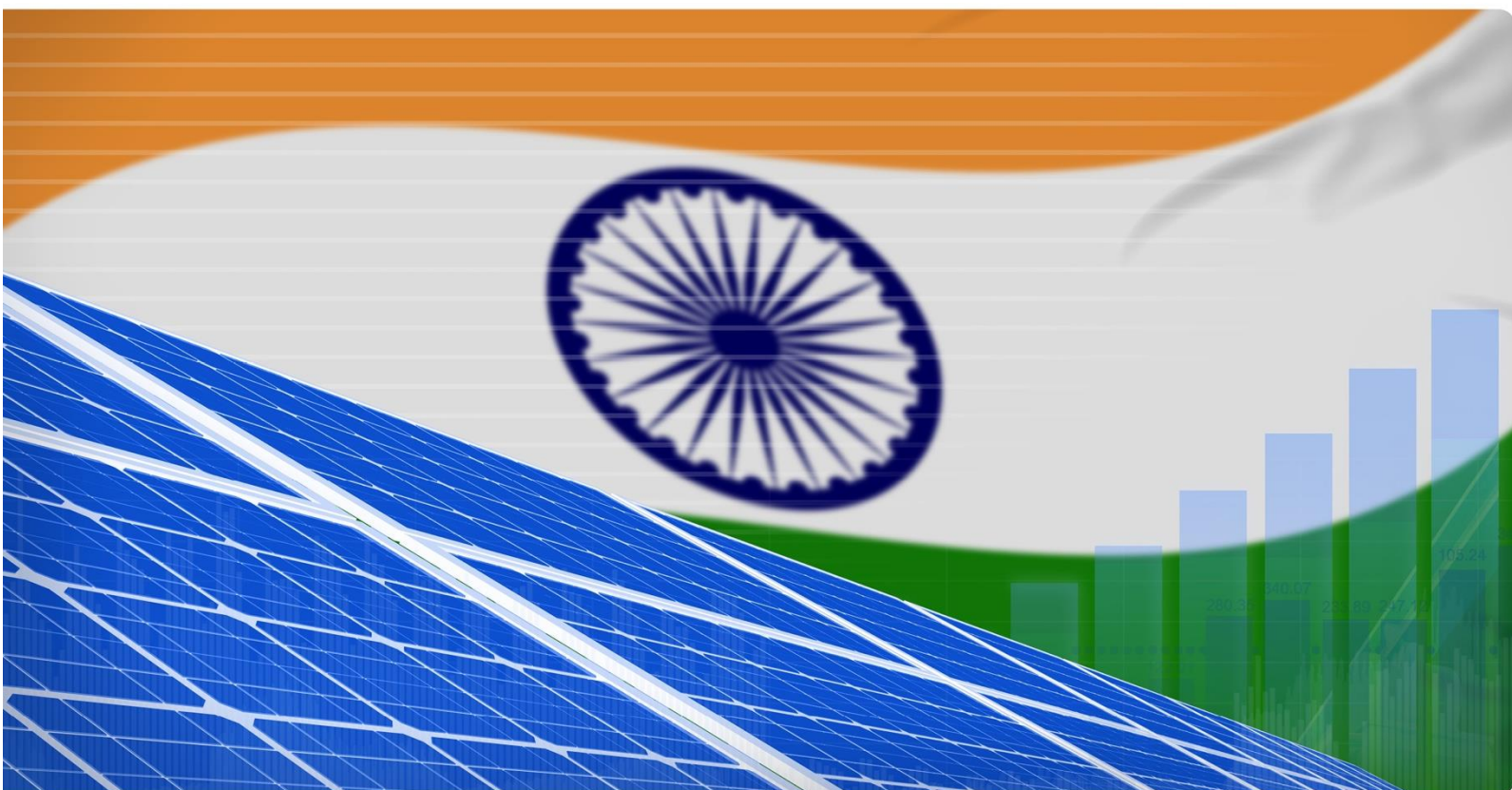


Renewable Energy Tenders Issuance in India Not in Tandem With Government Targets

Reasons and a Way Forward

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Key Findings

Variable Renewable Energy (VRE) tenders issued annually in India have fallen to about 28 gigawatts (GW) in 2022 from 40GW in 2019.

Poor financial health of state DISCOMs and rising solar module costs are keeping away developers from recent tenders.

Distribution companies (DISCOMs) are no longer seeking plain vanilla solar and wind projects and instead want wind-solar hybrid or renewable energy coupled with storage.

Some renewable energy-rich states, like Karnataka and Andhra Pradesh, have slowed tender issuance as they have achieved their renewable purchase obligation (RPO) targets.



Executive Summary

The amount of variable renewable energy (VRE) tenders issued in India in 2022, around 28 gigawatts (GW), is not enough. The country needs to add 30-35GW of new VRE capacity annually to reach its climate targets by 2030 and that requires more than 35GW of annual tendering. One of the ways to address this issue, is for future renewable energy tenders to look at improving project viability by designing innovative solutions and timely completion and delivery of projects. The central government's plan to remove the reverse auctions in wind tenders is a model that will address the generators' concern about aggressive bidding. Strict enforcement of renewable purchase obligations (RPOs) across all states with heavy penalties for failures will also help increase tender issuance. Finally, payment security mechanisms need strengthening to address developers' fears of delayed payments, especially in state-level tenders.

Exceptionally successful reverse auctions drove the growth of solar and wind energy in India in the mid-2010s. The Solar Energy Corporation of India (SECI) is the key central government entity responsible for issuing new tenders, concluding auctions, and galvanising key Indian and global investor and corporate interests at scale. SECI accounts for almost half of all renewable energy tenders issued in India. However, meeting Prime Minister Narendra Modi's target of 450 gigawatts (GW) of renewables by 2030 requires more tenders.

The total tenders issued for solar, wind and hybrid from 2010 to 2022 amounted to 161GW, with an allotted capacity of 114GW. Over the past few years, tendering (both issuance and allotment) of utility-scale projects (mainly solar and wind) has shown a downward trend and is not in tandem with government targets.

Variable Renewable Energy (VRE) tenders issued annually in India have fallen from 40GW in 2019 to about 28GW in 2022. Several contributing factors are leading to the recent slow uptake in renewable energy tender issuances.

First, there is a noticeable shift in the offtaker power demand profile. Despite VREs representing a very low share (11.5%) of the fiscal year (FY) 2022 electricity generation share nationally, distribution companies (DISCOMs) no longer prefer plain vanilla solar and wind projects. Instead, because of VRE's inherent intermittency and seasonality, DISCOMs seek alternate clean energy solutions that offer more stable and firm power, such as wind-solar hybrid and renewable energy coupled with energy storage.

- To suit the need of DISCOMs, SECI is also accordingly transitioning to new age tenders with round-the-clock (RTC) tenders, renewable energy tenders coupled with storage, and others. This has been a gradual process, and it has been a challenge to discover the optimum mix of technologies and tender conditions to arrive at suitable tariffs for both DISCOMs and developers. For firm renewable energy power, only pumped hydro storage technology, where tariffs range from Rs5-6/kilowatt-hour (kWh) (US\$0.06-0.07/kWh), is the

current viable option. Battery energy storage solutions (BESS) are still very costly, and the economics currently does not make financial sense without purchase power agreements (PPAs) supported by SECI.

- Some renewable energy-rich states like Karnataka and Andhra Pradesh have already achieved their renewable purchase obligation (RPO) targets. Hence, tender issuance from these states has slowed significantly in the past couple of years, despite the still-free interstate grid transmission access for VRE.
- A lack of participation from developers in some recent tenders is leading to undersubscription. Aggressive bidding and the failure of bidders to foresee a 30-40% rise in solar module prices have slowed developer participation due to the discovery of unviable prices in some tenders. Rising project costs due to the Approved List of Module Manufacturers (ALMM) and Basic Custom Duty (BCD) have also diminished the risk appetite of developers to bid aggressively on projects. The poor financial health of state DISCOMs leading to payment dues and the renegotiation of already executed contracts by certain states are other factors negatively affecting developer participation.
- Given that the tariffs discovered in auctions of new-age tenders are on the higher side, DISCOMs continue to rely on conventional thermal power. However, these newer wind and solar tender outcomes are still well below the realised wholesale price of electricity in India, given the imported fossil fuel hyperinflation of the last year.¹



For India to reach its climate targets by 2030, it needs to add more than 30-35GW of new VRE capacity annually.

For India to reach its climate targets by 2030, it needs to add more than 30-35GW of new VRE capacity annually. However, the VRE tendering in India is still not in tandem with the targets. Various measures can address this:

- Future renewable energy tenders should consider the harmony of requirements between the energy generators (developers) and the offtakers (DISCOMs). It is imperative for the upcoming renewable energy tenders to have a balanced approach between driving down tariffs and maintaining healthy competition by reducing the financial stress as a result of excessively aggressive bidding.
- The government is also planning to remove the reverse auctions in wind tenders to address the same issue. The bidding process will only consist of closed bidding to discover the L1 tariff. L1 tariff is the lowest quoted tariff among all the bidders in an auction. There will be no subsequent round of bidding to further drive down the prices.

¹ The Hindu. [India paid a record \\$28 bn for importing 131.92 mt coal in H1 FY23](#). December 2022.

Table 1: Current Bidding (Using Reverse Auctions) vs Closed Bidding

Parameter	Current bidding method	Closed bidding
Rounds	<ul style="list-style-type: none"> Two rounds of bidding 	<ul style="list-style-type: none"> Only one round of bidding
Structure	<ul style="list-style-type: none"> First round to discover L1 tariff Second round of reverse auction 	<ul style="list-style-type: none"> Just one round to discover L1 tariff among eligible bidders
Prices discovered	<ul style="list-style-type: none"> Lower as compared to closed bidding 	<ul style="list-style-type: none"> Comparatively higher as compared to current bidding system
Capacity allotment	<ul style="list-style-type: none"> Under reverse auctions, bidders asked to match the lowest tariff Those who match the lowest tariff are awarded the bidding capacity 	<ul style="list-style-type: none"> Uses the bucket-filling method Under bucket filling, the L1 tariff bidder is awarded its project bid capacity, then the L2 tariff bidder is awarded its project bid capacity and so on until the whole tender capacity is awarded
Main bottleneck	<ul style="list-style-type: none"> The risk of unallotted capacities when other bidders are unable to match the lowest bid in a reverse auction 	<ul style="list-style-type: none"> Higher prices discovered, which might lead to delay in PSA signing

Source: JMK Research

- To drive renewable energy sector growth, RPOs must be strictly enforced across all states with heavy penalties for failures to meet their renewable obligations.
- Payment security mechanisms should be strengthened to address developer fears of delayed payments, especially in state tenders.



The global financial capacity and investment interest in India's zero-emissions energy and grid infrastructure is a worldwide success story.

With enhanced maturity of tendering authorities in the next couple of years to design inclusive and technologically balanced tenders, the more than 35GW target, although ambitious, seems attainable if SECI, NTPC and other state agencies can leverage the huge progress made to date. The global financial capacity and investment interest in India's zero-emissions energy and grid infrastructure is a global success story that other nations are looking to emulate. Now is the time for India to leverage this enormous progress and double activity in domestic, deflationary, and zero-emissions electricity capacity expansions to diversify and strengthen the grid system while providing for the expanding energy needs to support India's sustained, robust economic growth.

Glossary of Terms

Abbreviation	Definition
ACS	Average cost of supply
ALMM	Approved List of Models and Manufacturers
ARR	Average Realisable Revenue
AT&C	Aggregate Technical & Commercial Losses
BCD	Basic Customs Duty
C&I	Commercial & Industrial
CAPEX	Capital Expenditure
CEA	Central Electricity Authority
COP	Conference of Parties
CSS	Cross subsidy surcharge
DISCOM	Distribution Company
ESS	Energy Storage Systems
FY	Financial Year
GENCOS	Generation Company
GST	Goods & Service Taxes
GUVNL	Gujarat Urja Vikas Nigam Limited
GW	Gigawatt
INR	Indian Rupee
IRR	Internal Rate of Return
ISTS	Interstate Transmission System
JNNSM	Jawaharlal Nehru National Solar Mission
kWh	Kilowatt-hour
LC	Letter of Credit
LCOE	Levelised cost of electricity
MNRE	Ministry of New and Renewable Energy
MoP	Ministry of Power
MPUVNL	Madhya Pradesh Urja Vikas Nigam Limited
MSEDCL	Maharashtra State Electricity Distribution Company Limited
MW	Megawatt
NAPCC	National Action Plan for Climate Change
NDC	Nationally Determined Contribution
NSM	National Solar Mission
NTPC	National Thermal Power Corporation
NVVN	NTPC Vidyut Vyapar Nigam Limited
PERC	Passivated Emitter and Rear Cell
PLF	Plant Load Factor
PPA	Power Purchase Agreement
PSA	Power Supply Agreement
PV	Photovoltaic
RFS	Request for selection
RPO	Renewable Purchase Obligation
RTC	Round the clock
SECI	Solar Energy Corporation of India

1. Introduction

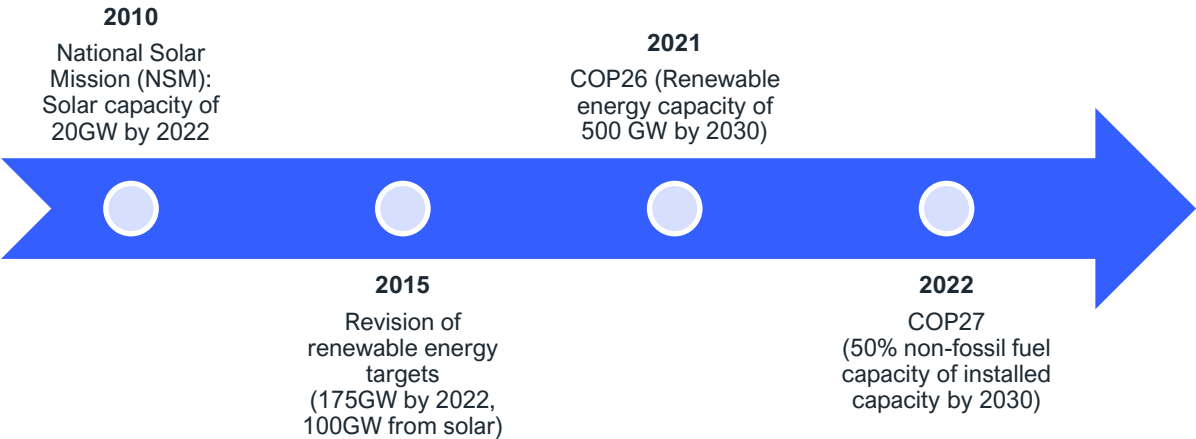
India has set ambitious and noteworthy decarbonisation targets with plans to obtain 50% of its installed capacity from non-fossil fuel sources by 2030, delivering improved energy security and reduced reliance on imported fossil fuels. The long-term plan is to reach net-zero emissions by 2070.

One of the key components for effective decarbonisation is the “greening” of the electricity system through variable renewable energy (VRE). Over the past decade, installed total capacity of VRE installations in India rose more than five times, from roughly 22 gigawatts (GW) in 2011 to 121GW in 2022.² Along with decreasing equipment costs, various government efforts to set up and achieve ambitious national clean energy targets have supported the growth in renewable energy installations.

The Indian government issued its latest sustainability targets in August 2022.³ It announced a detailed strategy to achieve the targets at the November 2022 United Nations climate summit (COP27). The current sustainability targets set by the Indian government include pledges to:

- Ensure 50% of the cumulative installed electric power capacity comes from non-fossil fuel sources by 2030
- Reduce the carbon intensity of India’s economy by 45% by 2030
- Achieve net-zero emissions by 2070

Figure 1: Timeline of the Indian Government's Renewable Energy Targets



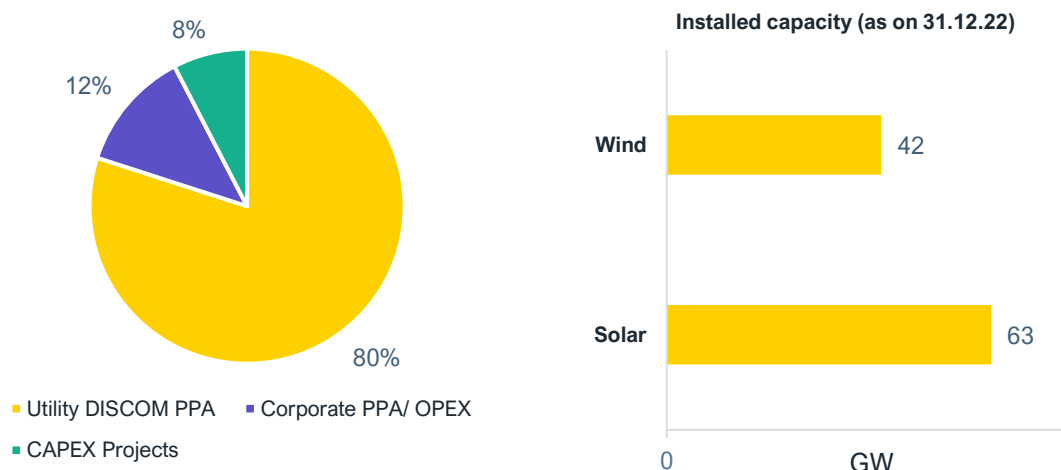
Source: JMK Research

Renewable energy installation offtake in India happens largely through three categories: Utility DISCOM power purchase agreements (PPAs), corporate PPAs and others.

² Central Electricity Authority (CEA). [Monthly Report](#). December 2022.
³ Press Information Bureau. [Cabinet approves India’s Updated Nationally Determined Contribution](#). August 2022.

Although state or private DISCOMs are the energy offtakers in utility DISCOM PPAs, corporate PPAs cater specifically to commercial and industrial (C&I) consumers. Corporate PPAs include both offsite and onsite installations. Others include residential and rooftop capital expenditure (capex) projects. Utility DISCOM PPAs in India mainly come through tenders.

Figure 2: Solar and Wind Renewable Energy Installations in India (by Offtaker Type)



Source: JMK Research, CEA

Note: CAPEX projects include both residential and C&I projects set up under CAPEX mode.

Utility DISCOM PPAs account for 80% of India's total solar and wind installations. This clearly shows the prevalence of utility DISCOM PPAs (driven by tenders) over corporate PPAs (12%) and other types of solar and wind procurement (8%).

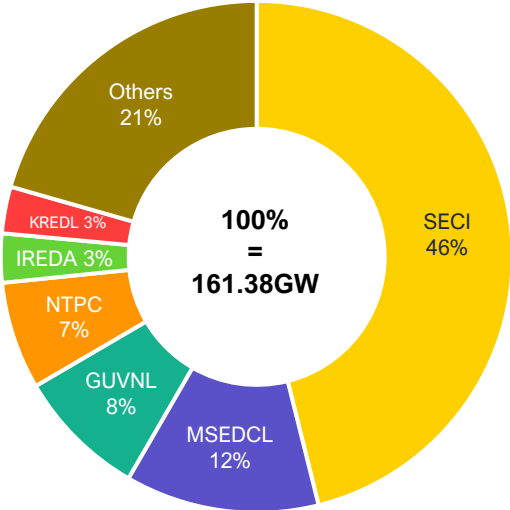
Repeating successful types of renewable energy tenders followed by transparent reverse auctions of highly bankable PPAs underwritten by the Indian government (via the Solar Energy Corporation of India, or SECI) to drive down prices was one of the key components for renewable energy growth in India in the past decade. However, over the past few years, tendering (both issuance and allotment) of utility DISCOM PPA projects (mainly solar and wind) has shown a downward trend. This needs addressing if India is to strengthen its energy security and meet its key national targets for 2030.

2. Tender Issuance and Allotment Trends

The government of India launched Jawaharlal Nehru National Solar Mission (JNNSM) in January 2010 as part of its National Action Plan for Climate Change (NAPCC) to achieve 100GW of total installed capacity through solar photovoltaic (PV) panels by 2022.

To fulfil this objective, its created SECI in 2011. SECI is the implementing agency of the Ministry of New and Renewable Energy (MNRE) for issuing tenders for solar, wind, and hybrid project development/utility DISCOM PPA tenders. Apart from SECI, every state’s renewable energy agency also issues tenders to fulfil their renewable purchase obligation (RPO) for solar and non-solar power and increase their state's clean energy capacity.

Figure 3: Key Agencies Issuing Renewable Energy Project Tenders



Source: JMK Research

As seen from the chart above, SECI accounts for almost half of all renewable energy tenders issued in India. Other key active agencies issuing renewable energy tenders in India include Maharashtra State Electricity Distribution Company Limited (MSEDCL), Gujarat Urja Vikas Nigam Limited (GUVNL) and NTPC Ltd.

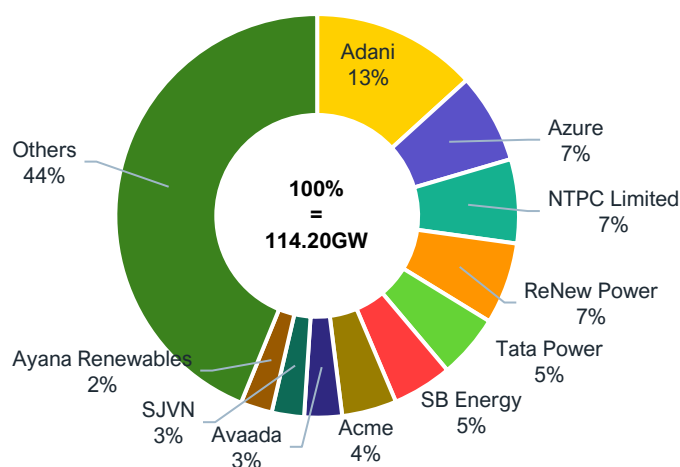
According to JMK Research, the total tenders issued for solar, wind and hybrid tenders from 2010 to 2022 amounted to 161.38GW, with an allotted capacity of 114.20GW (See **Table 2**).

Table 2: Renewable Energy Tender Issuance and Allotment (2010–22)

Year	Source	Tenders issued (GW)	Allotted capacity (GW)
From 2010–22	Solar	115	83
2016–22	Wind	23	17
2018–22	Hybrid	23	14

Source: JMK Research, SECI, State tendering authorities

Regarding majority capacity allotments, key players who won most of the capacity include Adani, Azure Power, ReNew Power and Tata Power. Cumulatively, the top 10 project developers have accounted for 64.1GW (approximately 56%) of India's total renewable energy tenders' allotted capacity.

Figure 4: Key Allotees of Renewable Energy Tenders (as of 31 December 2022)

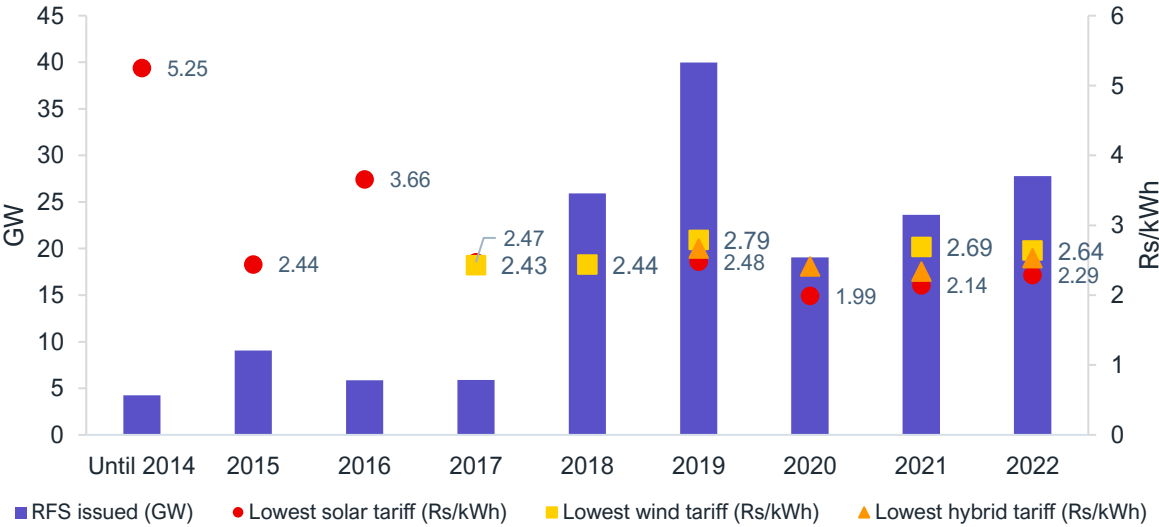
Source: JMK Research, SECI, state tendering authorities

Until 2016, India's tendering authorities issued only solar tenders. In 2016, SECI concluded its first auction of wind tenders in India, with a tariff of Rs3.46/kilowatt-hour (kWh) (US\$0.042/kWh). Since then, SECI has issued approximately 16.2GW capacity in 13 tranches of various capacities to develop wind power projects. Other agencies like Gujarat Urja Vikas Nigam Ltd. (GUVNL), Maharashtra State Electricity Distribution Company Ltd. (MSDCL) and NTPC have also issued wind power tenders.

In May 2018, the MNRE launched the Wind-Solar Hybrid Policy. A month later, SECI issued its first hybrid tender to develop 1,200 megawatts (MW) of hybrid power. The lowest price discovered in the first hybrid tender was Rs2.67/kWh (US\$0.032/kWh). By 2022 alone, there were 9,715MW of hybrid tenders, including standalone wind, solar hybrid tenders, round-the-clock (RTC) tenders and renewables-plus-storage tenders. We deduced this number from several source pages across the years from the same website of MNRE.

In the past five years, the annual lowest tariff discovered in renewable energy tenders has largely been between Rs2.2/kWh (US\$0.027/kWh) and Rs2.7/kWh (US\$0.033/kWh). By contrast, the wholesale price of electricity in India has risen steadily during the same period (a cumulative rise of 13.2% between fiscal year (FY) 2018 and FY2022).⁴ Additionally, almost all renewable energy tender contracts have zero price indexation for the entire project tenure. In these days of high inflation, this long-term cheap power from renewable energy tenders is a win-win proposition for both developers and DISCOMs.

Figure 5: Tenders Issued Capacity for Solar, Wind and Hybrid Tenders



Source: JMK Research
 Note: All years mentioned are calendar years (CY) unless specified otherwise.

As seen in Figure 5, India issued only 4GW of renewable energy tenders before 2014. Between 2014 and 2019, renewable energy tender allotment grew quickly. About 40GW of new renewable energy tenders came in 2019 alone. One of the key reasons for the increasing tender activity was the significant influx of private sector investments in the renewable energy sector between 2014 and 2019.

The declining trend in tenders first happened in 2020. In calendar year (CY) 2020, SECI reduced its tender issuance capacity by 52%, and some major state agencies (MSEDCL and GUVNL) also reduced their tender issuance capacities from 2019 levels.

⁴ Ministry of Commerce and Industry.

3. Factors Leading to the Slow Uptake in Renewable Energy Tender Issuance

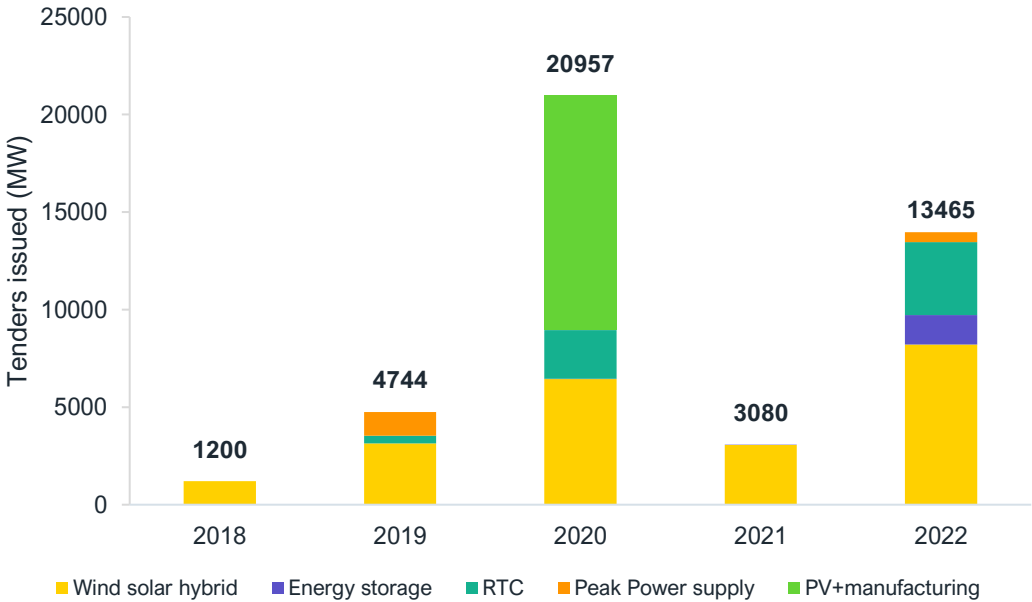
Section 2 demonstrated the slow uptake in India's renewable energy tenders issued by tendering agencies, especially in wind and solar power projects. This section will present the contributing factors leading to this trend in detail.

Demand Restraints

DISCOMs are the major energy offtakers in almost all renewable energy tenders in India. Over the past few years, they have shown a reduced preference for vanilla solar or wind power. The utmost priority of state DISCOMs has always been to procure cheaper and more reliable power, irrespective of the source. Plain solar and wind have largely failed to address their inherent intermittency and unreliability. As a result, the tendering authorities are now issuing fewer plain vanilla wind and solar tenders. The economic slowdown caused by the COVID-19 pandemic has also affected demand.

To address the DISCOM demand for firmer power, SECI has issued several new-age renewable energy tenders in the past few years, such as peak power supply, RTC and standalone energy storage systems (ESS).

Figure 6: Increased Uptake of New Age Renewable Energy tenders (2018–22)



Source: JMK Research

Currently, renewable energy sources coupled with pumped hydro storage (PHS) represent the only economically viable option that can provide firmness at a comparable tariff to conventional energy sources. Battery storage systems can provide such firmness but at higher tariffs comparable to new domestic coal plants and on a much smaller scale. Although, we note this ignores the intrinsic value VRE offers in terms of both energy security and zero-emissions electricity, given the rapidly rising global trend to pricing in CO₂ emissions in the European Union, China, U.S., Australia, and most recently announced by Japan. The smaller scale of BESS is due to its shorter duration (three to four hours) than PHS (10-12 hours). We also note BESS uptake in Europe, the U.S., and Australia is growing beyond the most bullish forecasts of just a year or two ago. The U.S. alone has some 300GW of VRE-and-BESS projects in its development pipeline, thanks to the investment tax credit (ITC) subsidy scheme for zero-emissions electricity.

However, there are several challenges in implementing PHS projects. First, there is a relatively long gestation period, usually five to 10 years. Considering the huge upfront capital required and the risk of capital cost and timeline blowouts, hydro has proven to be a risky investment for developers. Other issues such as environmental clearance, relocation of the local population and protests exacerbate the challenges. Also, there are few available natural sites that suit pumped hydro. Only a few developers, such as Greenko, are currently pursuing PHS in India.



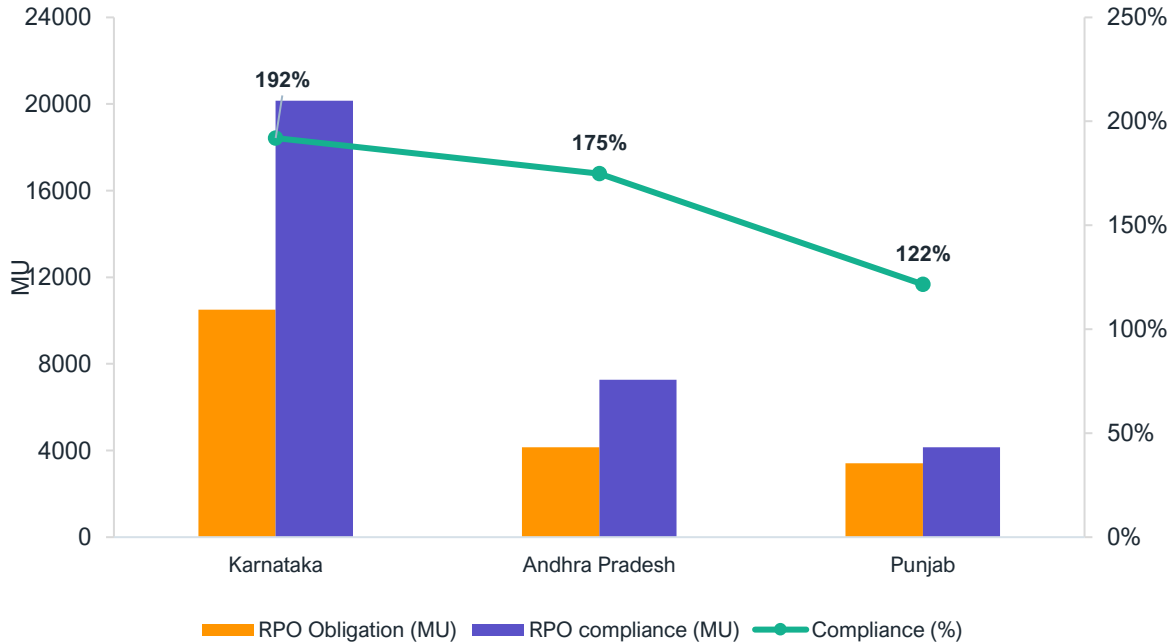
Unless a viable renewable energy alternative is available to deliver firm, invariable RTC power at scale, DISCOMs tend to prefer coal.

Because of the lack of available firm power from renewable energy sources, DISCOMs are reluctant to enter into long-term agreements with SECI or other tendering authorities. Therefore, unless a viable renewable energy alternative is available to deliver firm, invariable RTC power at scale, DISCOMs tend to prefer coal.

States that have Already Fulfilled their RPO Targets are No Longer Issuing New Tenders

Some renewable energy-rich states like Karnataka and Andhra Pradesh have already achieved their RPO targets, as shown in the chart below. Meeting RPO targets is a major driver for state authorities to issue renewable energy tenders. RPO-compliant states already have enough renewable energy sources to fulfil current and future RPOs, causing tender issuances to wane significantly. For example, the state tendering authorities in Karnataka and Andhra Pradesh have not issued any major renewable energy tenders since 2018, and future demand for renewables is likely to be less.

Figure 7: RPO-Compliant States (FY2020-21)

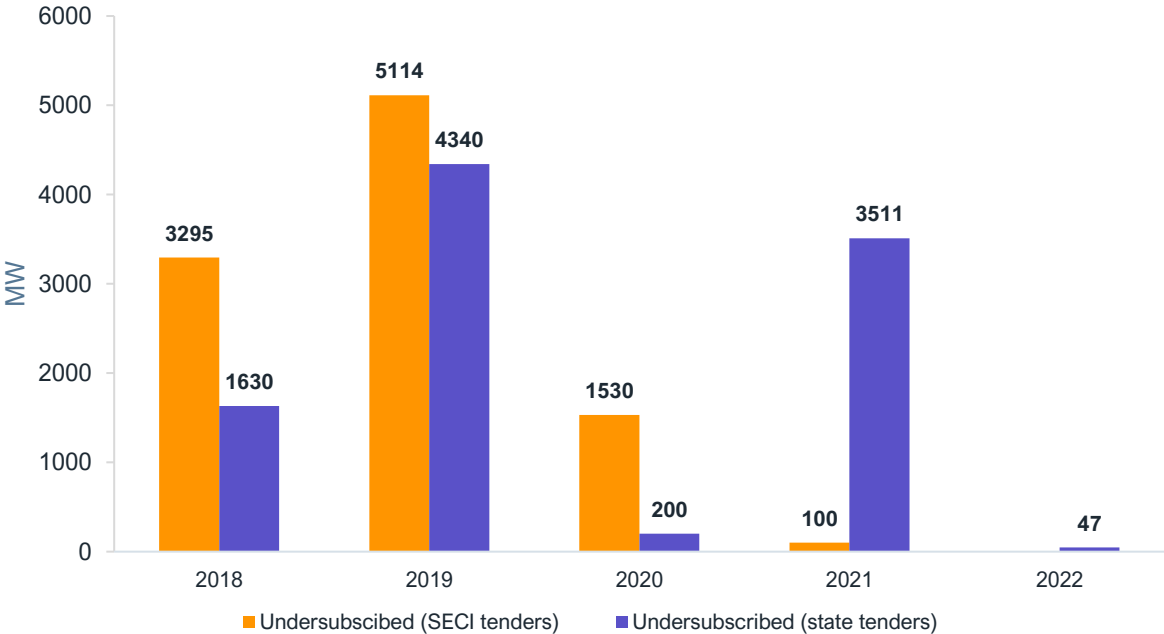


Source: SERCs of respective states, JMK Research

Undersubscription in Renewable Energy Tenders

The poor financial health of DISCOMs usually leads to delays in payment to power generators and developers. Consequently, states or DISCOMs with poor financial track records cannot execute successful renewable energy tenders as developers become wary about investing in that particular state. Consequently, many renewable energy tenders (both state and central) remain undersubscribed. According to JMK Research, from 2018 to 2022, cumulative undersubscription of state-issued renewable energy tenders was around 9,728MW. During the same period, undersubscription of SECI renewable energy tenders (with state DISCOMs as the energy offtaker) was also around 10,039MW. From the entire tendered capacity between 2018 and 2022, approximately 14% remained undersubscribed.

Figure 8: Undersubscribed Tenders (SECI vs State, 2018–22)



Source: JMK Research, SECI, state tendering authorities

We provide an analysis of the key reasons for the undersubscription in renewable energy tenders below.

Aggressive Bid Tariffs by Project Developers

Constantly decreasing renewable energy tariffs has been an important factor in India’s renewables growth story. For example, the lowest winning tariff (also known as L1) discovered in utility-scale solar tenders fell from Rs10.95/kWh (US\$0.13/kWh) in 2010 to Rs1.99/kWh (US\$0.024/kWh) in December 2020.

The steep reduction in L1 tariffs happened because of decreasing equipment costs as well as—in hindsight—overly aggressive bidding (coupled with reverse auctions). In previous years, closed bidding followed by reverse auctions has been instrumental in enhancing transparency and efficiency in the entire bidding process. However, developers recently have been vehemently opposing aggressive bidding, especially in the system of reverse auctions.

A reverse auction has one more round of bidding after discovering the L1 tariff to further reduce prices. Developers argue that reverse auctions are forcing them to make aggressive bids to outbid competitors, even at the cost of the financial viability of the entire project.

There are many reasons for developers to be competitive in pricing. Often, they must remain competitive while building their project pipelines. Some developers have easy access to low-cost international funding, leading them to quote aggressively. Other reasons leading to lower bids include measures by the developers to reduce project costs, such as having a presence across the

supply chain (such as manufacturing) or the ability to buy land at concessional rates for certain projects.

Often, developers are asked by tendering authorities to match the L1 tariff during the reverse auction. The inability to match the L1 tariff leads to either retendering of the unallotted capacity or tender cancellation. For example, the SECI issued an RTC-2 tender in 2020 for a capacity of 2,500MW. Although it awarded 250MW to Hindustan Thermal Projects at Rs3.01/kWh (US\$0.036/kWh), other bidders could not match the L1 tariff during the reverse auction; as a result, the remaining 2,250MW of tender capacity remained unallotted.



In a more recent development, the central government is considering ending reverse auctions for wind tenders.

The incessant attempt from tendering authorities to drive the tariffs down has resulted in lower engagement from developers in renewable energy tenders (especially in wind power).

A recent increase in the past couple of years in module prices, along with tariff- (Basic Customs Duty, BCD) and non-tariff barriers (Approved List of Models and Manufacturers, ALMM), have led to higher project capex costs. This is now exerting additional stress on developers to maintain the financial viability of the projects they won by quoting aggressive tariffs.

However, in a more recent development, the central government is considering ending reverse auctions for wind tenders.⁵ To replace them, the government will likely go back to closed bidding that will allot capacity through the bucket-filling method (See section **Improving the Bidding Auction Mechanism**).

Renegotiation of Contracts

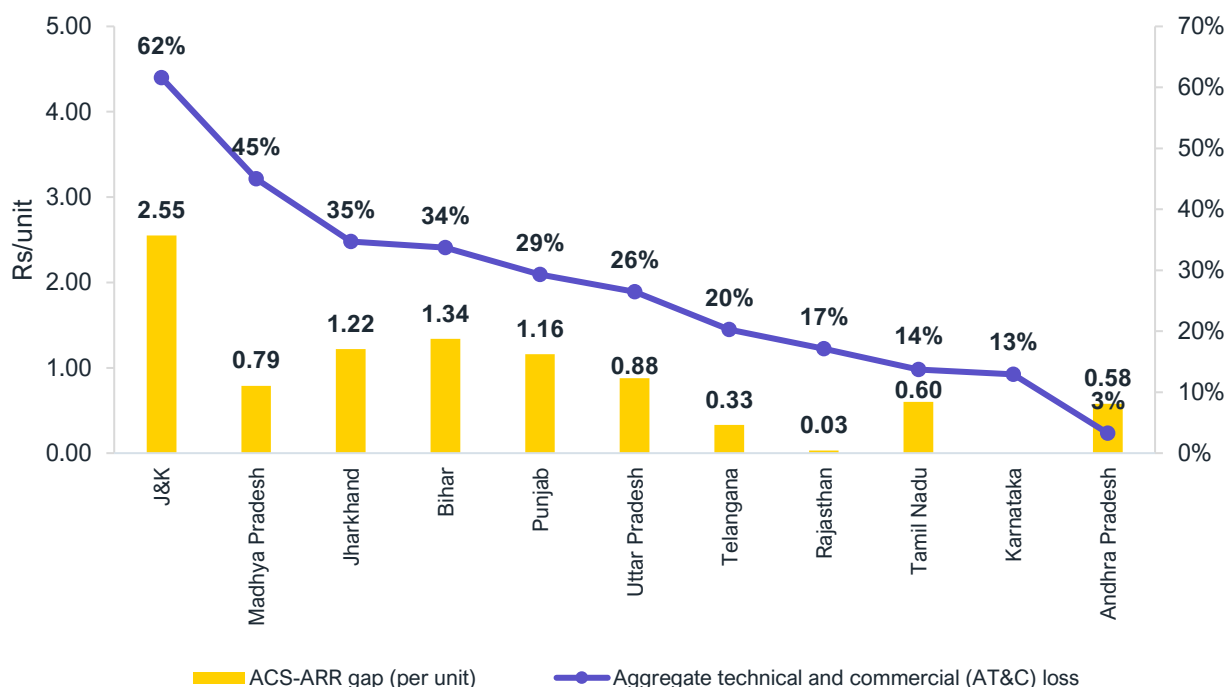
Over the past few years, several state governments have tried to renegotiate already executed solar PPAs. The trend started in Andhra Pradesh in 2019 when the state government declared that it would review the PPAs signed between state DISCOMs and developers for potential renegotiation.

Since then, other states, such as Gujarat, Rajasthan, Uttar Pradesh and Punjab, have attempted to nullify existing PPAs. The main reason to renegotiate contracts is the higher tariff applicable in the PPAs (Rs7–10/kWh or US\$0.085-0.12/kWh) vis-à-vis the current prevailing and much lower tariffs (Rs2–3/kWh or US\$0.024-0.036/kWh).

One of the key reasons for this trend is the poor financial health of state DISCOMs in India. Most state DISCOMs in India are under significant financial pressure because of high system losses and huge pending dues. In FY2022, state DISCOMs in India incurred aggregate losses of around Rs590 billion (about US\$7.2 billion).⁶

⁵ Mint. [Govt weighs ending reverse auction for green power bids](#). 11 October 2022.

⁶ The Economic Times. [Power Discoms losses widened to INR 59,000 crore in 2021-22](#). 1 June 2022.

Figure 9: Status of DISCOMs Losses (November 2022)

Source: Ministry of Power (UDAY Portal)

After an extensive legal dispute, the Andhra Pradesh high court ordered the state government in March 2022 to uphold the original contracts and provide long-sought relief to the project developers.⁷ Although the court eventually ruled in favour of the developers in Andhra Pradesh, this still may not prevent other states from renegotiating or nullifying existing renewable energy contracts.

This trend of renegotiation violates the sanctity of an executed contract and has the potential to derail India's long-term clean energy ambitions. Additionally, such renegotiation erodes the confidence of stakeholders (investors, developers, etc.) in the entire renewable energy bidding process.

Lower Participation Due to Rising Project Costs

In a complete reversal of the previous trend where renewable energy costs fell sharply over the past decade, the project costs of renewable energy plants (especially solar) have risen sharply over the last two or three years in India and globally. The major contributing factors to the trend are the rising costs of equipment and logistics. During the past two years, the price of the solar "monocrystalline passivated emitter rear contact" (MONO PERC) module in India, for example, has risen by approximately 62%.⁸

⁷ The Hindu. [Andhra High Court order on renewables' PPAs to boost investor confidence](#). 16 March 2022.

⁸ PV Infolink.

In India, other factors, such as applying basic customs duty (BCD) and increasing the Goods and Services Tax (GST), have further exacerbated a grim situation.

In July 2022, SECI cancelled solar power tenders for a cumulative 166MW capacity.⁹ The main reasons for the cancellation were volatility in project prices, and challenges bidders faced while procuring domestically sourced modules. The tender only allowed the usage of ALMM-enlisted modules, leading to lower participation from bidders and developers.



The increase in project costs is causing developers to be cautious about recent renewable energy tender bids.

The increase in project costs is causing developers to be cautious about recent renewable energy tender bids. Several developers are currently waiting and watching, hoping for a downturn in equipment prices. The inflation in project costs is ultimately leading to less participation in recent tenders.

Slowdown in Wind Tenders

In the wind sector, project development via tenders began in 2016 when SECI issued its first wind-based tender for 1GW of capacity. In recent years, tender activity in the wind sector has slowed, despite interest in wind capacity from energy offtakers (DISCOMs). From 7.6GW of tender issuance in 2018, the amount fell to 2.6GW in 2022.

The main hurdle in wind projects is in the project execution phase leading to undersubscription. This is mainly because of the following:

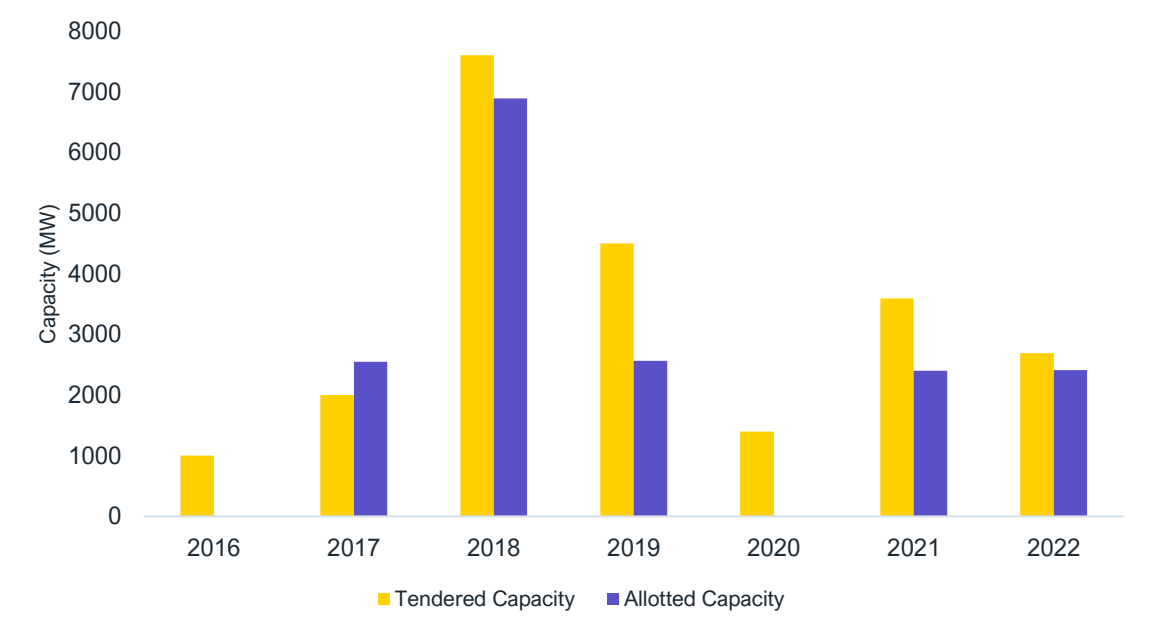
- **Land availability issues**— There is a shortage of available suitable wind sites in India. For the best wind resources and the lowest land costs, only a few locations in Gujarat and Tamil Nadu are suitable for viable project development. In some instances, even when suitable locations were available, state authorities were reluctant to lease land for wind projects auctioned by the central agencies.
- **Rise in project capex** - The rise in commodity prices has hit the sector hard. In the past few years, wind original equipment manufacturers (OEMs) have faced inflation in raw materials, supply chain disruptions due to the war in Ukraine, increases in logistics costs, and changes in the taxation structure in India.

These issues have led to extensive project delays and instances where developers have even requested to cancel their allotted wind projects.¹⁰ For similar reasons, the project developers are showing a lack of interest even in new wind auctions.

⁹ Saur Energy. [SECI Cancelled Solar Tenders Of 166 MW Cumulative Capacity Recently](#). 13 July 2022.

¹⁰ The Economic Times. [Renew Power, Mytrah Energy, Torrent Power seek termination of wind power PPAs](#). 22 September 2022.

Figure 10: Wind Capacity Allotted Through Tenders



Source: JMK Research, SECI, state tendering authorities

Recently though, to boost the wind sector, MNRE announced on 9 January 2023 that it plans to issue 8GW of wind tender bids annually until 2030. Under this scheme, every wind bid will consist of sub-bids from all eight wind-rich states. While discovered PPA tariffs may differ for each state sub-bid, a uniform PSA tariff will apply to each. The pooling of tariffs across state sub-bids will follow the procedure detailed in “Electricity (Amendment) Rules, 2022,” issued in December 2022¹¹.

The recent announcement is a significant positive development for the wind sector. In addition to faster capacity addition, the concept of a uniform tariff will expedite the equitable growth of wind projects across all wind-rich states in India.

Long Turnaround Time to Conclude New-Age Renewable Energy Tenders

The turnaround time to conclude the new-age renewable energy tenders issued by SECI and other state agencies is very long. Tender issuing agencies do multiple levels of stakeholder consultations to address all possible issues developers raise and identify the best way forward, leading to higher participation from project developers for these tenders. In turn, this leads to further delays in issuing new tenders.

¹¹ Ministry of Power. [Electricity \(Amendment\) Rules 2022](#). December 2022.

Table 3: Time Taken to Conclude Bidding for New-Age Renewable Energy Tenders

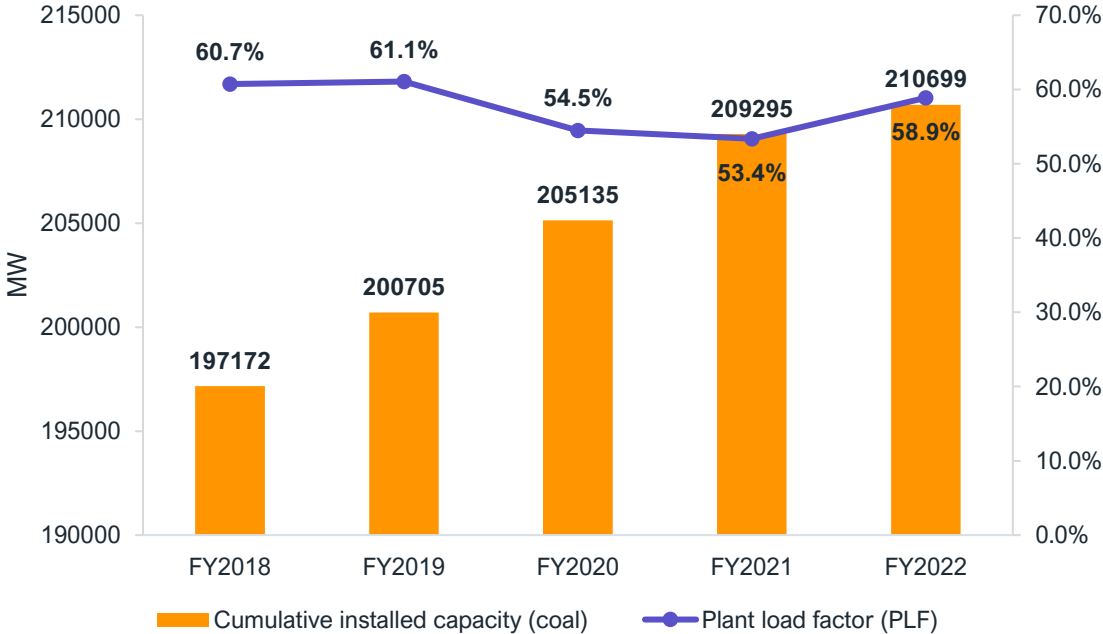
Tender	Capacity (MW)	Gap between tender issuance and bidding	Current Status
SECI Peak Power Supply	1,200MW	5 months	PPA and PSA signed. Project under construction.
RTC-1	400MW	7 months	Under construction (Expected commissioning: April 2023)
RTC-2	2,500MW	19 months	Auction was not successful, only 250MW capacity allotted. Also, PPA and PSA for 250MW are yet to be signed
Standalone ESS (SECI)	500MW/1,000MWh	4 months (10 months if counted from issuance of draft RFS)	Entire capacity won by JSW Energy. Winning tariff: Rs10,83,500/MW/month (US\$13,099.83/MW/month).
Standalone ESS (NTPC)	500MW/3,000MWh	11 months	Entire capacity won by Greenko. Winning tariff: Rs27,92,308/MWh/year (US\$ 33,759.81/MWh/year).

Source: JMK Research, SECI, NTPC

Sustained Reliance on Conventional Power is Also a Major Deterrent

Although India is committed to the growth of the renewable energy sector, there is also a sustained reliance on fossil fuels, such as coal and gas. In the past five years, the plant load factor (PLF) of coal plants in India fell from 60.7% (in FY2018) to 58.9% (in FY2022). In FY 2021, the coal PLF fell to a remarkable 53.4%. Despite the falling efficiencies, however, coal power installations have continued to rise. During the same period, the cumulative installed capacity of coal plants increased from 197.1GW to 210.7GW (approximately 7%).

Figure 11: Coal Installed Capacity in India vs Performance



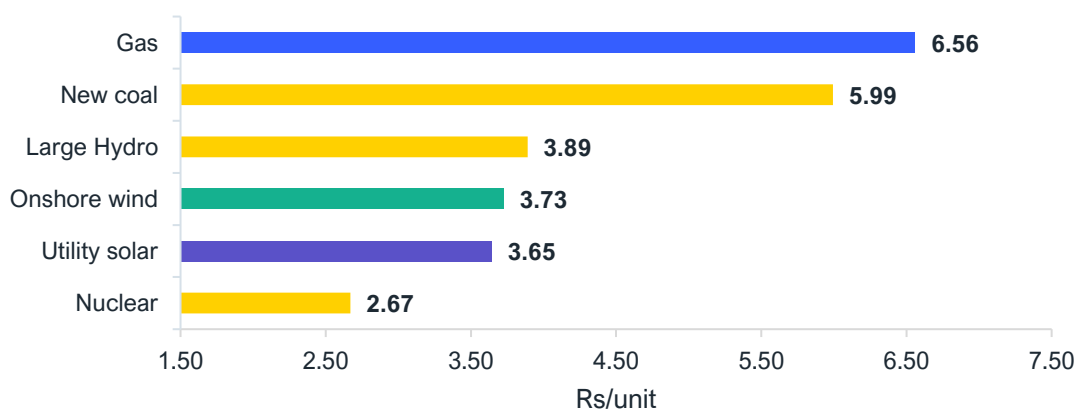
Source: Ministry of Power

Currently, approximately 26GW of new coal projects in India are under various stages of construction.¹² In addition, the Indian government is pushing to increase domestic coal production, with the largest-ever domestic coal mine auction launched in November 2022.

With an oncoming power demand growth of roughly 7% year-on-year,¹³ it is crucial for India to shift focus completely from expensive conventional power to developing sources of cheaper renewable energy. Based on the levelised cost of energy (LCOE), renewable sources are already much cheaper than coal.

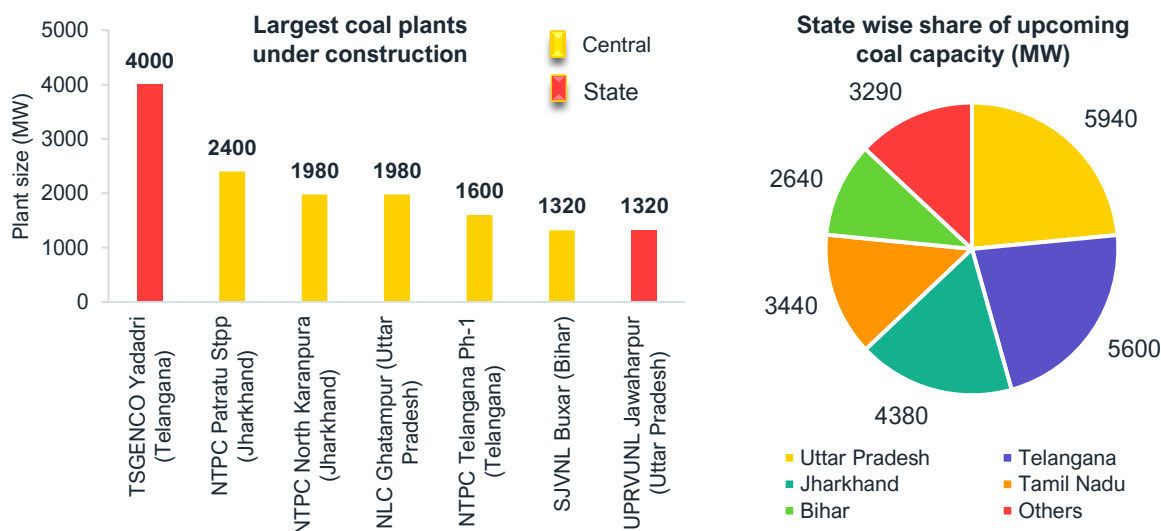
¹² CEA. [National Electricity Plan](#). September 2022

¹³ The Economic Times. [India electricity demand seen growing 7.2 per cent annually till 2026-27](#). 9 September 2022.

Figure 12: LCOE Comparison of Solar, Wind, Coal and Gas-based Power

Source: BloombergNEF,¹⁴ IRENA

Coal has been an integral component for decades in helping India meet its electricity requirements. There is significant political and financial support for coal both at the national and state levels from various stakeholders with vested interests. A significant portion of the population is directly or indirectly associated with the coal industry in states with large coal reserves, such as Jharkhand. Any government attempt to reduce coal production or consumption could prompt major dissent.

Figure 13: Coal Capacity Under Construction (2022–27)

Source: CEA

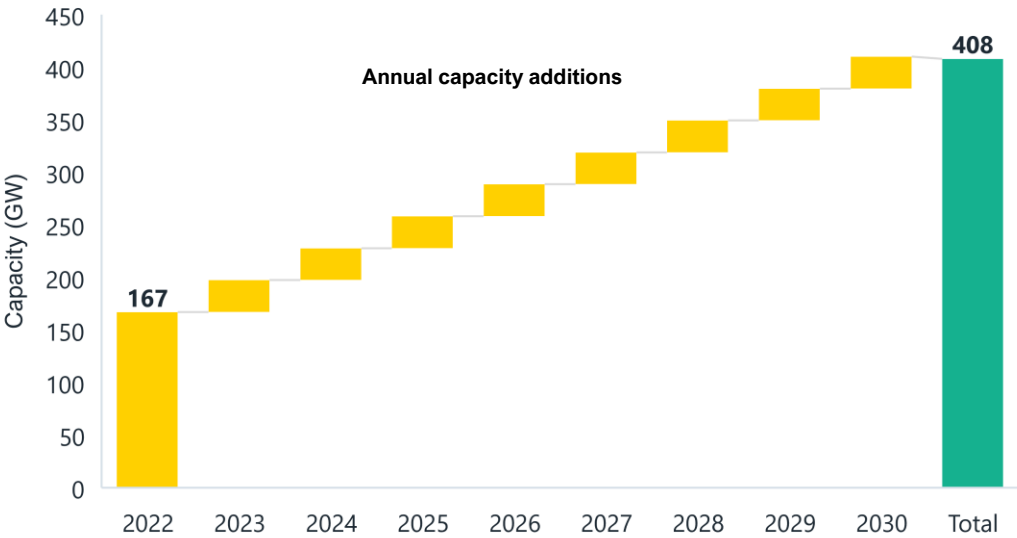
¹⁴ BloombergNEF. [Renewable Power Costs Rise, Just Not as Much as Fossil Fuels](#). 30 June 2022.

The sustained focus and reliance on conventional power sources negatively affect the growth of renewable energy tender activity in India. Looking at thermal capacity planned by generation companies (GENCOs), certain state utilities are cautious about planning for power procurement from other energy sources. This indirectly leads to fewer renewable energy tender issuances. In addition, the fixed charges associated with stranded coal capacity aggravate the already poor financial health of state DISCOMs, which again is a major factor in their slow uptake of renewable energy tenders.

4. What Needs to be Done?

Currently, India has a total power generation capacity of 410.3GW; the renewables’ share is about 167.7GW (viz. approximately 40% of the total).¹⁵ India has set a target of 50% cumulative installed capacity from renewable energy sources by 2030. With an estimated installed capacity of around 817GW in 2030,¹⁶ the share of renewables will be about 408GW (50% of 817GW). As shown in the graph, 30-35 GW of installed capacity is required annually to reach this target.

Figure 14: Projected Installed Capacity from Non-Fossil Fuels (until 2030)



Source: CEA, MoP, JMK Research

To reach the target of 408GW, SECI and other tendering authorities need to make a major contribution. SECI will need to meet approximately 80% of the requirements, and other agencies will make up the remaining 20%. It is imperative to implement certain measures for this new renewable energy capacity addition to aid India’s long-term renewable energy growth vision.

¹⁵ CEA. [Monthly Report](#). December 2022.

¹⁶ Ministry of Power. [Report On Optimal Generation Capacity Mix For 2029-30](#). January 2020.

Transitioning Away from Vanilla Tenders

DISCOMs argue that solar and wind are highly intermittent and variable power sources. Reducing such intermittency is critical to maintaining grid stability and improving grid resilience. In addition, solar power tends to peak in the middle of the day, when DISCOMs usually have less demand and surplus power. Going forward, there will likely be less DISCOM demand for plain solar power.

DISCOMs increasingly prefer new-age renewable energy tenders, including wind-solar hybrid tenders, which offer a better power generation profile and smoother output. Overall, such projects help boost the demand and participation of the stakeholders by creating a win-win scenario for the energy generators and offtakers alike.

Because of higher demand, issuing tenders for sustainable energy systems with multiple technologies will increase. Examples of such tenders include solar-plus- manufacturing, renewable energy coupled with thermal, agrivoltaics, and others. However, since most of these technological solutions are unique and still nascent, energy tariffs discovered under such tenders are likely to be high at first. There is a need for a more holistic approach to confirm the associated benefits of such projects.

Improving the Bidding Auction Mechanism

Reverse auctions are one of the factors responsible for the slowdown in wind tender activity in India. Although the government has announced its intention to remove the reverse auction process for wind tenders, it has not finalised the auction mechanism that will replace the current process.

The industry is pushing for a closed bidding mechanism. The closed bidding process has only one round of bidding. Project capacities are awarded based on a bucket-filling process. Unlike reverse auctions, there is no extra round of bidding to drive down prices.

Table 4: Current Bidding (Using Reverse Auctions) vs Closed Bidding

Parameter	Current bidding method	Closed bidding
Rounds	Two rounds of bidding	Only one round of bidding
Structure	First round to discover L1 tariff Second round of reverse auction	Just one round to discover L1 tariff among eligible bidders
Prices discovered	Lower as compared to closed bidding	Comparatively higher as compared to current bidding system
Capacity allotment	Under reverse auctions, bidders asked to match the lowest tariff Those who match the lowest tariff are awarded the bidding capacity	Uses the bucket-filling method Under bucket filling, the L1 tariff bidder is awarded its project bid capacity, then the L2 tariff bidder is awarded its project bid capacity and so on until the whole tender capacity is awarded
Main bottleneck	The risk of unallotted capacities when other bidders are unable to match the lowest bid in a reverse auction	Higher prices discovered, which might lead to delay in PSA signing

Source: JMK Research

According to industry stakeholders, prices discovered under the closed bidding method are more realistic regarding cost and internal rate of return (IRR). There is also less temptation for competitors to outbid each other, reducing unhealthy competition. The discovery of realistic prices through the closed bidding mechanism may spur wind tender activity and participation.

Stringent Payment Security Mechanisms in Tenders

In January 2023, the total dues of DISCOMs to power producers stood at Rs626.81 billion (about US\$7.68 billion).¹⁷ The poor financial condition of most DISCOMs, which are unable to pay their dues, further exacerbates the situation.



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As a result, renewable energy developers are very concerned about the payment risks when bidding for utility-scale tenders. To address renewable energy developer concerns about payment security, SECI introduced a revolving letter of credit (LC) for all bids in 2019. Under the scheme, the offtaker must provide a revolving and irrevocable LC for one month to the renewable energy developer. In case of any payment defaults by the offtaker, the developer can encash the LC.

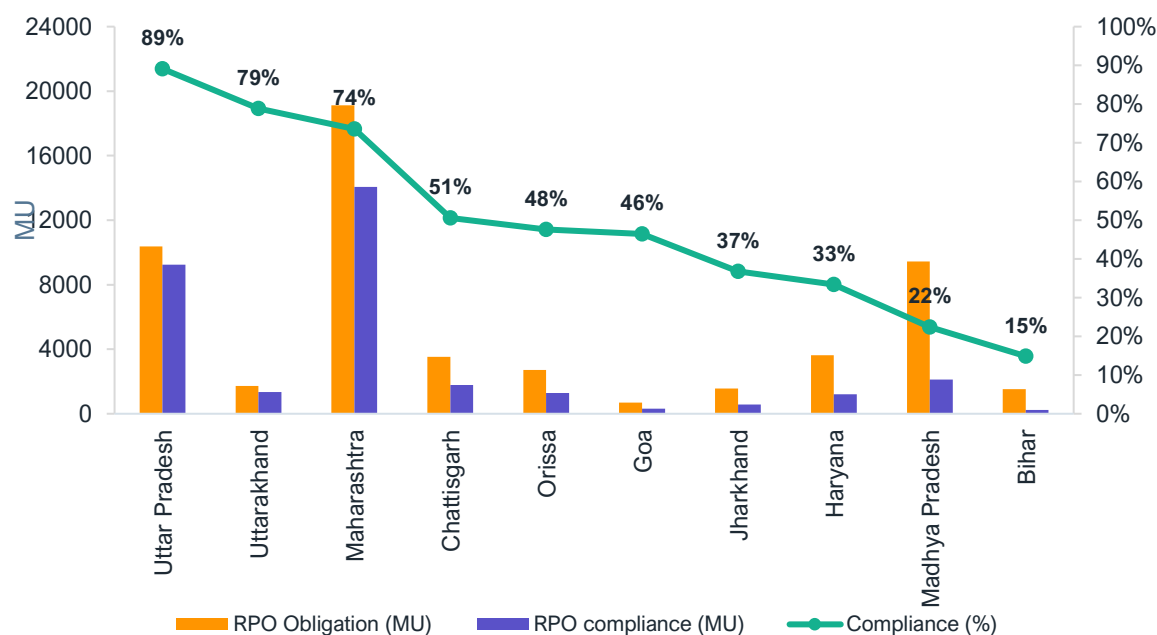
Renewable energy stakeholders have noted that one month is a very short period for payment security backup. The LC must be issued for at least 12 months to ensure its effectiveness in addressing payment risks associated with renewable energy bids. Additionally, since a DISCOM is the final offtaker, there must be a tripartite contract arrangement among the renewable energy developer, DISCOM and intermediary (SECI) to ensure payment security.

Although introducing the LC was a welcome step at the time, the outstanding dues to the renewable energy developers have continued to rise.

Stricter Enforcement of RPO

In recent years, the regulatory commissions of several states—including Punjab, Gujarat, Bihar and Rajasthan—have either waived, relaxed or carried forward RPOs of state DISCOMs from one year to the next. Reasons cited by the commissions for relaxing RPOs include lower power generation, COVID-19 complications, and delayed commissioning.

¹⁷ EQ International. [Discoms' outstanding dues to gencos nearly halved to Rs 62,681 cr in Jan](#). 9 January 2023.

Figure 15: RPO-Deficit states (FY2020-21)

Source: SERCs of respective states, JMK Research

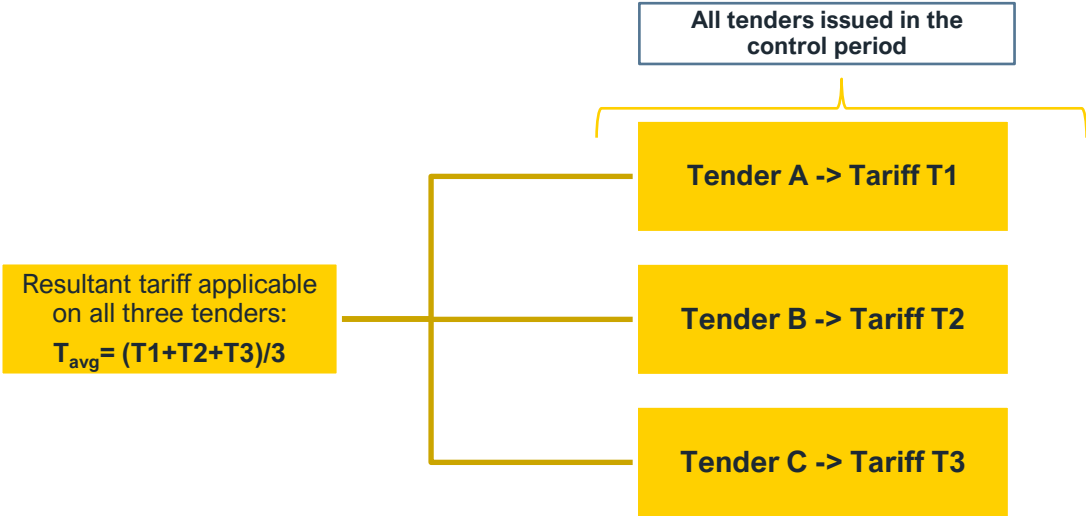
Meeting their RPO targets is a major driver in states issuing renewable energy tenders. The future RPO trajectory of various states will be a key determining factor in renewable energy power uptake. Although RPO-surplus states, like Karnataka, will not be motivated to issue renewable energy tenders in the immediate term, the future demand for renewable energy tenders will likely come from states with lower RPO compliance. States like Bihar, Jharkhand and Odisha may issue a large chunk of forthcoming renewable energy tenders to meet future RPO obligations and clear the backlog of RPO deficits.

It is important that regulating authorities ensure stricter state enforcement of RPOs. Authorities must also consider increasing RPOs for all states (including already compliant states) as a viable means to meet the country's overall sustainability targets by 2030. There should also be strict penalties in case of non-compliance or RPO deficit—something that the recently issued Electricity (Amendment) Bill 2022 aims to do.

Pooling of Renewable Energy Tariffs Within a Control Period

Renewable energy tariffs discovered in tenders have continuously fallen in the past decade. Consequently, some DISCOMs have delayed signing purchase supply agreements (PSAs) at the current rates in hopes that tariffs will fall further. The government is contemplating pooling renewable energy tariffs in a specific control period to address this issue. As part of the scheme, all discovered tariffs will be pooled together by averaging them over a specific control period. The resulting tariff (through averaging) would apply to the power purchase of all tenders issued within that control period.

Figure 16: Representation of Pooling of Renewable Energy Tariffs



Source: JMK Research

If implemented, this scheme will be crucial in speeding up power procurement and associated tender activity in the renewable energy sector. It will address the primary concern of DISCOMs while signing PSA that they will miss out on lower renewable energy tariffs in the future.

Improvement in ISTS Infrastructure

In December 2022, the India Ministry of Power (MoP) issued a plan to augment transmission and evacuation infrastructure to accommodate about 500 GW of renewables by 2030.¹⁸ The growth of the interstate transmission system (ISTS) was a major part of the plan, which envisions connecting major renewable energy potential zones in Ladakh, Rajasthan, and Gujarat to major load centres across the country through ISTS networks.

ISTS-specific renewable energy tenders aided by the planned transmission capacity enhancement can be a potential game changer in the renewable energy tendering landscape. It will allow huge renewable energy parks to be set up in generation hotspots to deliver power to demand hubs thousands of kilometres away. RPO-deficit states such as Bihar and Jharkhand also can fulfil their obligations by procuring cheaper renewable energy power from renewable energy-rich states.

¹⁸ Ministry of Power. [Transmission system for integration of over 500 GW RE capacity by 2030](#). December 2022.

Enhanced caution by developers while bidding

The renewables sector is evolving. Experience has shown that markets can change drastically in just a couple of years because of regulatory changes, supply chain shocks affecting the price of project equipment, or other factors.

Project developers need to exercise caution while bidding. They must provide an ample safety margin in all calculations and consider all possible scenarios. The developers should refrain from overly aggressive bids that may lead to issues later. Every stalled or unexecuted project indirectly affects the participation of all developers in future renewable energy bids.

5. Conclusion

Currently, renewable energy tendering activity in India is not in tandem with government targets. Annual tender issuances have fallen by 30%, from 40GW in 2019 to about 28GW in 2022.

The slow uptake of renewable energy tenders is primarily because of DISCOMs' financial issues leading to undersubscription and tariff renegotiation. The wind sector, in particular, is reeling from supply chain disruptions and increases in project capex, leading to caution and less bid participation from developers.

In the past couple of years, tenders have shifted focus from plain vanilla solar/wind to hybrid, RTC tenders, primarily because of DISCOMs' demand for more reliable and invariable power. So while the plain vanilla solar and wind tendering has decreased, new-age renewable energy tender issuances have increased.

Instead of aggressively participating in new-age SECI tenders, project developers might also conserve resources such as capital and land to explore newer renewable energy avenues like green hydrogen. The technology is already proven and implemented in developed markets like Europe and offers huge potential for medium- to long-term growth.

Stricter RPO enforcement will be imperative to drive renewable energy sector growth and installations. RPO-deficit states, such as Bihar, Jharkhand and Odisha, are likely to soon issue significant numbers of renewable energy tenders to meet their RPO targets.

The government also is planning to remove reverse auctions from wind tenders in favour of closed bidding. Returning to closed bidding will result in the discovery of financially viable tariffs that reflect current market conditions, reinvigorating the interest and participation in future wind bids.

Augmenting ISTS infrastructure will be an important element in improving transmission accessibility and enabling more ISTS-specific tenders. Pooling renewable energy tariffs over a specific control period is another viable option to address PSA signing delays.

Meeting the country's renewable energy targets by 2030 will require more than 35GW of tenders every year. Recent developments (such as removing reverse auctions for wind) have shown that the market stakeholders are beginning to understand the shortcomings and are looking to rectify them. There is a sense of optimism in the market that the worst may already be over, and more than 35GW of annual tendering will be achievable in a few years.

About JMK Research & Analytics

JMK Research & Analytics provides research and advisory services to Indian and International clients across renewables, electric mobility, and the battery storage market. www.jmkresearch.com

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