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

THE FOURTH DEBATE ON
"HOW CAN ANCILLARY SERVICES BE PROCURED MORE EFFICIENTLY?"

SEPTEMBER 17, 2021

PROCEEDINGS

Fourth online debate on "How can ancillary services be procured more efficiently?"

On 17th September 2021, the European Union (EU) - India Clean Energy and Climate Partnership (CECP) project in collaboration with the Florence School of Regulation (FSR) hosted the fourth of the six debates, as part of the 5th EU-India workshop series on Energy Regulations 'Enablers for India's Renewable Energy Transition: Competition and Market Design for the Power Sector'.

The fourth online debate focused on the topic "How can ancillary services be procured more efficiently?" The debate was attended by close to 130 participants, representing policy makers, regulators, power system operators, electricity trade 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 on behalf of the EU. He introduced the 2016 EU-India Clean Energy and Climate Partnership (www.cecp-eu.in) which was agreed at the highest level between the European Union and the Government of India. At the recent EU-India Leaders Meeting on 8th May 2021, the Partnership was one of the key priorities. The leaders agreed to further strengthen the cooperation. EU has been working with India in the areas of energy efficiency, renewable energy including offshore wind energy, floating solar, rooftop solar and solar parks, smart grid, power market design, sustainable finance, cooling and cold chain and climate proofing.

1.2. Panel Discussion

Ms. Norela Constantinescu, Head of Section Innovation, ENTSO-E discussed the important role of ancillary services in the European market and for India, and discussed following points:

- Europe is facing an increased integration challenge and with the Fit for 55 package (targeting a 55% reduction in greenhouse gas emissions by 2030, relative to 1990 levels) unveiled on 14th July 2021 by the European Commission, Renewable Energy penetration will further increase thereby aggravating the grid integration challenges.
- There is significant quantum of load, which is becoming more variable and uncertain with increased Electric Vehicles (EVs), electrification of heating sector and industries; however these are both challenges and opportunities at the same time.
- With power electronic devices implemented on supply as well as demand side, there is an issue of volatility in frequency and level of system inertia; hence a need to look into the area of balancing market.
- In Europe, market players are responsible for balancing by trading in energy market – intraday and are also financially responsible for imbalances in the system, until the time they are managed by the Transmission System Operators (TSOs).
- TSOs are playing their role in real time balancing and using market-based mechanism such as Merit Order dispatch; and need to ensure reserves for effective grid stability and operation
- Intraday coupling went live in 2008 and a new balancing platform has now been developed.
    - For less than 30 seconds, frequency containment reserve exists and there is no common platform at European level. However, for other products like Automatic Frequency Restoration Reserve, a platform exists and each process therein has its own specification and timing
    - For timeframe going from 30 seconds to 15 minutes there is manual frequency restoration reserve
    - For timeframe upwards of 15 minutes, there is replacement reserve

- Due to lack of inertia in the system, there is a need to have fast frequency reserve to handle low inertia. This was put in place by Nordic countries.
- There is a need for all flexibility resources, and hence need to integrate flexibility resources at TSO level as well. With developed coordination programmes – need for TSOs, Distribution System Operators (DSOs), to look at balancing and ancillary markets to ensure balancing.
- In terms of security issue, power electronics and stability management are closer to real time. This will require control centers to be enhanced and have Artificial Intelligence (AI) in order to have the decision support tool for dispatcher.
- In terms of planning, there is a necessity to integrate additional elements in terms of ramping capabilities, mainly for countries with solar projects, and having issue of grid security.

Mr. Tim Schittekatte, Florence School of Regulation made a presentation and highlighted the following points:

- When EU introduced balancing market in 2000, many TSOs had reservations against the market for reasons of security of the system. He shared examples of cases in Austria, Belgium and Czech Republic, where balancing did not work initially.
- In the beginning the emphasis was more on the balancing mechanism than the balancing market. Gradually due to national and European legislations, the market evolved. Net Recourse Guidelines on balancing, System operations have helped in the way balancing markets work.
- Between 2014-2019, in most of the European countries, balancing costs (in terms of capacity procurement, reservation and the activation of balancing) have reduced considerably. Nordic countries had a little increase, but the cost was already low there
- The share of renewable energy has increased in the system and the cost of balancing has reduced.
    - In Germany, the most important cost of balancing is not the cost to pay for activating reserve but the cost for reserving the capacity to be activated;
    - From 2014-19, the share of renewable energy has increased by 100% (share of renewable energy in electricity generation went up from almost 15% to 30%), however the quantum of reserves decreased over the years. Cost to reserve capacity went down by 50% and balancing energy costs (cost for activation) went down by 25%.
- The overall cost reduction for balancing can be attributed to two factors:
    - Volume of reserves: Need for balancing has reduced by improved usage of intraday markets, improved imbalance settlement and imbalance netting across borders
    - Price of reserves: Through improved market pricing, increased participation from demand-side acting as balancing providers and fostering competition through balancing market integration
- There are two major challenges for Europe in reducing or controlling the cost of balancing:
    - Procuring and sharing capacity reserves across borders (right now the sharing is limited to activation or balancing energy)
    - Increased Integration of distributed energy in distribution grid for purpose of balancing

Mr. KVS Baba, Chairman and Managing Director (CMD), POSOCO made a presentation to highlight importance of balancing and ancillary services:

- Load generation balance needs to be there at Discoms first, and adequacy needs to be ensured. Balancing has to be ensured at the system operator level as well.

In India there exists national, regional and state system operation for managing grid

- To ensure system reliability and security, India has made a lot of progress in last 10 years, namely through Grid code, Ancillary regulations, and subsequent amendments thereof.
- In India, ancillary started with frequency control - primary, secondary, tertiary reserve. The Central Electricity Regulatory Commission (CERC) has agreed on frequency continuum.
- Before procurement of ancillary, we need to analyse the system to identify the precise need. There is a need for ancillary since during non-peak solar hours, there is a lot of depletion of reserves.

However, when solar generation is high during sunny hours, down reserves are low; leading to a constraint, given thermal power plants cannot operate below a level.

- In terms of transaction, there is inadequacy in reserves in exchange where Discom can buy and maintain their reserves.
- Load-generation imbalance impacts grid security and poses reliability issues, and is analysed through trend of Area Control Error (ACE).
- Forecasting, resource adequacy and control mechanisms are required to address deviation and offer stricter processes for unit control of internal generation. Grid code has addressed the concerns to an extent and the expert committee has suggested modifications in India Electricity Grid Code (IEGC)
- Pan India Automatic Generator Control (AGC) is operational since 2020. Approximately 37 Giga Watt (GW) power plants have been connected now and by the end of 2021, close to 70-80GW capacity would be connected.
- Adequate monitoring mechanisms are required before the market is introduced. Parameters need to be defined before procurement of ancillaries is introduced.
- Voltage control ancillary services are also needed which have been proposed to CERC. A commercial framework is required along with metering, and many generators can provide reactive power.
- POSOCO has requested CERC to amend IEGC to include voltage control ancillary services.

Ravindra Kadam, Advisor, Renewable Energy, CERC shared Indian experiences and future preparedness for grid integration:

- He gave a background of imbalance handling in India– starting with Availability Based Tariff (ABT) and Unscheduled Interchange (UI) in 2002 – to create a mandate for generation companies to declare availability on day ahead basis and link their fixed cost accordingly, and variable cost to be assessed based on their schedule
- India introduced Deviation Settlement Mechanism (DSM) in 2014 to manage deviation either at generation end or at load serving end
- DSM imposes penalty for deviation - under/over injection to ensure entities follow grid discipline and permissible limits were progressively made stricter through amendments
- India had also narrowed down operational frequency bands over the years from 49.0-50.5Hz in 2002 to 49.9-50.05Hz now, and DSM has helped bring in discipline
- India has now come to a stage where frequency is no more an indicator if generation is deficit or surplus. It is recommended to price deviation in line with costs incurred to compensate the deviation through dispatch of ancillary services through envisaged market-based procurement
- Existing framework for ancillary services in India covers primary, secondary as well as tertiary reserves
    - Primary response: Mandated all Inter-State Generation Stations (ISGS) to have Restricted Governor Mode Operation - RGMO (primary) response;
    - Secondary response: Adopted cautious approach for secondary, started with pilot in 2019, implementation is now underway;
    - Tertiary response: Administrative mechanism was created in 2016 to manage existing imbalance in the system.
- CERC has proposed draft ancillary services regulations indicating procurement mechanism for ancillary services:
    - Secondary response ancillary service to be procured through administered mechanism;
    - Moving towards market based tertiary response ancillary service.
- Public hearing for the draft has been conducted and the regulation shall soon be finalized after review of comments received on the draft.
- India is moving from DSM, delinking it from frequency and introducing secondary ancillary mechanisms along with market-based principles for handling imbalances.

1.3. Questions and Answers

The moderator asked several questions to the panelists, based on the questions received from participants.

- **Question** – From your experiences, what lessons can India learn from Europe?
  - **Response from Ms. Norela Constantinescu**
    - EU member states have varied energy mix, which offers potential for cross country cooperation and India can also draw learnings from this.
    - Liquidity is important to reduce the cost.
    - Make participants responsible for imbalances.
    - TSO DSO Integration is important; though not easy as a lot of conditions need to be met – balancing is the key including frequency, voltage control and congestion management at transmission and distribution.

- **Question** – What is the impact of regulatory anomalies in a way that impact the efficiencies of market performance?
  - **Response by Ms. Norela Constantinescu** – It is important to consider the new developments in the Regulations. For example, for balancing, a harmonized approach is helpful and when moving forward, attempts are made to harmonize these products and market services into flexibility domain through TSO-DSO integration.
- **Question** - Reduction in ancillary services deployment may also be influenced by improvement in RE and demand forecasting and improved flexibility of the power system as such. Any thoughts on that?
  - **Response from Mr. Tim Schittekatte** –
    - Europe is also trying to create market-based renewable energy dispatch at transmission and distribution levels to avoid costly upgrade of networks, supported by aggregator/storage solutions.
    - Resources can be used for many functions such as in congestion management, controls.
    - On forecasting, Europe has pushed for responsibility amongst market players, and then proposed incentives for discipline.
    - Trade up to 5 minutes before real time to avoid errors
    - Imbalance settlement mechanism helps to correctly assess cost of deviations
- **Question** - a) Is there scope for Energy Storage in balancing the grid as Secondary or fast tertiary reserve? b) what is this quantum likely to be for energy storage?
  - **Response from Mr. KVS Baba**
    - In the present scenario of renewable energy, where intermittency is there; fast acting reserve such as storage will provide good flexibility for system operator. Storage is an important component which gives the fast-acting reserve. It helps in meeting both peak and fast ramping.
    - Pumped storage is also being promoted through Hydro policy to promote fast acting reserve
    - Quantum of storage – optimal reserve mix of Central Electricity Authority (CEA) 2029-30 clearly highlights requirement 27GW of storage to complement 450GW RE. Year 2025 onwards, there would be a need for larger quantity of fast acting storage.
- **Question** - Is there any interdependency between Available Transfer Capability (ATC) and Ancillary services? Is it required to develop the real-time ATC determination method to provide better Ancillary Services?
  - **Response from Mr. KVS Baba –**
    - ATC is a feature for congestion management. If transfer capability of the system is limited, then generation has to be increased to meet the deviation.
    - There is no need for online ATC competition for the time being.

- **Question** - In the Indian context, what should be the mechanism to rightly distribute or socializing the cost of Ancillary Services ? What are the takeaways from the experience of EU?
  - **Response from Mr. Ravindra Kadam** -

- Once the country moves towards storage, etc. there is a need to think on cost recovery mechanism for ancillary.
- Grid code is being amended to allow new innovation, etc. for next 10 years

1.4. Closing remarks

Mr. Matthieu Craye, International Relations Officer, DG ENER, European Commission, thanked all the panelists for the presentations and rich discussion, which brought out avenues for mutual benefit to India and EU. He highlighted that the issues discussed today are important to ensure that renewable energy integration can be done in cost effective manner. He added that the cost of balancing has reduced in certain parts of Europe in past years. He mentioned that the coordination between transmission and distribution is relevant and is also an emerging subject in Europe. He welcomed the lessons shared by CERC on EU-India cooperation. The lessons from EU-India exchanges on such issues are hopefully useful for India achieving its goal for 450GW by 2030, in a cost-effective manner. He mentioned that a lot has happened and is happening at regulatory level in India, which is a good moment to exchange information and expertise with Europe.

He concluded his remarks by inviting all the participants to join the next session on "Retail electricity competition: what can it bring to India's ambitious renewable energy transition?", scheduled for 1st October 2021 at 2 PM IST/10.30 AM CET.