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INDIAN ELECTRICITY SECTOR

Sun Rising on India's Renewable Energy Industry

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Population expansion, coupled with urbanisation, rapid industrialisation and higher usage of household electronic devices, have increased India's electricity demand in the last decade. According to an International Energy Agency report titled 'India 2020: Energy Policy Review' ("**IEA report**"), as compared to 2018, India's electricity demand is expected to triple by 2040 (available here). In order to meet this increased demand, massive addition to the installed power generating capacity is crucial. The Indian Government, with an eye on a self-reliant energy sector, has embarked on an ambitious project to increase its installed capacity of renewable energy - mainly from solar and wind, but also including biomass energy and small hydro power - to 175 Giga Watt ("**GW**") by 2022 and 450 GW by 2030. In concert to this massive push for renewable energy generation, India is also making attempts to phase out its thermal power plants as part of its climate change commitments and its endeavor to a green economy.

The power generation sector in India, much like the country itself, is extremely diversified. Generation varies from conventional sources such as coal, lignite, natural gas, oil to renewable energy sources such as wind, solar, and agricultural and domestic waste. The Central Electricity Authority of India ("**CEA**") has created a data base of all generating units having capacity upwards of 0.5 Mega Watts ("**MW**"). As per their May 2020 report, (available here), out of India's total installed capacity of 370.34 GW, coal based thermal power plants constitute a major 55.36% while renewable energy sources i.e. small hydro power less than 25MW, solar power, wind power and biomass power, account for 23.6% of the installed capacity.

Advancing from thermal power plants

In 2010, as an early course of action for reducing dependency on conventional sources and also to increase the share of renewable sources, the Indian Government imposed a 'Clean energy cess' on domestically produced and imported coal. This was later continued as compensation cess under Goods and Services Tax. The revenue so generated from the cess was utilised to set up a 'National clean energy and environment fund' which funded research and innovative projects in clean energy. Another major policy change which had a pronounced impact on coal based thermal plants are the new stringent emission standards legislated by the Indian Government in 2015 (available here). A 2019 study by the International Institute for Sustainable Development and the Council on Energy, Environment and Water (available here) estimates that it

would cost coal based power plants about INR 730 - 860 billion to install the required technology to control toxic emissions in compliance to the new standards. The study explains that this will effectively increase the operational cost by 9-21% also increasing the cost of electricity generated by coal power plants by INR 0.32-0.72 per KWh. Considering that this additional cost of installation of air-pollution control equipment will finally be borne by the consumer in the form of hiked power tariffs, and the fact that renewable energy has increasingly become cheaper, several private players are looking at renewable energy sources very favourably.

A mixture of such policies, in addition to the Indian Government's decision to close very old thermal power plants which have surpassed their operational age or where generation capacity has fallen below 40% and the limited approval for installation of new thermal plants, have succeeded in discouraging coal consumption and promoting renewable energy as a viable alternative option. A comparative analysis of the annual reports of CEA (available here), reveals that though coal based power generation capacity increased from 92.4 GW in 2010 to 205 GW in May 2020, the installed capacity for renewable energy has more than quadrupled in the same period from 18.4 GW to 87.3 GW.

Increasing renewable energy capacity

In order to promote renewable energy generation and sustain capacity growth, the Indian Government had notified a Renewable Power Obligation ("**RPO**") in 2011 which mandated electricity distribution companies ("**DISCOMs**") to purchase not less than 5% of its total annual consumption of energy from renewable sources. The RPO requirement has been gradually raised every year and will be 21% for all states by 2022 (Present data on RPO available here). However, Indian Government's RPO move of purchasing equal amounts of renewable source-based electricity regardless of where it is generated seems to not have factored in the disparity of renewable energy resources amongst the states. Presently almost all renewable energy plants are concentrated in western and southern India. states without renewable energy resources were constrained to purchase Renewable energy certificates ("**RECs**") - each REC equivalent to 1 MWh - in lieu of RPO. This led to an increase in the cost of purchasing power by DISCOMs, as these were in addition to the total thermal power required by them, further aggravating the financially constrained situation of cash starved state DISCOMs. Unfavourable financial conditions of the DISCOMs is a major reason why states without renewable energy resources have not strictly enforced RPO and REC provisions. The Indian Government should consider a policy option which incentivizes renewable energy rich states to set higher than national level targets to compensate for the inability of other states to meet the average national RPO target.

In order to obtain the necessary funding needed to carry out its visionary 2022 project, the Indian Government has permitted foreign direct investment ("**FDI**") up to 100% under the automatic route in renewable energy generation and distribution projects sector. While FDI in the renewable energy sector has witnessed a steady increase in the past few years, the Indian Renewable Energy Development Agency ("**IREDA**") has also been established under the Ministry of New and Renewable Energy ("**MNRE**") as a specialized financing agency for promotion and debt-financing renewable energy projects. IREDA is playing a key role in stimulating renewable energy uptake by extending long term loans to projects as they bear a long period of gestation. This healthy mix of debt and equity financing has helped put new and upcoming projects in a strong position.

Aggressive promotion of solar energy

Indian Government has been very aggressive in promoting solar energy since it introduced the National Solar Mission in 2010. India's growth in building solar power generating capacity has been impressive, increasing from 1 GW in 2012 to the present 33.3 GW of installed solar capacity (solar rooftops and utility scale) and another 47 GW in pipeline (data available here). On the strength of its bullish growth trajectory, Indian Government aims to touch 100 GW installed solar capacity by 2022 and has adopted a two-fold approach for achieving the same - incentives to boost solar energy generation and reduction in the cost of generating solar energy. Recognizing renewable energy projects as a priority sector, several State governments have offered a number of incentives to solar generation plants including 100% reimbursement of stamp-duty, property tax rebate, other tax related incentives, 100% reimbursement of land conversion fees (levied for use of agricultural land for commercial production). The decisive feature of the State governments policies has been the emphasis on development of solar park(s) (> 100 MW) hosting an array of players in the solar power sector such as several solar power plants, component manufacturers, R&D centres. It is pertinent to note that India has 9 solar parks having a cumulative installed capacity of 14.6 GW, with the Bhadla solar park in Rajasthan being the world's largest solar park to date having a total capacity of 2.24 GW. Despite facing land acquisition issues, project execution delays and a myriad of policy inconveniences, India has pioneered the development of multiple ultra-mega solar parks (> 1 GW).

Reducing the cost of renewable energy supply is the other side of the equation which can bring true India's solar energy dream of touching 100 GW. It is pertinent to note that setting up a domestic solar photo voltaic ("**PV**") cell manufacturing facility has two major challenges. Firstly, it is very capital intensive and secondly as the manufacturing is a high technology, multiple stage process, it takes around two years for the facility to become completely operational. Several states, such Gujarat, Uttarakhand and Karnataka have announced benefits and easy loans schemes to assist major power players in up expanding their domestic cell manufacturing facilities. Additionally, on 30 July 2018, India imposed a safeguard duty on imported solar cells from China and Malaysia for two years, i.e. an additional cost imposed on these imports in order to protect the domestic industry. (available here). This safeguard duty was later further extended till 29 July 2021 (available here). In March 2020, India's Energy minister had revealed that at the end of financial year ("**F.Y.**") 2018, India's imports of solar PV cells and modules stood at USD 3.83 billion which dropped down to USD 2.15 billion at end of F.Y. 2019, a decrease of over 43% year on year (News report available here).

However, while the safeguard duty succeeded in reducing the imports, India also witnessed a parallel decline in deployment of solar projects as tenders previously awarded at record low tariffs in the range INR 2.44 - 2.60/KWh had become unviable on account of the now additional cost to be borne by companies in the event of imports from China and Malaysia. An analysis by Council on Energy, Environment and Water ("**CEEW analysis**") (available here) also highlights that while imports from China and Malaysia reduced on account of the safeguard duty there was a concurrent increase in imports from Vietnam, Thailand and Singapore, resulting in the Indian Government now extending the safeguard duty from 30 July 2020 onwards to Thailand and Vietnam. Since many manufacturers of solar modules still rely heavily on imported cells, the input costs of such companies have also gone up significantly. It should be noted that module and PV manufacturers in India are mostly located in the Special Economic Zones ("**SEZs**"), which under the custom laws are regarded as international territory. SEZs majorly import solar PV and modules from China and sell the same to local Indian companies after value addition i.e., bringing together the glass aluminium frame, the EVA sheets which encapsulate solar cells, the back sheet which is the outermost layer of the solar cells, and other similar components to make the final product. Any local raw materials bought by Indian producers within SEZs are regarded as exports while goods that are produced in SEZs and sold in rest of India are regarded as imports. Thus, the sale of solar PV cells and modules manufactured in SEZ to rest of India will be treated as an import and will attract the additional safeguard duty thereby eroding the profit potential of manufacturers in SEZs. The safeguard duty has failed to achieve its objective of providing an impetus to domestic PV and module manufacturing as majority Indian companies shifted to other import venues. As it stands today, Indian solar module manufacturing capacity is nowhere near sufficient to supply the quality and quantity of modules required to achieve India's 2022 target.

Exploring off-shore wind projects

Wind energy is seeing a high level of commitment from the MNRE and several State governments, and there has been policy certainty in this sector. The total installed capacity of wind project stands at 37.8 GW with another 10.9 GW in pipeline with aims of increasing this to 60 GW by 2022. (data available here). Since 2015, a number of new policies have been introduced for promoting wind power including the draft wind-solar hybrid policy, guidelines for prototype wind turbines, and the proposal for evaluation of small wind energy and hybrid projects. Since 2016, potential of off-shore wind energy has attracted a lot of focus and in order to exploit India's vast 7,500 km coastline for offshore wind energy, Indian Government released the National offshore wind energy policy (available here). In June 2018, MNRE announced offshore wind energy targets of 5 GW by 2022 and 30 GW by 2030 giving a target destination to offshore wind energy in India. In January 2019, MNRE came up with draft offshore wind energy lease rules (available here). Under this initiative, offshore wind farms would be developed in exclusive economic zones along the Indian coastline with entities awarded lease areas of 100-500 sq. km.

The lease would be for an initial 5-year period to carry out necessary surveys followed by a 30-year period for construction and operation of the power projects, which can thereafter be renewed in 5-year increments. Finalization of these rules is needed for faster development of the offshore wind sector.

Though the potential of offshore wind energy is enormous, there are several technical, regulatory and logistics challenges that India needs to resolve. Presently, over 20 central government ministries and departments are likely to be included in the approval process for offshore wind power projects. This is likely to cause delays in securing approvals, make the clearance process cumbersome, postpone project timeline and also escalate the cost. A single-window time-bound clearance process is required to manage the timelines and to predict the costs of the project. Another area of concern is the logistics supply and grid integration as the offshore wind supply, which is still in its nascent stage, has practically no supply chain. India can leverage the supply chain, the local sub-structure and the trained workforce of the onshore wind industry to kick-off this nascent yet attractive opportunity.

Hybrid power plants

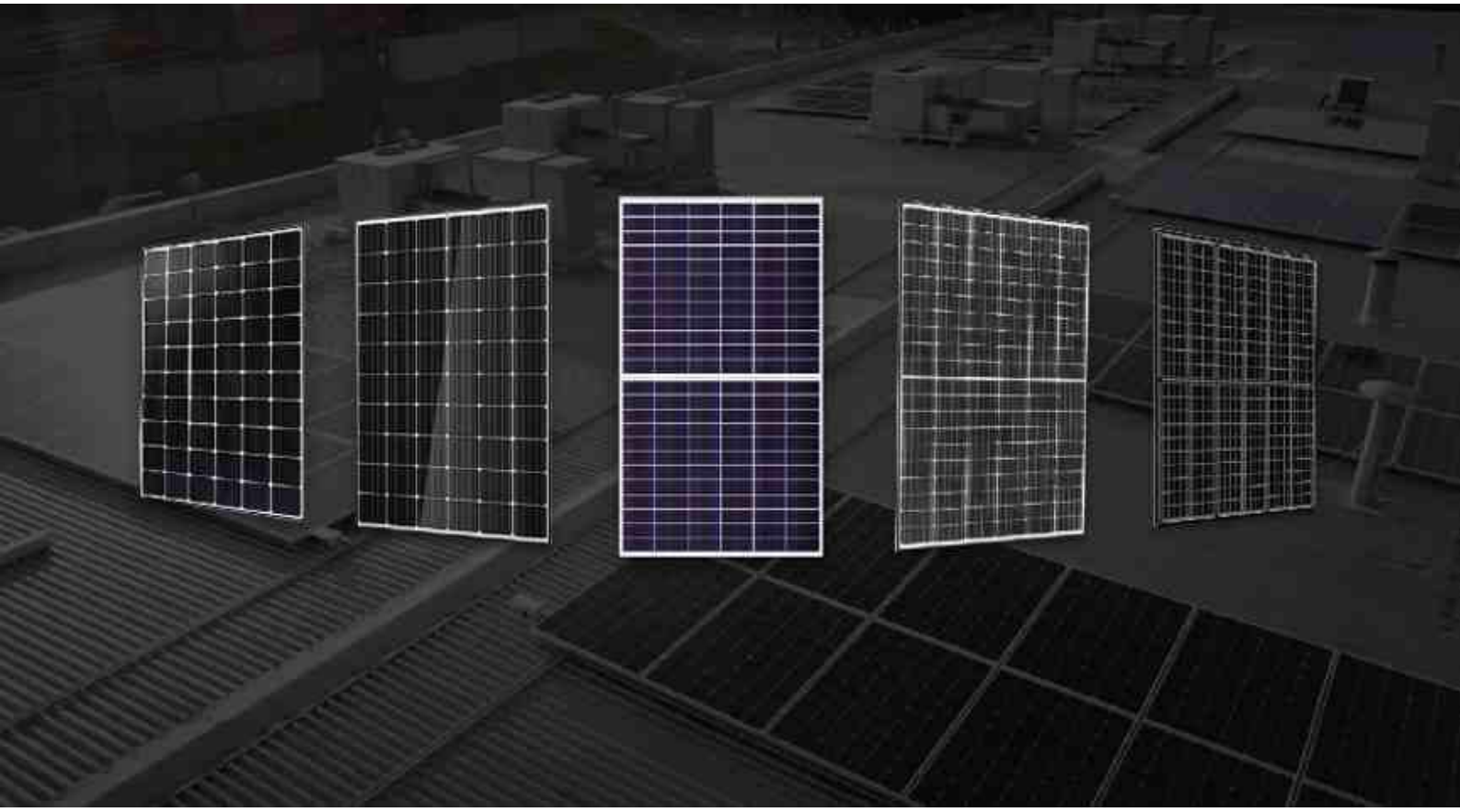
India is also looking at wind-solar hybrid power as an additional source of renewable power. Power generation from standalone solar or wind powered plants is irregular as solar energy peaks during the daytime whereas wind energy peaks at night. This irregular power supply affects the grid of DISCOMs are understandably unwilling to purchase power from standalone solar and wind power plants. However, wind-solar hybrid power marries the advantages of both and can be an effective alternative to coal-based plant. As already established wind and solar farms have enough space for hybrid plants, MNRE drafted a Wind-Solar hybrid policy in May 2018 (available here) seeking to promote new hybrid projects as well as hybridisation of existing standalone wind and solar projects.

Our thoughts

The efforts of the Indian Government are laudable as they have helped bring down the tariff rates of electricity from renewable source sand achieve parity with conventional sources. This has accelerated India's transition into a clean and green energy country, with renewable energy now an integral part of India's electricity development strategy. However, in order to achieve the 2022 ambition, it is imperative that there is uniformity between objectives of the various State governments with national goals

and policies of the Indian Government. Additionally, availability of land continues to be a struggle, especially for new entrants, and is a major reason why several global power giants are still hesitant from investing more in India. The Indian Government, the State governments and their various intermediaries must ensure timely allocation of land.

On the manufacturing front, India needs to utilise its existing manufacturing capacity optimally and promote R&D as the entire solar PV and module market is technology driven. Indigenous research can improve upon existing technology in terms of cost and performance. Instead of ad-hoc import duty imposition on foreign counterparts, India would be better served with a consistent long term domestic manufacture expansion policy with focus on providing trained labour, supportive debt financing and good market conditions. There is a need to invest in developing inexpensive energy storage capacity to meet peak hour demand. It is needless to say that an increase in renewable energy capacity has to be complimented with expansion and modernisation of the grid network, transmission lines and supportive infrastructure as most demand growth will come from states with less renewable energy potential. If properly executed, India - with its expected increase in energy demand and its abundant energy resources - could phase out its polluting thermal plants and be a global model for other countries to emulate.



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