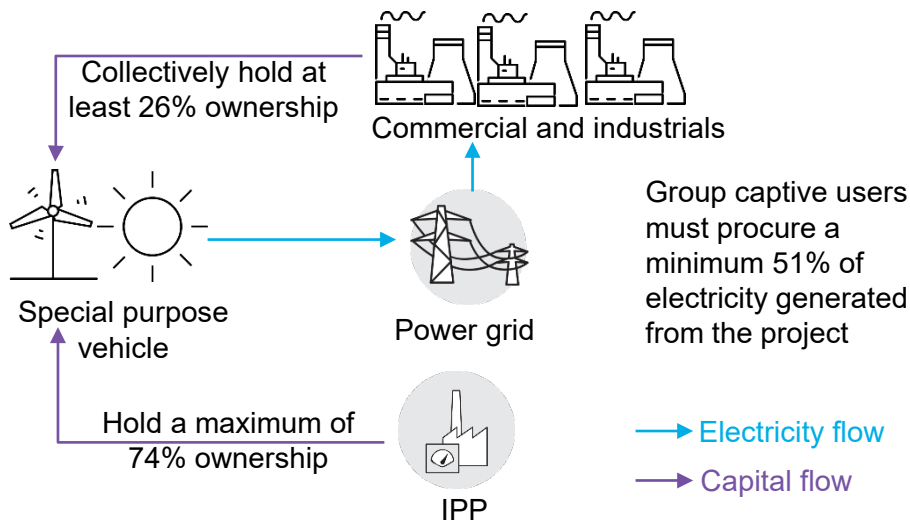
- Established IPPs with a successful project development track record could replicate Adani Green's use of a revolving project finance facility. Adani raised \$1.35 billion from a consortium of 12 banks in March 2021 and \$288 million from seven banks in March 2022.
- Revolving debt allow IPPs to source debt from a pre-approved debt pool, enabling faster deployment as the participating lenders have already signed off on a framework and procedure for lending. Debt drawn from this facility is paid back during project refinancing and the funding can be used again for the next project.

2. Improve regulatory certainty for Infrastructure Investment Trust

- InvITs should have become as common as mutual funds by now but India's frequent regulatory changes have deterred investors, according to industry stakeholders.
- Regulators still need to clarify rules on calculation of net distributable cash flow, since 90% of this value must be distributed to the InvITs unitholders. Banks have also expressed concerns that the current rules give the investment manager of the InvIT a freehand in deciding the net distributable cash flow. Excess dividends could lead to a short fall in servicing of the long-term loan.

New or underutilized sources of financing: corporate procurement and credit enhancement

3. Streamline group captive implementation for corporate clean power procurement



Source: BloombergNEF. Note: A group captive structure can have two or more electricity users. IPP is Independent Power Producer.

- The group captive structure brings together equity from multiple offtakers together with the IPP. It brings in capital for clean power projects from commercial and industrial companies who otherwise may not invest in renewables.
- The government can encourage greater uptake of group captive projects by streamlining the approvals process and by ensuring long-term certainty in regulations.

4. Increase usage of credit enhancement products

- Bonds have become a common choice for refinancing renewables in India. External credit enhancements, such as first-loss guarantee by a third-party and insurance to protect from default of counterparty improves the creditworthiness of the bond and lowers yields.
- The main barrier in the uptake of these is the high cost of external enhancement which outweighs any benefits from the lowering of the bond's yield. For instance, IREDA charges a guarantee fee of 1.8% - 2.9% per annum of its exposure. The union budget in 2019 had proposed to create a Credit Enhancement Guarantee Corp. to increase sources of capital for infrastructure financing. However, this body has not yet been setup.
- The second barrier is RBI guidelines on partial credit guarantee for corporate bonds. This rule caps the credit enhancement provided by one back to 20% of the bond issue size. Requiring multiple banks for a single bond creates significant complexity. Members of India's capital market regulators have called on RBI to relax these restrictions. If a single bank can give guarantees for 50% of the issue size, the improvement in creditworthiness can move the bond from a BBB rating to AA+.

New or underutilized sources of financing: taxes and regulations

5. Set up a clean energy fund by taxing polluters

- A dedicated fund could be set up to finance renewable energy projects by introducing a carbon tax on heavy emitters. The tax could be based on emissions intensity or absolute emissions so that there is a financial incentive to increase the use of clean power.
- In the past, India had a National Clean Energy Fund (NCEF) created by taxing sale of coal. However, this fund was underutilized and later subsumed into a different fund used for compensating states after the introduction of the Goods and Services Tax.

7. Provide concessional loans from government banks

- Foreign banks and non-bank Indian financial institutions are currently the leading debt providers for new renewable energy projects in India. India needs to mobilize its public sector banks to increase financing for clean power.
- Government banks can play a bigger role by providing loans at concessional rates or arranging for longer-tenor loans. These steps could increase competition among lenders, setting off a cycle of others matching the terms offered by government banks.

6. Issue tax saving renewable infrastructure bonds

- Government-owned companies and public sector banks could be allowed to issue renewable energy infrastructure bonds, along the lines of those issued by National Highways Authority and Indian Railway Finance Corp.
- Bondholders could be given tax saving benefits, such as a deduction on amount invested (section 80CCF) or allowing investors to offset long-term capital gains realized from other investments (section 54EC). In turn, the renewables sector can tap into the savings of retail investors

8. Relax norms for insurance firms and pension funds

- Allowing insurance firms and pension funds to invest in securities rated below AA in strategically important sector, such as renewables, will open up access to a vast pool of capital.

Organization/Sector	Assets managed (\$bn)
<u>Insurance industry</u>	632
<u>Employees' Provident Fund Organisation</u>	209
<u>National Pension System</u>	92

Source: BloombergNEF. Note: Table shows latest data available as of June 9, 2022. \$1 = 77.73 for currency conversion

Measures to increase availability of financing: regulatory reforms

1. Raise priority sector lending limit for renewables

- The RBI sets lending targets for domestic and foreign commercial banks in India for priority sectors. Renewables is one of the priority sectors where bank loans up to 300 million rupees (\$3.9 million) qualify. This amount would finance a 10MW solar project.
- Raising the renewables priority sector limit, for example to 3 billion rupees, will allow larger projects to access priority financing. Competition among banks to meet their priority sector goals could also result in more favorable loan terms for IPPs.

3. Relax NPA rules for projects contracted with discoms

- Banks in India are required to classify loans as non-performing assets (NPA) if payment delays exceed 90 days. This leads to an automatic deterioration in borrower's credit rating. The lender may even move to take over pledged assets. To avoid this, IPPs are forced to infuse additional equity, delay capital expenditure and use high-cost short-term loans.
- For most IPPs, overdue payments are due to delayed payments by state-owned discoms. In such cases, the NPA norms could be relaxed, allowing IPPs to maintain their credit ratings and avoid high-cost borrowings.

2. Liberalize external commercial borrowing rules

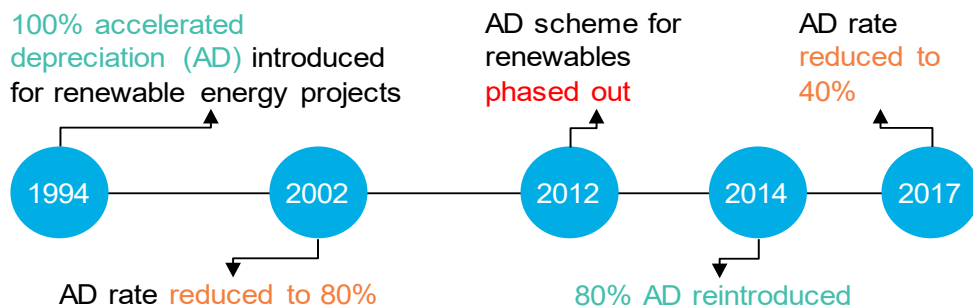
- External commercial borrowing is heavily regulated by the RBI via restrictions on end-use of proceeds, minimum average maturity period and an all-in debt rate set lower than the benchmark rate (Libor+500 bps).
- India's top IPPs have extensive experience of raising overseas financing and most are backed by foreign investors – giving them some ability to manage foreign currency risks. Liberalized rules will allow IPPs to borrow from global low/zero-carbon funds and tap into high-yield bond investors.

4. Separate lending category for renewables

- As a risk mitigation measure suggested by RBI, banks have internal limits on total lending to any specific sector. Typically, power is considered a single sector where loans to renewable IPPs, power distribution companies, grid operators and other IPPs are viewed collectively.
- Separating out renewables as a separate sector will allow banks to increase lending to clean power as most of the new loans are used to build renewable energy projects. Currently, a big proportion of power sector lending is been deployed for coal power projects and power distribution companies.

Measures to increase availability of financing: government support

5. Increase accelerated depreciation benefit



Source: International Institute for Sustainable Development, BloombergNEF.

- Depreciation is deducted as an expense before calculating the taxable profit, thus reducing the tax burden on a company. Accelerated depreciation (AD) reduces the tax liability in the early years which improves the project's net present value.
- Higher AD for renewable projects would attract higher capital inflows from two classes of investors.
 - Companies with large book profits
 - High net-worth individuals seeking tax savings
- As a safeguard, government may consider some restrictions such as specifying minimum project capacity factors and performance targets to ensure investors are not solely focused on capacity additions or over invoicing.

6. Utilize land held by government companies

- Land acquisition is the biggest challenge for renewable project development and one of the main causes for delays in project development. State governments and their affiliated firms can lessen this challenge by making their unutilized land parcels available.
- In March 2022, the federal government set up the National Land Monetisation Corp to aggregate land from government firms. Separate renewables-focused initiatives are already underway, for example Hindustan Salts is calling auctions to lease land sufficient for 1GW solar projects.

7. Use credit lines from multilaterals

- Multilateral development banks prioritize development goals over profit maximization. This mandate allows them to lend at concessional rates or provide grants. Funds from multilaterals can be more effective if it is in the form of a credit line to a local commercial bank. This is because the local entity can build specialized teams to appraise and monitor projects.
- In 2017, the World Bank lent \$625 million to State Bank of India for rooftop PV projects. Such facilities can be sourced from others multilateral lenders.

Measures to increase availability of financing: **tweaking auctions**

8. Provide additional payment security mechanisms

- Discoms owe renewable IPPs over \$2.5 billion in overdue payments as of April 2022. So, IPPs, investors and lenders take a favorable view of clauses in the contract that provide additional payment security.
- One example came from 2021 auctions¹ where the buyer, the Indian Railways, authorized RBI to unconditionally debit the Indian Railways account if the IPP's payment is delayed. An unconditional, irrevocable payment guarantee from the state government would have a similar effect.

10. Ensure that the offtaker is identified before auctions

- IPPs prefer participation in SECI auctions over those conducted by state discoms due to SECI's track record of timely payments. However, in some cases SECI has faced delays in finding discom buyers after the auction.
- One way SECI has solved this issue is by pre-identifying the discom buyers before the auctions. For example, it has auctioned 4.2GW solar capacity where projects were to be built in Rajasthan and the state discoms were identified as the committed buyers in the tender. Pre-identified discoms was one of the reasons of revival of IPPs' interest in bidding at 2021 wind auctions.

9. Use termination compensation clauses in PPAs

- The risk perception, and hence tariff bids, will be lowered if the offtakers can assure the IPP of committed offtake and timely payments for the entire PPA-term
- This can be done by putting in PPA clauses that compensate the IPP if the offtaker terminates the contract. For example, some 2021 solar auctions¹ gave IPPs the right to demand termination compensation equivalent to 100% of the debt due and 110% of the adjusted equity in exchange for handing over the project to the offtaker. Alternatively, the IPP could keep the project and get paid compensation equivalent to six months of power supply.

¹ Rewa Ultra Mega Solar (RUMSL) auctioned 1.5GW spread across three solar parks located in Madhya Pradesh.

Measures to increase availability of financing: **new types of projects**

Potential debt providers for initial projects of new renewables technology

Specialized power sector lenders (government)

- Government ownership influences sectoral focus
- Lower risk perception of lending to projects with discom counterparties

Specialized power sector lenders (private firms)

- Extensive understanding of India power sector from lending to coal power plants
- Mandates to invest in green projects

Multilateral banks

- Mandate to advance low-carbon technologies
- Access to cheaper capital to be deployed for projects that may not get private financing

International lenders

- Experience of assessing and lending to merchant renewables in overseas markets
- Pressure to improve portfolio's climate risk score

Blended finance (partnering banks)

- Banks can bring in large volumes of capital
- Multilaterals, philanthropies and governments reduce the risk for commercial banks

Source: BloombergNEF.

- India's renewable market is shifting from stand alone solar or onshore wind to include hybrid solar and/or wind along with energy storage as well as offshore wind.
- The first few such projects face challenges in raising debt as lenders prefer high degree of certainty in debt serviceability. The first few project may need government funding support.

Financing merchant renewable projects in India

- Power plants that sell their electricity output via the wholesale power market instead long-term power purchase agreements are referred to as merchant plants. In India, there are currently no renewable merchant plants due to low trading volumes and lack of credible wholesale power price projections. There are also fears of regulatory intervention if wholesale power price rises.
- Due to high merchant revenue uncertainty hence ability to service debt, the first merchant renewable plants will only be financed if the following conditions are met:
 - Reputed and **experienced sponsors** having a large portfolio of operational assets.
 - **Stringent covenants** attached to the loan such as parent guarantees and higher DSCR
 - **Conservative debt sizing** compared to current PPA projects. Sponsors will have to lower their equity IRR expectations as debt may only cover 50-60% of project cost.
 - **Merchant exposure limited** to 10-20% of project capacity with the rest tied-up in long-term PPA
 - **Higher cost of debt** compared to standalone wind, solar or hybrid projects

Lessons from other markets



| BloombergNEF

Summary of lessons from other markets

The growth of renewables has followed different trajectories in different markets. While each country has some unique challenges, there are also lessons and ideas that India can draw upon from the experience of other countries.

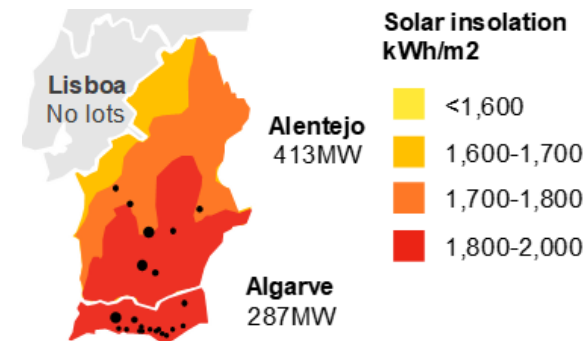
Category	Action	Country/Region
Challenges with land acquisition	Firm assurance on provision of government land	Saudi Arabia
	Auction land parcels with grid access	Portugal
Development of offshore wind projects	Provide IPPs with on-site renewable resource data before the auction	Denmark, Taiwan
	Proactive development of offshore power grids	Netherlands, Germany
Innovative financing instruments	Use of mezzanine financing	Africa
	Using a mix of loans with different tenors	Australia
	Government-owned leasing companies	China
Financial support for renewables	Government loan guarantee	USA
	Post-commissioning revenue certainty	UK
	Dedicated green bank for large-scale lending	Australia
	Inflation-indexed tariffs	Brazil, Peru, South Africa, UK

Lessons on challenges with land acquisition

1. Firm assurance on provision of government land (Saudi Arabia)

- Renewable projects are getting larger to take advantage of economies of scale. However, getting access to sufficiently large contiguous land area can be challenging. Even if land is available, the IPP may not have good visibility on its ability to acquire it at a desirable price in a timely manner. Land acquisition is the top risk for project development in India, according to a BNEF survey of 17 industry participants.
- One way to address this challenge is to for the government to provide designated land to renewable energy project developers. In Saudi Arabia, land is leased to developers by a government agency, the Saudi Authority for Industrial Cities and Technology Zones. The credibility of any such assurance is very important to ensure that developers reflect it in the form of lower auction bids.
- Land allocation needs to be done in a timely manner and with the coordination of all stakeholders. For instance, news reports indicate that less than a quarter of more than 4,000 acres set aside to develop solar project in Israel had been used, due to disagreement on land allocation among various ministries.

2. Auction land parcels with grid access (Portugal)



Source: MAAC, BloombergNEF. Note: Chart shows land lots available in Portugal's 2020 solar auction.

- Grid connection is important for project developers because expanding or strengthening the network can take much longer than building a renewable project. The uncertainty around securing grid connection is one of the biggest risks for project development.
- Portugal addressed this problem in 2020 by auctioning specific parcels of land with indefinite grid access. This gives IPPs the freedom to tweak the project design, shift completely to the merchant market at the end of the PPA and re-power at the end of the project's useful life. The Portugal auction saw extremely competitive bidding, with IPPs agreeing to 40.4 euros/MWh for the first 15 years to secure long-term grid access.

Lessons on easing development of offshore wind projects

3. Provide IPPs with on-site renewable resource data before the auction (Denmark, Taiwan)

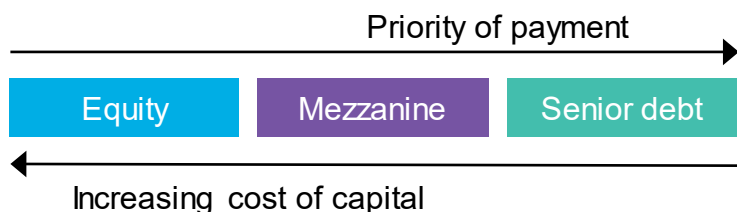
- Offshore wind projects face long development timelines and uncertainties related to site conditions and resource availability. These factors make it difficult to estimate total project cost without significant feasibility studies.
- In Denmark, the government-owned transmission system operator conducts environmental impact assessment of the designated offshore area along with grid connection requirements. The results of the preliminary survey of the geological conditions and Metocean data (wind, wave and current conditions) are made public before the submission of tenders. Costs of these studies are later compensated by the auction winners.
- Similarly, the Netherlands' federal government researches the shortlisted sites, the seabed, wind speeds and water data so that developers have all the information they need in preparing their bids.
- The initial offshore wind projects in India will have higher tariffs than all other incumbent sources of bulk power generation. Government-funded feasibility studies can de-risk development to narrow this gap and ensure participation from a wider pool of IPPs.

4. Proactive development of offshore power grids (Netherlands, Germany)

- IPPs developing offshore wind projects may not have the execution capabilities or the risk appetite to build the offshore grid connection themselves.
- In Netherlands and Germany, the transmission system operator (TSO) is proactively developing the grid from onshore sub-stations to pre-identified offshore wind project sites. The TSO is better placed than IPPs to undertake this work due to its expertise.
- In Europe, TSOs such as Tennet are also expanding interconnections with neighboring countries to enable higher volumes of power flows over longer distances to help manage the intermittency of renewables without the need for curtailment.

Lessons on use of innovative financing instruments

5. Use of mezzanine financing (Africa)



Source: BloombergNEF

- Mezzanine capital bridges the gap between debt and equity financing. By sitting between pure equity and senior debt in terms of priority of payment and cost of capital. The payment structure can vary widely, but often also includes interest paid in cash or shares and a component to calculate the conversion of debt-to-equity.
- Mezzanine finance helps to meet any extra debt requirement not provided by the senior lenders. For example, the 300MW Lake Turkana wind farm in South Africa had 5% of its debt in the form of mezzanine capital. Solar developers C&I users, such as Westa.solar, Redavia have also raised mezzanine debt. IPPs can use mezzanine as short-term bridge financing. For example, an IPP that is unable to lock in debt at preferred terms during a refinancing event may choose to use a mezzanine facility until it is able to secure long-term debt for the desired tenor and rates.

6. Using a mix of loans with different tenors (Australia)

- Some project developers in Australia are using a mix of semi-perm loans (short-term borrowings) and long-tenor debt (this may be refinanced later).
- Refinancing multiple times by an IPP can offer advantages as the expectation is that the cost of debt will get lower as the operational life of the plant increases. However, some potential buyers of the asset (like a pension fund) may not want to take on a large refinancing risk and hence the original developers with a build-to-flip model go in for a mix of semi-perm and long-tenor debt.

7. Government-owned leasing companies (China)

- Small private developers in China often do not have the financial means to develop the pipeline of their projects or the credit rating to raise commercial debt at favorable rates.
- In such cases, state-owned enterprises (SOEs) buy equipment and lease it to the private developer as an indirect form of financing. Often, there is a clause for the SOE to outright purchase the project after few years of operation.
- This model allows SOEs to build large portfolios of assets without taking on the development risks.

Lessons on financial support for renewables

8. Government loan guarantee (USA)

- Loan guarantees can provide access to low-cost capital for projects that might be considered high risk by commercial banks and private investors.
- The American Recovery and Reinvestment Act of 2009 created a temporary loan guarantee program (Section 1705) for deployment of renewables and power transmission. It provided \$16.5 billion in federal guarantee commitments to 27 projects.

10. Dedicated green bank for large-scale lending (Australia)

- A green bank is an entity, often backed by public funding, that is established specifically to facilitate private investment into domestic low-carbon infrastructure.
- The Australia Government-backed Clean Energy Finance Corp. (CEFC) has surpassed \$10 billion in lifetime investment commitments covering areas such as renewables, hydrogen, power grid and waste recycling.
- Green banks are also present in New Zealand, Malaysia, Japan, UAE, Norway, Switzerland and several states in the US.

9. Post-commissioning revenue certainty (UK)

- Contracts for Difference incentivizes investments in high-capex and low-carbon power generation projects by providing predictability of future revenue streams.
- When the market price for electricity generated is below the strike price (pre-agreed reference price) set out in the contract, payments are made by the government to the IPP to make up the difference. However, when the electricity market price is above the strike price, the IPP pays back the difference to the government.

11. Inflation-indexed tariffs (Brazil, Peru, South Africa, UK)

- Indexing PPAs to inflation reduces investors' price risk and passes this on to the offtakers. In the case of India, the discoms have some ability to pass on rising electricity costs to the consumers and are already making regular adjustments to reflect changes in coal price. But IPPs are not provided with the same revenue adjustments.
- Some auctions in Brazil, Peru and South Africa have all indexed their PPAs to inflation. In the UK, feed-in-tariff projects built between April 2010 to March 2020 have their tariffs adjusted by the annual retail price index.

Financing India's 2030 Renewables Ambition



June 22, 2022



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The **Power Foundation of India** has been established under the aegis of the Ministry of Power.

- The Foundation shall conduct research and studies, including sponsored, collaborative, on power and allied sectors providing authoritative analysis, data, policy recommendations and real-world solutions to help draw up smooth pathways for India's energy transition, identifying and resolving challenges therein.
- Its objectives include to commit itself to be a credible policy advocacy body in India in power and its allied sectors and to undertake pioneering efforts in commissioning independent and evidence-based studies in power sector. The Foundation shall also work towards sustainability and viability of the power and allied sectors in the new energy paradigm which would benefit to the common man by way of ensuring reliable and affordable power with reduced emissions.
- The Foundation has been designated as the knowledge partner to assist the Ministry of Power, Government of India for India's G20 Presidency and Clean Energy Ministerial.
- The Chairperson of the Steering Council of the Foundation is Hon'ble Minister for Power, New & Renewable Energy.



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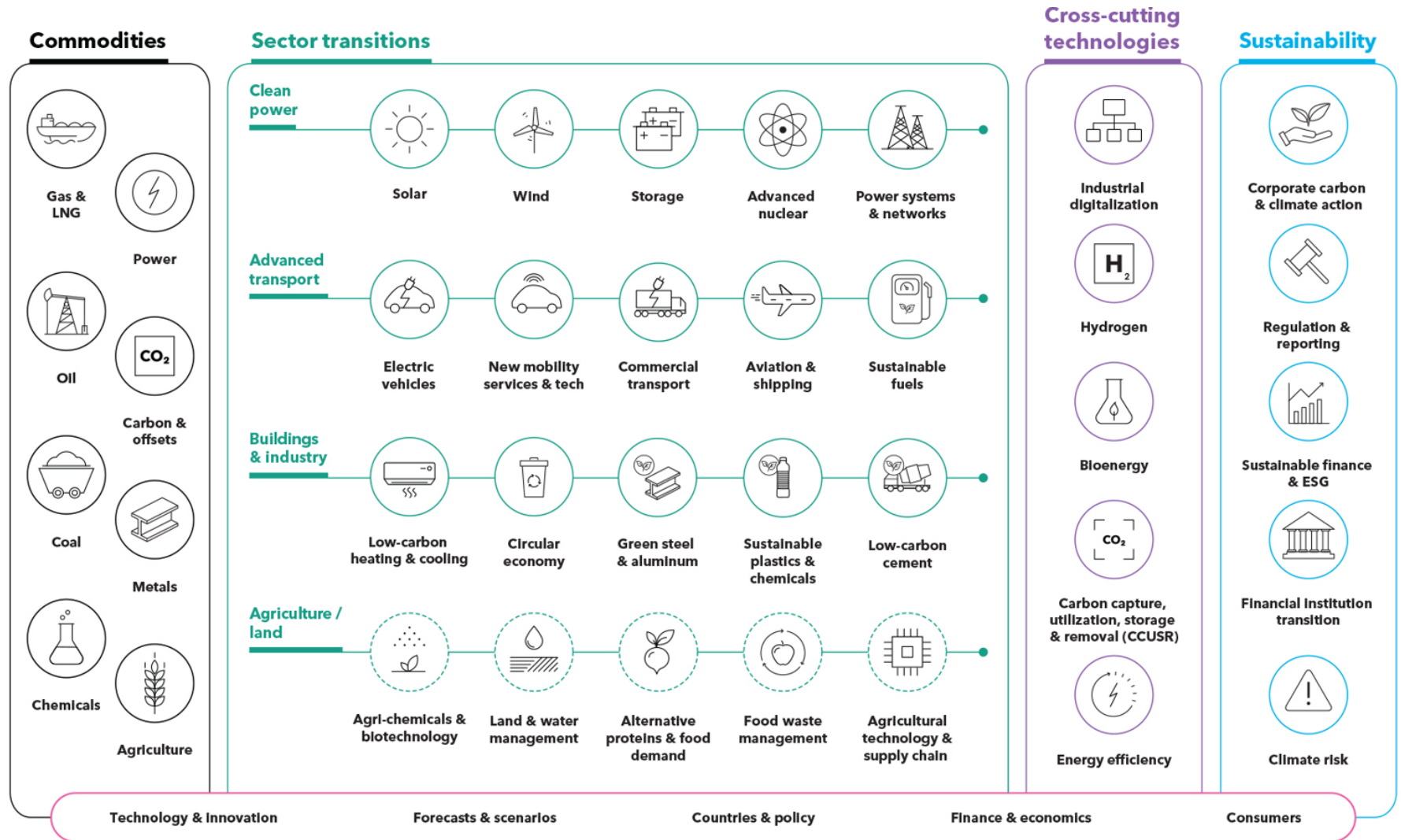
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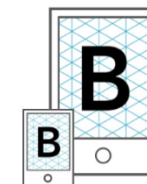
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London: +44-20-3216-4704

Tokyo: +81-3-3201-3112

Beijing: +86-10-6649-7209

Hong Kong: +852-2977-6742

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