

PUNJAB STATE ELECTRICITY REGULATORY COMMISSION

The Punjab State Electricity Regulatory Commission (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources), Regulations, 2018.

STAFF PAPER

In view of the target of 175 GW of Renewable Energy (RE) by 2022 fixed by Government of India, it is anticipated that RE like Solar Energy and Wind Energy, is bound to increase rapidly in the near future. Taking cognizance of variable and uncertain nature of Solar & Wind sources, the CERC notified framework on Forecasting Scheduling & Imbalance handling of variable RE on 7th August, 2015. This framework was also integrated with prevailing CERC Regulations on Indian Electricity Grid Code (IEGC) and Deviation Settlement Mechanism (DSM) through amendment on 7th August, 2015.

For large scale integration of solar and wind generators into the State Grid, the Forum of Regulators (FoR) has evolved Model Regulations on Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources at State level. The proposed draft regulations of PSERC are in line with the Model regulations and also the framework notified by CERC for regional entities. The objective of these regulations is to facilitate large-scale grid integration of solar and wind generating stations while maintaining grid stability and security as envisaged under the Grid Code, through forecasting, scheduling and commercial mechanism for deviation settlement of these generators. It is essential that the grid operator has visibility into how much renewable energy (RE) is expected to be injected into the grid. Forecasting and scheduling of these generators is critical to anticipate balancing requirements and procure requisite reserves to maintain load-generation balance and grid reliability. At the same time, due to the intermittent nature of these sources, special provisions must be made so that the generators are not unduly penalized. These regulations are intended to cover all wind and solar generators with individual capacity above 5 MW connected directly to the State grid and all RE generators connected through pooling stations with combined capacity of 5 MW and above. Majority of these generators are selling power within the State. Additionally, some wind and solar generators may be connected to the State grid but selling their power wholly outside the State, or partly within the State and partly outside the State boundary. All such solar and wind generators connected to the State grid fall under the purview of these regulations, irrespective of nature of transactions.

Weather and power system data at the turbine or inverter level is essential for the grid operator to have accurate visibility into the availability and performance of RE stations connected to the grid. Metering and communication of real time data at the turbine/inverter level are mandated. This data shall also help the QCA for improving forecasting accuracy. Thus, special energy meters and communication infrastructure must be installed by all generators, and as such, this should be a requirement for approval of connectivity going forward. Special Energy Meters should also be installed at the pooling station level, to meter the power injected into the grid in every time-block.

Forecasting is an essential pre-requisite for scheduling of the wind and solar generators. The concerned SLDC should also undertake forecasting of wind and solar power that is expected to be injected into the State grid, by engaging forecasting agency(ies) if required. The forecast by the concerned SLDC shall be with the objective of ensuring secure grid operation by planning for the requisite balancing resources. The forecast by the QCA or wind and solar generator, as the case may be, shall be generator centric. The QCA or wind and solar generators will have the option of accepting the SLDC's forecast for preparing its schedule or provide the SLDC with a schedule based on their own forecast. The QCA shall coordinate the aggregation of schedules of all generators connected to a pooling station and communicate it to the SLDC. Such schedule shall be used as reference for deviation settlement. The wind and solar generator or QCA should submit 15 minutes (time-block) day-ahead as well as week-ahead schedule for each generating station or each pooling station, as the case may be.

Once the day-ahead schedule is submitted, flexibility must be accorded to the QCA (or generators) to revise it as the accuracy of forecasting improves closer to real time. Keeping this in mind, 16 revisions per day have been allowed, to provide maximum opportunity to minimize deviations from schedule, and hence limit the commercial burden on the generator. Hence, the schedule of wind and solar generators could be revised by giving advance notice to the SLDC. Such revisions shall be effective from 4th time block, the first being the time-block in which notice was given. There may be one revision for each time slot of one and half hours starting from 00:00 hours of a particular day subject to maximum of 16 revisions during the day. The plan for data telemetry, formats of forecast submission and other details in this regard should be provided in the Detailed Procedure to be prepared by SLDC and approved by the State Commission.

The wind or solar generators, which are state entities, connected to the State Grid and selling power within the State shall be paid by the buyers as per actual generation whereas

deviation charges for shortfall or excess generation shall be payable by the wind and solar generator or the QCA, as the case may be, to the State Deviation Pool Account as specified by the Commission. The wind or solar generators, which are state entities undertaking interstate transactions shall be paid as per scheduled generation in accordance with CERC (Deviation Settlement Mechanism & Related Matters) Regulations, 2014, as amended from time to time

While forecasting accuracy increases over time with improved models and more reliable data, 100% accuracy is not possible to achieve given the uncertain nature of solar and wind sources. However, to incentivize investment in better forecasting methodologies and reliable data, deviation charges would be levied outside a tolerance band. Within this tolerance band, there will be no revenue impact on the RE generator. However, outside this band, a graded deviation charge can be applied. This will provide incentive to forecast as accurately as possible, utilizing the schedule revisions, and communicate accordingly with SLDC.