



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
नवीकरणीय ऊर्जा उद्भव विकास प्रभाग
Renewable Energy Source Development Division
*** ** ***

No. CEA/Plg/RES-30/2017

Dated: 19-07-2017

विषय: नवीकरणीय ऊर्जा स्रोतों के ग्रिड में एकीकरण को सुविधाजनक बनाने के लिए विभिन्न प्रकार के ऊर्जा स्रोतों / ऊर्जा भंडारण उपकरणों के अनुकूलतम स्थापन के अध्ययन और संबंधित मुद्दों के लिए सीईए द्वारा गठित तकनीकी समिति की अंतिम बैठक का कार्यवृत्त (मिनट्स) .

Subject : Minutes of the Final Meeting (held on 29-06-2017) of the Technical Committee constituted by CEA for study of optimal location of the various types of balancing energy sources / energy storage devices to facilitate grid integration of Renewable Energy Sources and associated issues – reg.

महोदय/Sir,

Minutes of the Final Meeting of the Technical Committee on the subject held on 29th June, 2017 at NRPC, New Delhi, under the Chairmanship of **Member (Planning), CEA, are enclosed herewith for your kind information and further necessary action.**

Copies of the presentations made during the meeting are being sent on emails only.

नई दिल्ली में 29 जून, 2017 को सदस्य (योजना), के. वि. प्रा. की अध्यक्षता में आयोजित उपरोक्त विषय पर तकनीकी समिति की अंतिम बैठक के मिनट (कार्यवृत्त) आपकी जानकारी और आगे की आवश्यक कार्रवाई हेतु संलग्न हैं।

बैठक के दौरान की गई प्रस्तुतियों की प्रतियां केवल ईमेल पर भेजी जा रही हैं .

कृपया पत्र की पावती दें/ Kindly acknowledge the receipt of the letter.

भवदीय/Yours faithfully

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5. Sh. P.A.R. Bende, Chief Engineer, SLDC, MPPTCL
6. Sh. Manoj Kumar, General Manager (BD&JV), NHPC Ltd.
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Copy for kind information to:

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- 3) PPS to Joint Secretary (Ms Jyoti Arora), Ministry of Power, New Delhi
- 4) Joint Secretary (Dist), MoP, New Delhi
- 5) SA to Chairperson, CEA,
- 6) SA to Member (Hydro), CEA
- 7) SA to Member (GO&D), CEA
- 8) SA to Member (Power System), CEA
- 9) SA to Member (E&C), CEA
- 10) SA to Member (Thermal), CEA
- 11) Sr.PPS to Member (Planning), CEA

Minutes of the Final Meeting of the Technical Committee held on 29th June, 2017 under the chairmanship of Member (Planning), CEA for study of optimal location of the various types of balancing energy sources / energy storage devices to facilitate grid integration of Renewable Energy Sources and associated issues

The final meeting of the Technical Committee constituted by CEA for study of optimal location of the various types of balancing energy sources / energy storage devices to facilitate grid integration of Renewable Energy Sources (RES) and associated issues was held under the Chairmanship of **Shri Pankaj Batra, Member (Planning), CEA**, on **29th June, 2017 (Thursday) at New Delhi**. List of participants is at **Annexure-1**.

Shri A K Rajput, Member Secretary of the Committee and Chief Engineer (RES), CEA welcomed Member (Planning), CEA and all the participants. He made a brief presentation of the agenda for deliberations in the meeting. Broad Frame Work of the report of the Committee was also presented (given at **Annex-A**).

Member (Planning), CEA and Chairman of the Committee was requested to address and guide the participants.

Shri Pankaj Batra, Member (Planning), CEA stated that the Committee is concerned about selection of balancing sources. He gave a brief outline of the outcome of previous meetings with respect to balancing of renewables in the long term, the types of balancing sources required, its framework and sharing of costs of balancing. He also mentioned about the focused meetings conducted on 28.06.2017 related to operationalization of existing Pumped Storage Plants (PSP) telemetry issues in order to achieve 100% online data of Renewable Energy (RE) in real time mode at the pooling stations and at SLDC/RLDC/NLDC.

Comparing the balancing sources on the basis of ramp rate, **the Chair** stated that storage / pondage hydro plants including pumped storage plants are the best sources of balancing the intermittency of generation from renewable sources of energy, as they have the best ramp rate among the conventional generation sources. He stated that gas power plants also have a high ramp rate of about 10% per minute. Coal based power plants can also be made flexible through suitable retrofitting. Thus balancing power requirement could be sourced from multiple sources and plants/devices located at various places in the system.

He presented the broad framework of the Report. He stated that the Tariff Policy envisages a uniform Renewable Purchase Obligation (RPO) as a national objective. It is also known that there is a cost for balancing the intermittency of renewable energy consisting of deviation settlement charges to be incurred by the States, backing down cheaper generation in order to take renewable energy, even if renewable energy is more expensive, to keep standby capacity, so that if the quantum of renewable energy reduces, the conventional controllable generation can feed the load. He stated that if these costs are put only on the renewable rich states, these states may not encourage further setting up of renewable plants.

Representatives from Gujarat SLDC, Maharashtra SLDC and MP SLDC and CERC raised apprehensions about the uniform RPO trajectory and sharing of balancing charges. They viewed that such an arrangement may not be to the advantage of states not having high amount of RE generation.

The Chair explained that since the uniform trajectory is a Government decision, so it has to be implemented in National interest. As far as balancing charges are concerned, it will comprise of two parts i.e. fixed and variable. Both parts should be shared by all stakeholders on post facto basis.

CE, Gujarat SLDC suggested that in case balancing source is outside the boundary of state, its scheduling facility is needed to be operationalized. He suggested that the cost of balancing may be bundled with the costs of renewables since Renewable Energy Certificate (REC) is being purchased without inclusion of balancing cost.

The Chair stated that this is precisely what the mechanisms is. However, instead of having actual balancing sources placed alongwith the renewable power, it would be more optimum to share balancing sources across states so that cost to consumer is minimized.

The Chair also suggested that scheduling could be made more towards real time mode i.e. revised for 5-minute time block instead of the existing 15 minutes. Moreover, in case of embedded system, State Regulations on forecasting and scheduling may be followed and where such Regulations are not finalised, till that time the CERC Regulations may be followed (Forecasting and Deviation Settlement Mechanism).

Representative from NLDC mentioned that they are going to implement in NTPC Dadri stage-II (2X 490 MW) as being controlled from NLDC through Automatic Generation Control (AGC) as a flexible thermal generation for balancing, on experimental basis.

Representatives of state SLDCs (Gujarat, AP, Telangana, Maharashtra, MP) raised concern on how they would monitor the Deviation Settlement Mechanism (DSM), excluding the variability due to intermittency of renewables.

The Chair suggested that the States would have to monitor the **net DSM**, which, if real time information of Deviation in renewable is available, would be obtained by subtracting from the **total Deviation**. He recommended (on the suggestion of **representative from Powergrid**) that the 15% deviation margin, at present permitted in forecast of RE generation, could be reduced in future progressively.

CE Maharashtra (SLDC) raised the issue that the State was making extra efforts on backing down of cheaper conventional sources to tackle the variation of generation during high wind period. There is a need to quantify state efforts and provide incentives for the same.

CE MP(SLDC) suggested for establishment of balancing resources as permanent ancillary services, **CE Maharashtra (SLDC)** also suggested to consider balancing sources as ancillary services. **Representative from AP** mentioned that they had to face a situation where RE generation was, at times, more than the total demand.

The Chair stated that balancing sources be considered under ancillary services and be stacked in a decreasing order in terms of cost. The ancillary services will be used for both ramping up and ramping down i.e. for absorption of RE as well. He also mentioned that the States can surrender their own balancing sources for use as common balancing source through competitive bidding. The balancing sources would be paid accordingly. Operators should be trained to observe the net DSM. Net DSM will be possible with real time data flow. The overall grid security would be the responsibility of the RLDCs and NLDCs with control of use of ancillary services and it would be their responsibility to ensure frequency stability, voltage stability, angular stability, adhering to line loading limit and using ancillary services for the same. Automatic Generation Control (AGC) may be required for the same.

Member Secretary, SRPC stated that schedule is a non-electrical quantity. In real time, the system operator has to monitor voltage, current, frequency and stability aspects.

Representative from PGCIL said that transmission lines are being laid under Green Energy Corridor(GEC) in RE rich regions. Hence putting energy storage systems at such places, in his view, may not be a favorable option.

The Chair suggested that a cost benefit analysis should be done before actual implementation of GEC, and whether augmentation of transmission lines or putting energy storage device at RE pooling station is better. He also mentioned that the cost of battery is decreasing at a rate 10% per annum, so this aspect should also be taken under consideration.

There was a general consensus on the framework of the Report.

Representative from CERC conveyed the following salient points:

1. CERC has notified **Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017** on 15.5.2017 applicable for intrastate generators also. The same can be enforced to ensure that adequate communication is available.
2. Sub-Committees have been formed under Member Secretary, Regional Power Committees (MS-RPCs) to devise a model of Regional cooperation for balancing power on account of renewables under Technical Committee of Forum of Regulators (FOR).
3. Following point must be considered further:
 - a. A detailed calculation of balancing requirement for all over India and possible options to meet the same.
 - b. Whether existing thermal plants will be able to flex and provide the flexibility or additional resources need to be installed.
 - c. An assessment of existing and planned pumped hydro stations may be done. The costing for same may also be considered.
 - d. A calculation on storage requirement may be carried out considering following
 - i. How much capacity is required?

- ii. The technologies available for same
 - iii. The requirement of space for placement of storage capacity
 - iv. The financial implications and possible funding mechanisms
- e. International experience
 - f. Whether plants proposed to be retired can be used for balancing requirement
 - g. Comprehensive listing of available generators with their age, efficiency, whether they have space required to meet MOEF norms, costing to implement MOEF norms, cost of retrofitting for balancing (to decide if it is to be used for balancing or as a base load plant), whether the capacity is under retirement proposal.
 - h. The above list should be considered so that when outage of plant is done, retrofitting for balancing as well as for MOEF norms should be done together.
4. A view on the mechanism to share the charges for balancing can be taken only after a calculation is carried out to assess the balancing requirement, which may be presented before seeking the view.

The Chair explained that optimum balancing sources should be planned and whatever the costs, they need to be shared.

Summing up the discussions, **Member (Planning), CEA** stated that the concerns of all the states will be taken care of, but they should also try to look at the bigger picture for which a comprehensive approach is required. In the long run, increasing RES contribution is a part of Government Policy considering the overall perspective.

The Meeting ended with the vote of thanks to the chair.

Broad Frame Work of the Report

1. The Renewable Purchase Obligation (RPO) trajectory is uniform and therefore, there is a need to share the balancing charges associated with balancing requirements. RPOs have been prescribed on the basis of consumption in MUs.
2. There are two types of balancing generation required, the balancing for uncertainty, i.e. deviation of actual from schedule, and the generation capacity required to ramp up to meet the variability due to reduction of generation from wind and solar, even if these are known.
3. Balancing source could be located either within the boundary of a State or outside the boundary of the host state.
4. There is a need to discriminate between balancing power needs on account of load variation from that on account of variability in RE generation. Real time generation data acquisition is required to see to what extent the states deviation under DSM mechanism is due to renewable variation on account of uncertainty.
5. Efficiency of thermal power plants goes down at lower loads, and if they are to participate in balancing requirement, these need to be compensated on account of high availability of RE generation. High RE generation also calls for backing down of cheaper conventional sources, because of must run status of RE. Frequent start-stop of machine and frequent ramping involves more deterioration and O&M needs. There is accost to these.
6. Balancing sources should form part of the bigger umbrella of Ancillary services. There is a need to categorize various type of balancing sources, based on response time, to be activated within minutes to hours and price for each category determined through bidding.
7. The extent of balancing required for balancing renewables may be extracted from these Ancillary Services.
8. Balancing resources of the States/Centre/Private sector generators could be surrendered and treated as common resources.
9. Ancillary services may be kept under the control of RLDC. Cost of these resources need to be shared by all the beneficiaries, with a certain rationale.
10. Cost benefit aspects need to be studied as regard to location of new balancing sources versus augmentation of transmission system. This aspect assumes a higher importance in view of the increasing land cost in urban areas. In some cases, location of balancing sources in the form of storage elements, near the point of generation may be more economical.
11. Settlement of balancing charges for the uncertainty portion to be done post facto, on the lines, somewhat similar to DSM charges.
12. Till the time intra-state DSM Regulation by the SERCs is not operational, the mechanism of inter-state DSM should be followed.

Annex-I

List of Participants- Final Meeting of the Technical Committee held on 29th June, 2017 under the chairmanship of Member (Planning), CEA for study of optimal location of the various types of balancing energy sources / energy storage devices to facilitate grid integration of Renewable Energy Sources and associated issues

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