Prayas (Energy Group)'s comments on Tamil Nadu Electricity Regulatory Commission (Forecasting, Scheduling and Deviation Settlement and related matters for Wind and Solar Generation) Regulations, 2023

25th October, 2023

TNERC has issued Draft Tamil Nadu Electricity Regulatory Commission (Forecasting, Scheduling and Deviation Settlement and related matters for Wind and Solar Generation) Regulations, 2023 and invited public comments by 10th October, 2023 which was later extended to 25th October, 2023.

Recent CERC's DSM regulations 2022 has done away with the concept of frequency linked deviation charges and introduced the new concept of charges for deviation. Also, it was felt that multiple QCAs within the State warrant multiple interaction points for SLDC for operationalizing the Scheduling and Deviation Settlement which is complicated and impractical. Considering above mentioned changes at state and central level and increasing RE penetration at state and central level, the proposed regulation has been brought out at right juncture.

Our comments on the proposed regulations are given below.

1. Applicability of Regulations

Regulation 4.1 notes the applicability of these regulations and is quoted below.

> *'4. Applicability: 4.1 These Regulations shall apply to all Wind and Solar Energy Generators (excluding Rooftop PV Solar power projects of capacity less than 1 MW) in Tamil Nadu connected to the Intra-State Transmission System or Distribution System, including those connected through Pooling sub-stations, and using the power generated for self-consumption or sale within or outside the State.'*

However, with the notification of the Green OA Rules, 2022, even consumers with load as low at 100 kW and Captive consumers with no load limit can directly procure green power. Hence there is a likelihood of wind and solar power plants below 1 MW capacity but which may not be rooftop plants. Hence the Commission should clarify that these regulations apply to all plant above 1 MW.

2. Review of Regulations

The commission has stated that:

> *"4.2 The Commission shall review these Regulations including formulation for Absolute Error, Accuracy Band and Deviation charge thereof after two years, or earlier if it considers necessary."*

A mid-term review of any regulations is a welcome step and we encourage it. We suggest that the review of regulations should be done based on an analysis of absolute error of generators during the implementation of these regulations over the next two years. Such data backed analysis should also be accompanied by the study of impact of DSM mechanism for solar-wind generator on state grid operation and deviation of state at national grid level. This analysis and data should be made public in the form of a report based on which a consultation could be held subject to which regulations could be appropriately amended. In addition to this, the regulation can include a provision for QCA providing past as well as real-time data related to power generation and any other related data on the request

of SLDC for the above stated studies. Necessary provision can be added to clause 5.9. The importance of deviation at state periphery is stated in regulation 12.1(c).

> *"12.1 (c) The SLDC shall also compute the impact of the deviation of the Wind and Solar Energy Generation and its contribution to the Deviation Charge at the State periphery and maintain State Deviation Pool Account (Wind and Solar) for both intra-state and inter-state transactions separately for the same."*

3. Forecasting and Scheduling Code: Single QCA

Regulation 5.1 notes that,

> *'... that the QCA authorized by the majority of the generators in the State shall be engaged as a* ***single QCA for all the respective wind/solar generators separately in the State*** *and the terms and conditions for engagement of single QCA shall be governed by the mutual agreement between the respective generators and the QCA.*
>
> *Provided that the wind/solar generators who do not wish to avail the services of the single QCA appointed by the majority of the generators shall have the option to avail the services of the SLDC for forecasting and scheduling services.'*

Further, Regulation 5.6 notes that,

> *5.6. The QCA shall be appointed by the Generators for the purposes specified in these Regulations, including but not limited to the following:*
>
> *(c)* ***In case of single QCA chosen by the wind/solar generators, such single QCA is responsible for state level aggregation*** *of scheduled generation for selling out power within Tamil Nadu and outside Tamil Nadu separately.*

Further, Regulation 5.13, 5.14 notes that,

> *5.13. The QCA(s) shall aggregate the separate Schedules of all Wind / Solar generators connected to the intra-state network / Pooling sub-station and communicate to the SLDC.*
>
> *Provided* ***that in case of single QCA, the QCA shall aggregate the generation of all wind/solar generators separately for the entire State*** *and communicate as single separate schedule for wind and solar respectively to the SLDC for each time block with respect to intra and inter-state transactions.*
>
> *5.14. If the QCA has difficulty to aggregate the generation of wind/solar for the entire State, they may provide schedules for each pooling station individually and in such case, the deviation charges will be calculated pooling sub-station wise.*

Similar provisions are noted in 6.1 and 6.2

> *6.1. The Generators connected to each Pooling sub-station shall appoint a person/entity as QCA from among themselves or any other entity/person as a QCA* ***or majority of the Wind / Solar Energy Generators in the State shall also appoint a single QCA separately for state wide aggregation of solar/wind generation.***
>
> *6.2.* ***Single QCA for state wide aggregation shall be appointed by the majority of the wind/solar generators separately in terms of their combined installed capacity****. The QCA at Pooling sub-station level shall be appointed with the approval of majority of the Generators connected to the polling sub-station in terms of their combined installed capacity, and on appointment with*

majority, the QCA shall perform all functions assigned in these Regulations for all generators for whom they are representing.

Regulation 5 and 6 has several clauses related to 'single QCA' for the whole state. This seems to be a new and novel innovative proposal. However, the plain reading of the proposal opens up several questions and is not very clear in its articulation. If all generators connected to a pooling sub-station agree on a QCA but that QCA is not the one selected by the majority of the state generators, then will such generators have to mandatorily select the SLDC forecast as suggested in 5.1?

Regulation 5.13 notes of an aggregate schedule for the entire state but Regulation 5.14 leaves an option of sub-station wise schedules if there are 'difficulties'.

We request the Commission to re-draft these provisions such that there is no room for confusion or non-clarity in terms of the mandatory or voluntary nature of this idea of single QCA.

4. Amending definition of Absolute error – a step in the right direction

We welcome the initiative by the Commission in transitioning from AvC based error calculation to schedule based determination of absolute error. This will provide better understanding of deviation from schedules and will be a good signal for improving forecasting mechanism by the generators or QCAs, as the case may be.

The commission has defined absolute error as:

> *"2.1(a) "Absolute Error" means the difference between the actual generation injected and the scheduled generation of Wind or Solar Energy Generators in relation to their scheduled generation in each time block, and may be computed in percentage terms by applying the following formula:*
> *Absolute Error (%) = 100 x [Actual Generation – Scheduled Generation]/* ***Scheduled Generation***
> *Provided that when the scheduled generation is zero and if there is actual generation in a particular 15 minutes block by the wind/solar generator(s), only 70% of the actual generation will be considered as scheduled generation."*

Further in case no schedule is provided for a time block, the generator will be penalised with error being 3/7, i.e., 42.86%.

The regulation also states that

> *"5.15. No Wind or Solar energy generation shall be despatched by the SLDC without schedule by the QCA on behalf of the Generators in accordance with the provisions of these Regulations. The generation from those generators not participating in the forecasting and scheduling activities shall be treated as inadvertent flow into the grid and no charges for such inadvertent injection of power shall be paid and/or no adjustment on consumption shall be made by the SLDC or distribution licensee."*

Both these provisions will encourage the generators to provide more accurate & timely schedules.

5. Change Payment & Accounting from actual to schedule basis.

Regulation 7.1 notes that,

> *'7.1 The sale of power within Tamil Nadu by Wind and Solar Energy Generators connected to the Intra-State Transmission Network shall be settled by the Procurers on the basis of their* ***actual generation****, and the Deviation Settlement shall be undertaken as specified in these Regulations.'*

Deviation penalties for inter-state transactions and for regional entities are parameterised (linked to tariff under their PPAs or linked to market rates), while those for intra-state transactions are based on absolute value (absolute value in Rs/kWh such as Rs 0.25/kWh etc). Such absolute values need careful attention and regular revision in line with the wind and solar market prices. Charges are being retained at same level decided four years ago while market prices of wind, solar and wind-solar hybrids have reduced in real terms in that period.

Hence ideally, Tamil Nadu should move to intra-state ABT framework-based accounting and align the state framework for RE forecasting and scheduling in line with the CERC framework for regional entities. Or else there might arise a situation in which deviation charges under these two frameworks may vary quite widely, even when projects are situated next to each other geographically. This would also remove the need for constant revision of deviation penalties for intra-state transactions.

The TNERC has already proposed change in the absolute error formula to reflect deviation accounting based on schedules. Therefore, Regulation 7.1 could be re-drafted as,

> *'7.1 The sale of power within Tamil Nadu by Wind and Solar Energy Generators connected to the Intra-State Transmission Network shall be settled by the Procurers on the basis of their* ***scheduled generation****, and the Deviation Settlement shall be undertaken as specified in these Regulations.'*

The same provision has been incorporated by Chhattisgarh[1] and Bihar[2] in their respective regulations.

6. Deviation Charges

The Commission has proposed following deviation charges for the generators:

Absolute error in % terms in 15 minute time block	Deviation charge payable to state deviation pool account (wind and solar) in case of over-injection or under-injection	
	Wind	Solar
<=10%	Nil	Nil
>10% but <=15%		At Rs.0.25 per unit
>15% but <=20%	At Rs.0.25 per unit	At Rs.0.25 per unit
> 20% but <= 30%	At Rs.0.25 per unit for the shortfall or excess beyond 15% and upto 20% + Rs. 0.50 per unit for the balance energy beyond 20% and upto 30%	At Rs.0.25 per unit for the shortfall or excess beyond 10% and upto 20% + Rs. 0.50 per unit for the balance energy beyond 20% and upto 30%
>30%	At Rs. 0.25 per unit for the shortfall or excess beyond 15% and upto 20% + Rs. 0.50 per unit for the shortfall or excess beyond 20% and up to 30% + Rs.1.25 per unit for the balance energy beyond 30%	At Rs. 0.25 per unit for the shortfall or excess beyond 10% and upto 20% + Rs. 0.50 per unit for the shortfall or excess beyond 20% and up to 30% + Rs.1.25 per unit for the balance energy beyond 30%

[1] https://cserc.gov.in/upload/upload_regulation/09-06-2020_15916911641.pdf (Regulation 6.1)
[2] https://berc.co.in/rules-regulations/regulations/individual-regulation/2282-berc-intra-state-availability-based-tariff-and-deviation-settlement-mechanism-regulation-2020 (Regulation 7.1)

A recent report by a Committee constituted by Ministry of Power on Forecasting and Scheduling mechanism for solar and wind plants has recommended that,

> *"As there is significant difference in forecasting accuracy for solar and wind forecasting technologies, there is a need for a differential treatment for deviations by Solar and Wind generators in DSM Regulations, keeping in view the requirements of both grid discipline ensuring grid security as well as for promoting generation from Solar and Wind sources."*

The same report suggested that

> *"Aggregation at pooling station level may be promoted for scheduling and deviation settlement of renewables. The forecasting accuracy would increase by aggregating the forecasting and scheduling at pooling station. With increase in accuracy of forecast and aggregation of pooling station, there would be reduction in the risk of deviation. This may minimize the financial impact on RE generator due to deviation from schedule. The DSM rates in case of pooling station shall be the weighted average of all transactions of the plants connected to the pooling station."*

In line with the reports' recommendations, the Commission has differentiated the first deviation band for solar and wind generators and also allowed aggregation of schedules for the entire state through a single QCA concept.

In terms of the DSM charges, one has to decide two things, 1) the error bands and 2) the deviation charges for each error band. It should be noted that the state-level aggregation of deviations will result in much lower deviation errors and hence, different and lower deviation band should be provided in case aggregation is being done at state level. However, the Commission is also proposing a new error formula with respect to scheduled generation which is likely to increase the absolute errors at the pooling sub-stations. As an example, Gujarat already has a much lower zero charge deviation band of 7% and 12% for solar and wind respectively[3].

In order to reduce the impact of RE deviation on grid management, the zero-charge deviation band should be much tighter and lower in case aggregation is carried out in practice at the state level. A possible error band structure could be as follows

Wind	0-12%	12-20%	20-30%	>30%
Solar	0-7%	7-15%	15-25%	>25%

In case such aggregation does not happen in practice and the new absolute error formula is accepted, then the proposed error bands could be appropriate for individual pooling sub-stations.

Appropriate changes in the deviation settlement charges linked to PPA/market rates would also need to be done. The CERC DSM charges for wind and solar generators are shown in **Annexure 1**.

With the increasing capacity of solar and wind power in state, the Commission should provide a broad roadmap for the tightening of error bands and deviation penalties until 2030. This will strongly encourage better forecasting & scheduling in the State.

[3] GERC (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2019, https://gercin.org/wp-content/uploads/2019/08/GERC-Forcasting.pdf

7. Capping the annual deviation charges levied on generators

The commission has proposed that:

> *"7.6. The total deviation charges remitted on account of deviations by wind / solar generator(s) into State Deviation Pool Account in a financial year shall be capped at the Ceiling Rate of **5 paise per unit** multiplied by the total annual generation at the respective Pooling sub-station(s)/total generated units in state wide aggregation.*
>
> *Provided that the Commission may refix the ceiling rates every year based on the true-up petition filed by the SLDC for the preceding year."*

It is likely that the basis for this 5 p/kWh is a pilot study noted in Regulation 13.2,

> *'The deviation charges based on the resultant data of the **pilot study** undergone by the stake holders for the past 18 months is worked out as follows:*
>
> *For wind: 4.27 paisa/unit of generation*
> *For Solar PV: 4.15 paisa /unit of generation.'*

Regulation 12.3 further notes that

> *'The charges collected in the State Deviation Pool (wind and solar) in respect of both inter-state and intra-state transactions shall be utilized to **offset the shortfall** in the State Deviation Pool Account (DSM).'*

Firstly, we request the Commission to make this pilot study public so that more informed and critical engagement on this topic is possible from all stakeholders. Prima facie, the notion of a cap on DSM charges is counter to whole notion of generators being fully responsible for the deviation they cause on the system. Putting in a cap on DSM charges and socializing this cost across other entities would weaken the F&S framework and can act as a deterrent to whole mechanism proposed by the commission.

Instead, there is a need to increase the responsibility of RE generators towards stable state grid operation. Under the existing framework in the state, the DISCOMs bears the cost of deviation penalties by wind and solar generators up to 15% absolute error (and now proposed 10% tolerance limit for solar). Until few years ago, while RE generation was low and high cost, an exemption from DSM charges up to a limit was necessary and appropriate. However, it is time that the deviation caused due to wind and solar generation should be fully borne by these generators. To operationalise this, we suggest the following approach:

a. First the SLDC calculates the contribution of solar and wind deviation to the total deviation charge for the state at its periphery.
b. Secondly, they collect deviation charges for wind and solar deviation in accordance to absolute error at each pooling station.
c. Thirdly, if the total deviation penalties collected from the wind and solar projects are lower than what wind and solar power deviation contributed to the state deviation penalty, then the balance is additionally recovered from the generators (through their QCAs) in proportion to their deviation.

In essence, the entire cost of deviation caused due to wind and solar is finally passed back to the generators, thereby allaying the fears of the DISCOM which would have had to bear the brunt in the

absence of this provision. We feel that this is the right approach and absolutely necessary for the reliable growth of renewables in the long run. Maharashtra had adopted a similar approach. The provision 12.1(d) of Maharashtra Electricity Regulatory Commission (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2018 states that,

> *"Any shortfall in the aggregate amount of Deviation Charge payable by Solar and Wind Energy Generators at the State periphery and the amount receivable from them by the Pool Account shall be paid by the respective QCAs in proportion to their deviation reflected at the State periphery."*

Similar provision can be incorporated in proposed regulation 12 (Deviation Accounting).

8. Data reporting by SLDC

The commission has proposed that:

> *"10.6 The deviation charges shall be calculated by the SLDC based on data available with them in 15 minutes block wise."*
>
> *"11.4 The IT-enabled communication platform and software should enable the SLDC and QCA to exchange information, including but not limited to the following:*
> *i. Generator outages and their reasons;*
> *ii. Deviation Charges payable/receivable by the QCA;*
> *iii. Site characteristics and details of the Wind Turbines, Solar Inverters, etc.;*
> *iv. Schedules and generation handled by the QCA."*
>
> *"16.2 All accounts relating to deviations within pooling sub-station / State wide aggregation shall be prepared by the respective QCA on a monthly basis based on inputs from the SLDC, and be accessible to the SLDC through an IT-enabled system and software."*
>
> *"16.3 The SLDC shall furnish the processed data on a monthly basis to the concerned QCA in the prescribed format for the preparation of monthly accounts of energy from the Pooling Sub-Station/Generators."*

However, the data reporting by SLDC in the public domain is entirely missing in the regulation. We suggest that the commission should include a provision for data reporting related to forecasting and scheduling in the public domain. Many other SLDCs & RLDCs are providing such data in public domain. In addition to this, information related to project-wise grid constraints and RE curtailment should also be made available on SLDC's website (communication of such information will be prescribed by SLDC under its procedure as per Regulation 11.1).

SLDC should be asked to create a database and analyse the data received from various QCAs if it has not done so already. The data should also be made publicly available for independent analysis. The SLDC should be mandated to analyse the past data and submit a yearly report to the TNERC on the same within 3-6 months of the end of each financial year. Amongst other things, this report shall provide analysis on formula for error calculation, tolerance band for deviation, deviation bands, DSM charges for different deviation bands, impact of all these on state grid operation.

9. Incorporating abnormal weather conditions into the mechanism

The commission has proposed:

"7.8 The deviations due to forced back down or abnormal weather conditions like cyclone, heavy rainfall, flood, gusty wind, if intimated by the QCA to the SLDC well before six hours of occurrence shall be excluded from the scope of deviation charges."

This is a welcome step and will reduce the cost implication on generators due to such extreme uncontrollable events.

10. State level coordination for better forecasting and scheduling

A recent report by committee of Ministry of Power on Forecasting and Scheduling mechanism for solar and wind plants has recommended that *"A task force comprising of CEA, MOP, MNRE, IMD, Grid India, Wind power association and Solar power Association, needs to be constituted on priority basis, for coordination in forecasting, data communication, process, validation and implementation."*

While such task force is being created at the national level, we suggest that TNERC incorporate similar provision for better co-ordination among the stakeholders for state grid management.

*"A **State** task force comprising of Energy Dept, Govt. of TN, TNSLDC, IMD, Grid India, Wind power association and Solar power Association, will be constituted on priority basis, for coordination in forecasting, data communication, process, validation and implementation."*

11. Monitoring of implementation of the regulations

There are various responsibilities given to QCA or other stakeholders regarding data reporting, registration, etc. The SLDC is best placed to monitor proper implementation of those provisions in the regulations and report the same to the Commission on a six-monthly / annual basis.

Along with this, SLDC should also report to the Commission on a six-monthly / annual basis whether they have implemented provisions applicable to them in the regulations.

In addition to this, the Commission can consider levying penalties if the mandatory requirements (related to data reporting or sharing, curtailment, etc.) are not adhered to by the relevant agencies within a period of 3 months. This will help in creating the required discipline in implementation of F&S regulations in the state.

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Annexure 1: Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related Matters) Regulations, 2022 – Charges for Deviation for wind and solar generators.

Entity	Charges for deviation payable to Deviation and Ancillary Service Pool Account	
Seller	Deviation by way of over injection	Deviation by way of under injection
For WS seller being a generating station based on solar or hybrid of wind –solar resources	Zero: Provided that such seller shall be paid back for over injection as under: (i) @ contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block, up to [10% DWS]; and (ii) @ 90% of the contract rate, or in the absence of a contract rate, @ 90% of the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [10% DWS] and up to [15% DWS]	i) Zero up to [10% DWS] and (ii) @ 10% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [10% DWS] and up to [15% DWS] and (iii) @ 50% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [15% DWS]: Provided that such seller shall pay back for the total shortfall in energy against its schedule in any time block due to under injection, @ the contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges, for the respective time block.
For WS seller being a generating station based on wind resource	Zero: Provided that such seller shall be paid back for over injection as under: (i) @ contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block, up to [15% DWS]; and (ii) @ 90% of the contract rate, or in the absence of a contract rate, @ 90% of the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [15% DWS] and up to [20% DWS].	(i) Zero up to [15% DWS] and (ii) @ 10% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [15% DWS] and up to [20% DWS] and (iii) @ 50% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [20% DWS]: Provided that such seller shall pay back for the total shortfall in energy against its schedule in any time block due to under injection, @ the contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges, for the respective time block.