

ANDHRA PRADESH ELECTRICITY REGULATORY COMMISSION

Dated:06.09.2016

NOTIFICATION

(Draft Regulation No.4 of 2016)

In exercise of the powers conferred under Section 181 of the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, and after previous publication, the Andhra Pradesh Electricity Regulatory Commission hereby makes the following Regulations, namely:

1. Short title and commencement

- (1) These Regulations may be called the Andhra Pradesh Electricity Regulatory Commission (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2016.
- (2) These regulations shall come into force from the date of their publication in the AP Gazette.

2. Definitions and Interpretation

- (1) In these regulations, unless the context otherwise requires,-
 - (a) '**Absolute Error**' means the absolute value of the error in the actual generation of wind or solar generators with reference to the scheduled generation and the 'Available Capacity' (AvC), as calculated using the following formula for each 15 minute time block:
$$\text{Error (\%)} = 100 \times [\text{Actual Generation} - \text{Scheduled Generation}] / (\text{AvC}) ;$$
 - (b) '**Act**' means the Electricity Act, 2003 (36 of 2003);
 - (c) '**Actual drawal**' in a time-block means electricity drawn by a buyer, as the case may be, measured by the interface meters;
 - (d) '**Actual injection**' in a time-block means electricity generated or supplied by the seller, as the case may be, measured by the Interface meters;
 - (f) '**Available Capacity or AvC**' for wind or solar generators means the cumulative capacity rating of the wind turbines or solar inverters that are capable of generating power in a given time-block;
 - (g) '**Beneficiary**' means a person purchasing electricity generated from a Solar or Wind generating station;

- (h) **‘Buyer’** means a person, including beneficiary, purchasing electricity from a Solar or Wind generating station through a transaction scheduled in accordance with the regulations applicable for short-term open access, medium-term open access and long-term open access;
- (i) **‘CERC’** means the Central Electricity Regulatory Commission referred to in sub-section (1) of section 76 of the Act;
- (j) **‘Deviation’** in a time-block for a seller means its total actual injection minus its total scheduled generation and for a buyer means its total actual drawal minus its total scheduled drawal;
- (k) **‘Existing VRE Plants’** means such wind and solar power plant (also termed as Existing variable renewable energy plants) which are already commissioned and supplying power to DISCOMs or to the third party consumers or captive consumption within or outside the state before the effective date of these regulations.
- (l) **‘Gaming’** in relation to these regulations, shall mean an intentional mis-declaration of available capacity or schedule by any seller in order to make an undue commercial gain through Charge for Deviations;
- (m) **‘Grid Code’** means the Grid Code specified by the State Commission under clause (h) of sub-section (1) of Section 86 of the Act;
- (n) **‘IEGC’** means the Grid Code specified by CERC under clause (h) of sub-section of Section 79 of the Act;
- (o) **‘Interface meters’** means interface meters as defined by the Central Electricity Authority under the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006, as amended from time to time;
- (p) **‘New VRE Plants’** mean such wind and solar power plants (also termed as New variable renewable energy plants) which will be commissioned and connected to the transmission/distribution system after the effective date of these regulations.
- (q) **‘Pool Account’** means a separate state account for receipts and payments on account of deviation by buyers or sellers;
- (r) **‘Pooling Station’** means the sub-station where pooling of generation of individual wind generators or solar generators is done for interfacing with the next higher voltage level. Provided that where there is no separate pooling station for a wind / solar generator and the generating station is connected through common feeder and terminated at a sub-station of distribution company/STU/CTU, the sub-station of distribution

company/STU/CTU shall be considered as the pooling station for such wind/solar generator, as the case may be;

- (s) ‘**Qualified Coordinating Agency or QCA**’ means the agency coordinating on behalf of Wind/Solar Generators connected to a pooling station. QCA may be one of the generators or any other mutually agreed agency for the following purposes:

Provide schedules with periodic revisions on behalf of all the Wind/Solar Generators connected to the pooling station(s).

Responsible for coordination with STU/SLDC for metering, data collection/ transmission, communication.

Undertake commercial settlement on behalf of the generators of such charges pertaining to generation deviations only including payments to the Regional/State UI pool accounts through the SLDC.

Undertake de-pooling of payments received on behalf of the generators from the State UI Pool account and settling them with the individual generators on the basis of actual generation.

QCA shall be treated as a State Entity and shall be registered with SLDC.

- (t) ‘**Scheduled generation**’ at any time or for a time block or any period means schedule of generation in MW or MWh ex-bus given by the SLDC;
- (u) ‘**Scheduled drawal**’ at any time or for a time block or any period time block means schedule of despatch in MW or MWh ex-bus given by the SLDC;
- (v) ‘**Seller**’ means a person, including a generating station, supplying electricity through a transaction scheduled in accordance with the regulations applicable for short-term open access, medium-term open access and long-term open access;
- (w) ‘**State Commission**’ means Andhra Pradesh Electricity Regulatory Commission established under sub-section 1 of Section 82 of the Act;
- (x) ‘**State Entity**’ means an entity which is in the SLDC control area and whose metering and energy accounting is done at the state level;
- (y) ‘**State Load Despatch Centre or SLDC**’ means Load Despatch Centre of the AP State, established under sub-section (1) of Section 31 of the Act, responsible for coordinating scheduling of the state entities in accordance with the provisions of the State Grid Code;
- (z) ‘**Time-block**’ means a time block of 15 minutes, for which specified electrical parameters and quantities are recorded by special energy meter, with first time block starting at 00.00 hrs;

- (2) Save as aforesaid and unless repugnant to the context or the subject-matter otherwise requires, words and expressions used in these regulations and not defined, but defined in the Act, or the Grid Code or any other regulations of this Commission shall have the meaning assigned to them respectively in the Act or the Grid Code or any other regulation.

3. GENERAL

3.1 Objective

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.

3.2 Applicability of the Regulations

All wind generators and solar generators connected to the AP State grid, including those connected via pooling stations, and supplying power to the DISCOMs or to the third parties through open access or for captive consumption through open access, and selling power within or outside the state of Andhra Pradesh. The deviation settlement of the energy sold by the Wind and Solar generators outside the state shall be as per the Deviation Settlement and Related Matters Regulations of CERC as amended from time to time.

4. FORECASTING AND SCHEDULING CODE

- 4.1 This code provides methodology for day-ahead scheduling of wind and solar energy generators which are connected to the State grid and DISCOMs network and re-scheduling them on one and half hourly basis, and the methodology of handling deviations of such wind and solar energy generators. Appropriate meters shall be provided for energy accounting. Telemetry/communication system & Data Acquisition System shall also be provided by the generators for transfer of information to the SLDC.
- 4.2 Wind and Solar generators, represented via Qualified Coordinating Agencies (QCAs), shall mandatorily provide to the SLDC, in a format as prescribed by SLDC, the technical specifications at the beginning and whenever there is any change. The data relating to power system output & parameters and weather related data as applicable shall also be provided by such generators to the SLDC in real time. The detailed information requirement and protocol for sharing information shall be outlined under the Detailed Procedures to be formulated by SLDC within two months from notification of these Regulations.
- 4.3 Forecasting shall be done by wind and solar generators connected to the State grid, or by QCAs on their behalf. The SLDC is also mandated to 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 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 provided separately for each Pooling Sub-station. 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.

- 4.4 The QCA or the wind and solar generator shall submit a day-ahead and week-ahead schedule for each pooling station or each generating station, as the case may be. Day-ahead schedule shall contain wind or solar energy generation schedule at intervals of 15 minutes (time-block) for the next day, starting from 00:00 hours of the day, and prepared for all 96 time-blocks. Week-ahead schedule shall contain the same information for the next seven days.
- 4.5 The schedule of wind and solar generators connected to the State grid and DISCOMs network (excluding collective transactions) may 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.
- 4.6 The plan for data telemetry, formats of forecast submission and other details in this regard shall be provided in the Detailed Procedure to be prepared by SLDC within two months from the date of publication in the AP Gazette and approved by the State Commission.
- 4.7 Any commercial impact on account of deviation from schedule based on the forecast shall be borne by the wind and solar generator, either directly or transacted via the representing QCA.
- 4.8 The existing plants shall either by themselves or through Qualified Coordinating Agency (QCA) or through an Aggregator shall establish forecasting tools within six months from the publication of these regulations in the AP Gazette and for new plants they shall be established before commissioning of their plants.
- 4.9 Alternately services of REMCs (Renewable Energy Management Centres) may be availed for installing forecasting tools and generation forecasting.

5. ROLE OF QCA AND IMPLEMENTATION ASPECTS

- 5.1 Each Pooling Sub-station will have only one QCA. Accordingly, QCA shall be identified and mapped to every Pooling Sub-station for the purpose of co-ordination with STU/SLDC.
- 5.2 SLDC shall register the QCAs subject to fulfilment of the eligibility conditions to be outlined under the Guidelines to be formulated by the SLDC.

- 5.3 SLDC shall formulate Guidelines for Registration of QCAs at state level within a period of one month from the date of publication of these Regulations in the AP Gazette upon approval by the State Commission.
- 5.4 QCA shall be single point of contact with SLDC for energy account, deviation settlement and co-ordination and issuance of instructions for despatch/curtailment.
- 5.5 The QCA shall undertake all commercial settlement on behalf of the generator(s) connected to the respective pooling station(s).
- 5.6 QCA shall undertake settlement of only Deviation Charges at Pooling Substation with State DSM pool for Wind and Solar generators.
- 5.7 QCA shall provide weekly/monthly/quarterly energy account statements (as applicable) in respect of RE Generator(s)/Pooling Sub-stations in line with following principles.
- i. Energy accounting and DSM computation shall be for each time block (15-min) duration
 - ii. Settlement period for all Energy Accounts and DSM accounts shall be on weekly basis
 - iii. Adjustment/true-up of DSM accounts, if necessary, shall be for each entity on quarterly basis.
- 5.8 Subject to conditions outlined under these Regulations, QCA and RE Generators will be free to mutually decide professional fees for services rendered by QCA (*in INR/MWh or MW; one time /annual*).
- 5.9 Within two months from the date of publication of these Regulations, SLDC shall formulate Detailed Procedures covering following aspects:
- i. Data/information exchange requirement, protocol for sharing between QCA, SLDC and Generators.
 - ii. Prescribe Fees for registration of QCA upon approval by SERC - One time and annual recurring or one time (3 year).
 - iii. Conditions and proposed treatment for dealing with default in State Pool Settlement by QCA

6. COMMERCIAL AND DEVIATION SETTLEMENT

- 6.1 (a) The wind or solar generators connected to the AP State grid and selling power within the State shall be paid by the buyer as per actual generation.
- (b) The wind or solar generators connected to the state grid and selling power outside the state shall be paid by the buyer as per scheduled generation.
- 6.2 The wind and solar generator or the QCA, as the case may be, shall have the option of accepting the SLDC's forecast for preparing its schedule or provide the

SLDC with a schedule based on its own forecast, and such schedule shall be used as reference for deviation settlement.

- 6.3 In the event of actual generation of a generating station or a pooling station, as the case may be, being less or more than the scheduled generation, the deviation charges for shortfall or excess generation shall be payable by the Wind or Solar generator or the QCA, as the case may be, to the State DSM Pool, as given in Table-I below:

Table-I: Deviation Charges in case of under or over-injection, for sale of power within the State

Sr. No.	Absolute Error in the 15-minute time block	Deviation Charges payable to State DSM Pool
1	$\leq 10\%$	None
2	$>10\%$ but $\leq 20\%$	At Rs. 0.50 per unit for the shortfall or excess energy for absolute error beyond 10% and upto 20%
3	$>20\%$ but $\leq 30\%$	At Rs. 0.50 per unit for the shortfall or excess energy beyond 10% and upto 20% + Rs. 1.0 per unit for balance energy beyond 20% and upto 30%
4	$> 30\%$	At Rs. 0.50 per unit for the shortfall or excess energy beyond 10% and upto 20% + Rs. 1.0 per unit for shortfall or excess energy beyond 20% and upto 30% + Rs. 1.50 per unit for balance energy beyond 30%

- 6.4 Provided that the deviation charges payable for under or over injection by the wind or solar generator or the QCA, which has been commissioned prior to the date of effect of these regulations, shall be as under:

Table – II: Deviation Charges in case of under or over-injection for wind or solar generators commissioned prior to the date of effect of these regulations, and selling power within the State:

Sr. No.	Absolute Error in the 15-minute time block	Deviation Charges payable to State DSM Pool
1	$\leq 15\%$	None
2	$>15\%$ but $\leq 25\%$	At Rs. 0.50 per unit for the shortfall or

		excess energy for absolute error beyond 15% and upto 25%
3	>25% but <=35%	At Rs. 0.50 per unit for the shortfall or excess energy beyond 15% and upto 25% + Rs. 1.0 per unit for balance energy beyond 25% and upto 35%
4	> 35%	At Rs. 0.50 per unit for the shortfall or excess energy beyond 15% and upto 25% + Rs. 1.0 per unit for shortfall or excess energy beyond 25% and upto 35% + Rs. 1.50 per unit for balance energy beyond 35%

- 6.5 The QCA shall also de-pool the energy deviations as well as deviation charges to each generator in proportion to actual generated units for each time-block for each generator.
- 6.6 The SLDC shall maintain separate records and account of time-block wise schedules, actual generation and deviations for all generators, including wind and solar generators.
- 6.7 Once the accounting procedures as above are put in place, all Wind and Solar generators shall be treated together as a virtual pool within the State Pool. Deviations for and within this virtual pool could be settled first at the rates and methodology stipulated above for wind and solar generators.
- 6.8 For covering the deficit in the overall pool, at the end of the year the SLDC may approach the National Funds such as PSDF or NCEF.

7. MECHANISM FOR DEVIATION SETTLEMENT FOR INTERSTATE TRANSACTION

- 7.1 The deviation charges for under or over injection by wind or solar generator connected to the State grid and selling power outside the State shall be payable or receivable as per the framework provided in **Appendix – I**. The accounting for this purpose shall be done by the SLDC.

Provided that all inter-state transactions at a pooling S/S shall be allowed if connected through separate feeder.

- 7.2 Deviations for Inter-State and Intra-State transactions at Pooling S/S shall be accounted for separately.

- 7.3 SLDC shall provide separate Energy/DSM accounts for inter-State and intra-state transactions to QCA.
- 7.4 QCA shall separately settle Deviation Charges with Wind and Solar Generators for inter-State and intra-State transactions.
- 7.5 In case of shortfall in amount at QCA level or for variation in weekly/monthly cycle, QCA may set rules for pro-rata settlement of inter-State and intra-state transactions of RE Generator(s).

8. MISCELLANEOUS

8.1 Power to Relax

The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected by grant of relaxation, may relax any of the provisions of these regulations on its own motion or on an application made before it by an interested person.

8.2 Power to issue directions

If any difficulty arises in giving effect to these regulations, the Commission may on its own motion or on an application filed by any affected party, issue such directions as may be considered necessary in furtherance of the objective and purpose of these regulations.

Secretary

Appendix -I

Framework for deviation charges for under or over injection by generator connected to the State grid and selling power outside the State

The wind or solar generators connected to the State grid and selling power outside the State boundary shall be paid as per schedule.

- a) In the event of actual generation being less than the scheduled generation, the deviation charges for shortfall in generation shall be payable by such wind or solar generator, or the QCA on their behalf, to the State DSM Pool as given in Table - 1 below:

Table - I: Deviation Charges in case of under injection

Sr. No.	Absolute Error in the 15-minute time block	Deviation Charges payable to State DSM Pool
1	$\leq 15\%$	At the Fixed Rate for the shortfall energy for absolute error upto 15%
2	$>15\%$ but $\leq 25\%$	At the Fixed Rate for the shortfall energy for absolute error upto 15% + 110% of the Fixed Rate for balance energy beyond 15% and upto 25%
3	$>25\%$ but $\leq 35\%$	At the Fixed Rate for the shortfall energy for absolute error upto 15% + 110% of the Fixed Rate for balance energy beyond 15% and upto 25% + 120% of the Fixed Rate for balance energy beyond 25% and upto 35%
4	$> 35\%$	At the Fixed Rate for the shortfall energy for absolute error upto 15% + 110% of the Fixed Rate for balance energy beyond 15% and upto 25% + 120% of the Fixed Rate for balance energy beyond 25% and upto 35% + 130% of the Fixed Rate for balance energy beyond 35%

Where the Fixed Rate is the PPA rate as determined by the Appropriate Commission under section 62 of the Act or adopted by the Appropriate Commission under section 63 of the Act. In case of multiple PPAs, the weighted average of the PPA rates shall be taken as the Fixed Rate. The wind and solar generators shall furnish the PPA rates on affidavit for the purpose of Deviation charge account preparation to respective SLDC supported by copy of the PPA.

Fixed Rate for Open Access participants selling power which is not accounted for RPO compliance of the buyer, and the captive wind or solar plants shall be the Average Power Purchase Cost (APPC) rate at the National level, as determined by CERC from time to time.

- b) In the event of the actual generation being more than the scheduled generation, the Deviation Charges for excess generation shall be payable to the wind or solar generator, or the QCA on their behalf, from the State DSM Pool as given in Table - II below:

Table - II: Deviation Charges in case of over injection

Sr. No.	Absolute Error in the 15-minute time block	Deviation Charges payable
1	$\leq 15\%$	At the Fixed Rate for excess energy upto 15%
2	$>15\%$ but $\leq 25\%$	At the Fixed Rate for excess energy upto 15% + 90% of the Fixed Rate for excess energy beyond 15% and upto 25%
3	$>25\%$ but $\leq 35\%$	At the Fixed Rate for excess energy upto 15% + 90% of the Fixed Rate for excess energy beyond 15% and upto 25% + 80% of the Fixed Rate for excess energy beyond 25% and upto 35%
4	$> 35\%$	At the Fixed Rate for excess energy upto 15% + 90% of the Fixed Rate for excess energy beyond 15% and upto 25% + 80% of the Fixed Rate for excess energy

		beyond 25% and upto 35% + 70% of the Fixed Rate for excess energy beyond 35%
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Where the Fixed Rate is the PPA rate as determined by the Appropriate Commission under section 62 of the Act or adopted by the Appropriate Commission under section 63 of the Act. In case of multiple PPAs, the weighted average of the PPA rates shall be taken as the Fixed Rate. The wind and solar generators shall furnish the PPA rates on affidavit for the purpose of Deviation charge account preparation to respective SLDC supported by copy of the PPA.

Fixed Rate for Open Access participants selling power which is not accounted for RPO compliance of the buyer, and the captive wind or solar plants shall be the Average Power Purchase Cost (APPC) rate at the National level, as determined by the CERC from time to time.

- c) In reference to clauses (a) and (b) as above, for balancing of deemed renewable purchase obligation (RPO) compliance of buyers with respect to schedule, deviations by all wind and solar generators which are selling power outside the State boundary shall first be netted off for the entire pool on a monthly basis and any remaining shortfall in renewable energy generation must be balanced through purchase of equivalent solar and non-solar Renewable Energy Certificates (RECs), as the case may be, by SLDC by utilising funds from the Pool Account. For positive balance of renewable energy generation, equivalent notional RECs shall be credited to the State DSM Pool and carried forward for settlement in future.