



5TH EU-INDIA WORKSHOP SERIES ON "ENERGY REGULATION"

THE SECOND DEBATE ON
"DISTRIBUTED ENERGY RESOURCES— WHICH REGULATORY FRAMEWORKS AND REFORMS
CAN ENHANCE THEIR ROLE IN INDIA'S RENEWABLE TRANSITION?"



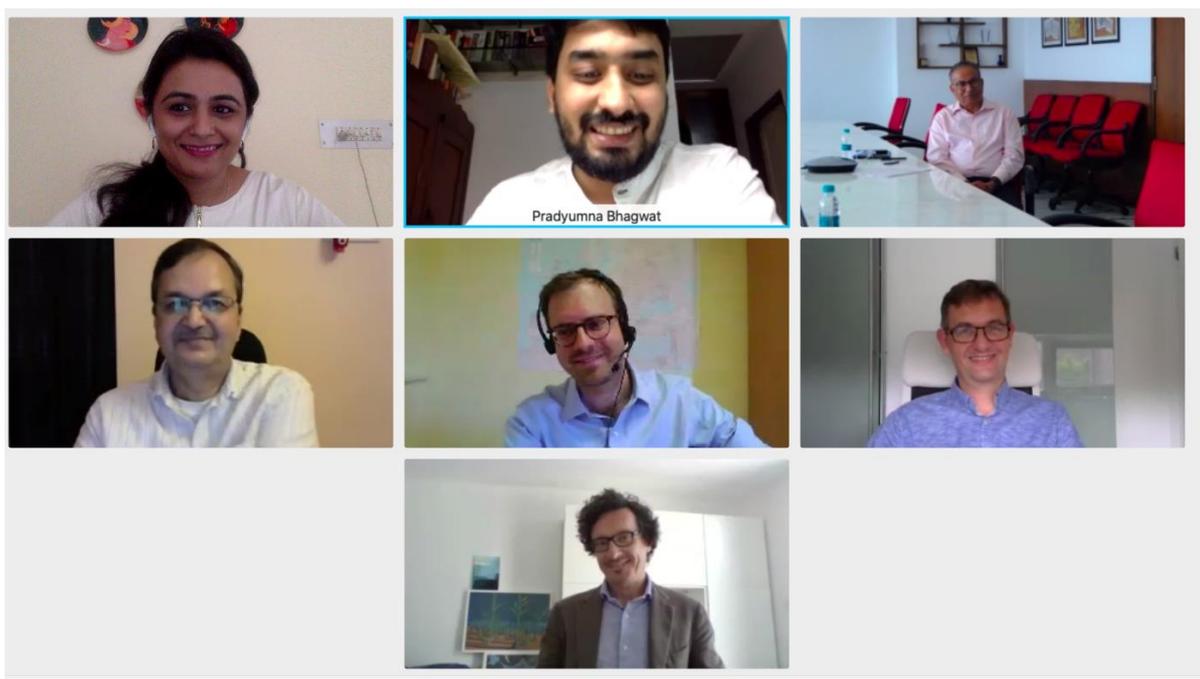
JUNE 4, 2021
FROM 14.00 - 16.00 IST (10.30-12.30 CET)

PROCEEDINGS

Webinar: second online debate on “Distributed energy resources - which regulatory frameworks and reforms can enhance their role in India’s renewable transition??”

On 4th June 2021, the EU-India Clean Energy and Climate Partnership (CECP) project in collaboration with the Florence School of Regulation (FSR) hosted the second of the six webinars, as part of the 5th EU-India workshop series on Energy Regulations. The theme of the series is 'Enablers for India’s Renewable Energy Transition: Competition and Market Design for the Power Sector'.

The second online debate was organized on the topic “Distributed energy resources (DER) – which regulatory frameworks and reforms can enhance their role in India’s renewable transition??”, which was attended by close to 150 participants, representing policy makers, regulators, organizations, utilities, think tanks, consultants and academia.



1.1. Inaugural Session

Mr. Edwin Koekkoek, Counsellor, Energy and Climate Action, Delegation of the EU to India welcomed the participants. He referred to the good cooperation between the EU and India in the area of clean energy transition and climate change. He mentioned that this series is organized together with the Florence School of Regulation. He thanked the Indian stakeholders, including the Ministry of Power, Central Electricity Regulatory Commission (CERC) and Power System Operation Corporation Limited (POSOCO) for their support and input to the webinar series.

He highlighted that under the clean energy and climate partnership, there are two activities dealing with distributed renewable energy resources – first of which is the Financing Investment in Clean Energy Platform (FICEP), which aims to catalyze investment for the clean energy transition with in the beginning a focus on DERs and energy efficiency in buildings and industry. The second activity takes place under the “Business Support to EU-India Policy Dialogue” project, where distributed energy is being promoted, especially in Uttar Pradesh with an end objective to bring together European and Indian businesses for concrete pilot projects.

1.2. Panel Discussion

Mr. R. P. Singh, Chairman, Uttar Pradesh Electricity Regulatory Commission (UPERC), opened the discussion by explaining his views on enabling DER in rural and urban areas in India from the regulatory perspective. Mr. R. P. Singh discussed the electricity framework in which India is currently operating and provided an overview of installed power capacity in India including thermal, hydro, nuclear and renewable energy (RE). He explained that in the last 4-5 years, the share of RE in the installed capacity has improved significantly and shall be the mainstream source in terms of annual capacity addition. Talking about the evolving trends in RE, he explained that wind used to lead the RE share but now solar has taken this role and now holds the largest installed capacity amongst renewables in India. He explained that in Financial Year 2020-21, share of RE generation is expected to touch ~10% of the total energy generation. He also took the stage to mention that demand for RE has remained stagnant in the last couple of years due to economic and non-economic factors.

Mentioning India's ambitious target of 175 GW of installed RE capacity by 2022, he mentioned certain impediments that are needed to be taken care of, to meet that target:

- While the cost of RE integration is less than thermal, the associated balancing cost of grid integration (in the form of higher associated transmission charges and fast response ancillary service requirement) is high in RE which makes it comparable to conventional power.
- Distribution companies' liability to pay stranded capacity charges in case of lackluster RE demand.
- Inadequate load and generation forecasting of DERs due to insufficient information / data for such forecasting and planning because of lack of smart systems to provide such data.
- High ramping and variability associated with DERs that are different than historical trends. Coordination for planning, installation and operation of DER resources was mentioned as a continuing need as the generation resource mix evolves on both transmission and distribution systems.
- Absence of long-term green products on energy exchanges (the available products like RTM, GTAM, etc. are short duration products) and non-existent ancillary market (so far only a draft regulation by CERC has been issued).
- Inadequate evacuation infrastructure for RE exists in India. Also, he mentioned that reactive power and harmonic issues are rampant.
- Visibility and control issues with behind the meter (BTM) application, etc. not visible in many cases. DERs are mostly passive and do not follow the dispatch signals and are generally not visible to system operators.
- Lack of trained man power to providing support to DERs / BTM smart assets.

Thereafter, Mr. R. P. Singh briefly discussed the current measures for enhancing RE grid integration that are being undertaken by the Government of India, such as Renewable Purchase Obligations, waiver of ISTS transmission charges & losses, development of solar parks, deployment of green energy corridors, demand aggregation for rooftop solar using The World Bank funding, promotion of rooftop systems through net metering, bundling of RE power with other sources such as RTC power and, most importantly, providing financial incentives for off-grid and decentralized renewable energy systems. Citing an example of such a scheme, he informed about the PM KUSUM initiative for agricultural pumps and decentralized solar systems.

He concluded with policy measures required to boost RE integration including promotion of smart energy metering systems and smart grid projects, blockchain for peer-to-peer RE trade, introduction of medium and long-term RE products in energy exchanges, standard settings for energy storage systems, RE-based EV charging infrastructure, enhanced incentives for solar-based cold storages in rural areas, incentivizing solar-powered agricultural tools such as solar dryers, solar-based green house, etc. and most urgently, human resource development to support DER asset in rural areas.

Dr. Praveer Sinha, CEO and MD, Tata Power expressed his gratitude for the opportunity to participate in the session and appreciated the selection of the topic, which is relevant in the context of Indian renewable energy sector. He discussed about improving energy access and quality of life for rural India and presented the initiatives that Tata Power has undertaken in the DER space in a rural setting. He mentioned that electricity supply in India has improved significantly in the last decade, especially for commercial and industrial consumers; however, reliable electricity supply in rural areas continues to be a challenge. Quoting example of farmers in India, he mentioned that 90 Lakh (9 million) farmers are still using DG pump with an approximate count of 3 crore (30 million) pump sets. Talking about the key contextual issue, he explained that there still exists a huge gap between tariff charge by Discoms and the cost of supply in rural areas, amounting to nearly INR 5.40 / unit. He stressed that this gap is likely to remain due to the high cost of service for utilities and small quantum of energy required in the rural setting, where micro/mini-grids have a significant role to play.

Dr. Sinha then set out Tata Power's partnership with The Rockefeller Foundation to set up TP Renewable Microgrid Ltd. He explained the mission of the company is to electrify 10,000 villages with solar mini-grids in selected states in the coming 6-7 years. To target villages where such mini-grids are to be installed, Dr. Sinha explained that Tata Power, jointly with MIT, has developed a tool to identify villages where electrification is required. The pilot is currently being run in 9 districts in the states of Uttar Pradesh and Bihar. He mentioned that 160 micro-grids (of 30 kW capacity each) have been installed by the company so far in the last one and half years. He explained that TP Renewable Microgrid team has worked closely with commercial and industrial users for activities like oil expelling, irrigation pumping, flour milling, milk chilling, rice hulling, etc. to provide support in terms of arranging equipment, financing and providing electricity. A focus on farmers in these villages is also being placed by promoting water as a service model and supporting farmers under the PM KUSUM scheme to see how they can use the power from micro-grids or standalone solar pumps. He mentioned that rural economy has improved in the 9 villages where pilots are being undertaken – usage pattern among consumers is improving and now capacity enhancement is being undertaken in some of the pilot villages. The company has also undertaken installing innovative micro-grid designs such as unmanned micro-grids, which can operate through remote monitoring, smart inverters, micro-grid in a box (pre-assembled containerized microgrid solutions), etc. He stressed that for the success of any mini-grid business, it needs to be commercially viable and should create economic activities for rural population in the concerned villages.

Mr. Paul de Wit, Senior Advisor Regulatory Affairs, Alliander, discussed how utilities have benefitted from DERs in Europe and how DER is being implementing in the EU. He started with explaining the DER landscape in the EU and mentioned that modern responses are being undertaken in Europe as new ESCOs and aggregators are being created. Originally, energy services were bundled but now Europe is seeing an unbundling in generation, transmission, supply and distribution. The main driver for this new trend of unbundling, he explained, is cost efficiency. The current structure requires good cooperation between all market roles to stay relevant with the evolving trend. Further, explaining the evolving future landscape, he mentioned that three main trends will become more visible:

- Energy will become increasingly more decentralized as production, supply and exchanges will be more locally sourced. Central production is already being replaced by decentralized production.
- Energy systems will be electrified more, especially in heating, cooling and transportation. He explained that previously heating was done in large part in Europe using natural gas and now it is becoming more and more common to use electricity for the same.
- Thirdly, the increased digitalization of the society will allow for new solutions.

He mentioned that, as a result of these envisaged trends, the system operators of the future will facilitate two mutually reinforcing layers of infrastructure – physical and digital.

From the regulation point of view, Mr. Wit mentioned that targets set by the European Commission also envisage an increasing role of Distribution System Operators (DSOs). In that vein, a new EUDSO entity is

being created. Further, the clean energy package promotes consumer empowerment, the promotion of integration of DERs and integration of smart meters, which is already being undertaken. He mentioned that the Green Deal also stresses that energy transition should involve and benefit consumers. The Clean Energy Package also pushes for the introduction of aggregators alongside the suppliers of energy to speed up the uptake of demand response. A significant thrust is also being placed on the creation of energy communities which calls for a new form of governance in which citizens can conduct their own affairs with increased autonomy, for example, sharing their created energy with each other or exchanging it with other energy communities.

Talking about smart meters, Mr. Wit mentioned that their role started as part of the Third Energy Package and some European nations like Sweden, Finland, Spain and Italy already have more than 80% consumers using smart meters. Discussing on the usage of smart meters, Mr. Wit explained that on the planning side, smart meters provide more insights in the energy usage patterns of customers and the associated power quality. On the maintenance side, smart meters provide insights about performance decline of grid components and prove to be useful in detecting concerned areas at outages.

He concluded with mentioning the key challenges that the DERs come with, and the possible solutions to address such challenges. A key challenge is planning of grid reinforcements with rapidly changing consumption patterns where the possible solution could be collection of data from different sources to have more insights and in-house training and education to address the challenge of lack of technical labour force. Other challenges are introduction of congestion management services in distribution grids and data management challenges especially the uptake of prosumers / active consumers. One way to tackle data management issue could be introduction of new digital platforms for individual tracking and tracing of energy flows alongside deployment of smart meters.

Dr. Nicolò Rossetto, Research Associate, Florence School of Regulation, discussed the ways to enable greater DER participation in electricity systems from an academic perspective. He highlighted the fact that DERs are often deployed and 'operated' by small and non-professionals actors such as households, small businesses, manufacturing sites having Rooftop solar, etc. or through the involvement of a third party. DERs are often neglected in system planning and operation and have been frequently considered merely as a stochastic component of the load that grid companies and energy utilities observe. However, this approach must change if we want to achieve deep decarbonization and keep integration costs low.

To better understand the extent of the required changes, Dr. Rossetto explains that three pillars are normally required to support transactions in electricity:

- A pricing mechanism that provides incentives to invest in an asset and operate it efficiently.
- A transaction loop that gives the possibility to trade the services provided by the asset. This loop plays an important role in dealing with transaction costs.
- A delivery loop to ensure that the services provided by the asset are delivered. In the case of electricity, the distribution grid represents this loop.

Historically, these pillars have been designed keeping in mind large assets connected to the transmission grid and managed by large and professional actors, i.e. energy utilities and wholesale traders. The specificities of DERs and small prosumers were not considered. In the EU, a first wave of change occurred around 10-15 years ago, when the will to accelerate the decarbonization of the electricity mix led to the introduction of a series of support measures, promoting the deployment of distributed generation based on renewable energy sources. Feed-in tariffs for solar PV, for example, provided a "peer-friendly" scheme: households and small businesses deploying them could benefit from high export tariffs for 20 years or so. In addition to that, the support scheme typically foresaw a public off-taker in charge of the marketing of the electricity generated by the new prosumers on wholesale markets. Finally, grid companies were mandated to adopt simplified procedures and tariffs for the connection of the new, small-scale, generation assets.

According to Dr. Rossetto, such schemes are good to enable a rapid penetration of DER in the energy system but not particularly their active participation. Indeed, participation calls for exposure of DERs to costs and benefits generated to the system. As such, there is a need to redesign the three pillars. Digitalization can help in this regard, as it enables the provision of more granular signals and a more effective transaction loop.

Finally, Mr. Rossetto quickly touched upon the policy changes needed to ensure a greater role of DERs in the energy transition:

- 1) a new definition of public service in electricity that moves away from the idea of a universal right to access the grid at affordable prices to the idea of a universal right to be able to choose and be active (empowerment);
- 2) a more dynamic environment for grid companies and regulators to re-invent system planning and be more agile;
- 3) a re-assessment of the boundaries of the electricity sector as other energy vectors and final uses like gaseous fuels, heating, cooling, telecommunications and transport are increasingly converging with electricity.

1.3. Questions and Answers

There were several questions for the panelists:

- Question – In India's draft national electricity plan, there is a call for distribution service aggregators. How should the DSO evolve with grid connected DER?
 - Response by Mr. R. P. Singh – the business in the country is driven by the Electricity Act and the policy is an overarching document which will drive the legislation. In the current context, distribution service aggregation is a novel concept but has to be introduced by the way of legislation, then only it will be feasible. In principle, this is considered as a welcoming step and will provide more flexibility to the DSOs and increase the adoption of more and more DER. The aggregation business is in nascent stage and very few states are doing experiments with, for example, RTS aggregation. Once the pilots have been successfully completed, an estimation of their benefit, if any, could only be made at that point. Mr. Singh mentioned that draft policy is yet to take shape and a lot of changes can be expected in the final version.
- Question – What is the role played by DER owned by industry to provide demand side flexibility? What is the role that aggregators might play and how would they interact with distribution companies in the future?
 - Response by Dr. Praveer Sinha – Aggregators are likely to play a very important role going forward because of two reasons. Firstly, it is expected that aggregators will have a huge role to play in RE as peer-to-peer trading is expected to grow exponentially in the future. He mentioned that blockchain technology is evolving and possibility is that it would be one of the growing areas. Secondly, ancillary services, which are growing at a fast pace, will require an aggregator to be able to collect individual solutions like storage, DERs and ensure they are able to create certain economic value in the market. Further, recently CERC has come up the draft ancillary policy which will provide opportunity to monetize the ancillary services and aggregators are expected to be playing a very critical role there.
- Question – How important it is to consider the integration of the micro-grid initiative, for example, to support the local communities to buy appliances (as a means to ensure sufficient demand off-take / consumption of power)?
 - Response by Dr. Praveer Sinha – Creating demand is imperative when starting a DER business. Citing examples from his field experience, he mentioned that household electricity consumption is a very small consumption and if the minimum economic sense of DER is to be made, it is important to support commercial and industrial activity in the village. Many rural people want to do such work but do not have the wherewithal and that's why the handholding one has to do, whether in terms of arranging energy

efficient equipment or arranging financing, is critical. He concluded that one of the biggest learnings for Tata Power is not just the need to supply electricity but also creating a whole ecosystem of consumption to gain sustainability.

- Question – Are DSOs in Europe embedded in the DNOs or independent market hosting DERs?
- Response from Mr. Paul De Wit – In the legislation, there is an evolution from DNO to DSO. Previously, distribution was just 'fit and forget' but now it is becoming much more than that. Now there is also the management and control of the grid which system operators are performing. DSOs try to help customers where space for RE installations is available, especially for areas that are suited for DER installations.
- Question – What is the status of prosumers and peer-to-peer solutions in Europe?
- Response from Dr. Nicolò Rossetto – The implementation of peer-to-peer solutions is limited in Europe as of now. However, it is important to clarify what we mean by peer-to-peer. In some European countries, there are energy retailers that provide quasi-peer-to-peer platforms, enabling their customers to engage in bi-lateral exchanges. However, if we have in mind highly disintermediated and local solutions, then only a few pilot projects can be found in Europe now. Led by universities and innovative start-ups, these projects are testing what can be done technically as well as from a regulatory point of view.
- Question – How do the panelists see options to improve quality of supply in India? Is it only a regulatory approach or are there certain equipment / technology needed to do so?
- Response from Mr. R P Singh – Government of India has regulations and standards of performance notified whereby the consumers are entitled to compensation in case the reliability of power is affected. Unfortunately, the implementation of quality standards is still a challenge because of certain technical issues which is hampering Discoms in India to implement such standards. High voltage to low voltage ratios have undergone a substantial change since the introduction of the Saubhagya scheme and 100% coverage of consumer base. Hopefully, schemes will be introduced to augment this and strengthen the distribution system and provide voltage support till the last mile.
- Is there a possibility of combining DER with climate change mitigation instruments and incentivize them to attract more finance in the sector directly?
- Response by Mr. R P Singh – There is a direct correlation between integration of DER in the energy system and climate change mitigation as DERs shall be very helpful in emission reduction. However, in India, unless DERs come up by way of providing round-the-clock source of power, their adoptability will remain limited. Right now, intermittency and variability are posing challenges, for example, solar not available during the peak night hours. Unless it is attempted with some hybrid system such as solar plus storage, its adoption could be hampered. As far as climate change mitigation is concerned, people have started to realize that there is no other way than adopting RE technologies. Government of India is also promoting it with the RE target set for the country.

1.4. Closing Remarks

Mr. Matthieu Craye thanked all the panelists for the presentations and rich discussion, which brought out avenues for mutual benefit to India and the EU. He highlighted that there are certain parallels between India and the EU in the DER space, which are very promising for further and more detailed exchanges. He considered the development of micro-grids in India a very relevant topic. In Europe there are experiences with optimizing local energy systems, with the aim to avoid that new network connections are needed and supply and demand are balanced locally with the aid of such solutions. He also stressed the role of digitalization and the need to go for an internet of energy platform to ensure visibility and control of DER and making this available to market operators. He also mentioned the need for developing platforms for new actors, such as aggregators, to enable them to be active in the most efficient way to balance the system and integrate as much DER as needed.