



भारत सरकार
Government of India
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
नवीकरणीय ऊर्जा उद्भव विकास प्रभाग
R E S Development Division
दूसरी मंजिल, सेवा भवन, आर.के.पुरम, नई दिल्ली-110066
2nd Floor, Sewa Bhawan, R.K. Puram, New Delhi – 110066



(ISO: 9001-2008)

No. CEA/Plg/RES-30/2017

Dated: 7th March, 2017

Subject: **First 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 and associated issues – reg.**

Minutes of the above mentioned meeting held on 23rd February, 2017, in CEA under the Chairmanship of Member(Planning), CEA, are enclosed herewith for your kind information.

(Hemant Jain)
Chief Engineer(RES Dev.)
Convener and Member Secretary
Email: ceaopmwind@gmail.com
Phone : 011-26103867 / (M) - 9818301995

To:

1. Sh. Hanumantharayappa, Chief Engineer, Elec, (Planning & Co- ordination), KPTCL
2. Sh. P.Suresh Babu, Chief Engineer, SLDC & Telecom, TSTRANSCO
3. Sh. B.B. Mehta, Chief Engineer ,State Load Despatch Centre, Gujarat
4. Sh. A K V Bhaskar, SE, State Load Dispatch Centre, A.P. Transco
5. Sh. P.A.R. Bende, Chief Engineer, SLDC, MPPTCL
6. Sh. Manoj Kumar, General Manager (BD&JV), NHPC Ltd.
7. Sh. Atulya Kumar Naik, AGM(Power Systems), SECI
8. Sh Dilip Nigam, Adviser and Sh. J.K.Jethani, Scientist-D, MNRE
9. Dr. Subir Sen, COO (CTU-Plg & SG), CTU/Powergrid
10. Sh G. Chakraborty, DGM, NLDC (POSOCO)
11. Sh. S.S. Mishra, AGM (PE-Solar), and Sh. A.K. Sinha, AGM (OS-SIIS), NTPC Limited
12. Chief Engineer (IRP), CEA
13. Chief Engineer (PSP&A-I), CEA
14. Chief Engineer (PSP&A-II), CEA
15. Chief Engineer (HE&TD), CEA
16. Chief Engineer (TE&TD), CEA
17. Chief Engineer (GM), CEA
18. Chief Engineer (FM), CEA

19. Chief Engineer (F&CA), CEA

Copy for kind information to:

1. PPS to Secretary (Power)
2. SA to Chairperson, CEA
3. PPS to Member (Planning), CEA

Minutes of the First Meeting held on 23rd February, 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

The First 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 and associated issues, was held under the Chairmanship of Shri Pankaj Batra, Member(Planning), CEA, on 23rd February, 2017 (Thursday) at CEA, New Delhi. List of participants is given at **Annexure**.

2. Welcoming the participants, Member(Planning), CEA, gave an outline of the framework of the proposed study and the agenda for deliberations in the first meeting. After a brief round of introductions, the representatives of the States were requested to make a presentation covering the following aspects:

- (i) Problems encountered by them in dealing with variable & intermittent generation from renewables;
- (ii) Steps taken for handling the problems cited at (i) above;
- (iii) The Intra-State transmission/distribution system facing congestion due to renewable generation; and
- (iv) Month-wise loss/curtailment of generation from renewables due to various reasons during 2016-17.

2.1 Representative of **Tamilnadu** informed that with its predominant installed capacity of 7600 MW of Wind, a maximum generation of 11 BU was achieved during the year 2016-17 upto December, 2016. He mentioned that the transmission problem has been solved due to implementation of Green Energy Corridor, but the problem was about the Deviation Settlement Mechanism, since the wind forecasting was not very accurate and there is significant variation in wind generation during the day. Consequently the state had suffered a loss of Rs. 100 Crores in Deviation settlement and he requested for compensation from Govt. of India on this count. In the context of the problems in balancing the intermittency of renewable generation, he mentioned that ramping up of generation in evening hours was difficult as the old thermal units cannot go below 70% as against the 55% technical minimum limit stipulated by CERC. He informed that the state has submitted the project report of 2000 MW Sillahalla Pumped Storage project to Ministry of New and Renewable Energy (MNRE) and the same may be treated as spinning reserve for renewables. In reply to a query, he explained that there was no problem in intrastate transmission system but interstate transmission was an issue.

2.2 Representative of **Gujarat** expressed that Deviation Settlement mechanism was resulting in significant financial loss for utilizing the entire generation from renewables. He quoted that while the variable cost of Wind was Rs 4.14 per unit, a deviation charge of Rs. 4.00 per unit was being paid to consume the generation from wind and accordingly suggested for a review of the band of allowable deviation. He expressed the view that availability of R-LNG through e-bidding for generation at gas stations can be a source of balancing the intermittent renewable generation. In the context of transmission system, he informed that there were no transmission constraints in the intrastate and regional system but the problem of interstate sales of renewable generation was required to be addressed, and interstate flow of power on account of RE variation between adjacent states should be allowed without any financial implication. In such a case the state of

Gujarat is presently backing down its cheaper stations during high wind period. He was of the view that the renewable energy framework for interstate has to be laid by CERC and an interstate energy bank can be considered to address the cited problems. On the issue of balancing the intermittent renewable generation, he suggested that the policy for operation of Sardar Sarovar pumped storage project as a balancing system should be made.

2.3 In his presentation, the representative of **Telangana** explained that there were no transmission constraints and no backing down/curtailment of renewable generation was being resorted to. He informed that forecasting of solar generation was better as compared to wind, and presently the solar generation was being utilized for agricultural supply during the day. He suggested that Srisailem and Nagarjunasagar pumped storage projects could be utilized for balancing the variability of renewable generation.

2.4 Making a presentation on the subject of renewable generation, the representative of **Andhra Pradesh** explained that the state was presently a power surplus state and thermal backing down was being undertaken along with reserve shutdown of costly thermal plants. In reply to a query, he replied that there was no curtailment of solar generation but slight curtailment of wind generation was required during the load crash period. He further explained that high wind season coincided with monsoon period when the demand is low. In the context of technical minimum for thermal plants, he informed that the units in the state were going down upto 70% level. While emphasizing on the problems of deviation settlement due to variable renewable generation, he mentioned that the regulations on deviation settlement mechanism for Wind and Solar are in draft stage with APERC. He cited that the flexing of gas generation for balancing is having huge financial implication, as no APM gas was available.

2.5 Representative of **Madhya Pradesh** made a presentation on the pertinent issues and expressed that despite being a power surplus state, there has been no curtailment of wind and solar generation by effecting rescheduling of power, under long term contracts. He informed that some curtailment is being made on biomass generation. The wind and solar generation along with load was connected at 33 kV level and then stepped upto 132 kV, but reverse power flow to 132 kV level was witnessed during high wind season. In the context of forecasting, he mentioned that the fluctuation in case of wind generation was high, although the forecasted wind pattern was almost the same as the actual one. He cited that the telemetry from renewables is a must for connectivity, but the telemetry system was not being maintained properly. No transmission congestion was stated to have been encountered during operation.

2.6 A brief presentation was made by the representative of **Maharashtra**. He explained that the Maharashtra system has a peak to off-peak variation of the order of 6500 to 7000 MW. Citing the fact that there was no real time visibility of renewable, he stressed the need for evaluation of optimal ratio of conventional to renewable generation which varies from state to state. He mentioned that large scale RE integration has an impact on thermal generation and variations for wind & solar are different. He suggested that agricultural load can be linked to solar generation through solar pumps. In reply to a query, he informed that there was no transmission congestion and no curtailment of renewable was being resorted to in Maharashtra. The Ghatghar Pumped Storage project was stated to be operated to adjust to the variable generation from renewable.

2.7 Chairman of the Committee stated that some studies with respect to renewable integration were carried out by National Renewable Energy Laboratory (NREL), Lawrence Berkeley

National Laboratory (LBNL) and NITI Aayog and it would be useful to know the details so as to take inputs for the Committee.

2.7.1 Ms. Jaquelin Cochran, **NREL**, gave a presentation of the USAID Study on RE Grid Integration under the 'Greening the Grid' project. The Study had looked at the technical flexibility in the Indian system for integration of renewables for the demand scenario of 230 GW by 2022. The separate regional and national studies had pointed out to an average renewable curtailment of 1% at national level with a maximum of 3% in Southern Region. As per the Study, the ramping requirement had gone up by 28% during the peak time with integration of 175 GW of renewable with respect to ramping requirement for load variation without renewable generation. An important result of the Study was that the barriers between states have to be removed, and there has to be resource sharing among the states to reduce RE curtailment.

2.7.2 A presentation was made by Mr. Nikit Abhyankar, **LBNL** on the subject of 'Techno-Economic assessment of integrating 175 GW of Renewable Energy into the Indian Grid by 2022'. Another presentation was given by Mr. Sarbojit Pal, Consultant, **NITI Aayog**, on 'State level issues in implementation of the renewable target of 175 GW'. The final presentation was made by **RES Development Division, CEA**, on the challenges and approach towards grid integration of Renewable Energy Sources.

3. During the discussions, following suggestions came up :

- RE generation for the entire month should be compared with the rescheduling of power done by the states from conventional sources, for analysis of the impact of variability of renewable generation.
- Energy storage cost vis-à-vis RE curtailment should be looked into, for cost benefit analysis.
- An effort would be made to first try to balance the variation from RES within the state; if the economics for the country as a whole dictate that balancing should be done within a Region, then that possibility may be considered. The third possibility would be to balance considering the full country to be a balancing area. The objective was to minimize the cost to consumers.

4. Summing up the discussions, Member (Planning), CEA, requested the representatives of the States to submit the month-wise figures of Deviation settlement on account of RE and the loss due to backing down of cheaper thermal stations for absorbing RE generation for the year 2016-17. He expressed that the state-wise issues would be taken up and may be Tamilnadu can be taken up first. He advised that all the southern region states may consider operational diversity in the region, as renewable generation may be at different levels in different states. A sub-group headed by Member Secretary, SRPC, with Chief Engineer (RES Dev.), CEA, GM, SRLDC, representatives of the Southern States and CE, SLDC, Gujarat as special Invitee, was proposed to be constituted for deliberating the issues of Southern Region in the grid integration of renewables and submit the Report within a fortnight.

The Meeting ended with a Vote of Thanks to the Chair.

List of participants in the first meeting of the Technical Committee held on 23.02.2017 in CEA

Central Electricity Authority (CEA)

1. Shri Pankaj Batra, Member (Planning) - in Chair
2. Shri J. Bandyopadhyay, Chief Engineer (IRP)
3. Shri Dinesh Chandra, Chief Engineer (GM)
4. Shri P. C. Kureel, Chief Engineer (HE&TD)
5. Shri Sanjay Sharma, Chief Engineer (TE&TD)
6. Shri Pardeep Jindal, Chief Engineer (PSP&A-II)
7. Shri Ravinder Gupta, Chief Engineer (PSP&A-I)
8. Shri Ajay Talegaonkar Chief Engineer (F&CA)
9. Shri Praveen Gupta Chief Engineer (FM)
10. Shri Hemant Jain, Chief Engineer (RES Dev.)
11. Shri Vijay Menghani, Director (GM Div.)
12. Shri Awdhesh Kumar Yadav, Director (PSP&A-I)
13. Ms. Ammi R. Toppo, Director (IRP Div.)
14. Shri L. Satya Narayana, Deputy Director (RES Dev. Div.)
15. Shri Rahul Raj, Deputy Director (IRP Div.)
16. Shri Satyendra Kumar Dotan, Deputy Director (PSP&A-II)
17. Shri Sumit Kumar Sinha, Assistant Director-I (RES Dev. Div.)
18. Ms. Sneha, Assistant Director-II (RES Dev. Div.)
19. Shri Hoshiyar Singh, Office Assistant (RES Dev. Div.)

Central Utilities

20. Shri Manoj Kumar, GM, NHPC
21. Shri Anil Kaushik, AGM (PE-SOLAR), NTPC
22. Shri Atulya Kumar Naik, AGM (Power Systems), SECI
23. Shri Rajesh Kumar, AGM, PGCIL
24. Shri S.C. Saxena, DGM, NLDC, POSOCO
25. Shri C.P.K. Roy, Manager, NHPC

State Utilities

26. Shri B.B. Mehta, Chief Engineer, SLDC, Gujarat
27. Shri P.A.R. Bende, Chief Engineer, SLDC, M.P.
28. Dr. Sanjay Kulkarni, Chief Engineer, SLDC, MSETCL
29. Shri P. R. Muralidharan, Superintending Engineer, REMC, TANTRANSCO
30. Shri J. Manipal Reddy, DE/ TS-SLDC , TSTRANSCO
31. Shri P.V. Satya Ramesh, DE/ AP-SLDC , APTRANSCO
32. Ms. S. Gomathi, Executive Engineer REMC, TANTRANSCO

Special Invitees

33. Ms. Jaquelin Cochran, Energy Analyst, National Renewable Energy Laboratory (NREL)
34. Shri Nikit Abhyankar, Lawrence Berkeley National Laboratory (LBNL)
35. Shri Ranjit Deshmukh, Lawrence Berkeley National Laboratory (LBNL)
36. Shri Sarbojit Pal, Consultant, NITI Aayog
37. Ms. Ruchi Gupta, Young Professional (Energy), NITI Aayog
38. Shri Sandeep Sarin, Head-Projects, C.I.I.
39. Shri Apurva Chaturvedi, Sr. Clean Energy Specialist, USAID