TATA POWER

TATA

GREEN MARKET CAPSULE

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TPTCL'S E-NEWSLETTER

Tata Power Trading Company Limited (TPTCL)

Contents:

Lighting up Lives!

Regulatory News

Chhattisgarh Releases Draft Renewable Purchase Obligations Regulations for 2021-2026

The Chhattisgarh State Electricity Regulatory Commission (CSERC) has issued a draft notification for the state's renewable purchase obligation (RPO) and renewable energy certificates (REC) framework regulations for 2021-2026. The Chhattisgarh State Renewable Energy Development Agency (CREDA) will be the designated state agency for accrediting and recommending renewable energy projects for registration. The agency must publish a summary statement of renewable energy procurement and RPO compliance by different obligated entities by April 15, 2021, on its website.

The CSERC said that it would remunerate the agency from time to time and assign other responsibilities as required. The regulations are set to come into effect from April 1, 2021. The Commission invited comments and suggestions on the draft regulations on or before April 8, 2021.

Applicability:

These regulations will apply to all distribution companies (DISCOM), open access consumers, and captive power users in the state. Co-located and non-co-located captive users with a connected load of 1 MW and above will be subject to a base percentage of RPO to the extent of the captive consumption met through the captive generating project.

The regulations also apply to open access (OA) consumers with a capacity of 1 MW and above who procure non-renewable power will be subject to a minimum RPO percentage to the extent of non-renewable power consumed. This applies only to consumers who do not have a supply agreement with their respective area's DISCOM. Consumers who have supply agreements with their DISCOMs and also with other individuals under OA regulations will also be subject to a minimum RPO percentage requirement. Obligated entities who consume power to the extent of the total RPO specified from fossil fuel-based co-generation power projects will be exempted from the minimum RPO requirement.

RPO Targets for Obligated Entities:

The RPO targets will be calculated based on different consumption parameters for obligated entities. For distribution licensees, RPO will be computed based on low-voltage, high-voltage, and extra-high-voltage sales. For co-located captive users and co-located end users who do not qualify as captive users, RPOs will be computed based on gross generation after subtracting auxiliary consumption and total energy injected into the grid.

For non-co-located captive users, the actual energy consumed by the captive generating project will be factored in to discover the RPO targets. Finally, OA consumers will get their targets based on their energy consumption. Only renewable power purchases under long- term power purchase agreements (PPA) with biomass-based generating projects would be considered for meeting RPO targets. It also noted that purchases from other renewable sources, including small hydro, wind, and solar under long, medium, or short-term arrangements, would be considered for meeting RPO requirements.

The regulations provided that existing long-terms PPAs for renewable power purchase shall remain valid and that any excess purchase over prescribed percentages will be adjusted to meet the next year's targets. It noted that the RPO targets for captive users with captive projects commissioned before April 1, 2016, will have targets applicable for the financial year 2015-2016 (1% solar and 6.25% non-solar).

Distribution Licensees:

DISCOMs are required to provide an estimate for the amount of renewable energy required for the ensuing year in the tariff or annual performance review petition as per the Commission's regulations. If the actual energy consumed is different from the estimate, the RPO in (million units) shall be deemed to have been modified according to the prescribed percentages.

They are also required to submit details regarding total electricity purchases or consumption, and purchase of renewable energy for meeting RPO targets every month to CREDA.

Defaults

Obligated entities that do not meet their targets during any financial year will be directed to maintain a separate fund for an amount that will be specified by the Commission. The Commission will determine the amount based on the shortfall in units and the forbearance price as determined by the Central Electricity Regulatory Commission (CERC).

This fund will be utilized as per the state Commission's directives. If defaulters provide a genuine reason for non-compliance, they can approach the Commission to be allowed to carry forward the unmet compliance requirements to the next year.

Renewable Energy Pricing

All renewable projects commissioned during the control period will be given the option to follow either the tariff structure and other conditions per the CSERC's tariff regulations or the REC mechanism for power pricing from the project. Renewable projects with long-term PPAs for the sale of power at a preferential tariff that has prematurely terminated their agreements will not be eligible for participating in the REC program for three years from the date of termination of their agreement.

Projects that opt for either the preferential tariff or the REC mechanism will have to continue with their choice for the entire tariff period or until their PPA expires, whichever is later. The regulations said that the prices of RECs will be as discovered in power exchanges for the duration of the regulations.

Open access renewable power consumers will be required to pay cross-subsidy surcharges as specified by the Commission's OA regulations. No banking facilities will be provided for third-party sales from renewable sources through open access. Earlier, the Punjab State Electricity Regulatory Commission proposed to cap the RPO for captive power projects. It has invited feedback from the industry on or before March 17, 2021.

Mercom has previously written about the importance of meeting RPO targets. The power market also awaited the end of an over seven-month halt in the trading of REC, and stakeholders remained hopeful of a deadline extension from their respective state electricity regulatory commissions to meet their targets. *Source*

Power News

Tata Power bags orders to develop 60 MW solar project in Gujarat

Tata Power said it has bagged an order to develop 60 MW (mega watt) solar project for Gujarat Urja Vikas Nigam. The company has received a letter of award from Gujarat Urja Vikas Nigam Limited (GUVNL) on March 26, 2021, to develop a 60 MW solar project in the state of Gujarat, Tata Power said in a regulatory filing.

The energy will be supplied to GUVNL under a power purchase agreement (PPA), valid for a period of 25 years from scheduled commercial operation date, the company said. As per the company, the project has to be commissioned within 18 months from the date of execution of the PPA.

Praveer Sinha, CEO and MD, Tata Power, said with this award the cumulative capacity under development in Gujarat would be 580 MW. Tata Power's renewable capacity will increase to 4,007 MW, out of which 2,687 MW is operational and 1,320 MW is under implementation including 60 MW won under this PPA, the company added. *Source*

India Can Boost Clean Energy and Double Its Power Supply by 2030

India has set ambitious targets for renewable power, with plans to quintuple its current wind and solar energy capacity by 2030. The country's transition away from fossil fuels will have a significant impact on global climate efforts, since it is the world's third-largest greenhouse gas emitter – although its per capita emissions are below the global average.

A new study recently published in the Proceedings of the National Academy of Sciences from researchers at Berkeley Lab, UC Santa Barbara, and UC Berkeley shows India can aim even higher with its renewable energy goals. By increasing its clean power capacity from the current target of 450 gigawatts within the next decade to 600 gigawatts, the nation can hold its greenhouse gas emissions from the electricity sector at 2018 levels while nearly doubling the supply of electricity to meet economic development needs. The costs, the researchers demonstrated, would be comparable to those of a fossil fuel-dominated grid. "We found that high renewable energy targets can be cost-effective for India, thanks to falling prices," said UC Santa Barbara assistant professor and Berkeley Lab faculty scientist Ranjit Deshmukh. "The key to achieving the lowest costs lies in finding the right mix on the electric grid."

Using computer models, the research team, which also included Duncan Callaway of UC Berkeley, examined the electricity and carbon mitigation costs needed to reliably operate India's grid in 2030 for a variety of wind and solar targets. Under current goals, two-thirds of India's added renewable electricity would come from solar and the rest from wind. But because of India's weather and electricity demand patterns, a target that leans more heavily on wind power will lead to lower costs, the study found.

India will still need resources to meet electricity demand during times when both sun and wind levels are too low, the researchers noted. "Costs for energy storage on the grid are falling rapidly, making it a viable option in the near term," said Amol Phadke, a Berkeley Lab staff scientist. "To avoid investments in new coal power plants, deploying battery storage will be essential." *Source*

Smart contracts to be vital for integration of renewable energy into system: CEA member

Smart contracts, which allows automatic execution of transactions without a third party, will be vital for the integration of renewable power into the system, said a government official. A smart contract represents a digital protocol that automatically executes predefined processes of a transaction without requiring the involvement of a third party. For instance, such fully automated smart contracts between power suppliers or producers and consumers regulate both supply of electricity and payment autonomously.

Smart contracts are going to be vital for the integration of renewable energy into the system, said Gorityala Veera Mahendar, member (economic and commercial) of Central Electricity Authority (CEA). He said this during a webinar on 'Ensuring Power Sector Viability & Reviving Investment Outlook' organised by FICCI. He further said, "Minimising the entry and exit barriers for investments will be important for maintaining private sector interest in the sector."

This assumes significance in view of India's ambitious target of having 175 gigawatts (GW) of renewable energy by 2022. Participating in the webinar, Gujarat Electricity Regulatory Commission (GERC) Chairman Anand Kumar said there is a huge opportunity for investment in renewable energy and transmission business in Gujarat. Kumar said Gujarat has taken care of payment issues and always maintained a balanced position for utilities and investors.

He also mentioned that one of the vital responsibilities of the regulators is to intervene to enforce contracts to safeguard investments in the sector. "Timely revision of tariffs is also essential for ensuring the sound financial health of the discoms (distribution companies) and the generators," said the GERC chairman. Vipul Tuli, chairman of FICCI Power Committee and CEO (South Asia) of Sembcorp Industries, stressed the need to find a way to get the regulatory systems to act faster.

"The transition that we are going through in the Indian power sector is a significant transition in terms of moving towards renewables, growth and new environmental norms," added Tuli. Emphasising the need for cost-reflective tariffs, Punjab State Electricity Regulatory Commission member Anjuli Chandra said reduction of cross-subsidy is one of the prime responsibilities of the regulator.

She further mentioned that the Regulatory Commission should allow legitimate expenses for technological advancements. However, regulatory assets are not sustainable in the long term, only banks make profit from these assets. She added that power purchase cost can be optimised by taking advantage of markets. Prabir Neogi, mentor of FICCI Power Committee and chief adviser (corporate affairs) at RP-Sanjiv Goenka Group, said the regulatory intervention has a major role in making the distribution sector viable. Speaking further, he said the effectiveness of the reform measures depends on the adaptability of the government policies and their proper implementation. *Source*

Solar tariffs likely to rise in near term: Icra

MUMBAI: Policy support and tariff competitiveness will likely continue to drive investments in the renewable energy sector but delays in signing of power purchase agreements (PPAs) and power sale agreements (PSAs) are key downside risks, said Icra Ratings. While solar power tariffs will see an expected increase due to the levy of the basic customs duty, they will likely remain below Rs 3 per unit and cost competitive.

The pandemic-induced restrictions had slowed down capacity addition in the renewable energy sector during the initial months of the current fiscal. However, beginning October, activity has picked up, ed by

easing of lockdown curbs and supply chain challenges. The sector added 5.9 GW in the first eleven months FY21, which is expected to increase to 7.5-8.0 GW by March 2021. Solar power segment remains the key driver of capacity addition in the sector, surpassing wind power capacity for the first time in January this year.

“Favourable factors like policy support and tariff competitiveness are likely to attract investments in the RE sector. Given the expected increase in solar tariff rates amid the imposition of basic customs duty (BCD) on imported solar PV cells and modules, the key downside risk for the sector in the near term arises from the risk of delays in signing of the PPAs/PSAs," said Girish kumar Kadam, co-group head, Icra ratings, adding that about 20 GW capacity tendered by central intermediate procurers such as the Solar Energy Corp of India Ltd (SECI) and NTPC Ltd are is yet to tie up PPAs/PSAs.

Icra has a stable outlook for the renewable energy sector due to factors such as continued policy support from the government, strong growth potential, presence of creditworthy central nodal agencies as intermediary procurers and tariff competitiveness. The resolution of tariff issue for renewable projects in Andhra Pradesh is a key monitorable.

The government has recently notified the Approved Models and Manufacturers of Solar PV modules (ALMM) for procurement by developers under various schemes. This is a positive for domestic solar cell and module manufacturers. And while the absence of solar PV manufacturers located outside India from the list helps, clarity is required on the applicability of the order on projects awarded under standard bidding guidelines, Icra said.

This apart, the credit profile of operational RE projects having exposure to state distribution utilities (discoms) remains constrained by delays in payments, with overall dues from discoms to independent power producers (IPPs) having risen 39% to Rs121.4 billion as of January 2021 from Rs87.6 billion as of March 2020, as per data from the PRAAPTI portal.

“The PLF performance of wind projects in ICRA’s rated portfolio has seen a greater variability, as against the solar projects. This is also reflected from the dip in generation for ICRA-rated wind IPPs by about 15% on a year-on-year (YoY) in FY2021, amid a relatively subdued wind season," said Vikram V, sector head, Icra Ratings, adding that payment delays have remained relatively more prominent for wind projects under the state policy framework. However, despite the variability in generation and payment delays, the credit profile of Icra-rated RE IPPs is supported by adequate liquidity buffer in the form of debt service reserve and working capital funding and presence of a relatively strong sponsor. *Source*

Study shows why India should increase renewable energy target of 2030

Researchers at UC Santa Barbara have just released a study that demonstrates why India should double down on renewables. The study examines electricity and carbon mitigation costs associated with achieving aggressive renewable energy targets in India's electricity grid in 2030, and finds that wind-majority or balanced wind-solar targets have the most cost-effective potential for power in India.

Researcher Ranjit Deshmukh, and co-authors Duncan Callaway and Amol Phadke, reveal in a paper published in the Proceedings of the National Academy of Sciences that building significant numbers of wind and solar plants (600 GW) will reduce how often fossil fuel power plants must run. This will hold India's 2030 electricity emissions at its 2018 level, at costs comparable to a fossil fuel-dominated grid while nearly doubling the supply of electricity.

As costs decrease, battery storage can cost-effectively avert the need for new fossil fuel power plants. These findings stem from an exhaustive analysis of India's power usage, weather patterns and energy infrastructure. The Indian government set a target of 450 gigawatts of renewable energy capacity by 2030. For comparison, the country's total energy generation capacity today is about 380 gigawatts, out of which 90 gigawatts are of renewable energy, not including large hydropower stations.

According to the Council on Energy, Environment and Water (CEEW), India would need to generate at least 83 per cent of its electricity from (non-hydropower) renewable energy sources in order to reach net-zero by 2050. However, mitigating carbon emissions is only one concern when it comes to developing countries like India. "Most of these countries have low historical carbon emissions compared to more industrialized countries," said Deshmukh, an assistant professor in the Environmental Studies Program who leads the Clean Energy Transformation Lab. "So, the approach we take is that if renewable energy makes economic sense, then those countries should deploy more of it."

Because the costs of wind and solar, as well as battery storage, are dropping so rapidly, Deshmukh explained, it's actually cost-effective to install these technologies instead of conventional fossil fuel technologies, like coal and natural gas, regardless of environmental considerations. Renewable energy has become cheaper than conventional energy sources simply by avoiding the cost of fuel that would otherwise need to be mined or, in the case of natural gas, imported to generate the same electricity.

Based on his simulation of a few hundred scenarios, Deshmukh and his colleagues contend that India could increase its target to 600 GW of renewable capacity by 2030 and increase the cost to its consumers by only a small amount -- or in many cases actually decrease the cost. Batteries are becoming a cost-effective tool for smoothing differences between energy supply and demand. They can store clean energy for times of peak demand, averting the need to call on conventional power plants, especially the expensive ones that will be operated infrequently.

Without this ability to store and shift energy, renewables may not be able to prevent the need for building new coal and natural gas power plants if India hopes to meet peak demand. Fortunately, prices are already becoming so low that it will soon be less expensive to install batteries to store energy when demand is low compared to increasing power production when demand is high. This will shift economic factors even more toward renewable energy. *Source*

Net-zero emissions in India’s energy systems by 2050 highly challenging: Report

To reach a net-zero emissions energy system by 2050, India needs a suitable policy and innovation driven context to deploy clean energy technologies on a massive scale, according to a recent report by TERI and Shell. It added that this would require more and faster deployment of large-scale solar, wind and hydropower to enable greater electrification across the country. “It requires the development of new fuels... Energy efficiency must improve significantly, and carbon removals will have a critical role in moving towards zero emissions,” said the report that has assessed India’s technology and policy options if it were to accelerate its transition to a net-zero emissions energy system by 2050.

“With its geographic advantage and availability of vast potential, not only can India materialize its renewable potential, it can also become a global leader to showcase its green energy pathways. This is the right time for India to think in this direction of net-zero emissions by 2050,” said Amitabh Kant, CEO of the NITI Aayog at the report’s launch.

According to the report titled ‘India: Transforming to a net-zero emissions energy system’, the transformations needed over the next 30 years for India, in pursuit of this goal by mid-century would

consist of several areas of action. These would be to grow the power sector by a factor of more than four in 30 years, dominated by renewables, a target 13 per cent hydrogen in final energy, including as a fuel for industry and transport and to transform bioenergy, with liquid biofuels surpassing petroleum products by 2040 to fuel industry and transport.

To support energy-efficient and lower-carbon choices, investments in processes, technologies and end uses to improve energy intensity per unit of GDP by almost 60 per cent by 2050, a rate of improvement nearly twice historical levels, would be required, it added.

The report said that adoption of economic mechanisms such as carbon trading and pricing to facilitate reallocation of capital and resources to support commercialisation of new fuels and technologies and resorting to carbon sequestration to achieve net-zero emissions by 2050 would be necessary steps.
Source

India Needs to Generate 83% Electricity From RE to Achieve Net-Zero Emissions by 2050: CEEW

India would need to generate at least 83 percent of its electricity from (non-hydropower) renewable energy sources by 2050, if it were to commit to achieving net-zero greenhouse gas emissions by mid-century, according to an independent study released by the Council on Energy, Environment and Water (CEEW). This would mean a massive 55-fold increase in use of non-hydro renewables in electricity generation within the coming three decades, from only 160 Terawatt-hour (TWh) (10%) in 2019.

Further, to achieve net-zero by 2050 the share of electricity in India's industrial energy use must rise three-fold, from 20.3% in 2018 to 70% in 2050. The share of electric vehicles in passenger car sales would also have to rise to 76% in 2050 from just 0.1% in 2019. These estimates are based on CEEW's best understanding of progress on mitigation technologies. To meet net-zero, India would need to either completely eliminate greenhouse gas (GHG) emissions, or balance these by sequestering GHG emissions.

Dr. Vaibhav Chaturvedi, Fellow, CEEW, and author of the study, said, "Our first-of-its-kind analysis is intended to provide policymakers with different options in making a critical decision for India's future. We find that India would need to undergo a double transition, through faster electrification of sectors and an increasing share of renewables in power generation, if it were to announce an ambitious net-zero target. Policymakers would also need to identify manufacturing sectors where electricity could replace fossil fuels. Reducing the cost of electricity to make it competitive would be equally critical. Finally, the rate of decline in India's emission intensity of primary energy would have to be ramped up drastically to peak within the coming two decades."

The CEEW study is the first exercise to outline multiple pathways for India to attain net-zero emissions, rather than fixating on a single scenario or a single year. It highlighted that India would need to reach peak emissions within this decade if it were to achieve net-zero emissions by mid-century, a pace of transition unlike anything the world has seen before. This would give India an extremely narrow window to ensure a smooth and equitable transition from a peaking year to a net-zero year. Advanced economies, including China, Japan, the UK, and the USA, will have taken at least 30, and at times well over 40 years for this transition. Advanced economies peaked emissions at much higher levels of development, slower rates of growth and would have had longer transition periods.

Dr. Arunabha Ghosh, CEO, CEEW, said, "India has already demonstrated climate leadership and is the only G20 nation on track to surpass its Paris Agreement targets. However, if India were to announce a

net-zero target, it must choose a year that not only minimises climate impacts but also gives it enough space to develop. Achieving net-zero emissions by 2050 or 2060 would need rapid systemic changes across all sectors and sections of society. This, in turn, would require significant international financial investments and technological transfer from or technology co-development with the developed world. It would be equally important for India to closely examine trade-offs such as increasing cost of household electricity, increasing railways passenger fares, fiscal challenges for coal-dependent states, job losses for over half a million coal mining workers, and the shifting geopolitics around energy trade and the energy transition before announcing its net-zero targets. We need an informed debate based on analytics, not just heuristics."

The study explains why India's case is different from the net-zero pathways of China, the EU, Japan, the United Kingdom and the United States of America. First, the per capita emissions for all other economies in their respective peaking years would be much higher than India's, even if India were to peak in 2050. Secondly, India's real GDP growth rate would be much higher than any other country post their peaking years. This indicates that India would need to put in significantly more effort to peak and subsequently reduce emissions. Thirdly, India would have a much lower per capita income to support the transition, even if it began the post-peak transition in 2050, let alone 2030.

The study also found that if India were to peak in 2030 and reach net-zero in 2060 like China, its cumulative carbon emissions for 2021-2100 would be 80 GtCO2. For the same period, China and USA's cumulative carbon emissions, even after incorporating their net-zero ambitions, would be 349 GtCO2and 104 GtCO2, respectively. According to the World Bank, India's per capita carbon dioxide emissions stood at 1.82 tCO2 in 2016, much lower than the global average of 4.55 tCO2. Source

Gram Ujala scheme to offer LED bulbs for Rs 10 per piece in rural areas

State-run EESL arm Convergence Energy Services Ltd (CESL) launched the Gram Ujala programme under which high quality energy efficient LED bulbs will be given for Rs 10 per piece in certain villages of five states in the first phase. In the first phase of this programme, 15 million LED bulbs will be distributed across villages of Aarah (Bihar), Varanasi (Uttar Pradesh), Vijaywada (Andhra Pradesh), Nagpur (Maharashtra), and villages in western Gujarat. The programme will be financed entirely through carbon credits and will be the first such programme in India.

"CESL, a wholly-owned subsidiary of Energy Efficiency Services Ltd (EESL), unveiled GRAM UJALA programme today," CESL said in a statement. The Gram Ujala programme was launched by Power & New and Renewable Energy Minister R K Singh in Bihar. Under the programme, 7 watt and 12-watt LED bulbs with three years of warranty will be given to rural consumers on submission of working incandescent bulbs.

The Gram Ujala programme will be implemented in villages of the five districts only and consumers can exchange a maximum of five LED bulbs. These rural households will also have metres installed in their houses to account for usage. The programme will have a significant impact on India's climate change action energy savings of 2025 million KWh/year and CO2 reductions of 1.65 million tonnes CO2/year.
It will also enable better illumination, at an affordable price. This will usher in a better standard of life, financial savings, more economic activity, and better safety for rural citizens, as per the statement. "It is a moment of great pride and joy that we are able to find a solution that will provide affordable and high-quality LEDs to our rural population. I commend the efforts of Convergence (CESL) for their relentless work in taking the country's vision forward. I am sure such commitment and effort will be replicated across rural areas of India," Singh said.

Union Power Secretary Alok Kumar said it was a very important initiative based on an innovative model utilising carbon credits. "Gram Ujala will not only give a fillip to our fight against climate change by increasing energy efficiency, but also usher in a better standard of life, financial savings, and better safety for the citizens in rural areas," he added.

EESL Executive Vice Chairman Saurabh Kumar said the Ujala programme could not touch every village because the rural consumers were not able to pay Rs 70 per LED bulb. "With GRAM UJALA scheme, we will be taking back the consumer's incandescent bulbs and provide this high-quality LED bulb for Rs 10 per bulb," he added.

Further, carbon credit documentation will be sent to UN-accredited validators for inclusion into the Shine Programme of activities. Carbon credits will be prepared under the Shine Programme of Activities with an option for verifying under the Voluntary Carbon Standard, depending on the needs of buyers. Carbon credit buyers will also be sought through an open process based on initial discussions with the market. The balance cost and margin on the LED cost will be recouped through the carbon credits earned.

With price being one of the principle barriers, the Gram Ujala programme has been designed to support widespread distribution by removing the chief barrier for rural consumers. In addition, the energy savings garnered will reduce household's energy outlay, enabling higher disposable income and savings. *Source*

Could India establish itself as the global leader in energy storage?

With around 6.6 % of the global electricity demand (1,547,000 GWh/Year) India is the third-largest electricity market in the world, according to the U.S. Energy Information Administration. Considering its pivotal role in the global energy market, at COP 21 in Paris in 2015, India made a commitment of meeting 40% of its electricity generation through non-fossil fuels by 2030. Accordingly, the government of India has set an ambitious plan of 175 GW by 2022, 275 GW by 2027, and 450 GW of renewables by 2030.

	Actual as on 31.12.2020		Target as on 31.03.2022		Target as on 31.03.2030	
	(GW)	(%)	(GW)	(%)	(GW)	(%)
Thermal:	206.63	55.05	217.0	**45.40**	267.0	**32.09**
Hydro:	45.80	12.20	51.0	10.67	76.0	8.77
Gas:	25.00	6.66	25.0	5.23	25.0	3.00
Nuclear:	6.78	1.81	10.0	2.09	19.0	2.04
Renewable:	**91.15**	**24.28**	**175.0**	**36.61**	**450.0**	**54.09**
Total:	375.37	100.00	478.00	100.00	837.00	100.00

Figure 1: India's Installed Electricity Capacity and projection (Source: CEA)

How does storage play a role?

Given its specific characteristics, renewable energy (RE) technologies are fundamentally changing electricity systems and markets. Due to intermittent generation, RE increases the flexibility requirements placed on the overall power system requiring a significant step-up in investment in grid reliability via batteries, pumped hydro storage, solar thermal, gas and/or diesel power 'peakers', faster-ramping coal plants, increased interstate grid connectivity, demand response management and a variety of policy decisions to minimize the impact of variability and enabling grid integration of renewable energy.

In such a scenario, energy storage solutions could play a crucial role in enabling renewable energy integration without overreliance on new transmission corridors that could require huge capital investments. Energy storage solutions offer various value streams, such as optimizing demand and supply; increasing power infrastructure utilization; deferring investment in transmission and distribution infrastructure; deferring investment in peaking generation power plants; replacing expensive and polluting diesel power backup; and improving the quality of power supply through ancillary services including through frequency control and voltage support.

Various types of storage solutions such as pumped hydro storage, supercapacitors, flywheels, compressed air energy storage, etc., are available across the world; however, in India, these technologies have their constraints with regard to environmental and social effects, size, location, energy density and maximum hours of operation etc., making them less attractive. In such a predicament, Battery Energy Storage Systems (BESS) are increasingly seen as the holy grail of the Indian energy storage landscape, particularly because of decreasing prices and technology improvements. Based on Bloomberg NEF 2010–2018 data, the learning rate – reduction in price for each doubling of cumulative volume – of Li-ion batteries is 18%. BNEF uses this rate to project a price of US$62/kWh by 2030.

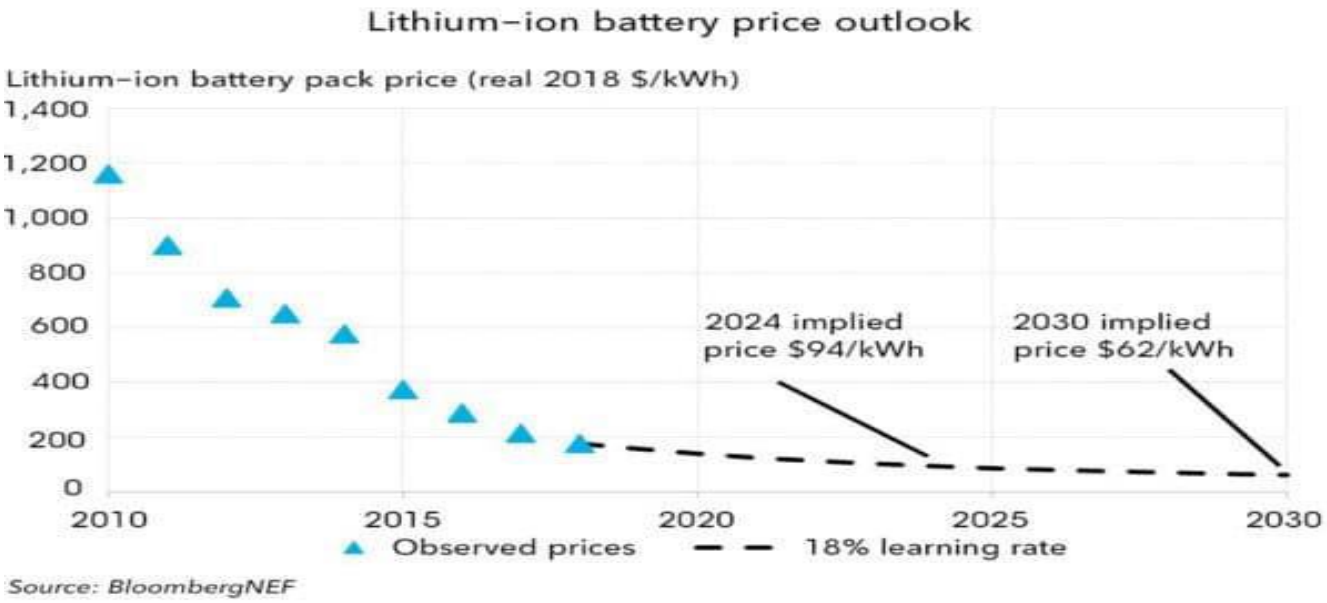


Figure 2: Li-ion battery pack historical prices and price projections (Source: BNEF, 2019)

Meanwhile, NITI Aayog and the Rocky Mountain Institute (2017) estimate that battery pack prices will reach $92–$99/kWh by 2025 and $60–$67/kWh by 2030.

Opportunities and targets

Owing to the burgeoning growth of electrified transportation, a sharp drop in battery storage prices, and increased variable renewable generation, BESS has now become the new buzz word of the electricity sector and led to a surge in investment, research, and market deployments of BESS across the globe. As per the U.S. Department of Energy's (DOE's), by 2030, the stationery and transportation energy storage combined markets are estimated to grow 2.5–4 terawatt-hours (TWh) annually, approximately three to five times the current 800-gigawatt-hour (GWh) market. By 2030, annual global deployments of stationary storage (excluding PSH) are projected to exceed 300 GWh, representing a 27% compound annual growth rate (CAGR) for grid-related storage.

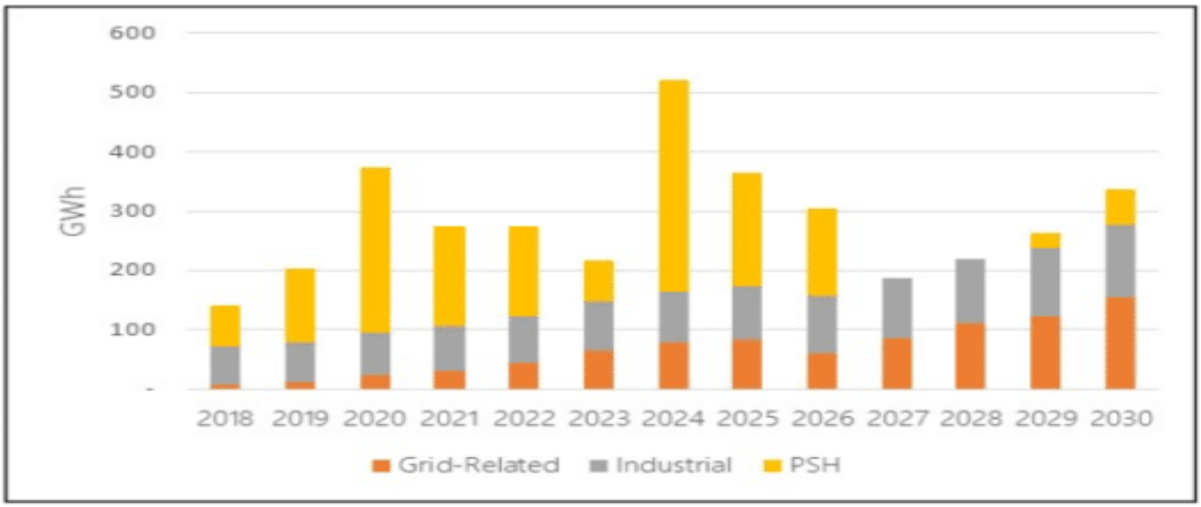


Figure 3: Annual global stationary storage deployment projection (Source: DOE, Energy Storage grand challenge)

NITI Aayog and Rocky Mountain Institute (2017) estimate that India could account for 800 GWh of battery demand per year by 2030, thus representing over a third of global demand. In India, the major growing markets for BESS are renewable integration into the grid, telecom towers back up, data centers, diesel optimization, solar rooftop, and distribution utility scale storage.

Renewable integration into the grid will be steered primarily through the focus on solar-wind hybrid tenders by Solar Energy Corporation of India (SECI) and other government agencies. Diesel genset optimization is also a key sector on account of the rising cost of diesel and operational issues associated with it. As of November 30, 2020, the total installed capacity of diesel-based power projects in India was 509.7 MW. Another top market for energy storage is the Distribution Utility market, with top private DISCOMs such as BSES and TPDDL (10 MWh) in Delhi having already completed BESS installations. Recognizing the transformative potential of battery energy storage and the imperative to limit climate change and achieve sustainable growth, India launched a National Mission on Transformative Mobility and Battery Storage (NMTMBS, 2019) that will support the deployment of battery storage in both e-mobility and across the power sector, with the objective of reducing India's energy import dependence, by reducing direct oil demand and increasing the uptake of renewable energy in the power sector.

Conclusion

In India, the lack of suitable fiscal incentives and relevant experience, combined with high upfront capital costs, has hindered the adoption of battery energy storage systems (BESS) in comparison to other developed countries.

However, driven by suitable grid tariffs, clearer regulatory policies and fiscal incentives, and a range of value propositions offered by BESS, grid storage systems have seen increased adoption on both the generation and consumption side.

Through identifying and marketing the value propositions of battery storage, access to affordable green capital, sustainable business models customized for the Indian market, and a clear policy and regulatory structure that supports and incentivize investments in battery energy storage systems, India could establish itself as the global leader in energy storage and lead the next big transition across the global energy sector. *Source*

Microgrids with hydrogen fuel cells installed in rural India

These microgrid solutions, installed at remote off-grid sites, consist of two EFOY Pro 12000 Duo fuel cells with a total output power of 1,000 Watts, a solar panel of 5,000 Watts, a Li-Ion battery bank and an intelligent energy management module. The AC supply is provided through a Hybrid 230 Volt AC inverter. The end users are a small cluster of habitat housing a total of about 50 people. This solution will ensure adequate lighting, ventilation, mobile phone charging, running of TVs, and other end devices.

The northeastern corner of India is characterised by territory that is difficult to navigate. Also, weather conditions can be adverse with low temperatures and heavy rainfall for long durations causing poor connectivity. The nature of methanol as a fuel that is used in other applications as an antifreeze agent makes it the perfect fuel for this kind of environment. This, together with the very low fuel consumption of the SFC fuel cells, are significant logistical advantages for the resupply over conventional diesel generators.

“Fuel cells are becoming increasingly sought after by Indian customers especially the Government departments in India due to their high reliability, low maintenance, and massive logistical advantages especially where conventional forms of energy cannot be relied upon. We see a very bright future for SFC Fuel Cells in India where we are also adding the SFC Hydrogen Fuel Cells to our portfolio,” says Karandeep Singh, managing director of FC TecNrgy Pvt Ltd.

The fuel cells require less than one liter of fuel per hour. On an average, these units are operated not more than six hours per day unless there is a bad weather spell that prohibits solar power harvesting. This simplifies logistics and significantly reduces the need to stockpile fuel compared to diesel generators. The EFOY fuel cells do not emit environmentally harmful emissions such as nitrogen oxides (NOx), carbon monoxide (CO), or particulates. This makes them a better option for installation close to living and rest areas.

“This initial serial field installation of this kind in India is an important step for us and our partner. We see great growth potential in India and all over the world, which we intend to tap with our innovative and approved fuel cell solutions,” says Dr. Peter Podesser, CEO of SFC Energy AG. SFC Energy is a supplier of hydrogen and direct methanol fuel cells for stationary and mobile hybrid power solutions and delivered the order together with partner FC TecNrgy Pvt Ltd. *Source*

India achieves 92.97 GW of renewable energy capacity in Feb this year

India has achieved 92.97 GW of renewable energy (RE) capacity till February this year, while 50.15 GW is under various stages of implementation, Parliament was informed. India has set an ambitious target of achieving 175 GW of installed RE capacity (excluding large hydropower) by 2022. "So far, 92.97 GW of cumulative installed RE capacity has been achieved as on February 2021. Further, projects of 50.15 GW capacity are under various stages of implementation and 27.02 GW are under various stages of bidding," Power and New & Renewable Energy Minister R K Singh said in a written reply to the Rajya Sabha.

Renewable energy projects are being implemented throughout the country based on various factors such as RE potential, availability of land and transmission etc, the minister added. According to the reply, India has the potential of 10,97,465 MW of RE including 7,48,990 MW of solar, 3,02,251 MW of wind energy and 21,133.62 of small hydro (with the capacity of up to 25 MW each). *Source*

Net-metering provision: Let the choice be with consumers, says industry

The government last year came up with the Electricity Rules, 2020, which laid down consumers rights and modified some of the existing rules such as for metering and billing. However, a provision related to metering in the rooftop solar segment has caused a lot of uproar among the solar developers. The said provision, mandated under the rules, mentions that there would be net-metering for solar rooftop projects of up to 10 kilowatt (kW) capacity and gross-metering for projects above that.

Simply put, this means that installations above 10 kW of solar rooftop projects would not be able to get the net-metering benefit and would be depended on the state-specified tariff on the electricity generated by their rooftop systems. “Developers are primarily worried about the viability of the tariff which they would get for the electricity generated through rooftop solar systems above 10 kW. This tariff varies from state-to-state and can change over time,” said Manish Gupta, senior director, CRISIL Ratings.

He added that if this tariff is not remunerative then it can make projects unviable and if the state-specific tariffs are not kept attractive for rooftop consumers then it might slow the pace of rooftop addition. According to industry experts, on-site generation through rooftop solar is the easiest way to convert idle space into a revenue-generating asset, especially in a country like India where land availability is scarce and at a premium.

They added that the value proposition to the user lies in this model being low-carbon and low-cost, while converting idle space into revenue-generating assets. Apart from this, the rooftop solar sector creates jobs, which can benefit the economy -- an imperative post the pandemic.

What is net-metering?

According to industry experts, the reason why the government decided on this provision was because it was seeking to standardise policy on metering of rooftop solar systems across the country. Let us understand this. In a net-metering arrangement, excess solar power generated by a customer’s solar power plant during the day is exported to the grid and is adjusted in the electricity bill against the units consumed from the grid during the evening.

In a gross-metering arrangement, the customer is compensated at a fixed ‘feed-in’ tariff. This fixed feed-in tariff is significantly lower than the retail supply tariff for which the customer was being compensated earlier under the net-metering arrangement for power exported to the grid.

What is the issue with the provision?

The provision implies that under gross-metering all energy would be mandatorily purchased by discoms at the price decided by the state regulatory commissions. According to experts, there is no clarity on whether this price will be fixed or liable to change over the years. They said that solar economics warrant a viable fixed price over the life of the project, especially, since the majority of the lifetime costs are in upfront capex.

Given the relatively-low 'feed-in' tariffs in gross-metering, the overall attractiveness of rooftop solar plant from an economic perspective goes down for customers whose connected load is greater than 10 kW and who do not need round-the-clock power such as schools, colleges, and industries which are seasonal in nature or those which only work for five to six days in a week.

What is the impact of this provision on discoms?

According to CRISIL's Manish Gupta, the step seems to be directionally positive for discoms, as it removes the benefit of net-metering for industrial consumers. Industrial consumers have been the high paying consumers for discoms, who were shifting to rooftop installation.

Why is the industry worried?

They are worried that it would massively impact the rooftop solar sector and make it nearly impossible to meet the 40 GW rooftop solar target by 2022. Ravinder Singh, chief – solar rooftop business, Tata Power, India's largest specialised EPC player, said that the new regulation will have a huge impact on the overall growth of the sector.

"Despite the various on-ground implementation challenges, net-metering has been one of the primary drivers for the growth of the rooftop solar industry over the past few years. This new regulation is going to have a huge impact on the overall growth of the rooftop industry in India," said Singh. Hyderabad-based Fourth Partner Energy (FPE), the country's leading solar energy company, told that as part of the industry body DISPA they have sent in their concerns regarding the provision to the MNRE officials.

"We understand the perspective on safeguarding the financial health of discoms, but an overarching cap on net-metering above 10 kW will be detrimental to this segment. The new rules, if adopted by different states will lead to substantial contraction in the rooftop business, impacting the livelihoods of lakhs of people employed in the sector," said Karan Chadha, head – business development, FPE.

He added that it would also kill any opportunity to meet the government target of 40 GW rooftop solar. India's cumulative installed rooftop solar capacity is currently about 6 GW. The target of the government is 40 GW by 2022. Over 70 per cent of rooftop solar is installed by the commercial and industrial segments. One of the key drivers for continued growth of the commercial and industrial rooftop segment in India is the provision of net-metering.

The simple premise is that many facilities and factories remain shut on Sundays and holidays, without net-metering, all the energy generated on off-days would go to waste. "We have seen robust growth and enthusiasm by customers in states where net-metering provisions are available, as it helps the customer reduce costs while meeting sustainability targets," added Chadha.

That said, the industry's demand from the government is very simple -- let the choice between gross-metering and net-metering lie with the end user. Apart from this, they also demand a stable long-term

policy that balances the interest of all the key stakeholders including the consumers, discoms and the industry itself. *Source*

Govt committed to promote renewable energy, especially in MSME sector: Gadkari

The government is committed to promote renewable energy resources in the country, especially in the micro, small and medium enterprises (MSMEs) sector, Union minister Nitin Gadkari has said. He also exuded confidence that within five years, India will be a top manufacturing hub for automobiles in the world.

Gadkari, who holds MSME portfolio along with road transport, said by making solar energy available, "we will create big market for electric vehicles". He invited investors abroad to invest in Indian MSMEs and expressed hope that this will provide a number of opportunities to the MSME sector to become the world's largest manufacturing hub. The minister was addressing a webinar on 'Aatmanirbhar Bharat – Opportunities in Solar & MSME'.

In his address, Gadkari said that the MSMEs with good track record are now being encouraged for capital market. He said there exists a huge opportunity for investment in scrapping policy. The minister highlighted that India has tremendous potential and capacity for electricity generation. He said that the solar power rate in India is Rs 2.40 per unit and commercial rate of power is Rs 11 per unit and the cheap power generated through solar energy can be used for automobiles and other developmental works. The government has set an ambitious target for renewable energy and in particular, solar power generation, for this decade. The target for renewable energy installation is 450 GW by year 2030. *Source*

REC signs MoU for financing 600 MW hydroelectric project in Bhutan

REC Limited said it along with Power Finance Corp has signed Memorandum of Understanding (MoU) with Kholongchhu Hydro Energy (KHEL) for financing of 600 Mw hydroelectric project at Trashi Yangtse, Bhutan. KHEL is a 50:50 JV company of SJVN (India) and Druk Green Power corporation Limited, Bhutan.

The project is being executed as per an inter-governmental agreement signed between India and Bhutan in April 2014 to undertake implementation of four hydroelectric projects in Bhutan through a joint venture model to be formed by PSUs of the two governments, an official statement said. KHEL is the first Joint Venture Company being undertaken between the two governments for implementation of 4x150 Mw Kholongchhu Hydro Electric Project.

KHEL has signed a concession agreement with the Bhutan government dated 29.06.2020 for a concession period of 30 years. The project is proposed to be funded in debt-equity ratio of 70:30 and as per the MoU, REC would be extending Rupee Term Loan of Rs 2,029 crore. The balance debt shall be extended by PFC (Rs 2029 crore), and Bhutan's NPPF (Rs. 200 crore) and Bank of Bhutan (Rs 200 crore). *Source*

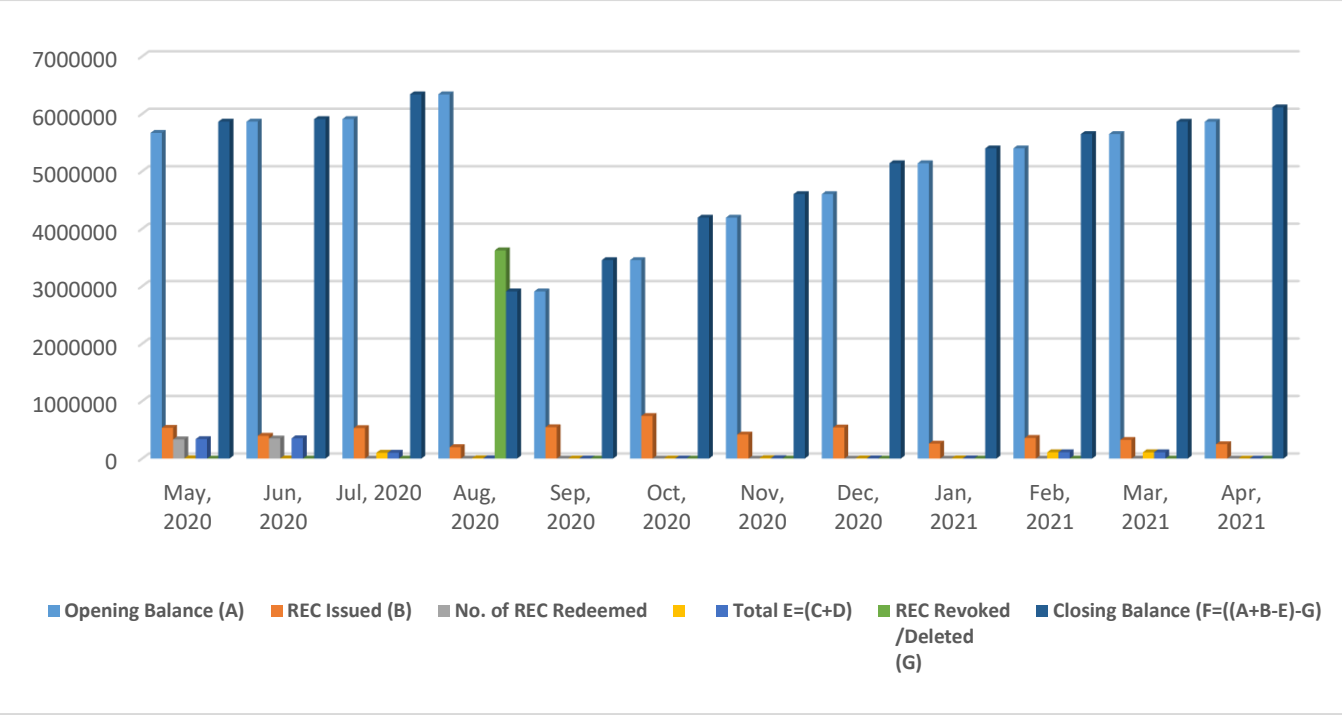
Source wise REC break up:-

SN	Source	Accredited		Registered		RECs Issued	RECs Redeemed Through Power Exchanges	RECs Redeemed Through Self Retention	Closing Balance
		As on date		As on date		Since Inception	Since Inception	Revoked/Deleted RECs	As on date
		Capacity	No. of Project	Capacity	No. of Project				
1	Wind	2749	535	2696	525	27476482	21953273	2356087	0
2	Urban or Municipal Waste	0	0	0	0	72892	72892	0	0
3	Solar Thermal	0	0	0	0	0	0	0	0
4	Solar PV	946	422	911	406	10374651	9561111	119543	0
5	Small Hydro	196	31	196	31	5442994	4765341	6899	0
6	Others	4	2	3	1	27012	12755	5010	0
7	Geothermal	0	0	0	0	0	0	0	0
8	DISCOM	NA	NA	NA	NA	8513006	4628199	0	3623895
9	Biomass	470	42	401	37	10809171	9896423	156549	0
10	Bio-fuel cogeneration	826	91	385	55	9169926	8610583	5001	0
	Total	**5191**	**1123**	**4592**	**1055**	**71886134**	**59500577**	**2649089**	**3623895**

REC Inventory position

Month Year	Opening Balance (A)	REC Issued (B)	No. of REC Redeemed		Total E=(C+D)	REC Revoked/ Deleted (G)	Closing Balance (F=((A+B-E)-G)
			RECs Redeemed through Power Exchanges ©	RECs retained by RE Generators (D)			
May, 2020	5668878	534663	333770	4893	338663	0	5864878
Jun, 2020	5864878	396265	349056	3415	352471	0	5908672

Jul, 2020	5908672	530935	0	100471	100471	0	6339136
Aug, 2020	6339136	198726	0	4744	4744	3623895	2909223
Sep, 2020	2909223	544955	0	207	207	0	3453971
Oct, 2020	3453971	740650	0	1086	1086	0	4193535
Nov, 2020	4193535	417810	0	7833	7833	0	4603512
Dec, 2020	4603512	540794	0	3171	3171	0	5141135
Jan, 2021	5141135	260411	0	2612	2612	0	5398934
Feb, 2021	5398934	359001	0	109394	109394	0	5648541
Mar, 2021	5648541	324035	0	109141	109141	0	5863435
Apr, 2021	5863435	249138	0	0	0	0	6112573
Total:		**71886134**	**59500577**	**2649089**	**62149666**	**3623895**	



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