Prayas (Energy Group)'s Submission and Comments regarding Suo-moto proceeding by CERC for Determination of value of "X" for computation of the deviation (in %) for Wind and Solar (WS) Sellers from 01.04.2026 onwards

Summary: The CERC has initiated a suo-moto proceeding to determine the value of "X" in the deviation formula applicable to Wind and Solar (WS) Sellers under the Deviation Settlement Mechanism (DSM) framework effective from 1 April 2026. This submission by Prayas (Energy Group) evaluates the implications of varying values of "X", the impact of pooling of renewable generators, and the proposal regarding non-payment for over-injection during high-frequency conditions. The analysis is based on detailed 15-minute DSM data for FY 2023-24 and FY 2024-25 covering over 70% of ISTS-connected solar and wind capacity in the Western and Southern regions.

Key Findings and Recommendations

1. Impact of tightening DSM tolerance bands – The reduction of tolerance from ±10%/±15% to ±5%/±10% will increase deviation-linked penalties. Without pooling, the proportion of time blocks within permissible limits may fall by 20–30%.
2. Effectiveness of pooling – Aggregation of projects at the pooling-station level smooths generation variability, increasing compliance within tolerance limits and reducing penalties by 30–65% at (X=100).
3. Sensitivity to "X" – As "X" decreases from 100 (available capacity basis) to 0 (scheduled generation basis), penalties rise steeply—especially for wind projects. Pooling moderates these effects but benefits diminish as "X" falls below ~60%.
4. Differentiated and phased approach – Empirical analysis supports a graduated shift towards schedule-based deviation computation:
   - FY 2026–28: X = 40–50% for solar and 60–70% for wind.
   - From FY 2028 onwards: full transition (X=0), aligning with TNERC's approach and CERC's proposed treatment for new WS projects.
5. High-frequency over-injection – Frequency ≥50.05 Hz occurred ~9.5% of the time in FY 2025, but energy affected was under 1% of total generation, implying negligible revenue impact. The proposed rule therefore strengthens grid security without significantly impacting revenue. DSM regulations should be amended to include this proposed change.
6. Pooling and 100 MW deviation cap – As WS sellers are progressively aligned with General Sellers, pooling of large RE stations (≥1000 MW) under a ±10% or 100 MW cap requires reconsideration to ensure equitable treatment.

CERC has initiated suo-moto proceeding for determination of value of "X" for computation of the deviation (in %) for Wind and Solar (WS) Sellers from 01.04.2026 onwards and has invited public comments by 17th October, 2025. Prayas' suggestions and comments on the proposal are detailed below.

The DSM framework for Renewable Energy (RE) has undergone significant changes over time. With the DSM regulation of 2022[1] coming into effect, RE projects had a ±10% tolerance band without any penalty, which was later differentiated, through CERC order dated 6th Feb, 2023[2], to ±10% for solar/hybrid and ±15% for wind. This evolved further with the 2024 CERC regulations[3], with key changes for wind-solar sellers being:

- From 16th Sep 2024, penalties for deviations exceeding the outermost band have been doubled. Further, aggregation of generating stations has been allowed at a pooling station through QCA.
- From 1st April 2026, tolerance bands will narrow to ±5% for solar/hybrid and ±10% for wind.
- A new hybrid deviation formula was introduced:

$$Deviation(in\%) = \frac{100\ \ [(\text{Actual injection in MWh}) - \ (\text{Scheduled generation in MWh})]}{[(\mathbf{X}\%\ \text{of Available Capacity}) + \ (100 - \mathbf{X})\%\ \text{of Scheduled Generation}]^*}$$

**Wherein, the value of 'X' will be specified by the Commission through separate order(s) following public consultation.*

The present proceeding initiated by the Commission is focused on specifying the value of X for the deviation % formula. The draft also proposes some more changes in the DSM framework for solar and wind. Our submission primarily focuses on analyzing the implications of possible values of X and pooling. We have also included a preliminary analysis of the implication of CERC's new proposal, i.e. "*no payment shall be made to the existing Wind and Solar (WS) Sellers for any over-injection during periods when the system frequency is at or above 50.05 Hz*."

To begin with, we have undertaken a detailed analysis of the DSM data for ISTS RE generators (solar and wind) published by Western and Southern RPCs[4]. The analysis was carried out using 15-minute interval generation data of RE plants for two financial years (FY 24 and FY 25). The analysis covered 67% of Western Region plants in FY24 (24 of 36: 11 solar, 13 wind) and 85% in the Southern Region (33 of 39: 25 solar, 8 wind). In FY25, coverage extended to 68% in the Western Region (32 of 47: 16 solar, 16 wind) and 82% in the Southern Region (40 of 49: 28 solar, 12 wind). An overview of the selected projects and pooling stations can be found in Annexure-1. Further, to see the changes in DSM regulations over time and get a broad overview of the selected plants across the two regions, click to the following interactive visualisations link (ISTS RE- DSM Intro & Summary).

[1] Effective from 5th December, 2022. https://cercind.gov.in/Regulations/168-GAZ.pdf
[2] https://cercind.gov.in/2023/orders/1-SM-2023.pdf
[3] https://cercind.gov.in/regulations/192-Noti.pdf
[4] Our analysis has not captured any solar or wind projects from Northern region, because of some issues in understanding and interpreting the data reported by NRPC in public domain. As a result, no analysis is done for any hybrid projects in the country. Further, only those projects have been considered for which we have the data for the whole financial year, to avoid any seasonality bias on DSM charges for such projects.

Having reviewed the evolution of the DSM framework and the upcoming tightening of tolerance bands, it is essential to understand how aggregation or pooling can mitigate the resulting financial and operational risks for renewable generators.

1. Impact of Aggregation on deviation

According to CERC's analysis provided in the proposal, tightening DSM tolerance bands from FY26 onwards reduces the proportion of time RE plants remain within tolerance limits[5] without any penalty, with wind showing the steepest decline followed by solar.

A similar trend is observed in our analysis[6] for 9 Pooling stations, as seen in Fig.1. For wind, the percentage of time-blocks where deviation lies within tolerance limits in the Western region drops from 75–92% (±15%) to 49–72% (±10%) and in the Southern region from 79–87% to 47–62%. Solar too sees a decline, with the Western region falling from 87–96% (±10%) to 70–87% (±5%) and the Southern region from 83–91% to 70–77%. As pooling of renewable energy generators has already been permitted under CERC's DSM framework effective from 16.09.2024, this mechanism will play a critical role in mitigating the enhanced financial risks associated with tighter DSM tolerance bands from 01.04.2026. Pooling enables aggregation of generation from multiple plants, thereby smoothing individual variability and improving the probability of remaining within the penalty free deviation tolerance limits. After pooling, for wind, the values rise to 56–70% in the Western region and 56–67% in the Southern region, while for solar they improve to 79–86% and 72–77% respectively.

Impact of pooling on deviations with change in DSM Regulation

Technology Type	Region	Band Group	Tolerance Band	**Before Pooling**	**After Pooling**
Wind	Western Region	Band 1 (Upto 31/03/25)	±15%	75.45% – 92.01%	82.94% – 95.44%
		Band 2 (From 01/04/26)	±10%	49.00% – 72.21%	56.39% – 69.95%
	Southern Region	Band 1 (Upto 31/03/25)	±15%	78.68% – 86.83%	87.92% – 89.43%
		Band 2 (From 01/04/26)	±10%	47.05% – 61.91%	55.90% – 66.60%
Solar	Western Region	Band 1 (Upto 31/03/25)	±10%	86.52% – 96.04%	91.27% – 94.14%
		Band 2 (From 01/04/26)	±5%	70.07% – 87.08%	78.78% – 85.96%
	Southern Region	Band 1 (Upto 31/03/25)	±10%	83.35% – 91.22%	87.92% – 90.27%
		Band 2 (From 01/04/26)	±5%	69.67% – 77.44%	71.62% – 76.83%

Fig.1 Impact of pooling on deviation% range with change in DSM Regulation

[5] Here, by tolerance limit, we mean the deviation band for which there is no revenue implication on solar or wind plants.

[6] Here, the analysis considers generation of complete FY 2024-25, instead of just the period of the financial year during which DSM Regulation 2024 was made effective.

Further, to explore how pooling affects the distribution of deviation percentages across defined error bands, the frequency of penalty-imposed time blocks, and the overall penalty amounts under different regulatory regimes for FY24 and FY25, click to the following interactive visualisations link (ISTS RE- Impact of Pooling).

While pooling improves deviation performance, its benefits depend on how the deviation percentage is computed. The next section therefore examines how varying the value of "X" influences penalties under different DSM formulations.

2. Analysing various values of "X" from 100 to 0.

a) Further, to assess the value of 'X', an analysis was undertaken by applying different values of 'X' across each 15-minute time block for the selected ISTS RE generating stations over the entire FY25 period. While the actual data was for FY 25, we have applied the DSM framework rules beginning from 1st April 26. During this analysis, our focus was to understand:
   1. Financial implication of varying value of X. Finding a broad range of X when the penal implications on generators without pooling and X=100 is similar to the case with pooling and X reducing.
   2. Checking impact of X on solar and wind generators separately, to understand which source is more influenced by shifting deviation % formula from AvC towards one with more weight for scheduled generation.
   3. Penalty as calculated in the following analysis, refers to the extra charges imposed on RE plants when their actual energy injection deviates from schedule and exceeds the permissible deviation limits. The penalty charges are calculated using the formula:-

$$Penalty\ (₹) = DSM\ Receivable\ (in\ Rs) - DSM\ Payable\ (in\ Rs) - (Deviation\ (MWh) * RE\ Gen\ PPA\ Rate\ (Rs/MWh))$$

$$Penalty/Unit\ (₹/\mathrm{KWh}) = \frac{Penalty\ (₹)}{Scheduled\ Generation\ (MWh) * 1000}$$

For illustration, results from a solar pooling station (PSS_S_11) in the Southern Region and a wind pooling station (PSS_W_4) in the Western Region are presented.

Percentage Gain (+) or Loss (-) in Revenue Compared to Contract Rate with Varying X Values (FY25)

Type WIND | **Region** Western Region | **Pooling Station** PSS_W_4

Pooling Station	No of Plants	Total Installed Capacity (MW)	Constituents	X Value 100	90	80	70	60	50	40	30	20	10	0
PSS_W_4	8	2,437	W-7	-3.7%	-4.2%	-4.8%	-5.6%	-6.4%	-7.5%	-8.6%	-9.8%	-11.1%	-12.6%	-14.2%
			W-8	-2.4%	-2.8%	-3.5%	-4.2%	-5.2%	-6.2%	-7.4%	-8.7%	-10.2%	-11.8%	-13.6%
			W-9	-3.1%	-3.6%	-4.3%	-5.2%	-6.3%	-7.5%	-8.9%	-10.5%	-12.2%	-14.1%	-16.1%
			W-10	-2.7%	-3.4%	-4.4%	-5.6%	-7.0%	-8.6%	-10.3%	-12.2%	-14.3%	-16.6%	-19.0%
			W-11	-3.4%	-3.8%	-4.3%	-4.9%	-5.7%	-6.6%	-7.8%	-9.2%	-10.8%	-12.6%	-14.6%
			W-12	-2.3%	-2.8%	-3.6%	-4.5%	-5.7%	-7.1%	-8.7%	-10.4%	-12.4%	-14.5%	-16.8%
			W-13	-2.4%	-3.1%	-4.2%	-5.6%	-7.4%	-9.4%	-11.7%	-14.4%	-17.3%	-20.4%	-23.9%
			W-14	-1.8%	-2.3%	-3.1%	-4.1%	-5.4%	-6.9%	-8.6%	-10.6%	-12.8%	-15.4%	-18.1%

Pooling Station	100	90	80	70	60	50	40	30	20	10	0
PSS_W_4	-0.9%	-1.2%	-1.7%	-2.4%	-3.4%	-4.5%	-5.8%	-7.4%	-9.1%	-11.0%	-13.2%

Fig.2 Wind Projects aggregated at a pooling station (PSS_W_4) in Western Region (for the period from 01.04.2024 to 31.03.2025).

Percentage Gain (+) or Loss (-) in Revenue Compared to Contract Rate with Varying X Values (FY25)

Type SOLAR | **Region** Southern Region | **Pooling Station** PSS_S_11

Pooling Station	No of Plants	Total Installed Capacity (MW)	Constituents	X Value 100	90	80	70	60	50	40	30	20	10	0
PSS_S_11	13	2,000	S-20	-5.5%	-5.8%	-6.1%	-6.5%	-6.8%	-7.3%	-7.7%	-8.2%	-8.8%	-9.4%	-9.6%
			S-21	-4.1%	-4.4%	-4.6%	-4.8%	-5.1%	-5.4%	-5.8%	-6.1%	-6.5%	-7.0%	-7.2%
			S-23	-4.7%	-4.9%	-5.2%	-5.5%	-5.8%	-6.2%	-6.6%	-7.0%	-7.5%	-8.1%	-8.5%
			S-24	-6.1%	-6.4%	-6.7%	-7.1%	-7.5%	-7.9%	-8.4%	-8.9%	-9.5%	-10.2%	-10.6%
			S-25	-3.9%	-4.1%	-4.3%	-4.6%	-4.9%	-5.3%	-5.7%	-6.1%	-6.6%	-7.3%	-7.6%
			S-26	-5.2%	-5.5%	-5.8%	-6.2%	-6.5%	-7.0%	-7.4%	-8.0%	-8.6%	-9.3%	-9.5%
			S-27	-5.6%	-5.8%	-6.1%	-6.4%	-6.7%	-7.0%	-7.4%	-7.8%	-8.3%	-8.9%	-9.3%
			S-28	-4.6%	-4.8%	-5.0%	-5.3%	-5.6%	-5.9%	-6.3%	-6.7%	-7.2%	-7.7%	-8.1%
			S-29	-4.0%	-4.2%	-4.4%	-4.6%	-4.9%	-5.1%	-5.5%	-5.9%	-6.3%	-6.8%	-7.0%
			S-30	-5.2%	-5.5%	-5.8%	-6.1%	-6.4%	-6.7%	-7.2%	-7.6%	-8.1%	-8.8%	-9.0%
			S-31	-5.4%	-5.7%	-6.0%	-6.3%	-6.6%	-7.0%	-7.4%	-7.9%	-8.4%	-9.0%	-9.4%
			S-32	-5.1%	-5.3%	-5.6%	-5.9%	-6.2%	-6.6%	-7.0%	-7.5%	-8.0%	-8.6%	-8.9%
			S-33	-4.4%	-4.6%	-4.8%	-5.1%	-5.4%	-5.8%	-6.2%	-6.6%	-7.1%	-7.7%	-8.0%

Pooling Station	100	90	80	70	60	50	40	30	20	10	0
PSS_S_11	-3.1%	-3.5%	-3.8%	-4.0%	-4.3%	-4.5%	-4.9%	-5.3%	-5.7%	-6.3%	-6.6%

Fig.3 Solar Projects aggregated at a pooling station (PSS_S_11) in Southern Region (for the period from 01.04.2024 to 31.03.2025).

As seen in Fig.2 & Fig.3 the results show that at the individual plant level, both solar (PSS_S_11) and wind (PSS_W_4) plants experience losses relative to the PPA contract rate as the value of X decreases. For solar plants, losses range from about 4% at X=100 to 10% at X=0, while for wind the losses are much higher, stretching from 2% to 4% at X=100 to as high as 16% to 24% at X=0. However, when plants are aggregated at the pooling station level, the results improve substantially. For solar pooling station PSS_S_11, the combined losses reduce to a range of 3.1% (X=100) to 6.6% (X=0), compared to individual constituents which faced losses up to 10%. Similarly, in wind pooling station PSS_W_4, aggregation narrows the losses from severe individual plant deviations (up to 19% or 24%) to a reduced pooled range of 0.9% (X=100) to 13.2% (X=0).

This again indicates that **pooling of solar or wind projects is beneficial for the individual projects as it reduces the DSM charges or penalty that they would have paid in case they had no option for pooling**.

b) The following analysis presents the impact of varying value of 'X' on DSM penalties for two PSSs, PSS_S_11 (Solar, Southern Region) and PSS_W_4 (Wind, Western Region), comparing penalties before and after pooling against a common baseline.

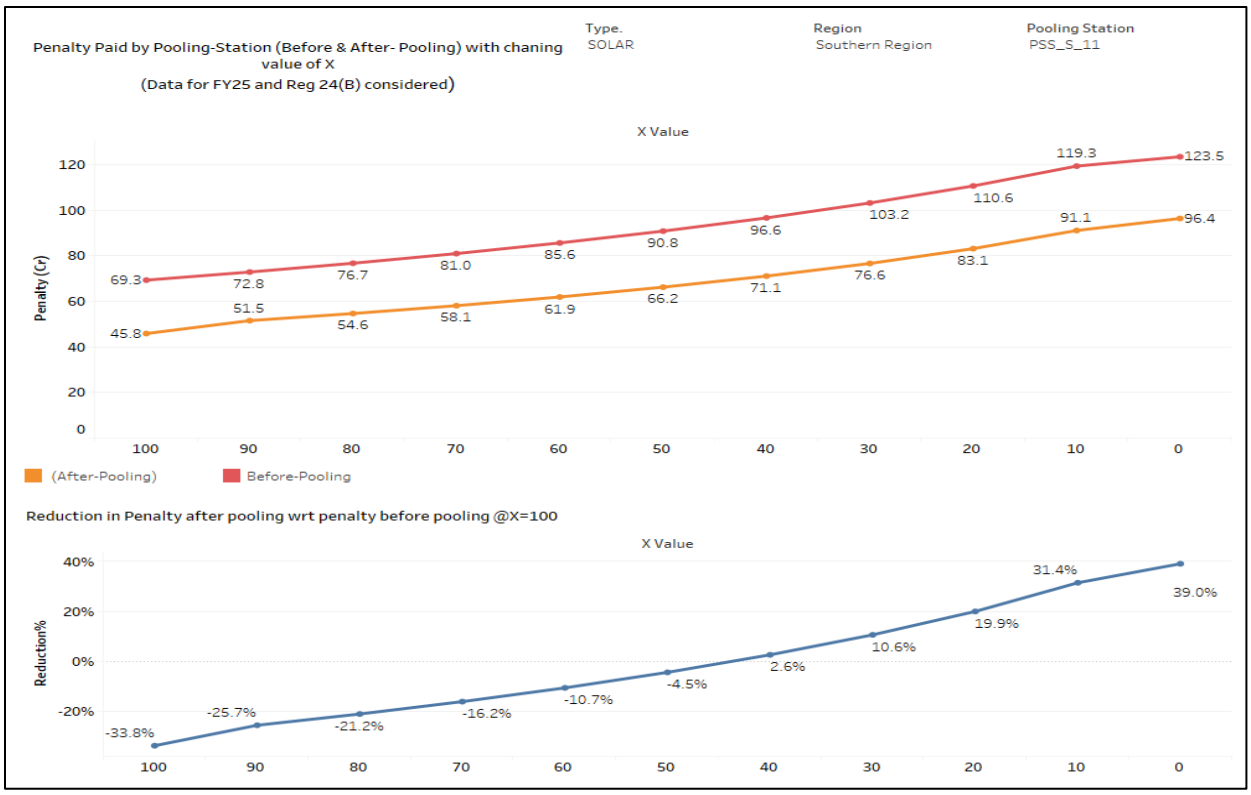


Fig.4 Solar Projects aggregated at a pooling station (PSS_S_11) in Southern Region (for the period from 01.04.2024 to 31.03.2025).

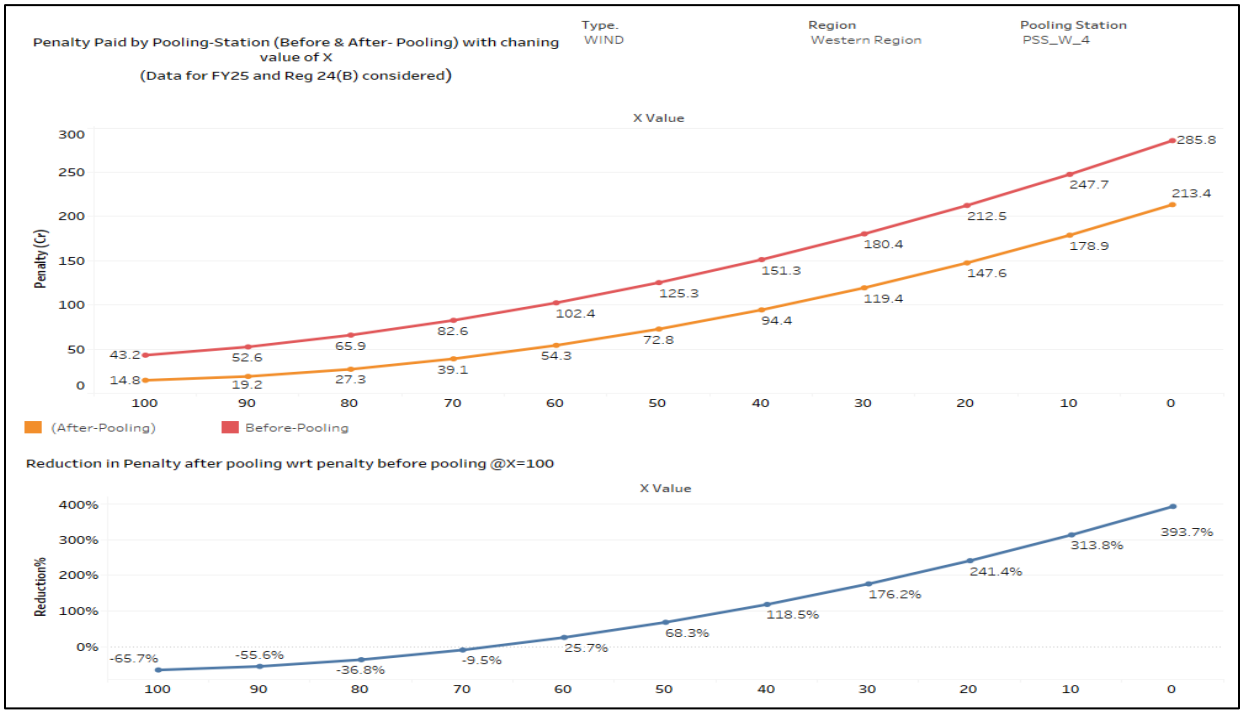


Fig.5 Wind Projects aggregated at a pooling station (PSS_W_4) in Western Region (for the period from 01.04.2024 to 31.03.2025).

For FY 2025 (refer to Fig. 4), in PSS_S_11 (Solar, Southern Region), as X shifts from 100% (available capacity) to X=0 (i.e. 100% scheduled generation), the penalty before pooling rises from ₹69.3 crore to ₹123.5 crore (~78% increase). After pooling, the penalty reduces to ₹45.8 crore (X =100) but grows to ₹96.4 crore as X = 0. Here, the baseline is taken as the penalty before pooling at X = 100% (₹69.3 crore). Pooling initially reduces penalties significantly: at X = 100%, the penalty is 33.8% lower than the baseline un-pooled penalty. However, this benefit diminishes as X decreases: at X = 50%, reduction narrows to 4.5%, and beyond this, as X reduces the penalty even after pooling is higher than that before pooling (X = 100). By X = 0%, the penalty is 39% higher relative to the baseline (no pooling and X =100), showing diminishing effectiveness of pooling as scheduled generation dominates in the formula.

For FY 2025 (refer to Fig. 5), in PSS_W_4 (Wind, Western Region), as X shifts from 100% (available capacity) to X=0 (i.e. 100% scheduled generation), the penalty before pooling rises from ₹43.2 crore to ₹285.8 crore (~561% increase). After pooling, the penalty reduces to ₹14.8 crore (X =100) but grows to ₹213.4 crore. Here, the baseline is taken as the penalty before pooling at X = 100% (₹43.2 crore). Pooling gives very strong initial benefits: at X = 100%, penalties fall by 65.7% compared to the baseline. As X reduces, pooling's effectiveness steadily declines. At X = 70%, the penalty is 9.5% lower than baseline and beyond this, as X reduces the penalty even after pooling is higher than that before pooling (X = 100): +118% at X = 40%, and surging to +393% at X = 0%.

c) The same analysis is shown in Fig.6 for all pooling stations together and evaluates % reductions or increases in DSM penalties for pooled PSSs of both Solar and Wind in the Southern and Western Regions, with results assessed at different weighting factors (X ranges from 100% to 0%). Here, the

baseline reference is the total penalty at each pooling station (without pooling) at X = 100%. While the actual data was for FY 25, we have applied the DSM framework rules beginning from 1st April 26.

Reduction in Penalty after pooling wrt before pooling @X=100 (Data for FY25)

Type	Region	Pooling Station	No of Plants	Total Installed Capacity (MW)	X Value										
					100	90	80	70	60	50	40	30	20	10	0
SOLAR	Southern Region	PSS_S_11	13	2,000	-34%	-26%	-21%	-16%	-11%	-4%	3%	11%	20%	31%	39%
		PSS_S_12	11	1,400	-42%	-38%	-33%	-29%	-23%	-17%	-11%	-3%	6%	17%	22%
	Western Region	PSS_S_2	5	1,300	-52%	-49%	-46%	-42%	-38%	-33%	-28%	-21%	-13%	-4%	1%
		PSS_S_4	6	650	-37%	-32%	-28%	-23%	-18%	-12%	-5%	2%	10%	21%	23%
WIND	Southern Region	PSS_W_6	5	1,220	-51%	-42%	-28%	-10%	12%	37%	65%	97%	131%	168%	208%
		PSS_W_9	3	650	-59%	-51%	-41%	-27%	-10%	12%	39%	70%	105%	144%	187%
	Western Region	PSS_W_3	2	449	-33%	-20%	-1%	25%	56%	94%	137%	187%	242%	302%	368%
		PSS_W_4	8	2,437	-66%	-56%	-37%	-10%	26%	68%	118%	176%	241%	314%	394%
		PSS_W_5	2	480	-23%	-10%	7%	29%	54%	83%	115%	152%	191%	235%	282%

Fig.6: % Reduction in DSM Penalties for Pooled Solar and Wind PSSs (Southern & Western Regions) across X Values (FY25)

Solar PSSs in both Southern and Western Regions show significant pooling benefits at X = 100%, with penalties lower by 34% to 52%. These advantages steadily decline as X reduces, narrowing to about 4-33% lower penalties at X = 50% and eventually reversing the trend, with penalties higher by 1-39% when X=0%. Wind PSSs in both regions reflect similar benefits, with penalties lower over a wider range of 23- 66% at X = 100%. However, the analysis clearly shows that **wind is more sensitive to the change in value of X**. Penalties are higher than the baseline for X ranging from 60-80% depending on the PSS. For X=50, penalties in all PSS are higher than the baseline and for X = 0%, they are higher by 208–400%.

To further explore how variations in the value of X, along with key regulatory changes—such as tighter error bands, higher penalty rates in the highest deviation band, and the introduction of pooling—affect penalties at both the pooling station and individual plant levels, click to the following interactive visualisations link (ISTS RE- Impact of varying X Value).

d) As mentioned in the proposal, the Commission recognizes the intermittency of renewable generation but also notes improvements in forecasting and the need for stricter grid discipline. Accordingly, the current DSM formula based on available capacity will continue until **31.03.2026**, after which a phased transition to a scheduled generation basis will be undertaken, balancing grid security with the operational complexities of RE generators.

In this regard, we would like to highlight that TNERC has already adopted scheduled generation in their definition of absolute error for solar and wind in its Tamil Nadu Electricity Regulatory Commission (Forecasting, Scheduling and Deviation Settlement and related matters for Wind and Solar Generation) Regulations, 2024. The regulation defines error as:

"Absolute Error (%) = (100 x [Actual Generation – Scheduled Generation])/Scheduled Generation

where, scheduled generation ≠ 0.

Further, the TNERC regulation states that "If the scheduled generation is zero and if there is actual generation in a particular 15 minutes block by the wind/solar generator(s), the deviation settlement charges will be collected from those generator(s) at 125% of the capped price for such energy injected."

The CERC has proposed the following trajectory for X for Existing Projects (WS Sellers).

With Effect From (w.e.f.)	Value of "X"
01.04.2026 to 31.03.2027	100%
01.04.2027 to 31.03.2028	80%
01.04.2028 to 31.03.2029	60%
01.04.2029 to 31.03.2030	40%
01.04.2030 to 31.03.2031	20%
01.04.2031 onwards	0%

Considering the financial implications of changing the deviation % formula with some weightage to scheduled generation as shown in the above analysis, we see merit in shifting the formula to scheduled generation over time.

e) We fully agree that strengthening grid discipline and enhancing forecasting accuracy are essential as the share of renewable energy in the grid continues to rise. These measures will support better management of intermittency and ensure reliable and secure grid operations. At the same time, while the phased reduction of X is an important step, the differentiation of X values across technologies requires careful consideration. Our analysis clearly indicates that pooling plays a vital role in mitigating financial risks and reducing deviations beyond permissible bands. Since RE plants are already started deriving the benefits of pooling, we suggest[7] that **differentiated values for X be introduced for a period of 2 years (where X could be 40-50% for Solar PSSs and 60–70% for Wind PSSs before linking the error formula completely to schedule generation over time**. This phased and differentiated approach would allow sufficient time to observe impacts, stabilize operations, provide policy certainty for the generators, and ensure a smoother transition. **Our analysis shows that considering value of X in suggested range will have limited impact on revenue for these generators after pooling.**

Further, from 1st April 2028, the complete shift can be made to scheduled generation like in the case of TNERC. This will match the timeline proposed by CERC in the proposal, where it has signaled for similar treatment for new wind/solar projects as that for general sellers. The proposal is reproduced below:

[7] Based on data analysis results shown in Fig 6.

"(b) All new Wind and Solar (WS) projects, with tendering or bid submission dates on or after 01.04.2026, shall be treated at par with General Sellers."

Solar/Wind projects are usually commissioned in a time span of 1.5-2 years. So, any project with tendering or bid submission dates after 1st April 2026 is expected to commissioned by 1st April 2028. In this regard, we would like to point that treating **existing** solar or wind projects at par with General Sellers from 1st April 2031 and treating **new** WS projects as general sellers from roughly April 2028 as highlighted above may lead to some complexities, one of them is accounting deviation in case of pooling. At present, solar and wind projects enjoy aggregation at pooling station. Hence, in case of different timelines for existing and new WS projects, existing projects will have deviation arrangement for WS sellers, while new projects will have deviation arrangement for General Sellers. This will lead to complexity on how aggregation can be allowed and accounted at a pooling station where there are both existing as well as new projects. Alternatively, the CERC may not allow for pooling of existing and new WS projects.

Beyond deviation computation, grid frequency is also critical. The following section analyses CERC's proposal to restrict payments for over-injection when system frequency exceeds 50.05 Hz and its likely impact on RE revenues.

3. No payment for over-injection when f> 50.05

CERC has proposed that **"no payment shall be made to existing Wind and Solar (WS) Sellers for any over-injection during periods when the system frequency is at or above 50.05 Hz"** However, the recent CERC order dated 5th Oct, 2025, *Planning for safe, secure, and reliable integrated operation of the power system during critical periods arising on account of seasonal variations wherein the electricity demand increases rapidly by undertaking specific measures to mitigate the risks on the power system, under clause (h) of sub-section (1) of Section 79 of the Electricity Act, 2003 and the Regulation 31 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023* has already partly operationalised this proposal as seen from the excerpt from the order shown below.

"63 (j) In light of critical grid security issues and in exercise of the powers conferred under Regulation 57 and Regulation 58 of the Grid Code, and the powers conferred under Regulation 11 and Regulation 12 of the DSM Regulations, the Commission directs the following interim measures:

(v) When the system frequency, f > 50.05 Hz, and directions are given under TRAS Emergency, the charges for deviation of scheduled power by way of over injection for the WS seller shall be zero. In such a situation, DSM charges for over injection shall be zero.

*64. We direct that the directions issued under Paragraph No. 63(j) are interim measures to ensure grid security and shall be followed by due process of amendment to the relevant regulations. The directions under Paragraph 63(j) shall come into force from **10.10.2025** and shall continue to be in force until the issuance of appropriate amendments, after which the provisions of the amendments shall prevail."*

This proposal has to be seen in the light of a recent petition filed by the GRID Controller of India Limited (GCIL) seeking amendments in the AS, DSM and IEGC regulations of CERC to secure reliable grid operation. An RoP in this matter dated 5th June 2025 highlights the issue of high frequency > 50.05 *particularly during low demand periods (e.g., weekends and holidays), which jeopardizes the stability and security of the national grid.* It notes that, *'TRAS Down reserves are getting exhausted prematurely, revealing systemic weaknesses in current regulatory and market frameworks. Further, due to scarcity of reserves in the TRAS shortfall category, NLDC has* ***no option but to trigger TRAS under emergency provisions****.'*

Further, the daily reports on Ancillary Services and Security Constrained Unit Commitment (SCUC) and VRE clearly show the consistent and increasing curtailment of RE power in the last few months due to high frequency. On 12th Oct, 2025, a maximum of 22,246 MW of solar power was curtailed in Emergency TRAS Down. In terms of energy, it was 93 MU (**66 %** of the total 141 MU solar generation from ISTS in that day)

Our analysis indicates that, during FY25 the grid frequency was at or above 50.05 Hz approximately 9.48% of the time (refer Fig. 7). Out of these, over-injection instances across WS pooling stations range between 3.1% and 4.6%, leading to only a small portion of generation being impacted (~0.7% to 1.2%) and corresponding revenue impacts being less than 1% on average. **However, it is important to note that this is based on the FY 25 data and frequency profile.**
Solar PSSs in the Southern Region (PSS_S_11, PSS_S_12) show slightly higher revenue impacts (~0.9–1%), while most Wind PSSs reflect relatively lower values (~0.7–0.9%). Overall, the data indicates that **while over-injection during high frequency conditions is visible, the actual financial impact remains marginal across FY25. Hence, there is a need of appropriate amendment in the DSM regulations for solar and wind projects, as have been proposed in the present proceeding, which will require them to share more responsibility in grid stability.**

To further explore the behavior of RE plants with respect to grid frequency for FY25, click to the following interactive visualisations link (ISTS RE- Impact of RE Gen on Grid Freq).

Impact of over-injection instances (at or above 50.05 Hz) (Data for FY25)

Type	Region	Pooling Station	Total Installed Capacity (MW)	No of REPlants	Instances when Freq at or above 50...	Overinjection Instances when Freq a..	Gen. impacted	Revenue impact
SOLAR	Southern Region	PSS_S_11	2,000	13	9.48%	4.39%	1.11%	0.91%
		PSS_S_12	1,400	11	9.48%	4.36%	1.18%	1.01%
	Western Region	PSS_S_2	1,300	5	9.48%	4.12%	1.05%	0.86%
		PSS_S_4	650	6	9.48%	4.63%	0.88%	0.76%
	Weighted Average	-	5,350	35			1.09%	0.92%
WIND	Southern Region	PSS_W_6	1,220	5	9.48%	3.18%	0.88%	0.74%
		PSS_W_9	650	3	9.48%	3.43%	0.87%	0.75%
	Western Region	PSS_W_1	367	3	9.48%	3.87%	0.83%	0.73%
		PSS_W_3	449	2	9.48%	3.92%	0.81%	0.76%
		PSS_W_4	2,437	8	9.48%	3.47%	0.70%	0.66%
		PSS_W_5	480	2	9.48%	3.91%	1.18%	0.96%
	Weighted Average	-	5,604	23			0.83%	0.74%

Fig.7 Impact of Over-Injection Instances at High Frequency (≥ 50.05 Hz) for Solar and Wind PSSs – (Data for FY25).

As CERC moves toward harmonising the DSM framework across all seller categories, it is necessary to consider how existing WS projects and new entrants will transition to the General Seller regime, especially in relation to pooling and deviation limits.

4. Treating WS seller "at par" with General Sellers

As per the proposal, Commission has directed the staff to initiate the process of amendment to the DSM Regulations, 2024 for following:-

> *"(a) All existing Wind and Solar (WS) Projects shall be treated at par with General Sellers from 01.04.2031 onwards.*
>
> *(b) All new Wind and Solar (WS) projects, with tendering or bid submission dates on or after 01.04.2026, shall be treated at par with General Sellers."*

In this regard, we have tabled differential treatment for WS and GS sellers as per present DSM framework by CERC.

Parameters	For WS Seller	For GS Seller
Deviation (%) formula	Linked to Available Capacity; which will be progressively linked to Scheduled generation.	Linked to Scheduled generation
Frequency Linking	Not Linked	Linked
Tolerance Band	For Solar ±10% and for Wind ±15%	±10% + (Freq between 49.97Hz to 50.03Hz)
Pooling	Allowed	Not Allowed
Calculating deviation charges	Step wise charges[8]	Charges based on deviation% or MW limit and frequency[9]

Table.1 Difference in DSM framework for WS and GS sellers.

As per Table 1, based on the parameters listed, these are some key differences in the currently applicable DSM regulations for WS (effective from 16.09.2024) and GS sellers. We would like to point out two aspects: differential treatment for solar and wind projects, and aggregation/pooling. Presently, Wind and Solar sellers have separate deviation bands without frequency linkage due to their intermittent nature. However, after aligning them with GS framework, both solar and wind projects will follow common deviation bands with frequency linkage. Given that pooling is allowed for WS sellers, would they be treated as GS sellers individually or pooling would be continued?

Pooling creates another interesting issue. Currently, the permissible deviation limit for GS Sellers is ±10% or 100 MW whichever is less. For RE-rich pooling stations with capacities of 1000 MW or more (i.e. PSS_S_11 and PSS_W_4) (refer Fig.7), deviation percentages even much less than 10% might result in deviation crossing 100 MW mark. Hence, maintaining deviations within this narrow limit will be challenging in case pooling is allowed for larger capacity PSS. Therefore, the deviation limit for such large RE-rich pooling stations needs to be suitably considered (possibly broader limits for size wise PSS) to account for their aggregated capacity.

We request the Commission staff to consider the prevalent differential treatment for GS and WS sellers and consider these aspects (differential treatment for wind and solar; pooling and 100 MW limit for large scale RE PSS) when proposing the amendments to DSM regulations.

The analyses above underscore the interconnected nature of DSM parameters—tolerance bands, pooling, the value of X, and frequency-linked rules. Synthesising these insights can lead to a coherent regulatory framework for a phased and balanced transition.

[8] For e.g., for a solar project, if the deviation% is 16% (over-injection), then receivables will be sum of 100% of PPA Rate (for 0-10% deviation), 90% of PPA Rate (for deviation 10-15%) and 0% of PPA Rate (for deviation > 15%).
[9] Considering same deviation % of 16% for GS seller, the receivables will be 0 for the whole 16% deviation up to a frequency of 50.10 Hz, beyond which the seller shall pay an extra penalty of 10% of the RR for the 16% deviation.

Annexure-I

Region-Wise Pooling Station Info

Region: Western Region

Type	State	Pooling Station	Constituents	Financial Year: Installed Capacity (MW) FY23-24	Installed Capacity (MW) FY24-25	CUF % FY23-24	CUF % FY24-25	PPA Rate (Rs/kWh) FY23-24	PPA Rate (Rs/kWh) FY24-25
WIND	Gujarat	PSS_W_1	W-1	115	115	25.6	32.9	2.76	2.76
			W-2	51	51	33.4	31.4	2.82	2.82
			W-3		250		32.5		2.83
		PSS_W_3	W-5	149	149	24.3	23.0	2.82	2.82
			W-6	300	300	35.1	32.4	2.77	2.77
		PSS_W_4	W-7	300	300	34.7	20.9	2.44	2.44
			W-8	300	300	31.3	25.1	2.44	2.44
			W-9	250	250	31.0	27.3	2.65	2.65
			W-10	556	556	30.2	24.4	2.87	2.87
			W-11	166	166	35.7	31.2	2.51	2.51
			W-12	300	300	29.9	26.7	2.45	2.45
			W-13		410		18.0		3.18
			W-14		207		22.2		2.08
		PSS_W_5	W-15	230	230	26.8	29.3	2.64	2.64
			W-16	300	300	32.5	30.1	3.48	3.48
	Madhya Pradesh	PSS_W_2	W-4	324	324	31.3	30.3	2.83	2.83
	Western region	-	Grand Total	3,340	4,207	31.2	26.5	2.74	2.76
SOLAR	Maharashtra	PSS_S_1	S-1	10	10	19.8	20.9	3.45	3.45
	Gujarat	PSS_S_4	S-8	100	100	28.2	27.0	2.70	2.70
			S-9	100	100	16.1	12.4	2.51	2.51
			S-10	100	100	28.5	27.9	2.68	2.68
			S-11	200	200	27.7	26.8	2.65	2.65
			S-12		100		22.2		2.64
			S-13		100		17.8		2.65
		PSS_S_6	S-15	56	56	18.8	20.7	2.69	2.69
		PSS_S_7	S-16	20	20	19.9	22.7	2.69	2.69
	Madhya Pradesh	PSS_S_2	S-2	250	250	22.1	21.5	3.18	3.23
			S-3	250	250	22.4	22.1	3.17	3.22
			S-4	250	250	22.4	22.6	3.17	3.22
			S-5		350		21.6		2.44
			S-6		200		24.8		2.46
		PSS_S_5	S-14		300		22.4		2.71
	Chhattisgarh	PSS_S_3	S-7	50	50	17.6	20.3	2.91	2.91
	Western region	-	Grand Total	1,386	2,436	23.1	22.5	2.95	2.80

Western Region – Pooling Station Wise Renewable Energy Data (Wind & Solar)

Region-Wise Pooling Station Info

Region
Southern Region

Type	State	Pooling Station	Constituents	Financial Year: Installed Capacity (MW) FY23-24	Installed Capacity (MW) FY24-25	CUF % FY23-24	CUF % FY24-25	PPA Rate (Rs/kWh) FY23-24	PPA Rate (Rs/kWh) FY24-25
WIND	Tamil Nadu	PSS_W_6	W-17	200	200	25.8	26.7	2.64	2.64
			W-18	250	250	21.9	24.3	3.46	3.46
			W-19	250	300	22.7	27.0	2.78	2.78
			W-20	245	250	27.8	28.7	3.46	3.46
			W-21	250	220	25.0	29.6	2.50	2.50
		PSS_W_7	W-22		520		14.0		3.00
		PSS_W_8	W-23	300	250	21.8	20.8	2.51	2.51
		PSS_W_10	W-27	300	300	32.6	31.1	2.82	2.82
	Karnataka	PSS_W_9	W-24		300		26.0		2.88
			W-25		300		28.3		3.32
			W-26		300		26.4		2.78
	Southern region	-	Grand Total	1,795	3,190	25.5	24.8	2.87	2.94
SOLAR	Tamil Nadu	PSS_S_9	S-17		150		23.2		2.53
		PSS_S_13	S-45	230	230	24.1	23.9	2.69	2.69
	Telangana	PSS_S_10	S-19		100		21.7		4.49
	Karnataka	PSS_S_11	S-20	50	50	24.5	24.1	4.78	4.78
			S-21	400	400	25.1	24.1	3.58	3.58
			S-22	50		24.5		4.80	
			S-23	150	150	25.1	25.1	4.81	4.81
			S-24	50	50	23.3	22.4	1.24	1.24
			S-25	250	250	25.6	24.8	2.85	2.85
			S-26	100	100	22.9	22.1	4.79	4.79
			S-27	100	100	26.9	25.7	2.93	2.93
			S-28	150	150	25.1	24.2	2.92	2.92
			S-29	150	150	25.1	24.2	2.92	2.92
			S-30	50	50	25.1	24.5	4.79	4.79
			S-31	50	50	25.2	24.7	4.79	4.79
			S-32	300	300	26.4	24.9	2.91	2.91
	Andhra Pradesh	PSS_S_8	S-18		25		18.2		4.49
		PSS_S_12	S-34	100	100	22.5	21.1	4.43	4.43
			S-35	250	250	26.7	26.4	2.72	2.72
			S-36	50	50	25.8	24.6	4.43	4.43
			S-37	50	50	24.0	22.7	4.43	4.43
			S-38	50	50	21.4	20.3	4.43	4.43
			S-39	250	250	26.9	25.5	2.73	2.73
			S-40	50	50	25.6	24.4	4.43	4.43
			S-41	50	50	25.4	23.9	4.43	4.43
			S-42	50	50	25.8	24.7	4.43	4.43
			S-43	250	250	26.6	25.8	2.73	2.73
			S-44		250		16.4		5.96
	Southern region	-	Grand Total	3,430	3,905	25.4	23.9	3.33	3.48

Southern Region – Pooling Station Wise Renewable Energy Data (Wind & Solar)