Uttar Pradesh Electricity Regulatory Commission

No.: UPERC/Secy/Regulations/ABT (Solar & Wind)/2018/
Dated:
Notification

In exercise of the powers conferred under Section 181 of the Electricity Act, 2003 and all powers enabling it in this behalf, the Uttar Pradesh Electricity Regulatory Commission makes the following Regulations to facilitate large- scale grid integration of solar and wind generating stations while maintaining grid stability and security as envisaged under the IEGC/ Uttar Pradesh Electricity Grid Code (UP EGC), through forecasting & scheduling and providing commercial mechanism for Deviation Settlement of these generators:

1. Short title and commencement

(1) These Regulations may be called the Uttar Pradesh Electricity Regulatory Commission (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2018.

(2) These Regulations shall come into force from the date of their publication in the official 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:
Error (%) = 100 X [Actual Generation– Scheduled Generation] / (AvC);

(b) **'Act'** means the Electricity Act, 2003 (36 of 2003) and Amendments thereto;

(c) **'Actual drawl'** in a time-block means electricity in MW or MWh ex-bus drawn by a buyer, as the case may be, measured by the interface meters;

(d) **'Actual injection/generation'** in a time-block means electricity in MW or MWh ex-bus generated or supplied by the seller, as the case may be, measured by the Interface meters;

(e) **'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 as declared by such Generators/ QCA as the case may be;

(f) **'Beneficiary'** means a person procuring electricity generated from a solar or wind generating station including solar/wind captive generating station;

(g) **'Buyer'** means a person, including beneficiary, purchasing electricity through a transaction scheduled in accordance with the regulations applicable for short-term, medium-term and long- term open access;

(h) **'CERC' means** the Central Electricity Regulatory Commission referred to in sub-section (1) of section 76 of the Act;

(i) **"De-Pooling"** means the disaggregation and apportionment of the deviations and the applicable charges among the Generators at a Pooling Sub-Station;

(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 drawl minus its total scheduled drawl;

(k) **'Fixed Rate'** means the PPA rate as determined by the Commission under Section 62 of the Act or adopted by the Commission under section 63 of the Act or APPC (in case of captive consumption/ third party sale) of the State Discoms as determined by the Commission for the previous year.

(l) **'Gaming'** in relation to these regulations, shall mean an intentional mis-declaration of available capacity in order to make an undue commercial gain through Charge for Deviations;

(m)**'IEGC'** means the Grid Code specified by Central Commission under clause (h) of sub-section (1) of Section 79 of the Act;

(n) **'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;

(o) **'Intra-State Entity'** means an entity which is in the SLDC control area and whose metering and energy accounting is done at the State level;

(p) **'Pooling Station'** means the sub-station where pooling of generation of individual wind generators or solar generators is done for interfacing with the grid/transmission or distribution system:

Provided that where there is no separate pooling station for a wind / solar generator and the generating station is connected through common/dedicated feeder and terminated at a sub- station of distribution

company/STU, the sub-station of distribution company/STU shall be considered as the pooling station for such Solar/Wind generator, as the case may be;

(q) **'Qualified Coordinating Agency or QCA'** means the agency, mutually agreed by the generators, registered with SLDC, to act as a coordinating agency on behalf of Wind or Solar Generators connected to a pooling station having minimum installed capacity of 5MWor above, and may be one of the generators. This QCA shall be exclusively either for Solar or wind generators at a given pooling station.

(r) **'Regional Entity'** means such persons who are in the RLDC control area and whose metering and energy accounting is done at the regional level;

(s) **'Scheduled Generation'** at any time or for a time block or any period means schedule of generation in MW or MWh ex-bus as given by SLDC;

(t) **'Scheduled drawl'** at any time or for a time block or any period time block means schedule of dispatch in MW or MWh ex-bus as given by SLDC;

(u) **'Seller'** means a person, including a generating station, either selling electricity to Distribution Licensee or supplying electricity for captive use or through a transaction scheduled in accordance with the Regulations applicable for short-term, medium-term and long-term open access;

(v) **'State Pool Account'** means State account for receipts and payments on account of deviation by buyers or sellers including Solar and Wind generators and shall be maintained by SLDC;

(w) **'State Load Dispatch Centre or SLDC'** means Load Dispatch Centre of the 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 Uttar Pradesh Electricity Grid Code and its amendments thereof;

(x) **'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;

(y) **'UPERC/ State Commission'** means Uttar Pradesh Electricity Regulatory Commission;

(z) **'Uttar Pradesh Electricity Grid Code (UP EGC)'** means the State Grid Code specified by the Commission under Section 86(1) (h) of the Act and its amendments thereof;

(2) Save as aforesaid and unless repugnant to the context or the subject matter otherwise, words and expressions used in these Regulations and not defined, but defined in the Act, or the UP EGC or any other Regulations of this Commission, shall have the meaning assigned to them respectively in the Act or the UP EGC and its amendments thereof or any other Regulation.

PART-1

GENERAL:

3. Applicability of the Regulations:

These Regulations shall apply to all Solar (excluding rooftop solar covered under UPERC RSPV Regulations) and Wind Energy Generation plant in the State of Uttar Pradesh connected to the Intra-State Transmission System and having an installed capacity of 5 MW. or above. The solar or wind generation plant of installed capacity of 5 MW or more, using the power generated for self-consumption shall also be covered by these Regulations.

Provided that the charges payable for deviation from schedule by the Solar/ Wind generators, supplying power outside the State, shall be accounted for and settled in accordance with the provisions of the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014 as amended from time to time:

PART- 2

ROLE OF QUALIFIED COORDINATING AGENCY (QCA):

4. The Qualified Coordinating Agency (QCA) as defined at Clause 2(1)(q) shall be nominated based on consensus and mutually agreed terms and conditions from amongst the Solar/Wind generators. The registration of QCA with SLDC shall be in accordance with the Detailed Procedure prescribed by the SLDC. SLDC shall submit the detailed procedure with the Commission for approval within 45 days of promulgation of this Regulation. SLDC shall place the detailed procedure on their website within next 7 days after the approval. The QCA shall register themselves with SLDC within next 30 days. The Solar and Wind generators shall also inform the State Commission to this effect. The QCA will act as agent of the wind/ solar generators and have to follow the directions issued by SLDC as per Section 33(2) of the Electricity Act 2003.QCA shall be the single point of contact with SLDC on behalf of its coordinated generator(s) connected to a pooling station for the following purposes:

(1) Submit one-time details to the SLDC as per Annexure - 1

(2) Provide schedules with periodic revisions as per these Regulations on behalf of all the Solar/Wind Generators connected to the pooling station as per Annexure -2.

(3) For coordination with STU/SLDC and other agencies for metering, data collection and its transmission and communication.

(4) Provide real time availability and generation data as per Annexure -3

(5) Undertake commercial settlements on behalf of the generators, of such charges pertaining to generation deviations only including payments to the State pool account through the concerned SLDC.

(6) Undertake de-pooling of payments received on behalf of the generators from the State Pool account and settling them with the individual generators in accordance with these Regulations.

(7) Undertake commercial settlement of any other charges on behalf of the generators as mandated from time to time.

QCA shall be treated as an intra-state entity for the purpose of these Regulations.

5. Each pooling station having minimum combined installed capacity of 5 MW shall have one QCA. However, in case a particular solar or wind generator having a capacity of 50 MW or more, then such generator shall act as a QCA provided that such generator is connected alone to a pooling station.

Provided that in case only one generator is connected to a pooling station then such generator will act as QCA.

6. Notwithstanding the appointment of a QCA, the onus of complying with the relevant provisions of these Regulations shall remain that of the concerned Generators, and the commercial and other arrangements between them and their QCA shall be governed by their inter-se agreements or terms of engagement.

7. The Generators at a Pooling Sub-Station may appoint one amongst themselves or any other entity as a QCA:

8. The QCA shall be appointed with the approval of at least 51% of the Generators at a Pooling Sub- Station, in terms of their combined installed capacity.

9. The Generators shall satisfy themselves that the QCA is technically and financially competent to undertake on their behalf the designated functions and discharge the obligations specified in these Regulations.

10. The terms of engagement of the QCA shall include provisions on the following aspects:
    a. The respective roles and responsibilities of the QCA and Generators;
    b. The metering, billing and energy accounting arrangements;
    c. The modalities for recovery of Deviation Charges from the Generators and their settlement, including the principles for de-pooling;
    d. The payment security mechanism and related provisions;
    e. The events of default and their mitigation.

11. Once generator has achieved COD as per UPERC CRE Regulations, QCA cannot discriminate amongst the generators connected to Pooling Station.

FORECASTING AND SCHEDULING:

12. These Regulations provide methodology for day-ahead scheduling of Solar and Wind energy generators which are connected to the State grid and the methodology of handling deviations of such wind and solar energy generators. Appropriate meters shall be provided by STU at the cost of generator/ QCA for energy accounting. Telemetry/communication system & Data Acquisition System as required by SLDC shall also be provided by the generator concerned for transfer of information to the SLDC.

13. Forecasting shall be done by individual solar/ wind generators connected to the State Grid through the QCAs on their behalf. The SLDC shall also undertake forecasting of Solar and Wind power that is expected to be injected into the State grid. 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 Solar and Wind generator, as the case may be, shall be generator centric. The QCA or solar and wind generators will have the option of accepting the SLDC's forecast for preparing its available capacity or providing SLDC with available capacity based on their own forecast. The QCA shall coordinate the aggregation of available capacities of all generators connected to a pooling station and communicate it to the SLDC.

Provided that, if the QCA opts to adopt the forecast of the SLDC, the consequences of any error in such forecast which results in a deviation from scheduling shall be borne by the concerned Generators through their QCA.

Provided the existing Solar and Wind generators or QCA on their behalf shall establish the forecasting tools for day-ahead forecasting and scheduling to be furnished to SLDC within three months from the date of coming into effect of these Regulations. However, all the new Solar and Wind generators or QCA on their behalf shall establish forecasting arrangements before commissioning of the plant and connecting to the State Grid.

14. The QCA or the wind and solar generator shall submit available capacity on day-ahead basis 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.

Provided that the wind and solar generators, as the case may be, having multiple transaction under Power Purchase Agreement and intra- state and/ or inter-state Open Access with a common interface meter shall submit available capacity with respect to such approved capacities allocated and such capacities alone shall be treated as available capacities (AVCs) for the purpose of transactions under this Regulation.

15. The schedule of Solar and Wind generators connected to the State grid (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 only one revision for each time slot of one and half hours starting from 00:00 hours of a particular day. This will be subjected to a maximum of 16 revisions during the day for wind generators and a maximum of 8 revisions during the day for solar generators.

16. Any commercial impact on account of deviation from schedule shall be borne by the wind and solar generator, either directly or transacted via the representing QCA.

17. Treatment for mis-declaration of Available Capacity:

(a) Any intentional mis-declaration of Available Capacity to the SLDC by QCA/ generator for its own undue commercial gain or that of a Generator shall constitute a breach of these Regulations.

(b) The QCA/generator shall be liable to pay a penalty of three times the Deviation Charges that would have been applicable had the Available Capacity been correctly declared.

(c) The amount of penalty shall be payable by the QCA to the State Deviation Settlement Mechanism (DSM) Pool, through the SLDC.

(d) The SLDC may, after giving due notice and as stipulated in the Detailed Procedure, cancel the registration of the QCA upon repeated events of mis-declaration.

Part-3

METERING, TELEMETRY AND DATA COMMUNICATION:

18. Wind and Solar generators covered under these Regulations shall be governed by interface metering with a provision for recording and storing all the load survey and billing parameters for every 15-minute time block as specified in the CEA Regulations governing metering. Monthly meter readings shall be forwarded to the SLDC in addition to data acquisition through SCADA for energy accounting.

19. Data telemetry shall be adopted at the turbine/inverter or plant level as considered appropriate by SLDC. Wind and Solar generators, represented via Qualified Coordinating Agencies (QCAs), shall mandatorily provide to the SLDC, in a format prescribed by SLDC, the technical specifications at the beginning and whenever there is any change. The data relating to power system output & parameters as directed by SLDC shall be mandatorily provided by such generators or QCA to the SLDC in real time. The existing generators shall mandatorily provide data within 45 days from the date of notification of the detailed procedure by the SLDC on its website. New generators shall ensure that telemetry system is installed and provide data from the start of the scheduling of the power.

20. A penalty will be imposed in case of failure of Generator/ QCA to provide data as directed by SLDC or error in the data provided as per the table below

Percentage of Unavailability/ Error on day to day basis	Penalty
Less than 5%	Nil
5% to 10%	Rs. 200 per day per MW
10% to 15%	Rs. 1000 per day per MW
15% and above	Rs. 2,000 per day per MW

In case of failure of the generators/ QCA comply with the above timelines, penalty of Rs. 25,000/- per day will be levied.

21. The plan for data telemetry, Communication requirement, formats of forecast submission and other details in this regard shall be provided in the Detailed Procedure prepared by SLDC.

22. The Detailed Procedure shall address the following aspects:

- The procedure and requirements, including the payment of fees and penalties for the registration and de-registration of QCAs by the SLDC and payment security mechanism.
- The information and data, and the formats, required by the SLDC from the QCAs and to be provided by the SLDC to them.

- The mode and protocol of communication for exchange of information and data between the QCAs and the SLDC.

- The guidelines for energy and deviation accounting of Solar and Wind energy transactions under the State energy accounting framework, with illustrative examples, in accordance with the principles specified in these Regulations.

- The mechanism for monitoring compliance of the Forecasting and Scheduling Code by the QCAs.

- The default conditions in the State Pool Settlement by QCAs and their treatment.

- Set out the protocol for communication and exchange of information between the QCA and the SLDC, including with regard to the following aspects:

    a) Communication of the Day-Ahead and intra-Day Schedule and any revisions to the SLDC.
    b) Communication of the real-time generation at the Pooling Sub-Station or by the stand-alone Generator
    c) Communication of Grid constraints and curtailments by the SLDC to the QCA.

23. The detailed procedure shall be approved by the Commission.

PART- 4

COMMERCIAL AND DEVIATION SETTLEMENT:

24. The Deviation Settlement Mechanism (DSM) specified under these Regulations shall be applicable to all Solar and Wind generators covered under these Regulations and connected to the State Grid/ Pooling Station.

25. The wind or solar generators connected to the State grid/ Pooling Station and selling power within the State shall be paid by the buyer as per actual energy supplied irrespective of quantum of energy scheduled by it. However, the wind and solar generators connected to the State Grid and selling power outside the State shall be paid by the buyer as per scheduled generation.

26. Schedule given by SLDC to the QCA shall be used as reference for deviation settlement.

27. The QCA shall undertake commercial settlements related to deviations on behalf of the generator(s) connected to the respective pooling station(s) on a monthly basis. Any discrepancy communicated by the QCA within 15 days shall be corrected forthwith by the SLDC after verification within next 15 days.

28. In the event of actual generation for sale or self consumption of power within the State by a generating station or a pooling station, as the case may be, being less or more than the scheduled generation as per Clause 26 above, the deviation charges shall be applicable for wind and solar generator or the QCA, as the case may be, as prescribed in Table – I below:

Table – I: Deviation Charges payable by Solar/Wind Generating Stations in case of under/over injection to the State DSM Pool

S No.	Absolute Error in the 15-minute time block	Deviation Charges payable to State DSM Pool
1	<=15%	Nil
2	>15% but <=25%	(Nil for the shortfall/excess energy for absolute error up to 15%) + (10% of the Fixed Rate for balance energy beyond 15% and up to 25%)
3	>25% but <=35%	(Nil for the shortfall/excess energy for absolute error up to 15%) + (10% of the Fixed Rate for balance energy beyond 15% and up to 25%) + (20% of the Fixed Rate for balance energy beyond 25% and up to 35%)

4	>35%	(Nil for the shortfall/excess energy for absolute error up to 15%) + (10% of the Fixed Rate for balance energy beyond 15% and up to 25%) + (20% of the Fixed Rate for balance energy beyond 25% and up to 35%) + (30% of the Fixed Rate for balance energy beyond 35%)

Provided that 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 accounted for and settled in accordance with the provisions of the CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2014 as amended from time to time. The accounting for this purpose shall be done by the SLDC.

29. The QCA shall also de-pool the energy deviations as well as deviation charges to each generator on the basis of the deviation of each generator or any other methodology /criteria mutually agreed between QCA and generators.

30. Monthly accounts as mentioned above shall be prepared by the SLDC. The wind and/or solar or QCA or SLDC, as the case may be shall separately account the deviations for multiple transactions under PPA and/or intra-state and/or inter-state Open Access.

31. The State Load Dispatch Centre shall maintain separate records and account of time-block wise schedules, actual generation and deviations for all pooling stations.

32. The QCA shall maintain separate records and account of time-block wise schedules, actual generation and deviations for all generators connected at the pooling station.

33. The guidelines in respect of payment mechanism, payment security, curtailment and other matters incidental to these Regulations shall be as provided in the detailed procedure provided by SLDC under Clause 22 of these Regulations

34. The SLDC shall equip itself with the necessary Information Technology (IT)-enabled communication platform and software for communication between it and the QCA.

35. The QCA shall provide the IT-enabled communication software log-in details to enable the SLDC to access live data of all Schedules and deviations and facilitate the timely billing and payment of Deviation Charges.

36. The IT-enabled communication platform and software should enable the SLDC and QCA to exchange information, including with regard to the following:

a) Site characteristics and details of the Wind Turbines, Solar Inverters, etc.;
b) Schedules and generation handled by the QCA.
c) Generator outages and their reasons;
d) Deviation Charges payable by/to the QCA;

37. The methodology for deviation settlement for the State shall be as follows:

a) The SLDC shall compute the Absolute Error as defined in Clause 2(1)(a), in respect of each QCA for each Pooling Station, and shall accordingly determine the amounts payable/receivable on account of the Deviation Charge in accordance with clause 28.
b) Any shortfall in the aggregate amount of Deviation Charge payable by Solar and Wind Energy Generators shall be paid by the respective QCAs in proportion to their deviation reflected.

The SLDC shall compute the deviations from the Schedule, determine the Deviation Charges payable and bill the QCA accordingly.

The QCA shall pay the amount of Deviation Charges to the SLDC, and collect it from the concerned Generators in proportion to their actual generation:

The Deviation Charges shall be paid within ten days from the issue of the accounts and billing by the SLDC, failing which a late payment surcharge amounting to 1.25% per month shall be levied for the period of delay.

Any curtailment imposed on the energy injection for reliable and secure Grid operation in emergency situations shall be communicated by the SLDC to the QCA through an IT-enabled communication, and no Deviation Charges shall be payable for any consequent deviations.

In case of any curtailment planned and communicated by the SLDC due to line maintenance or other reasons in certain time blocks of a day, the QCA shall be responsible for curtailing the generation at site and amending the Schedule accordingly, failing which the SLDC shall revise the Schedule as required.

Part- 5

MISCELLANEOUS

38. 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 aggrieved person.

39. 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.

40. Power to amend

The Commission may, at any time, vary, alter, modify or amend any provision of these Regulations.

41. Dispute Settlement

In case of any dispute in giving effect to these regulations, the affected party may approach the State Commission with a proper application in accordance with UPERC (Conduct of Business) Regulations, 2004 as amended from time to time.

However, the disputes between the Generators and the QCA shall be settled at the level of QCA, in accordance with the terms and conditions of the agreement between the QCA and the Generators.

Whereas, the dispute between SLDC and the QCA shall be resolved as per the provisions of Section 33(4) of the Electricity Act 2003.

(Kaushal Kishore Sharma)
Member

(Suresh Kumar Agrawal)
Member

(Raj Pratap Singh)
Chairman

Dated: 12.12.2018
Place: Lucknow

By the Order of the Commission

Sanjay Srivastava
Secretary

Annexure-I

Details of Wind/Solar generating stations connected to Pooling Station to be submitted by the QCA / Individual generator (if connected to other sub-station)	
Source:	Wind / Solar
Copy of Agreement between QCA and the generators connected to Pooling Station	
Total Installed Capacity of the generators connected to the Pooling Station	
Total Number of Units with details	
Physical location of Pooling Station	
Whether any PPA has beensigned: (Y/N)	If yes, then attach details
connectivityty Details	Location / Voltage Level
Metering Details	Meter No. 1. Main 2. Check
Connectivity Diagram	(Please Enclose)
Static data	As per attached sheet
Contact Details of the QCA	Name: Designation: Number: Landline Number, Mobile Number, Fax Number E - Mail Address:
Contact Details of the Alternate Person	Name: Designation: Number: landline Number, Mobile Number, Fax Number E - Mail Address:

Data to be submitted by the QCA for every RE Generator

For Wind turbine generating plants

S No	Particulars
1	**Type**
2	Manufacturer
3	Make
4	Model
5	Capacity
6	commissioned date
7	Hub height
8	total height
9	RPM range
10	Rated wind speed
11	**Performance Parameter**
12	Rated electrical power at Rated wind speed
13	Cut in speed
14	Cut out Speed
15	Survival speed (Max wind speed)
16	Ambient temperature for out of operation
17	Ambient temperature for in operation
18	survival temperature
19	Low Voltage Ride Through (LVRT) setting
20	High Voltage Ride Through (HVRT) setting
21	lightning strength (KA & in coulombs)
22	Noise power level (db)
23	**Rotor**

24	Hub type
25	Rotor diameter
26	Number of blades
27	Area swept by blades
28	Rated rotational speed
29	Rotational Direction
30	Coning angle
31	Tilting angle
32	Design tip speed ratio
33	**Blade**
34	Length
35	Diameter
36	Material
37	Twist angle
38	**Generator**
39	Generator Type
40	Generator no of poles
41	Generator speed
42	Winding type
43	Rated Gen. Voltage
44	Rated Gen. frequency
45	Generator current
46	Rated Temperature of generator
47	Generator cooling
48	Generator power factor
49	KW/MW @ Rated Wind speed
50	KW/MW @ peak continuous
51	Frequency Converter

52	Filter generator side
53	Filter grid side
54	**Transformer**
55	Transformer capacity
56	Transformer cooling type
57	Voltage
58	Winding configuration
59	**Weight**
60	Rotor weight
61	Nacelle weight
62	Tower weight
63	**Over speed Protection**
64	**Design Life**
65	**Design Standard**
66	Latitude
67	Longitude
68	COD Details
69	Past Generation History from the COD to the date on which DAS facility provided at UP SLDC/ RLDC, if applicable
70	Height above mean sea level

For Solar generating Plants

Static data points:

1. Latitude
2. Longitude
3. Turbine Power Curve (In case of Solar Thermal based Plants)
4. Elevation and orientation angles of arrays or concentrators (In case of Solar Thermal based Plants)
5. The generation capacity of the Generating Facility
6. Height above mean sea level etc.
7. COD details
8. Rated voltage
9. Details of Type of Mounting: (Tracking Technology If used, single axis or dual axis, auto or manual)
10. Manufacturer and Model (of Important Components, Such as Turbine, Concentrators, Inverter, Cable, PV Module, Transformer, Cables)
11. DC installed Capacity
12. Module Cell Technology
13. I-V Characteristic of the Module
14. Inverter Rating at different temperature
15. Inverter Efficiency Curve
16. Transformer Capacity & Rating, evacuation voltage, distance form injection point

Annexure-II

Forecast and Schedule Data to be submitted by QCA

FORMAT: A (to be submitted a day in advance)

16 Min time block	TIME	Installed Capacity (MW)	Day Ahead Availability (MW)
1	00:00-00:15		
2	00:15-00:30		
3	00:30-00:45		
4	00:45-01:00		
94			
95			
96			

Note: The forecast should ideally factor forecasting errors. As such schedule should ordinarily be same as forecast.

FORMAT: B (to be submitted on the day of actual generation, revision of availability and schedule, if any, shall be done as per provisions of the relevant Regulations.

Revision No.

15 Min time block	TIME	Current schedule (MW)	Revised Available Capacity (MW)
1	00:00-00:15		
2	00:15-00:30		
3	00:30-00:45		
4	00:45-01:00		
.			
94			
95			
96			

Annexure-III

Real-time Data Telemetry requirement (Suggested List)

Wind turbine generating plants

1. Turbine Generation (MW/MVAR)
2. Wind Speed(meter/second)
3. Generator Status (on/off-line)- this is required for calculation of availability of the WTG
4. Wind Direction (degrees from true north)
5. Voltage (Volt)
6. Ambient air temperature (° C)
7. Barometric pressure (Pascal)
8. Relative humidity (in percent)
9. Air Density (kg/m^3)

For Solar generating Plants

1. Solar Generation unit/ Inverter-wise (MW and MVAR)
2. Voltage at interconnection point (Volt)
3. Generator/Inverter Status (on/off-line)
4. Global horizontal irradiance (GHI)- Watt per meter square
5. Ambient temperature (°C)
6. Diffuse Irradiance- Watt per meter square
7. Direct Irradiance- Watt per meter square
8. Sun-rise and sunset timings
9. Cloud cover-(Okta)
10. Rainfall (mm)
11. Relative humidity (%)
12. Performance Ratio-