



India's Renewable Energy Policy Headwinds

Recommendations for Urgently Accelerating Activity in the Renewable Energy Sector

Executive Summary

The rapid expansion of domestic renewable energy will improve India's energy security, reduce pollution pressures, and provide electricity deflation to help alleviate the growing distress of power distribution companies (discoms).

India's renewable energy progress to date however can be described as non-linear — two steps forward, one step back.

As of December 2019, India's on-grid renewable energy capacity stood at 85.9 gigawatts (GW). Of the 24GW of renewable energy capacity installed since the beginning of financial year (FY) 2017/18 coupled with an additional 50GW awarded to date, more than 90% has been contracted for tariffs ranging between Rs2.43-2.80/kilowatt hour (kWh) with zero indexation for 25 years. This is 25-35% less than average domestic coal-sourced thermal tariffs of Rs3.74/kWh for the first half of 2019/20 from India's largest energy conglomerate NTPC.

Domestic renewable energy tariffs are now two thirds of the cost of domestic coal-sourced thermal tariffs, and half that of imported thermal power costs.

After the addition of on average 13GW of renewable energy capacity in FY2016/17 and FY2017/18, India's renewable capacity additions were expected to grow on average at 20-25GW in line with the target of 175GW by December 2022. However, less than 10GW of on-grid renewable capacity and installs were added in FY2018/19. This is expected to grow to 12-13GW in FY2019/20, which is up year-on-year but still tracking well below target.

During the past 12 months a number of major reforms in the power sector, including amendments to the electricity act, a new power tariff policy, and payment security funds for renewables have been discussed or foreshadowed. IEEFA's concern is that most of these are yet to be executed: talk is easy, India needs delivery.

In IEEFA's view, the opportunity cost of delaying India's electricity sector transition is too high. International investors are seeking policy certainty and commitment from the Indian government. If this is re-established, it will accelerate capital deployment in one of the world's largest and fastest growing markets for renewable energy, storage and power transmission.

**The opportunity cost
of delaying India's
electricity sector
transition is too high.**

This report highlights key issues responsible for the slower-than-expected development of India's renewable energy sector, including:

- **Counterproductive trade duties on imported solar modules**

The two-year trade import duty introduced in July 2018 to protect the domestic solar manufacturing industry has proven counterproductive and disruptive. While shuffling the market share of exporting countries, the duty has neither reduced imports nor significantly improved the competitiveness of Indian manufactured solar cells. Instead, it has severely slowed down solar installs.

- **Poor coordination between central and state governments on renewable energy projects**

Confusion, delay and mismanagement in auctions, transmission connectivity and land acquisition-related issues between central and state-backed projects are causing delays and cost overruns for renewable energy developers, jeopardising their project economics.

- **Payment delays from state-owned discoms**

Payment delays from debt-ridden state-owned discoms remain a major concern. As of December 2019, state-owned discoms still owed Rs81,894 crore (~US\$11.5bn) in payments to power producers.¹ The enforcement of a new payment security mechanism from August 2019 is reportedly improving payments due, but government must ensure consistent governance of this mechanism. Another discom reform scheme expected to be announced in the near future could potentially include privatisation of debt-ridden discoms to improve their performance.

- **Increased financial risks from aggressive tariff caps, tariff renegotiations, and policy inconsistencies in capacity tendering processes**

Aggressive tariff caps in auctions and retrospective renegotiations represent a common problem across India. Some states and discoms are attempting to unfairly burden renewable energy sources to reduce the average cost of supply or through abandoning legally binding contracts signed before renewable tariffs fell. This short-termism is coming at a massive long term cost in degrading India's investment risk profile, and introduces sovereign risk issues for foreign investors.

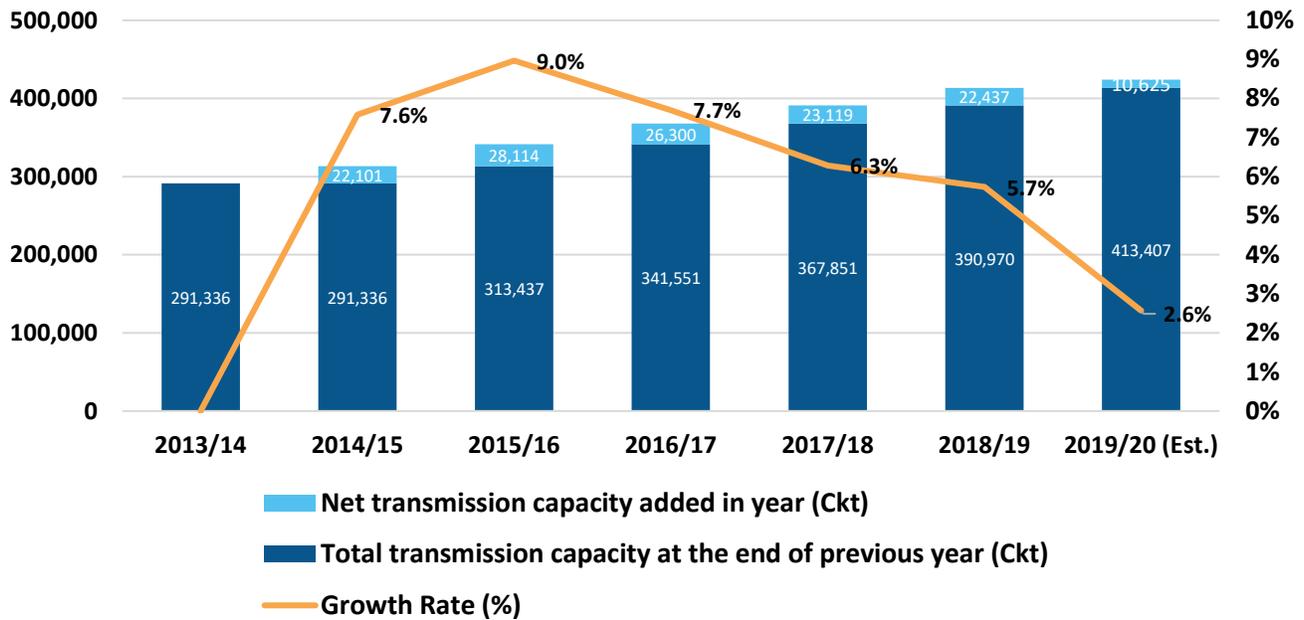
- **Slow expansion of transmission networks and balancing capacity**

India's transmission capacity grew hand-in-hand with renewable capacity between FY2015/16 and FY2017/18, with average additions of 25,000 circuit kilometres (ckt) per year. However for FY2019/20, IEEFA expects only 10,625 ckt of new transmission capacity to be added (based on 7,083 ckt added between April-November 2019). The recent slowdown in the growth in renewable energy capacity appears to have diminished the urgency of building new transmission capacity.

¹ Ministry of Power, Payment Ratification And Analysis in Power procurement for bringing Transparency in Invoicing of generators (PRAAPTI), accessed December 2019.

There is a negative spiralling effect being observed in the slower growth of transmission capacity buildout on India's renewable energy ambition.

India's Power Transmission Capacity



Source: CEA

Note: Net capacity addition in till YTD FY2019/20 (Nov 2019) is 7,083 Ckt

While the current economic downturn brings increasing financial pressures, it also emphasises India's need and opportunity to accelerate infrastructure spending — particularly in domestic power generation and grid infrastructure. The government must remain committed to attracting investment into the transmission sector to further renewable capacity growth, both of which offer job creation opportunities while laying the groundwork for future demand growth.

- **Financial constraints for smaller renewable energy developers**

Sovereign risk, policy risks and erratic payments are all creating unnecessary financing constraints on the renewable energy sector. India's stranded or non-performing assets (NPAs) in the thermal power sector are also stifling financing for the renewable energy sector. Given India's massive renewable energy target of 450GW by 2029/30, and the necessary associated expansion and modernisation of the national grid system, IEEFA estimates US\$500-700bn of new investment is required. Smaller regional developers will also require domestic funding. India must free up the liquidity in the domestic banking system as soon as possible to keep India's renewable energy ambition on track.

IEEFA recommends improving fluidity in the renewable energy sector by:

1. Improving coordination and engagement between central and state governments, financial institutions, discoms and developers.
2. Supporting the domestic solar manufacturing industry with off-take assurances, better solar tariff caps, and by encouraging exports.
3. Rationalising GST on solar and wind power equipment using one standard, fixed national rate.
4. Clearing land acquisition and transmission connectivity-related operational bottlenecks and inefficiencies for renewable energy projects, and putting a renewed focus on renewable energy hubs and industrial solar parks with state governments shouldering land acquisition and grid connection risks, thereby reducing investor risk and ensuring non-arable land is preferenced.
5. Diversifying and encouraging new third parties for renewable power procurements through corporate power purchase agreements (PPAs), with the Solar Energy Corporation of India Ltd (SECI) and NTPC rolling out state-specific solar and wind tenders.
6. Providing performance-based support for discoms via reform schemes.
7. Privatising more of the power distribution sector, or allowing entry of private competition to accelerate investment and technology deployment.
8. Planning for transmission network expansion and modernisation, and incorporating the connection needs of large scale renewable energy hubs.
9. Revising and formulating tariff caps by reviewing industry's tariff expectations and its' assessment of risk differentials, and continuing to work to reduce risk so as to sustainably reduce the required tariffs.
10. Improving domestic and international access to capital for both large-scale and smaller renewable energy players, lifting the balance sheet capacity of the Indian Renewable Energy Development Agency (IREDA), and applying far greater capital discipline and oversight to the Power Finance Corporation (PFC) in light of its ongoing unsustainably high losses from non-performing assets in the thermal power sector.

Contents

Executive Summary.....	1
Introduction	6
Trade Duty on Imported Solar Cells and Modules	8
Need for Better Centre-State Coordination on Renewable Energy Implementation	12
Discoms' Payment Issues	15
Insufficient Grid Expansion.....	18
Aggressive Tariff Caps and Tariff Renegotiations	23
Financing Now a Constraint.....	27
Policy Recommendations.....	30
About IEEFA	32
About the Authors.....	32

Introduction

The pursuit of India's ambitious renewable energy mission has been a mixed bag.

The government's December 2022 mega target of 175 gigawatts (GW) of renewable energy was always going to be a momentous task given the structural challenges in India's electricity sector.

According to IEEFA's renewable energy tracker, India is set to achieve 145GW of renewable energy by close of FY2021/22.^{2 3}

As of December 2019, India had installed 85.9GW of on-grid renewable energy capacity. Of the 24GW of renewable capacity installed since the beginning of FY2017/18, and an additional ~50GW awarded to date, more than 90% has been contracted for tariffs between Rs2.43-2.80/kilowatt hour (kWh) with zero indexation for 25 years. This is 25-35% less than average domestic coal-sourced thermal tariffs at Rs3.74/kWh for the first half of FY2019/20 from India's largest energy conglomerate NTPC.⁴

**India is set to achieve
145GW of renewable
energy by close of
FY2021/22.**

Annual renewable capacity additions of 13GW (on average) during FY2016/17 and FY2017/18 were expected to grow to 20-25GW (on average) annually to meet the target of 175GW by December 2020. However, FY2018/19 saw additions of less than 10GW of on-grid renewable capacity, while FY2019/20 has an expected range of 12-13GW.

In IEEFA's view, lower-than-expected growth in India's renewable energy capacity has been affected by policy disruptions and inconsistencies relating to:

- Anti-dumping trade duties on imported solar modules from China and Malaysia;
- Poor coordination between central and state governments on renewable energy;
- Payment delays and offtake curtailment from state-owned power discoms;
- Aggressive tariff caps and tariff renegotiations, and policy inconsistencies in capacity tendering processes;
- Slow expansion of transmission networks and grid access delays; and/or
- Financial constraints for smaller renewable energy developers.

² As per tender and auctions data till December 2019.

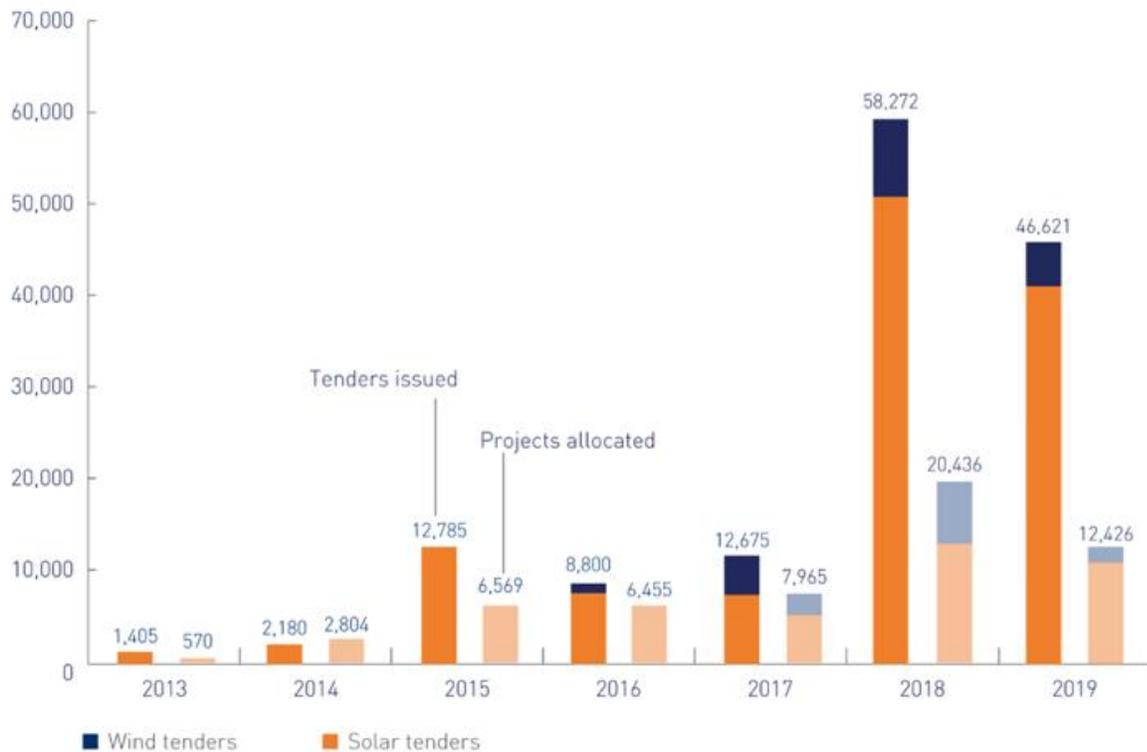
³ IEEFA's India renewable energy tracker maintains a list of ongoing capacity auctions and tenders in the pipeline which we also use to forecast renewable capacity additions in the medium-term.

⁴ NTPC Performance Highlights H1FY2019/20. 9 November 2019.

Introduced in 2017, reverse bidding auctions - where suppliers view the current bid and make lower bids if they wish - were initially well attended, resulting in dramatically lower renewable energy tariffs.

More recently however, solar and wind power auctions have been less well attended due to the impact of government policy. Roughly 6.7GW of auctioned capacity between March-December 2019 did not receive any response from developers. In fact, India managed to auction only 12.4GW of wind and solar capacity during the calendar year 2019— way below its desired aim of auctioning 20-30GW of capacity to meet its short-term target of 175GW by December 2022.

Figure 1: India Renewable Energy Tenders and Auctions Till 2019



Source: Bridge to India

A fundamental reason behind this slowdown is the developers' increased perception of risk including factoring in higher costs of modules due to the imposed trade duties, a lack of clarity on rule changes, payment delays from discoms, and delays in grid-connectivity and land acquisition. These issues have increased developer risks, which has raised return on investment (ROI) expectations. This in turn has increased tariffs at auctions, creating a mismatch between the discom's offered tariffs (tariff upper caps) and the developer's required prices (tariffs).

On the brighter side, India's renewable energy sector continues to attract foreign capital (nicely illustrated by Total's US\$500m investment in Adani Green in February 2020). This reflects confidence in India's long-term trajectory of power

demand growth supported by the government's long-term renewable energy targets, notwithstanding the short-term headwinds in the sector.

Further, India's renewable generation for April-December 2019 was up 7.0% while thermal generation was down 3.2% for the same period compared to the previous year. This is an early sign of movement in the coming decade: thermal power will continue to lose market share to low-cost, low-emission renewables in India.

Trade Duty on Imported Solar Cells and Modules

In July 2018, the Indian Ministry of Finance imposed a two-year trade duty of 25% on imported solar cells and modules from China and Malaysia.⁵ (The imposed duty of 25% was for a period of one year, later to be scaled down to 20% and 15% for the first six months and remaining six months of the second year respectively).

The uncertainty of this trade duty has been one of the most serious impediments to India's renewable energy momentum, both in terms of the quantum of unexpected increases in costs but also due to the lack of clarity in how it was introduced.

The objective of the imposed duty was to make Indian domestic manufactured solar cells and modules competitive against cheaper imported Chinese and Malaysian modules. (Since first elected in May 2014, the Prime Minister Narendra Modi-led BJP government has put an emphasis on growing local manufacturing industries under its 'Make in India' initiative.⁶)

Between FY2014/15 and FY2017/18, some 80-90% of India's imported solar modules came from China, meeting more than 90% of India's requirements.⁷ India's current manufacturing of domestic cells is roughly 4GW, far from sufficient to meet annual solar installation demand of 8-10GW. Being highly dependent on imported solar cells and modules, India's trade duty imposition of 25% meant a subsequent hike in the capital costs of building solar power, which increased the required tariff by 10-15%.

The duty also impacted the pace of solar capacity installations in two stages. In the first year, there was a period of confusion among developers from when domestic solar manufacturers filed a petition in favour of imposing a trade duty to when the duty was finally imposed. During this period, solar capacity tenders were undersubscribed as developers awaited a decision. After the duty was finally

The uncertainty of this trade duty has been one of the most serious impediments to India's renewable energy momentum.

⁵ Solar Module/Panel refers to a single photovoltaic panel which is a packaged and connected by an assembly of solar cells.

⁶ Government of India. [Make in India](#). Accessed December 2019.

⁷ As per the Commerce Ministry's data.

imposed, tenders previously awarded at record low tariffs in the range Rs2.44-2.60/kWh had become unviable using either local or imported solar modules.

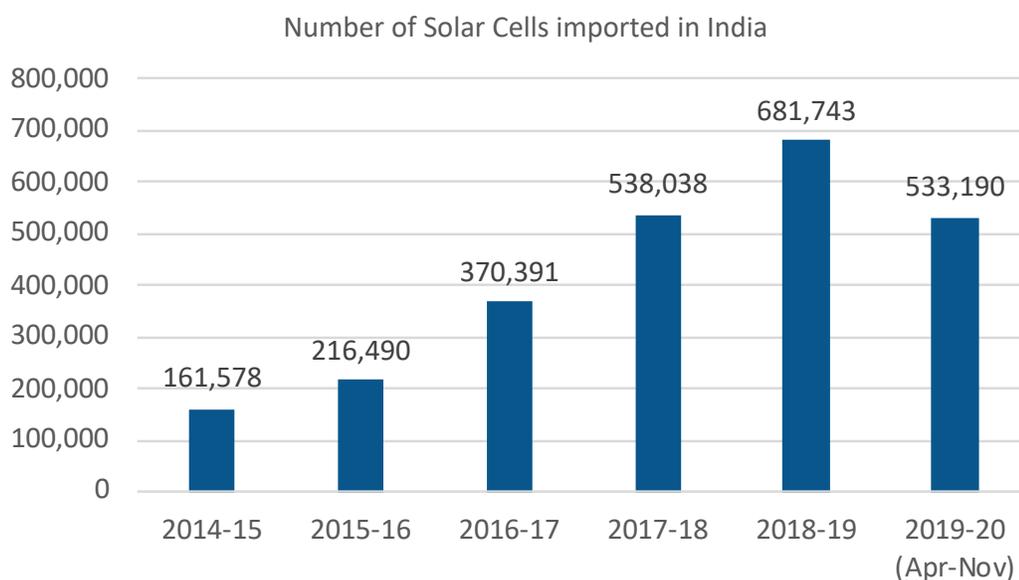
Whilst the 25% trade duty has slowed down capacity commissioning of solar projects and increased tariffs, any material improvement in the scale of domestic manufacturing is yet to be experienced. As it stands today, Indian solar module manufacturing capacity is nowhere near sufficient to supply the quality and quantity of modules required to build the targeted 100GW of solar capacity by 2022.

Impact of Trade Duty in Numbers

The trade duty has impacted India's importation of solar cells and the overall solar sector in the following ways:

1. The number of solar cells imported into India did not, as hoped, decrease due to the trade duty. Rather, import numbers increased by 322% in FY2018/19 compared to figures in FY2014/15.

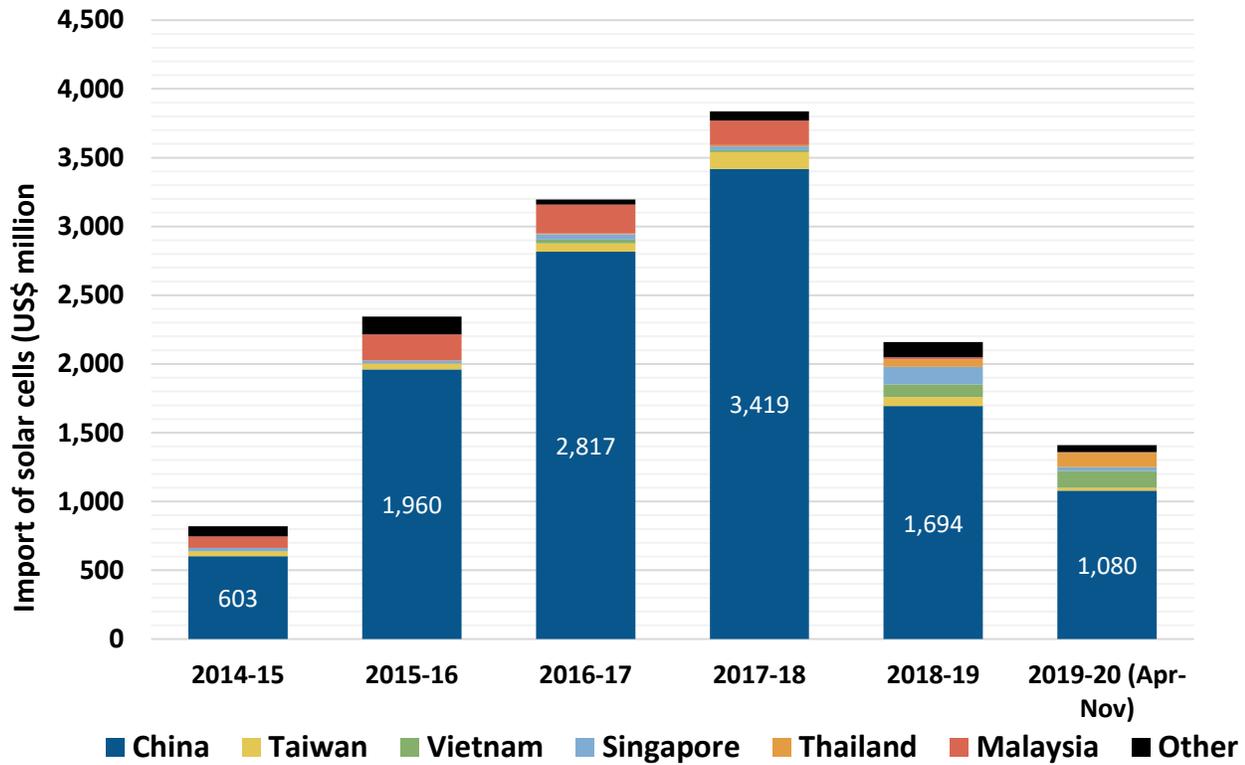
Figure 2: Growth of Solar Cells Imported Into India



Source: Indian Ministry of Commerce, IEEFA

2. The total value of solar cell imports (in US\$ million) has significantly decreased. However, this represents a deflation in global module prices in the given period, as the volume of cells imported into India has increased.

Figure 3: Imports of Solar Cells During FY2014/15 - FY2019/20 (US\$m)



Source: Indian Ministry of Commerce, IEEFA

- Although China and Malaysia's market share decreased post the imposition of the trade duty, solar module imports from China in absolute terms (number of cells) has not significantly decreased. On the other hand, Vietnam and Thailand have emerged as significant new players, with their solar module market share into India increasing from 1% to 18% during the last 20 months.

Figure 4: Change in Market Share of Countries Importing Solar Cells Into India

No of Cells	Imports pre-ADD (FY2014/15- FY2017/18)	Imports Post-ADD (FY2018/19- FY2019/20 (Apr-Nov))
China	72%	45%
Malaysia	3%	1%
Taiwan	18%	10%
Vietnam	1%	18%
Thailand	1%	18%
Singapore	1%	0%
Other	4%	7%

Source: Indian Ministry of Commerce, IEEFA

The trade duty has shuffled the market shares of exporting countries but has failed to significantly improve the competitiveness of Indian manufactured solar cells. Instead, it has severely slowed down capacity installs as developers wait until the high trade duty period expires before importing the solar modules they need.

Alternative Strategies for Supporting Domestic Solar Manufacturing

In IEEFA's view, India's solar manufacturing industry needs policy support but not at the cost of India's energy transition. Instead of trying to make Indian manufactured solar cells competitive by causing imported modules to be as expensive as domestic ones, the industry would be better served if it was provided with an assured offtake in domestic markets, and also incentivised for exporting.

A good example of how local manufacturing could be supported is illustrated in the recently concluded auction by Solar Energy Corporation of India (SECI) linking solar manufacturing to solar capacity.

SECI auctioned 12GW of solar capacity with 3GW of solar modules linked to manufacturing capacity. Developers were allowed to bid for solar capacity and module manufacturing capacity in a 4:1 ratio. Adani Green and Azure Power, two of India's top renewable developers were awarded the project, winning 8GW and 4GW respectively at Rs2.92/kWh for 25 years with zero indexation — an acceptable price for developers which would potentially allow them to use domestically manufactured modules.⁸ Under this project, Adani and Azure have to commission solar module manufacturing capacity of 2GW and 1GW respectively. Azure Power's analyst presentation from January 2020 suggests the company plans to commission

⁸ Mercom India. [Adani, Azure Win SECI's Manufacturing-Linked Solar Auction, Greenshoe Option Next](#). 17 January 2020.

1GW of manufacturing capacity by FY2021 and 4GW of solar capacity between FY2022 and 2025, with 1GW of commissioning each year.⁹

Extension of Trade Duty Hazardous

Indian solar equipment manufacturers have reportedly urged the government to extend the two-year trade duty on imported solar cells and modules past the July 2020 termination date.¹⁰ IEEFA recommends the government refrain from 'giving in' to an easier but counterproductive option of supporting local solar cell manufacturing.

The government must refrain from 'giving in' to supporting local solar cell manufacturing.

China is a global leader in solar equipment and its industry is years ahead in the learning curve of solar cell manufacturing. In IEEFA's view, China's cheaper solar modules are a gift to India's energy transition. India must find innovative ways to support its solar manufacturing industry without straying from its renewable energy capacity targets.

Need for Better Centre-State Coordination on Renewable Energy Implementation

In India's federal structure, states (provinces) are primarily responsible for meeting their own electricity needs while the central government is actively involved in developing power projects.

The central government agencies SECI and NTPC have played a key role in enabling India's energy transition by formulating a strong national policy and legal framework. They have also underwritten solar and wind energy power purchase agreements (PPAs) and leveraged the strong credit rating of India's central government to lower the cost of contracts, benefiting discoms and hence consumers.

Whilst renewable energy capacity is primarily being rolled out via SECI and NTPC, India's state governments have also awarded capacity through state-level agencies or state government-owned discoms.

Gujarat Land Policy Causing Issues for Wind Power

SECI and NTPC have auctioned some 10GW of onshore wind power capacity since India opted for a reverse bidding tariff regime in June 2017, resulting in a near halving of tariffs and massive downward pressure on costs resulting in the compression of profit margins.

⁹ Azure Power Investor Briefing. 16 January 2020.

¹⁰ Business Standard. Govt may extend safeguard duty on Chinese solar power equipment. 06 January 2020.

The majority of this renewable energy capacity awarded allowed developers to commission the capacity anywhere in India. Developers could establish projects in locations with the best wind resources but it was their responsibility to organise land for the projects, not the state's nor the central governments. This led to intractable land acquisition issues with appropriate sites difficult to find or afford, and meant many projects could not get off first base.

The case of Gujarat provides an exemplary case study of such difficulties. The states of Gujarat and Tamil Nadu have the best onshore and offshore wind power potential in the country. This makes these two states extremely attractive locations for wind power developers.

In the beginning of 2019, wind power developers who won contracts through SECI and NTPC's auctions increasingly expressed concerns about access to suitable land for project development in Gujarat.¹¹ The developers complained that the Gujarat government was reserving state-owned land for state government-backed wind projects. That meant successful bidders of the centre's auctions were forced to look elsewhere for expensive private land.

Further, it was reported there was also confusion between developers and the Gujarat government regarding whether the state government or the central government would be responsible for providing the transmission lines and grid connectivity for the projects. This significantly delayed commissioning of wind power projects throughout 2019.

The much larger impact however was the lack of available land with good wind power potential, denting developers' confidence and causing a muted response in subsequent wind power tenders. The result was a 10-15% increase in wind tariffs as developers factored in higher regulatory risks and costs of expensive private land.

Gujarat's Land Policy for Green Energy Projects

In January 2019, the Gujarat government moved to resolve the policy confusion by announcing its expanded land policy for renewable energy projects. The government allotted land for 30GW of solar, wind, and solar-wind hybrid capacity. Out of the 30GW, 10GW worth of project land was allotted to state-backed discoms. The remaining 20GW worth of land was available for state and centre-backed projects.¹²

This policy clarity came a little too late for developers whose proposed projects were approaching commissioning deadlines. Reportedly, some of the developers had already bought expensive land in Gujarat or elsewhere in the country.¹³ This higher capital cost materially impacted their tariff calculations, as did the lower

¹¹ ET Energy World. [SECI project winners buying expensive land as state stays reluctant on leasing for central projects](#). 11 February 2019.

¹² ET Energy World. [Gujarat frames land policy for green energy projects](#). 28 January 2019.

¹³ ET Energy World. [Wind energy developers dissatisfied with Gujarat's land offer](#). 01 December 2019.

wind power yield of less optimal sites on which they based their bidding calculations.

Developers are still seeking clarity on how land will be allotted in renewable energy parks as per the Gujarat government's policy. The latest SECI wind auction was postponed four times, and even at a proffered Rs2.93/kWh tariff cap, the January 2020 tender round had bids below the minimum capacity required for the auction to go forward.¹⁴ As a result, the new bidding deadline for the tender was moved to 24 January 2020. The failure of this wind auction, even with a better price and a credible offtake such as SECI, suggests that issues related to wind power have still not been resolved.

Issues related to wind power have still not been resolved.

The reverse bidding mechanism, as opposed to feed-in-tariffs (FiTs), dramatically brought down wind power tariffs since its introduction in 2017 from Rs4-5/kWh to Rs2.43-2.80/kWh. The long-term policy on future capacity rollout, which aims to reach 100GW of wind by 2030, means the wind power industry remains cautiously optimistic, despite its initial struggle with razor-thin margins as a result of the tariff regime changes.

However, the lack of clarity on other project nuances such as grid-connectivity, land and other regulatory approvals has materially undermined sector momentum, curtailing investment and employment opportunities. The severity of this confluence of events is evidenced in the ongoing financial distress in ReGen Powertech,¹⁵ Suzlon and Inox Wind, undermining investor and banking confidence.

There needs to be better coordination between central and state governments on these issues. Although in this case developers knew they were responsible for finding land for their projects, improved government policy support and coordination would certainly benefit the industry. This in turn would help drive India's energy transition by accelerating investment in domestic renewable infrastructure while lowering India's excessive reliance on expensive, inflationary fossil fuel imports.

Insufficient State Government Projects

India's recent wind power capacity roll-out has largely originated from the central government. Since the beginning of reverse bidding, 14.5GW of wind capacity has been auctioned (of which 2.2GW found no takers) and only 1.25GW of that capacity belonged to state governments — Gujarat (745MW) and Maharashtra (500MW). Tamil Nadu's 300MW auction through SECI in September 2018 showcased the opportunity for state-centre cooperation to lower financial risks, ensure payment confidence and hence improve investor confidence.

¹⁴ ET Energy World. [SECI's wind energy tender gets cold response for fourth time](#). January 2020.

¹⁵ ET Energy World. [NCLT begins insolvency process of ReGen Powertech](#). 18 December 2019.

State governments need to utilise their respective wind power potential to drive in-state investment and employment. Providing a more diverse supply of locations will both improve grid stability and widen the states' buy-in to this critically important national objective.

State-specific wind power projects could also potentially resolve developers' concerns arising from centre-state miscoordination, such as on land and evacuation lines. States could involve corporates as part owners of projects, allowing third party diversification and offtake assurances, thereby reducing key risks in projects.

State-specific wind power projects could also potentially resolve developers' concerns.

Discoms' Payment Issues

India's state-owned power discoms are one of the major contributors to stranded or non-performing assets (NPAs) in the Indian power sector.

Delays in payments from debt-ridden discoms have been a major concern over the years. In addition to unfunded cross-subsidies, the ailing financial situation of discoms largely stems from high aggregate technical & commercial (AT&C) losses and higher cost thermal PPAs against lower revenue recovery.

Discoms have been offered two major financial bailouts in the last two decades, Ujjwal Discom Assurance Yojna (UDAY) being the latest one. The UDAY reform aims to improve the financial and operational performance of discoms by restructuring discoms' debt into state government-issued bonds.

Discoms had accrued roughly Rs396 thousand crore (US\$55bn) in debt as of September 2019¹⁶, of which 59% had been converted into non-statutory liquidity ratio (non-SLR) bonds.¹⁷ Deployment of smart meters and customer category-wise feeder segregations were employed to reduce theft and improve billing efficiency to further aid improvements in the discoms' operational performance.

In IEEFA's view, a key success of the UDAY reform was the reduction in AT&C losses from 24.6% in FY2011/15 to 18.2% in FY2018/19. However, discoms still remain financially stressed with a total debt of some Rs110 thousand crore (~US\$15.5bn). In FY2018/19, discoms suffered losses of roughly Rs27,000 crore (~US\$3.8bn).

In FY2018/19, discoms suffered losses of roughly Rs27,000 crore.

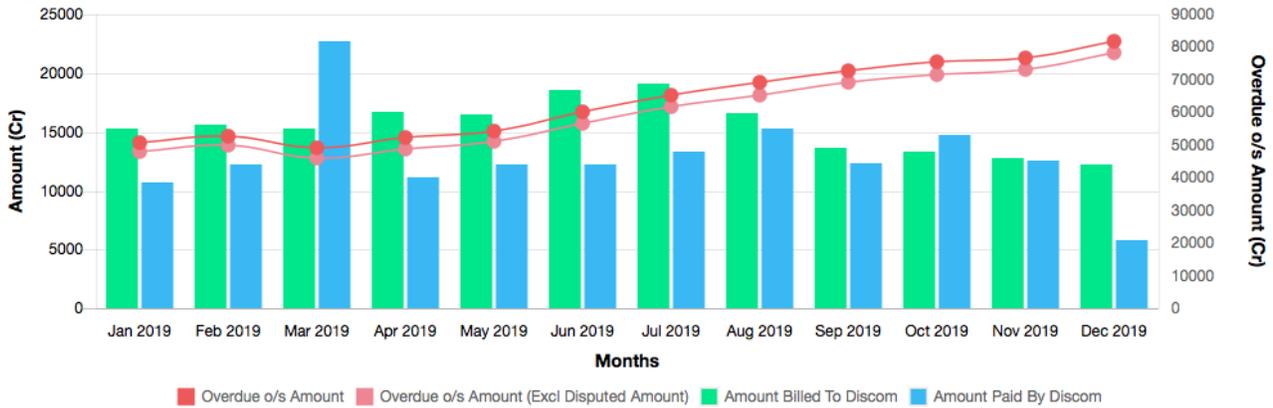
According to the power ministry portal PRAAPTI, which provides data on what discoms' must pay to power producers, payments of Rs81,894 crore (~US\$11.5bn) were due as of December 2019. This amount captures

¹⁶ UDAY. *Journey of UDAY*. March 2017.

¹⁷ UDAY. *Q2FY2019/20*.

payments overdue by more than 60 days, a normal test definition of financial distress.¹⁸

Figure 5: Payments Overdue From Discoms to Power Producers in 2019



Source: PRAAPTI

As Figure 5 illustrates, discom payments overdue for more than 60 days consistently rose during 2019. While much of these late payments are due to thermal power producers, as of November 2019 discoms owed Rs5,936 crore (US\$850m) in overdue payments to renewable energy producers. This is a rising financial risk undermining the bankability of renewable energy infrastructure projects.

Discom payment delays are largely attributed to a mismatch between the cashflow cycles of discoms and the payments required by power producers. Discoms are exposed to payment delays from bulk customers such as local bodies and state government departments as well as rural consumers. Additionally, discoms face irregular payments on solar panel and smart meter installations on government-owned buildings and various other government-run schemes. In comparison to upstream players such as power producers, coal miners and transmission companies, discoms are more exposed to a variety of end-consumers. In turn, payment delays from discoms hampers power producers' cash flows and further transfers financial stress.

Payment delays from discoms hampers power producers' cash flows.

Given the magnitude of debt and equity capital required to implement India's renewable energy transition, the discom's financial distress is undermining the commercial performance of renewable energy developers, a number of which are largely backed by international investors. A robust commercial and financial setting allows further investment in the sector at least cost to consumers.

¹⁸ PRAAPTI. December 2019.

Early Signs of Improvement

From August 2019 onwards, discoms have been mandated to open and maintain adequate Letters of Credit (LC) as a payment security mechanism within PPAs. A dispatch of power is only scheduled after written communication specifying the duration of supply has been provided to the load despatch centre (LDC). This communication is provided by the discom and confirmed by the power generator.

Sumant Sinha, founder and CEO of ReNew Power, India's largest renewable energy developer, recently suggested that the payment situation is improving, with the exception of Tamil Nadu and Andhra Pradesh.¹⁹

A New Discom Reform Scheme

The UDAY scheme has mainly focused on reducing the financial burden of discoms by reducing the gap between the average cost of supply (ACS) and the average revenue realised (ARR), as well as reducing AT&C losses.

In IEEFA's view, although UDAY has been a significant step in the right direction, the initial positive momentum has met financial headwinds causing aggregate discom sector losses to again rise (Figure 5).

The Ministry of Power has mentioned that a sequel scheme — ADITYA— is being planned that would mandate discoms with excessive losses to either privatise operations or appoint distribution franchisees.²⁰ The scheme was expected to be announced in the FY2020/21 union budget with a capital outlay of Rs230 thousand crore (US\$32.8bn) for infrastructure upgradation, but there was no mention of the scheme during the budget.

Privatisation of the Power Distribution Sector

The privatisation of the power distribution sector has been a growing area of discussion over the last year. Leading private utilities such as Adani Transmission and Tata Power are already operating in the sector in the big cities of India such as Mumbai and Delhi.

Further opening up of the discom sector for privatisation or private competition could well insert the required capital, technology, accountability and efficiency the state-run discoms have till now been unable to provide.²¹ However, privatisation alone will not be the panacea for such a significant and complex set of interrelated issues.

¹⁹ Aljazeera. [Goldman-backed ReNew has warning about renewable energy in India](#). 01 November 2019.

²⁰ Business Standard. [Budget 2020: Powermen red flag any 'privatisation' attempt by govt](#). 31 January 2020.

²¹ ET Energy World. [From a B2B or B2G company, Tata Power is becoming B2C: Praveer Sinha](#). 26 November 2019.

A core problem is that India's power tariffs are composed of largely unfunded cross-subsidy structures whereby industrial and commercial customers are charged the highest tariffs (of Rs9-10/kWh) and agricultural customers are offered extremely low or zero tariffs (residential tariffs in the range of Rs5-6/kWh).

The largely unfunded nature of electricity subsidies is a political issue; politicians from all parties use cheap electricity as an election vote winner. The political nature of these subsidies (even whilst the intention is positive in terms of providing equitable access to energy) undermines the viability of infrastructure investment and raises capital risk premiums across the entire electricity generation sector, for both thermal and renewable investors. A progressive or partial privatisation of the distribution sector is not without risk, given private owners would look to progressively repeal this cross-subsidy as unsustainable.

The largely unfunded nature of electricity subsidies is a political issue.

To IEEFA, an effective Direct Benefit Transfer (DBT) scheme could be a key tool in addressing the need for a safety net while ensuring that privatisation is just, viable and also politically acceptable. A DBT provides upfront bank transfers to lower socioeconomic farmers and residential customers who then pay for the electricity they consume.

IEEFA notes that better planning, as well as improving the financial management of discoms by addressing payment security issues, would serve to improve the credit ratings of renewable energy projects in India, in turn lowering capital costs whilst attracting more investment into the renewable energy sector.

Insufficient Grid Expansion

A key prerequisite for continuing India's renewable energy investment ambition is concurrently building out and modernising India's national transmission grid to accelerate the enormous progress achieved over the last decade.

The Central Electricity Authority (CEA) estimated in 2018 that an additional 110,000 circuit kilometres (ckt) of new transmission lines were required to serve annual peak load demand of 225.7GW by FY2021/22.²²

While the state-owned power transmission developer, Power Grid Corporation of India Limited (PGCIL) recently updated its progress to report that 52,000 ckt of the required additional transmission capacity had been commissioned²³, India's transmission network

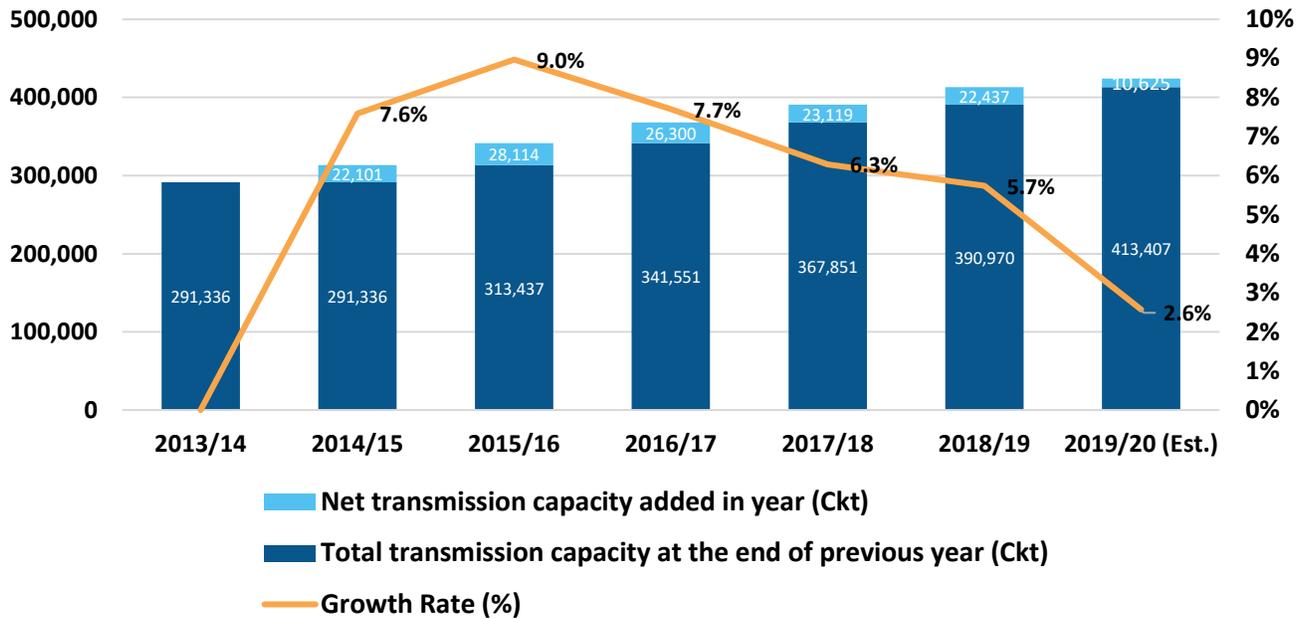
52,000 ckt of the required additional transmission capacity had been commissioned.

²² National Electricity Plan (India). January 2018.

²³ Financial Express. Few takers for renewable energy! Power transmission capacity addition down 31% in 2019. 5 January 2020.

expansion lately has not kept up with growth in the deployment of renewable energy capacity.

Figure 6: India's Power Transmission Capacity



Source: CEA

Note: Net capacity addition in till YTD FY2019/20 (Nov 2019) is 7,083 Ckt

The lack of new transmission infrastructure capacity has been a growing concern for solar and wind developers. For a number of mega solar and wind tenders, developers have attributed their low participation to the lack of power evacuation and grid transmission capacity.²⁴

For FY2019/20, IEEFA expects only 10,625 ckt of new transmission capacity to be added (a 2.6% growth in overall capacity). Figure 6 illustrates the slowdown in growth of India's transmission capacity expansion.

The drop in transmission capacity additions during FY2019/20 has been drastic. Reportedly, the slow growth in renewable energy capacity expansions has diminished the requirement to build new transmission capacity. This has created a negative spiralling effect, where the growth of transmission capacity has slowed, in turn slowing India's renewable energy ambition.

²⁴ Mercom. [India's Transmission Infrastructure Struggles to Keep Up With RE Additions](#). 1 August 2019.

Green Energy Transmission Corridor

A green energy transmission corridor has been planned to support India's renewable energy mega target. The central government's Green Energy Transmission Corridor aims to improve interstate transmission capacity and thereby unlock the potential of new renewable energy specific zones.

Given India's geographic spread of renewable rich states on the western and southern coasts, inter-regional capacity for transmitting power from energy surplus states to deficit states would boost energy security, and provide better load balancing capacity.

Figure 7: Green Energy Transmission Corridor Project Auction

Project name	Project cost (in ₹ cr)	Final bid (in ₹ cr)	Winning company
GEC			
WRSS21 (A) Transmission	147.05	95.12	Adani
WRSS21 (B)	317.05	178.9	Sterlite Power
Rajasthan SEZ	232.05	122.06	PowerGrid
Rajasthan SEZ Transmission	205.36	100.05	Adani
Bhuj-II	170.51	123.67	Power Grid
Non-GEC			
Udupi-Kasargode	107.1	84.74	Sterlite
UP Obra Transmission	144	84.35	Adani
UP Jawaharpur	99	53.81	Power Grid
Total	1422.12		

GEC= Green Energy Corridor; Non-GEC

Source: Business Standard

In August 2018, a power transmission network committee proposed transmission system infrastructure for renewable energy specific zones to support 50GW of solar capacity and 16.5GW of wind capacity cumulatively in seven states. The infrastructure was planned to be implemented in two phases by FY2019/20 and FY2020/21 with the total cost estimated to be Rs42,235 crore (US\$6bn).²⁵ In July 2019, the renewable power ministry invoked special powers to declare these transmission projects to be of national importance.²⁶

²⁵ CEA. 1st Meeting of Western region Standing Committee on Transmission (WRSCT) — Agenda Note. 24 August 2018.

²⁶ ET Energy World. Govt invokes special powers to save green projects worth Rs 40,000 crore. July 2019.

In August 2019, a competitive bidding auction for the transmission projects saw projects with estimated costs of Rs1,422 crore (US\$200m) being awarded at 40-50% lower. Adani Transmission, Sterlite Power, L&T, Tata Power and PGCIL participated in the auction. ReNew Power made its debut in the transmission sector by participating in the auction, but did not win any projects.²⁷ IEEFA notes the participation of the private sector in competitive auctions has brought project execution costs down.

The participation of the private sector in competitive auctions has brought project execution costs down.

South Australia's Success

India's top renewable energy states could learn from South Australia's success.

IEEFA recently highlighted the success of the Australian state of South Australia in transitioning its electricity sector to low-cost renewables. The state produced 54.6% of its total power generation from variable renewable sources during 2019. Onshore wind and solar (both utility scale and rooftop) represented 49% of total installed electricity capacity and battery storage another 2%.²⁸

The Australian transmission regulator recently approved a transmission interconnector between the states of South Australia and New South Wales (NSW). The new interstate transmission line will not only improve the energy security of South Australia — which is currently relatively isolated at the end of the long-line national grid with only the state of Victoria to trade electricity with — but will also unlock additional renewable-rich zones in both states.²⁹

Economic Slowdown Buys India Some Time

Another underlying reason behind the slowdown in transmission capacity growth is the sustained and unexpectedly significant slowdown in power demand due to weaker economic growth in FY2019/20.

India's GDP growth during the July-September 2019 quarter was only 4.5% compared to 7% during the same quarter in FY2018/19, sliding down to 6.6%, 5.8% and 5% for the following quarters between (October 2019-June 2019).³⁰

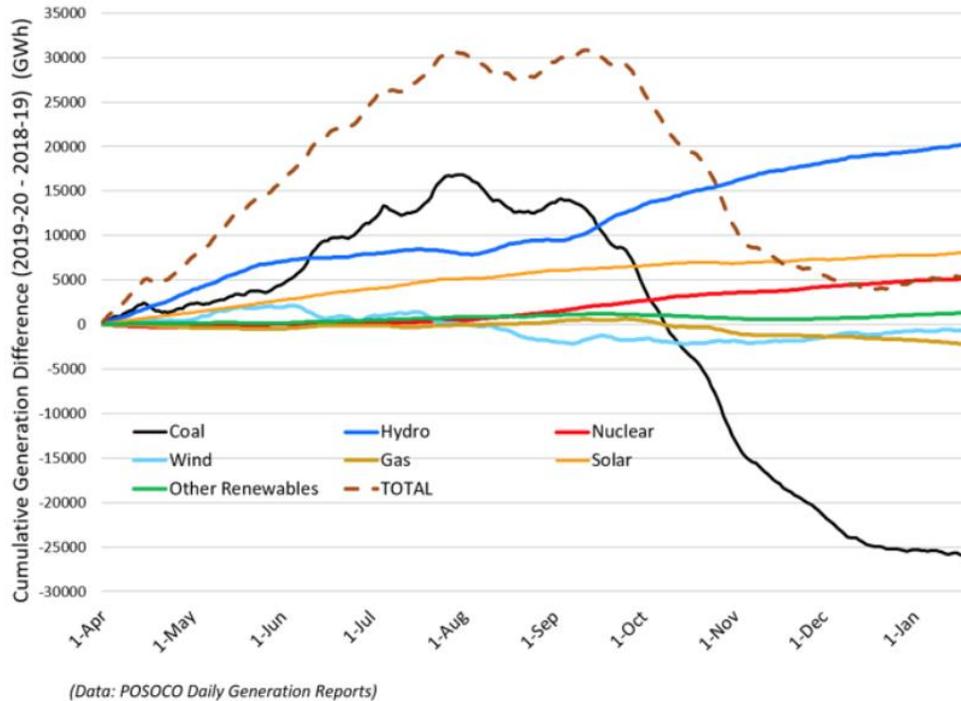
²⁷ Business Standard. *New green energy corridors witness 50% reduction in project costs.* 1 August 2019.

²⁸ IEEFA. *India's top renewables states can learn from South Australia.* 13 January 2020.

²⁹ Renew Economy. *South Australia on track to 100 pct renewables, as regulator comes to party.* 24 January 2020.

³⁰ Economic Times. *India's GDP growth shrinks to 4.5% in Q2FY20; lowest in 26 quarters.* 29 November 2019.

Figure 8: Cumulative Generation – FY2019-20 Versus FY 2018-19



Source: Charles Worringham

While the economic downturn increases financial pressures, it also emphasises an opportunity for India to accelerate forward-looking infrastructure spending. With the right policy commitments, stability and clarity, India could attract investment into the transmission sector and further aid the renewables sector, both of which offer job creation opportunities during this difficult economic period.

Need for Forward Planning

India's transmission capacity grew hand-in-hand with total electricity demand growth between FY2015/16 and FY2017/18 with average capacity additions of 25,000 ckt per year.

A multitude of policy issues have slowed down renewable capacity and transmission capacity additions. An efficient and robust grid network is crucial in minimising grid curtailments and for ensuring that renewable assets do not face the financial risk of asset stranding, as is currently occurring in the Indian thermal power sector.

The government must stay on track with its plan to support green energy corridors with new transmission capacity, despite the slowdown in renewable capacity additions.

Improving interstate grid transition capacity is key to driving a progressively higher reliance on low cost domestic renewable energy capacity, with the

Improving interstate grid transition capacity is key.

concurrent benefits of improving energy security by diluting India's reliance on expensive imported fossil fuels.

Aggressive Tariff Caps and Tariff Renegotiations

Since the Indian renewable energy sector has moved to reverse bidding auctions for energy procurement, there has been some 50GW of solar and wind capacity awarded at below Rs3.00/kWh (US\$42/MWh) with zero indexation for 25 years. This is an exceptional outcome for India.

This is an exceptional outcome for India.

While there has been record low tariffs for wind of Rs2.43/kWh (US\$34/MWh) and for solar of Rs2.44/kWh (US\$34/MWh), these have proven unsustainable in light of the increased financial risks to investors.

In the current context of policy uncertainty and headwinds related to project execution, developers are now finding the lower range tariffs of Rs2.60-2.80/kWh and less to be unviable and unsustainable.

Indian reverse bidding auctions, especially through the state-owned discoms, set upper and lower tariffs caps within which developers have to bid. Developers are finding the tariff caps too aggressive, with the risk-return viability stretched to the point where they are increasingly unwilling to participate in auctions. Roughly 6.7GW of auctions received no response between March-December 2019.

The upper tariffs for each contract must be tailored by taking into account the renewable energy potential of the location — solar irradiation or wind speeds, as well as the relative risk / credit profile of the discom involved. Financial markets are clear: the higher the risk, the higher the tariff required for the project to be viable.

The power ministry and state governments must engage better with developers and investors to discover expectations and reach common ground on acceptable risk parameters. Stubbornly low tariff caps based on price discoveries evidenced in previous auctions when conditions were ideal (falling interest rates, no import duties, clear and consistent policy support, and policies where the government absorbed the land acquisition and grid access risks) are no longer viable. The repeated lack of depth in tendering responses throughout 2019 is clear evidence that private capital will only be mobilised when there is an acceptable risk-return profile.

Private capital will only be mobilised when there is an acceptable risk-return profile.

Moreover, there have been a number of occasions where state-owned discoms have tried, after the event, to renegotiate tariffs discovered through reverse bidding auctions, bringing sovereign risk issues to the fore. Again, the Indian tendering experience has made it clear: the higher the risk, the higher the cost to consumers in

the form of tender price outcomes. To IEEFA, this is slowing the inevitable technology driven transformation of India's energy system, with all the associated benefits of lowering pollution pressures, reducing carbon emissions and improving India's energy security.

Andhra Pradesh's Tariff Renegotiation Attempts

In August 2019, then newly-elected Andhra Pradesh (AP) Chief Minister Jaganmohan Reddy announced a review of the state's position, calling for retrospective renegotiation and even the cancellation of renewable energy projects contracted during the previous government, suggesting corruption in the awarding of contracts and further blaming contracts for the financial losses of Andhra Pradesh's state-owned power discoms.

The Chief Minister also called for a slew of measures including recovery notices for solar and wind projects contracted at high tariffs, a revision of high tariffs to match the level of the lowest tariffs ever recorded in India, and the cancellation of a number of big projects including 21 wind power projects, the landmark 600MW Siemens Gamesa hybrid project, the Axis Energy hybrid project, a number of energy storage projects, and about 600MW of scheduled power proposals.³¹

The renewable power tariffs that were under contention ranged from Rs3.50/kWh to Rs5.45/kWh and were signed during the previous feed-in-tariff regime when the market rate was considerably higher than rates achievable in 2018/19.

³¹ Mercom India. [Andhra Pradesh to Issue Recovery Notices to Solar, Wind Projects for Loss Caused to DISCOM](#). 3 July 2019.

Figure 9: Some of the Contracts Under Contention in Andhra Pradesh

Developers	Intermediary / Offtaker	Portfolio size considered (MWp)	Average tariff (INR/unit)	Proposed tariff (INR/unit)	Percentage reduction in revenues
Greenko Group companies	NTPC + AP discoms	582	4.50	2.38	-47%
APGENCO	AP discoms	400	3.50	2.44	-30%
SB Energy	NTPC	350	4.63	2.37	-49%
Tata Power	NTPC	300	5.45	2.37	-57%
Azure power	NTPC + SECI	200	5.16	2.37	-54%
ACME Solar Holdings Pvt. Ltd	SECI	150	4.43	2.37	-47%
FRV Power India Pvt. Ltd.	SECI	100	4.43	2.37	-47%
Adani Green - Prayatna Developers	NTPC	50	5.13	2.37	-54%
Total/ average		2132	4.54	2.39	-46%
Note: Proposed INR 2.37/ unit of tariff excludes the trading margin of INR 0.07/ unit for both SECI and NTPC backed payment agreements					
Source: CEEW-CEF analysis					

The core of the issue however rested with the loss-making state-owned discoms, Andhra Pradesh Southern Power Distribution Company (APSPDL) and Andhra Pradesh Eastern Power Distribution Company (APEPDCL). Both made entirely unsustainable losses of Rs934 crore (US\$130m) and Rs628 crore (US\$90m) respectively in FY2018/19. The gap between average cost of supply (ACS) and average revenue realised (ARR) per unit of electricity supplied was prohibitively high at Rs 0.23/kWh and Rs 0.71/kWh for APSPDL and APEPDCL respectively.

Various legal and political interventions have meant the retrospective renegotiation issues are slowly being resolved. In December 2019, the central government and the Andhra Pradesh government reached consensus on the PPAs under contention, with the outcome that they would not be revisited. Also, the Andhra Pradesh government agreed to pay discoms' dues of Rs280 crore (US\$38.5m) within a 10 day period.³² Some developers that had PPAs with Andhra Pradesh discoms such as Hero Future Energies and Mytrah confirmed they received such payments.³³

Aggressive tariff caps in auctions and retrospective renegotiations represent a common problem across Indian states. India has seen wind tariffs decline by 30-50% post 2016, while solar tariffs have fallen from a much higher starting point of up to 80% over the last decade. The resulting learning-by-doing in the domestic context, and the development of ongoing whole-of-supply chain cost reductions would not have been possible without this initial investment. However, financially distressed discoms are now saddled with another ~20 years of contract terms at prices well above the replacement cost today. Notwithstanding this, the attempt to walk away from legally

Aggressive tariff caps in auctions and retrospective renegotiations represent a common problem.

³² Mercom India. [Solar and wind PPAs with tariffs set by SERC in Andhra Pradesh will not be revisited](#). 2 December 2019.

³³ ET Energy World. [Ray of as Andhra Pradesh starts clearing renewable dues this week](#). 4 January 2020.

binding contracts is a false economy, undermining the rule of law that is a critical pre-requisite before new investment in low cost renewables capacity can occur.

In IEEFA's view, this short-termism is likely to have massive long term costs in terms of degrading Andhra Pradesh and even India's overall investment risk profile. The sanctity of legal contracts should be of the utmost importance and is key to India achieving its long-term goal of delivering a doubling or tripling of electricity generation over the coming decade or two at the least cost to consumers, while sustaining India's rate of economic growth.

Positive Developments in Tendering to Reduce Risks

In August 2019, the power ministry amended bidding rules for wind power auctions to revitalise developers' much-diminished investment interest.³⁴ The amendments included:

- **Land acquisition:** The earlier clause that required developers to find project land within seven months after signing their PPA was repealed. Developers are now allowed to find land anytime within the commissioning deadline.
- **Penalty on generation shortfalls:** The penalty on any generation shortfall from the wind project's declared annual capacity utilisation factor (CUF) was reduced from 75% to 50% of the contracted tariff.
- **Payment on early commissioning:** Payment rates for projects commissioned earlier than the project's deadline were increased, rising from 75% of the contracted tariff to 100%.
- **Project deadline:** The deadline of SECI tenders was changed from the earlier 18 month deadline from the time the PPA was signed between the developer and SECI. As per the new rules, developers have an extended deadline of 18 months after SECI signs a power supply agreement (PSA) with the state discom.

In addition to the above changes, the MNRE is planning to remove ceiling tariffs for SECI's wind energy tenders. This would be a welcome move for the developers as it allows them to bid for appropriate tariffs that balance their risk-return outcomes.³⁵

These are positive changes that will improve the risk-return balance. However, the failure of the latest SECI tender suggests issues in the wind power sector are still difficult and materially deeper than just a few unfavourable contractual terms. Despite flexible land acquisition timelines, developers have not been able to find suitable land

**Suggests issues in the
wind power sector
are still difficult.**

³⁴ Indian Ministry of New and renewable Energy. [Amendments to the guidelines for tariff based competitive bidding process for procurement of power from grid connected wind projects](#). 16 July 2019.

³⁵ ET Energy World. [Ceiling tariff in wind energy tenders to go](#). 7 February 2020

at the right price. Unless this issue is effectively addressed, any improvement in developers' confidence is unlikely.

Financing Now a Constraint

Sovereign risk, policy risks and erratic discom payments are all creating unnecessary financial constraints for the Indian renewable energy sector.

In addition to policy issues specific to renewable energy, the magnitude and unresolved nature of India's many NPAs in the thermal power and discom sector has undermined the integrity of the Indian financial sector as a whole. This in turn has had a ripple effect on financing in the renewable energy sector.

The NPAs of US\$40-60bn in the thermal power generation sector has impaired various financial institutions' ability to lend. Although slowly getting resolved through either financial restructuring or bankruptcy mechanisms, the staggering rate of loan losses reaching 40-80% or more means that improvement in the banks' lending capacity is yet to be seen.³⁶

Despite the improvement in the flow of international debt and equity capital into India's renewables sector, the market's depth is limited because of the lack of a cost-effective currency hedging option, with capital access increasingly limited to a handful of top developers.³⁷

Renewable Energy Assets Credit Rating Downgraded

In October 2019, one of India's credit rating agencies, ICRA Ltd downgraded the credit rating of around 1.9GW of wind and solar assets. According to ICRA, with record low solar and wind power tariffs, banks are wary of lending to developers as they suspect the viability of projects, including whether developers have agreed to sell power at unsustainably low tariffs. ICRA cited other key issues including payment delays, land acquisition problems for wind power projects, as well as transmission and connectivity related challenges.

Removal of Priority Lending Limit

To its credit, the central government has recognised and tried to address the financing constraints in the renewable sector.

In June 2019, the MNRE requested the Reserve Bank of India remove a priority lending limit for the renewable energy sector, allowing private banks to lend more to renewable energy projects.³⁸ The union power minister R. K. Singh also requested the banks differentiate between the renewable energy sector and the thermal power sector. Given the distress in India's thermal power sector, lending activity has dried

³⁶ IEEFA. *Seriously Stressed and Stranded*. December 2019.

³⁷ IEEFA. *International Capital Awaits a Robust Policy Environment in India's Renewables Infrastructure Sector*. August 2019.

³⁸ ET Energy World. *Ministry seeks removal of priority lending limit for renewable energy to boost financing*. June 2019.

up in the power sector more generally as a result. Separating out the renewable energy sector would allow an easier flow of funds into the sector and cost differentials for the lower financial risk profile.

Despite short-term headwinds, India maintains a clear commitment to its long-term objectives for new renewable energy capacity to supply the majority of incremental new power demand around the country.

IEEFA is confident that international capital will continue to flow into India's renewable energy sector. We make this forecast conditional upon the resolution of sovereign risk issues and assuming the market is allowed to adequately differentiate tariff outcomes to reflect differing risk profiles.

IEEFA is confident that international capital will continue to flow into India's renewable energy sector.

Adani Green and Azure Power are two of the largest renewable energy developers in India, and both have leveraged their better access to international and domestic capital. Figure 10 illustrates the stock performance of Adani Green (orange) and Azure Power (purple) versus Bombay Stock Exchange (BSE, blue) and Nifty 50 Index (green) between 1 January 2019 to 31 January 2020.

Figure 10: Stock Performance Adani Green vs Azure Power vs BSE vs Nifty50 (January 2019 – January 2020)



Source: Thomson Reuters

Adani Green and Azure Power both outperformed the markets during the stated period despite the doldrums in the country's renewable energy sector. Adani Green and Azure Power's stock prices rose 357.6% and 35.7% respectively, whilst the BSE was down 11.2% and Nifty 50 Index was up 9.7%. In IEEFA's view, this is reflective of investor's improving confidence in the long-term outlook of India's renewable energy sector where policy risks can be effectively managed.

India's renewable energy sector will require a huge investment push from a multitude of public and private financial institutions, non-banking financial corporations and green investment banks, as well as innovative new financing models such as Infrastructure Investment Funds (Invits) and growing access to international green bonds to improve access to an ever larger pool of capital at progressively lower costs, which in turn should drive further renewable energy tariff deflation over time.

Given India's massive target of 275GW of renewables by 2026/27 and 450GW by 2029/30, and the associated expansion and modernisation of the national grid system, IEEFA estimates US\$500-700bn of new investment is required. This will also

**IEEFA estimates
US\$500-700bn of new
investment is
required.**

require activities from smaller regional developers who will in turn require domestic funding.

Therefore, it is extremely important to free up liquidity in the domestic banking system as soon as possible to keep India's renewable energy ambition on track. This will require financial institutions to wear the short term pain of writing off and resolving stranded thermal power plant loans, and moving to hold promoters accountable for their investment decisions. Promoters hold all of the benefits on good investments; it is also critical that they wear the losses on failed investments, otherwise this socialisation of losses will mean past mistakes will invariably reoccur, to the cost of the Indian electricity consumer and taxpayers.

Policy Recommendations

The government will need to provide policy support and clarity while ensuring sanctity of contracts to better manage India's energy sector transition.

IEEFA recommends the following ten broad recommendations to be executed to accelerate renewable energy activity in India:

1. Improve coordination and engagements amongst the central and state governments, discoms and developers.
2. Support the domestic solar manufacturing industry with means other than trade barriers, such as off-take assurances, better solar tariff caps, and by encouraging exports.
3. Rationalise GST on solar and wind power equipment at one standard national rate, and then leave it at that rate.
4. Clear land acquisition and transmission connectivity-related operational bottlenecks and inefficiencies for renewable energy projects, with a renewed focus on renewable energy hubs and industrial solar parks where the state government shoulders the land acquisition and grid connection risks, reducing the risk for investors and ensuring non-arable land is preferred.
5. Diversify and encourage newer third parties for renewable power procurements through corporate PPAs, with SECI and NTPC rolling out state-specific solar and wind tenders.
6. Provide performance-based support for discoms under the new discom reform schemes.
7. Privatise the power distribution sector, or allow the entry of private competition.
8. Plan for transmission network expansion and modernisation, and incorporate the connection needs of large scale renewable energy hubs.

-
9. Revise and formulate tariff caps via better understanding of the industries' tariff expectations and risk assessments.
 10. Improve domestic and international access of capital for both large scale and smaller renewable energy players, and improve the balance sheet capacity of the IREDA whilst applying far greater discipline to the PFC in light of its ongoing losses from NPAs in the thermal power sector.

India's economic potential, the size of its electricity market, and its clear long-term objectives for electricity sector transformation are strong pillars. If further supported by policies and strong governance, India could attract US\$500-700bn of investment into its renewable energy and grid sectors this decade.

About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

About the Authors

Tim Buckley

Tim Buckley, IEEFA's director of energy finance research, Australasia, has over 30 years of financial market experience covering the Australian, Asian and global equity markets from both a buy and sell side perspective. Tim was a top-rated Equity Research Analyst and has covered most sectors of the Australian economy. Tim was a Managing Director, Head of Equity Research at Citigroup for 17 years, as well as co-Managing Director of Arkx Investment Management P/L, a global listed clean energy investment firm that was jointly owned by management and Westpac Banking Group.

Kashish Shah

Kashish Shah, a Research Associate at IEEFA, has a master's degree in economics from the University of Sydney and an engineering degree from NMIMS University in Mumbai. Kashish has worked in the Global Analytics Division of the Royal Bank of Scotland with a focus on regulatory policies. Kashish has research experiences in India's public sector in his work for a member of Indian Parliament and a University of Sydney-based research group.

This report is for information and educational purposes only. The Institute for Energy Economics and Financial Analysis ("IEEFA") does not provide tax, legal, investment or accounting advice. This report is not intended to provide, and should not be relied on for, tax, legal, investment or accounting advice. Nothing in this report is intended as investment advice, as an offer or solicitation of an offer to buy or sell, or as a recommendation, endorsement, or sponsorship of any security, company, or fund. IEEFA is not responsible for any investment decision made by you. You are responsible for your own investment research and investment decisions. This report is not meant as a general guide to investing, nor as a source of any specific investment recommendation. Unless attributed to others, any opinions expressed are our current opinions only. Certain information presented may have been provided by third parties. IEEFA believes that such third-party information is reliable, and has checked public records to verify it wherever possible, but does not guarantee its accuracy, timeliness or completeness; and it is subject to change without notice.