comments on provisions of 'X' in reg. of the CERC DSM Reg 2024

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To,

The Secretary,
Central Electricity regulatory Commission,
3rd & 4th Floor, Chander lok Building,
36, Janpath, New Delhi- 110001.
Date 29/09/2025

Sub: comments on provisions of 'X' in reg. of the CERC DSM Reg 2024

Sir,

The CERC through public notice has invited comments by 05-10-25 on its proposal to determination of value of "X" for computation of the deviation (in %) for Wind and Solar Sellers (WS sellers) from 01.04.2026 onwards under the provisions of reg. 6(2)(b) of the CERC DSM Reg 2024 and has placed on its website CERC's order dated 10th September, 2025 containing the proposal. I am submitting my comments. If deemed fit, CERC may initiate amendment to other regulations.

Formula for D_{ws}

2. The proposal is to specify value of "X" in the calculations of D_{ws} by following formula as 100% for FY26-27, 80% for FY27-28, 60% for FY28-29, 40% for FY29-30 and 20% in FY30-31 and 0% after 1.4.31 so as to effect changeover of denominator from Available Capacity to Scheduled generation in FY30-31 so as to align with D_{gs}.

D_{ws}(in %) = 100 x [(Actual Injection in MWh) – (Scheduled generation in MWh)] / [(X% of Available Capacity) + (100-X) % of Scheduled Generation):

3. In this respect, it is submitted that Available Capacity vide definition at reg 3(1)(g) is in terms of power i.e MW and scheduled generation as per definition at reg 3(1)(z) can be in MW or MWh but it is specified in numerator in terms of MWh and also calculations of D_{gs}. Thus there is mismatch in units considered in formula of (X% of Available Capacity) + (100-X) % of Scheduled Generation) and also in the terms of numerator and denominator. While calculating deviations-D_{ws}, RLDCs might have been considering converting either the scheduled generation and actual generation in MW (using MW=4*MWh injected / drawn during a time block of 15 minutes) or Available Capacity to MWH (by Mwh=MW/4) but it would be appropriate to regularise the such conversion and specify the numerator in the formula in MW as schedule as Format -A for submitting day ahead schedule at annexure-II of PROCEDURE FOR IMPLEMENTATION OF THE FRAMEWORK ON FORECASTING, SCHEDULING etc (approved by CEEC on 3-3-17 seeks available capacity and schedule(for each time block of 15

minutes) in MW.

Impact of changes in regulation and value of "X" and integration of schedules and actuals:

4. From 1.4.26 and thereafter, there will be two changes. First reduction by 5 percent in tolerable band($VL_{ws}(1)$ for both solar and wind project and changes in "X" as per para 2 above. The table at para 11 of order indicate that percentage of time the RE generating stations remained within the revenue-neutral deviation tolerance band (Volume Limit-1 -$VL_{ws}(1)$) will be significantly increased from existing values by 26% to 29% for solar PPs and 20% to 41% for wind. In respect of variation of "X", Grid-India vide para 15 has stated that the impact of DSM on the revenue of RE plants under different values of X, ranging from X = 100% to X = 0%, indicate that the solar plants experienced a moderate range of revenue loss, varying from around 3.5% to 11.1%. Hybrid plants showed a slightly wider loss range from 2.4% to 11.8%. However, the highest impact was seen in wind power plants, where the percentage loss is from 2.8% to 48.2%, reflecting their higher variability and forecasting challenges. At para 17 and 18 Grid-India has analysed the aggregation of WS sellers at a pooling station through the Qualified Co-ordination Agency (QCA) and has concluded that one effective strategy to manage the DSM for WS Sellers is the implementation of aggregation at the pooling station level through a Qualified Coordinating Agency (QCA). By combining the schedules and actual injections of multiple RE generators, aggregation helps offset individual generation fluctuations and reduces overall deviation.

5. One of the function of CERC vide section 79(1)© is to regulate the inter-State transmission of electricity and for this purpose, discipline of maintaining generation and drawls as scheduled is essential so that operation of grid is within specified variations in frequency and voltage. Deviation settlement mechanism (DSM) has been evolved to enforce grid discipline through commercial mechanism. Thus objective of DSM is not the revenue but to limit deviations from schedule to minimum. In consideration to this, conclusion through study of forecasting challenges and integration of scheduling and actuals is welcome and should be considered and introduced by CERC with effect from 1.4.26 or earlier.

Integrated schedule for WS generation and BESS/PSP.

6. In respect of energy storage system, provisions of the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related Matters) Regulations, 2024 are as under:

> "3(1) (dd) **'WS seller'** means a seller in the case of a generating station based on wind or solar or a hybrid of wind-solar resources and shall include such solar or wind or hybrid generating station, **with or without storage**.
> 8(5) Charges for Deviation, in respect of **a Standalone Energy Storage System** (ESS), shall be the same as applicable to a general seller (other than an RoR generating station and a generating station based on municipal solid waste) as specified in Clause (1) of this Regulation:
> Provided that in the charging mode, deviation by way of over drawal shall be treated as under injection and deviation by way of under drawal shall be treated as over injection and the charges for deviation shall be settled accordingly:
> Provided further that the charges for deviation including the formula for computation of Deviation, in respect of charging of a standalone ESS being pumped hydro storage plant shall be the same as applicable to a WS seller being a generating station based on solar resources, for the period from the date of commencement of these regulations to 31.03.2026."

7. CERC's above regulations covers only stand alone ESS and does not cover co-located energy storage system (ESS). Further, CERC's above regulations appears to be considering pumped storage power plants (PSP) only which can maintain its day ahead schedule as it have energy storage for number of days and its output is not affected by WS generation. In-comparison to PSP, Battery Energy Storage System (BESS) has limitations of storage capacity as it when fully charged can meet peak energy requirement for few hours up to energy storage capacity x battery efficiency (of 85%) (e.g. 50 MW BESS with 100 MWh storage when fully charged will have 2 hours storage capacity and power regeneration of 85 MWh only i.e. 50 MW for 1h42 min). If WS generation is less than day ahead schedule, BESS may not be fully charged and its output will be less than scheduled. If WS generation is more than day ahead schedule, BESS may fully charged in less than time considered in schedule and this will affect WS-generation. Thus for a co-located WS-BESS plant, actual output from BESS will be dependant on actual generation by WS. This too will be the case if standalone BESS is tied with one or two WS generators at same pooling station or common feeder from solar park.

8. Both pumped storage and BESS have quick pickup for energy storage by water pumping / battery charging and quick regeneration capability. Compared to these gas-open cycle, gas combined cycle, coal, nuclear and bio-mass plants have high ramp rates. As such pumped storage plant and BESS only can absorb the abrupt changes or fluctuating generation in WS effected by weather conditions. Thus operation of co-located BESS can yield significant benefit of deviation reduction and help grid operation. However, this can not be achieved, if WS generation and BESS are considered separate units for DSM, as any change of their schedule will be effective only after 7^{th} and 8^{th} time blocks as per reg. 49(4)(b)and(c) and 49(8) of CERC (Indian electricity Grid Code) reg. 2023("IEGC")(vide p-154,155 and 158/212 of pdf version). In view of these, although metering and scheduling of WS and co-located BESS may be separate but for the purpose of determination of deviations and DSM charges, their integrated schedules and actuals, should be considered so that BESS can meet any change required for evening out the abrupt changes/ fluctuations in WS generation. In respect of stand-alone and PSP plants also, the integration of schedule and actuals should be considered if one or more WS generation at a pooling station are contractually tied with it. CERC may consider such integration also.

9. For promoting the evening out of actual WS solar so as to improve deviations, it is suggested that CERC through Forum of Regulators take up study of technoeconomic of BESS and PSP operating in aforesaid mode of evening out of impact of fluctuations and abrupt changes in generation based on actual data of energy rich states and place on web sites / publish it. If to make them remunerative, if any policy changes are required then CERC may under sec. 79(2) of the Electricity Act 2003 such changes to promote BESS and PSP for balancing schedules.

Improvement in forecasting softwares.

10. Studies conducted by Grid India is for a short period of 9 months and it does not give comparative figures of year wise data of % of deviation within tolerance band ($VL_{ws}(1)$), UI band ($VL_{ws}(2)$ and OI band($> VL_{ws}(2)$). Such figure would have established whether there is progressive improvement in forecasting methodology and software in each region. However, conclusion of this study for Wind generation supports general perception that QCAs have not effected progressive improvement in forecasting methodology and software and have acted merely as an intermediatory

between RE generator(s) and load Despatch Centres for integrating the schedules at a pooling station and segregating DSM charges among its generators; and RE generators considers DSM charges as unavoidable. If so, commercial mechanism like reduction in tolerance band, increase in DSM rate, reduction of 'X', etc will have no impact in improving forecasting and scheduling and Grid operation will continue to be affected by over-drawls / under-drawls and low and high voltage conditions. With increasing penetration of WS generation through RPO, it will become more and more desirable. Further, CERC regulations are more or less followed by States but forecasting at state level requires further modifications to soft-wares to account for no scheduling by (i) small WS generators, (ii)roof top solar generation and (iii) decentralised solar generation (under KUSUM). Their generation is only estimated by Discoms/ SLDC and likely to have higer deviations. These estimates ,incorporated in day ahead SLDC's scheduling, will consequently have heavy deviation in their schedule as regional entity. This besides increased deviation charges will causes grid operational problems. In consideration to these, it will be appropriate to devise mechanism at FOR level which can lead to state specific open source software development in forecasting and scheduling of RE generation at state level for all WS generators, roof top installations and Decentralised RE generation by taking into considerations the scheduling by generators / QCA as one of the input (to be cross checked and rectified) and such mechanism should ensure progressive evaluation of software / software's changes and devise improvement in software through software developers.

Daily Schedule change for regional Entity.

11. Further CERC may also review IEGC and to prevent spikes in schedules permit regional entity under reg 49(4)© to revise schedule if schedule of WS generation undergo change and such revision to be effective from 4th or subsequent time block such that with the specified ramp rate it achieves full schedule change from 7th and 8th time block.

Yours

Shanti Prasad

Ex-chairman, RERC.