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Power

APL/CERC/24072019 24th July, 2019

Shri S. C. Shrivastava
Chief (Engineering)
Central Electricity Regulatory Commission
3rd & 4th Floor, Chanderlok Building
Janpath,
New Delhi- 110001

Subject: Constitution of Expert Group to review "Indian Electricity Grid Code and other related issues

Dear Sir,

This is with reference to the comments/suggestions sought by the Hon'ble Commission vide notice dated 10th June, 2019 on the changes/modifications to be made in the existing IEGC in light of large scale integration renewable and changing power scenario in the country.

In this regard, please find enclosed comments of Adani Power Ltd. You are kindly requested to take the comments on record.

Thanking You

Yours Sincerely,

For Adani Power Limited

Authorised Signatory

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Points for consideration of Expert Group appointed by CERC to review Indian Electricity Grid Code and other related issues

1. **Compensation for part load operations**

In terms of IEGC 4th amendment, the Commission vide Order dated 05.05.2017 approved the "Mechanism for Compensation for Degradation of Heat Rate, Aux Consumption and Secondary Fuel Oil Consumption, due to Part Load Operation and Multiple Start/Stop of Units" effective from 15.05.2017.

a) Need for time block wise compensation: As per CERC Order the Compensation shall be worked out for a month on cumulative basis considering degradation in SHR and AEC based on Average Unit Loading, subject to reconciliation at the end of the year. As there is no compensation for PLF above 85%, a part of loss suffered during the period when PLF is below 85% cannot be recovered when compensation is computed on cumulative PLF as it gets nullified by the time blocks when PLF is above 85%. This anomaly does not allow full compensation to the generating companies for actual loss suffered due to part load operation and defeats the objective of providing the compensation. An illustration in this regard is as follows:

For a typical supercritical unit of 660 MW, the Heat rate loss for a day is as follows:

12 Hours running @ 75% & 12 Hours running @ 95%					
PLF (%)	No. of Hours	% Hours	SHR loss as per OEM Curve* (kcal/ kWh)	Compensation as per existing CERC Methodology (considering one year as a block)	Compensation if it is allowed time block wise (Kcal/kWh)
95	12	50	4.44	0.00	0.00
75	12	50	44.34		13.6

* As per OEM curve considered by CERC for deciding the compensation levels in the 4th Amendment to the IEGC Regulations, 2016.

Request: Compensation for degradation of Heat Rate (SHR) and Auxiliary Energy Consumption (AEC) needs to be computed separately for each time Block of 15 Min instead of monthly basis cumulative over a year.

Adherence to uniform Merit Order Despatch by all SLDCs:

Electricity Act 2003 stipulates that the dispatch of electricity shall be economical and entrusts this task to RLDCs and SLDCs as one of their functions U/s 28 and 32 respectively. However, it is noted that this statutory obligation is not complied with by

some of the SLDCs. It is also noted that the Merit Order concept is not followed uniformly among all SLDCs and adopting different approaches. CERC has many a times stated that the Merit Order shall be based on Energy Charge/Variable Charge to ensure least cost purchase of power. It is submitted that Merit Order Despatch should be strictly followed and no discrimination should be made based on the ownership of the plant i.e. between Central, State and Private generators in terms of MOD. Further, random instruction should not be allowed to be issued to IPPs to back down/reserve shut down. In this regard, mechanism such as gate closure concept may be adopted. Accordingly, to ensure scrupulous adherence to Merit Order purchase by all SLDCs and to make the economical and optimal power purchase principle mandatory through Regulations, it is essential to incorporate suitable amendment to Regulation 6.4.(5) IEGC.

b) **Additional Capex for plant renovation to mitigate impact of frequent start/stops on account of RSD:** Damage is caused to the metallurgy of the boiler and other parts due to frequent start/stops and the consequential additional capital expenditure is required for renovation of the plant/equipment to mitigate such impact (reduction of the useful life of the plant). The framework of competitive bidding for procurement of thermal power was designed to cater base load of the distribution utilities. Accordingly, the normative availability mandated in section 63 PPAs is 85%. The generators are entitled to receive incentives if the availability is more than 85% and are penalised for availability below the normative availability. Therefore, the scenario of frequent start/stops on account of RSDs and consequential impact on machinery was not envisaged while submitting the bid. While the power plants supplying power under regulated tariffs are allowed relief through additional capital expenditure, such a dispensation is not available for the plants supplying power under competitive bidding regime. The relief available to Section 63 PPA is only in terms of change in law and Force Majeure provisions.

   Request: It requested that Section 63 projects should be allowed relief available to cost plus PPAs to restore the developer to the same economic position which could not be envisaged at the time of bid. A suitable provision may be incorporated in IEGC.

c) **Compensation towards increase in Repair & Maintenance Expense**: Thermal power stations are designed as a base load power station. After implementation of above said order there will be increase in unplanned outages / defects, as thermal power stations are not designed for such frequent variations in operating points which will require additional Repair & Maintenance expenses resulting in to increase in the O&M expenses. Also due to Reserve Shutdown of units (RSD) there will be additional chemical requirement for preservation as well as auxiliary power consumption which will impact R & M Expenses of power station. Hence suitable mechanism to be devised in new order to address this type of increase in R & M Expenses. A suitable provision may be incorporated in

Regulation 6.3B of IEGC to allow additional Repair & Maintenance Expense on account of frequent variation in operations for both section 62 and section 63 PPAs.

d) **Compensation towards Secondary Fuel Oil compensation**: As per CERC mechanism (also in 4th amendment), no compensation for degradation of Secondary Fuel oil consumption is Payable for the year if total number of start-ups is equal to or less than 7 x no. of units in the generating station or the Actual Secondary Fuel Oil Consumption is less than Normative Fuel Oil Consumption.

Submission: Thermal power stations running at 55% are vulnerable for tripping of boilers due to improper flame condition in case of poor coal quality or any tripping of coal mills. Due to this additional oil support will be required for flame stabilization to avoid tripping of Unit thereby ensuring reliability of power supply. The oil required for such incidences is not considered for any compensation in this order and compensation is only considered for solely attributable to reserve shut-downs.

Also if loading is not allowed for say more than 100 - 120 hrs of continuous operation at 55% loading, the Unit may be forced to carry out wall soot blowing with oil support.

Hence, it is requested that appropriate provision may be incorporated for compensation for both the above cases.

e) As per CERC 4th amendment no compensation for Heat Rate degradation and Auxiliary Energy Consumption shall be admissible if the actual Heat Rate and / or actual Auxiliary Energy Consumption are lower than the normative Station Heat Rate and / or Normative Auxiliary Energy Consumption applicable to the unit or the generating Station.

Submission:
This clause is discouraging to the power stations which are implementing the efficiency improvement measures and reducing the actual Stations heat rate & Auxiliary Energy Consumption for the same output. ADTPS in the past has consistently over performing the efficiency norms and thereby sharing the efficiency gains with the consumers, however, with such onerous condition, it might be possible that entire efficiency gain will be lost. It is submitted that compensation shall also be provided to protect the efficiency gains for performing Generating Stations.

The efficiency gain can be compensated by stipulating the condition that in case of part load operation, the degraded Stations Heat Rate and Auxiliary Consumptions shall be considered as the normative parameters and it shall be compared with the actual parameters for computing the efficiency gains / losses.

2. Regulation 6.4(2)(c)(iii)

Regulation 42(3) of the Tariff Regulations, 2019 provides as under

"(3) Normative Plant Availability Factor for "Peak" and "Off-Peak" Hours in a month shall be equivalent to the NAPAF specified in Clause (A) of Regulation 49 of these regulations. The number of hours of "Peak" and "Off-Peak" periods during a day shall be four and twenty respectively. The hours of Peak and Off-Peak periods during a day shall be declared by the concerned RLDC at least a week in advance. The High Demand Season (period of three months, consecutive or otherwise) and Low Demand Season (period of remaining nine months, consecutive or otherwise) in a region shall be declared by the concerned RLDC, at least six months in advance:

Provided that RLDC, after duly considering the comments of the concerned stakeholders, shall declare Peak Hours and High Demand Season in such a way as to coincide with the majority of the Peak Hours and High Demand Season of the region to the maximum extent possible:

Provided further that in respect of a generating station having beneficiaries across different regions, the High Demand Season and the Peak Hours shall correspond to the High Demand Season and Peak Hours of the region in which majority of its beneficiaries, in terms of percentage of allocation of share, are located."

Regulation 6.4(2)(c)(iii) of IEGC provides as under

"(iii) ***If a generating station is connected both to ISTS and the State network, scheduling and other functions performed by the system operator of a control area will be done by SLDC,, only .if state has more than 50% Share of power. The role of concerned RLDC, in such a case, shall be limited to consideration of the schedule for inter state exchange of power on account of this ISGS while determining the net drawal schedules of the respective states****. If the State has a Share of 50% or less, the scheduling and other functions shall be performed by RLDC."*

Request: It is requested to clarify that the Regulation 42(3) of CERC Tariff Regulations 2019 shall be applicable only to the generators whose tariff is determined by CERC but falling under the control area jurisdiction of RLDC in terms of IEGC Regulation 6.4(2)(c)(iii).

3. Regulation 6.5.19

(a) Reserve shutdown of unit is done on the instantaneous instructions of concerned SLDC / RLDC and the generator is bound to follow the instructions. Therefore, reserve shutdown of a unit cannot be considered a planned outage since it is immediate & instantaneous in

nature, which construes to be forced outage. Hence, revision of short term open access transactions should be allowed in case of reserve shutdown and the Regulation 6.5.19 should be modified as follows:

"*Notwithstanding anything contained in Regulation 6.5(18), in case of forced outage* ***and / or Reserve Shut Down (RSD)*** *of a unit for a Short Term bilateral transaction, where a generator of capacity of 100 MW and above is seller, the generator shall immediately intimate the same along with the requisition for revision of schedule and estimated time of restoration of the unit, to SLDC/RLDC as the case may be. With the objective of not affecting the existing contracts, the revision of schedule shall be with the consent of the buyer till 31.07.2010. Thereafter , consent of the buyer shall not be a pre-requisite for such revision of schedule. The schedule of the generator and the buyer shall be revised, accordingly. The revised schedules shall become effective from the 4th time block, counting the time block in which the forced outage is declared to be the first one.. The RLDC shall inform the revised schedule to the seller and the buyer. The original schedule shall become effective from the estimated time of restoration of the unit. However the transmission charges as per original schedule shall continue to be paid for two days."*

Notice period for RSD

(b) It is suggested that imported coal based project should be given an advance notice of 15 days before instructing such plants for Reserved Shut down. Imported coal based projects need to plan their coal supply in advance and cannot go for RSD on instantaneous instructions. Therefore, a suitable provision may be incorporated in IEGC for imported coal based projects.

Scheduling and operating procedure

(c) Under prevailing DSM Regulations at the Regional / State level DISCOMS are subjected to stringent limits and DISCOMs need to undertake fast decisions to accurately manage the deviations within defined limits. Therefore, the scheduling and operating procedures need to enable real time decision making and market operations.

4. Revision request (6.5.19)

Comment: Revision request submitted by Drawee entities for revision of Generation schedule or Drawal schedule should be made effective from 2nd time block, counting the block in which revision was requested to be the first one.

Rationale:

1. The States / drawee entity forecast the demand and accordingly arrange the generation, however it is not possible to forecast demand requirement at 100% accuracy and there is need for revision of the schedule such that during real time operation deviations are limited.

2. Large scale RE integration will also require the facility for schedule revisions at the shorter advance notice.

3. With fast communication medium and online web portals for monitoring of revision requests faster communication is possible. Therefore Generators will also get the timely intimation and can be practically implemented.

4. Unlike Generators the Drawee entity have very little control over the deviations hence this is very important to reduce the advance intimation for revision. Further State Commissions generally adopt the principles consistent to those outlined in IEGC, hence this amendment is necessary in IEGC.

5. Revision of Interstate Short Term Open Access Transactions

Comment: Revision of Interstate Short term Open Access schedule to be made effective on same day basis in line with the Long / Medium Term contracts (Currently advance notice of 2 days is required)

Rationale: Generally DISCOMs undertake Bilateral Transactions to meet the Daily / monthly / seasonal peaks. These decisions are undertaken well in advance hence it is not possible to forecast accurately and it needs revisions based on the actual demand trends and DISCOMs need to revise the schedules. As per prevailing procedure, request for revision of Interstate Open Access schedule is only implemented after 2 days, effectively there is no option for managing deviations from InterState bilateral sources. These provisions will also enable effective RE integration.

Renewable Energy

6. 10% Hydro power station:

In the light of the express provisions in the Grid Code; dispensation provided to the Central Generating Stations for scheduling the generation corresponding to overload capacity during peak season. Hon'ble Central Commission has also allowed similar dispensation to hydro generating stations irrespective of ownership (private or government) and directed RLDCs to allow injection of power corresponding to overload capacity upto 10% of LTA without obtaining additional LTA/ MTOA/ STOA for the overload capacity. In case of scheduling of overload capacity up to 10% beyond granted LTA, the hydro generating station or the beneficiary, as the case may be, are required to pay additional LTA charges and additional

RLDC fees & charges for the overload capacity. These additional charges shall be in proportion to the existing LTA charges and RLDC fees & charges respectively. CTU and respective RLDCs shall raise bills accordingly.

It is suggested that similar dispensation should also be provided to the wind and solar generators and necessary amendment to be incorporated in the IEGC.

7. Clause 5.1.(h): Recognition of unmanned sub-station

The said clause mandate power plant/sub-station of 132 kV and above shall be manned round the clock by qualified and adequately trained personnel. It is suggested that power transmission substations are now a days very often unmanned and can be physically distributed over quite a large area. They usually not only contain the high voltage level but also the sub-transmission and distribution as well. Substation automation system available for all voltage level provide reliable remote connection for operational purposes and to have a fast and secure operation and the same should be recognized in the Grid Code.

8. Points for consideration of Expert Group appointed by CERC to review Indian Electricity Grid Code and other related issues

Ontario Independent Electricity System Operator (IESO) is an independent Electricity System Operator (IESO) is the entity responsible for operating the electricity market and the bulk electrical system in the province of Ontario, Canada.

IESO mandates that generators, including wind and solar generation, satisfy specific capabilities as part of its connection conditions, namely concerning the maximum deadband, adjustable droop range, and rate of delivery. The requirement to operate with a functioning governor in service satisfying these technical specifications is mandated for units providing IESO's frequency regulation ancillary service.

IESO now mandates that wind generators have the capability to provide a synthetic inertia response to the system following a frequency deviation. This response must be activated within one second and maintained for a minimum of ten seconds, for the case where the frequency has not sufficiently recovered. The motivation for this requirement was to enable wind generators to contribute to the Primary Frequency Response (PFR) of the system without needing it to curtail itself to do so.

It is suggested that IEGC should enable market based Ancillary Services procurement for large scale integration of wind and solar energy and also allow such wind and solar generators to participate in such market.

9. Clause 5.2 (u): Backing down of wind and solar generation

As per Regulations 5.2 (u) that the SLDC/RLDC can instruct the solar/wind generator to back down only in cases of grid security or safety of any equipment or personnel is endangered. Many SLDCs are asking wind and solar generators to back down in cases other than event of grid security or safety of any equipment or personnel is endangered, like low demand in the system.

There should be strict adherence to the provision of 'Must Run' for renewable energy. Accordingly, it is suggested that any backing down in cases other than grid security or safety of any equipment or personnel is endangered, a provision of deemed generation should be provided and its compensation form the State or regional UI Pool by SLDC /RLDC needs to be mandated. The generator should be compensated for full tariff in order to meet their liability towards debt service.

It is further suggested that the term "Grid Security" needs to be specifically defined as the low demand in system cannot be considered as a grid security event. SLDCs in the name of low demand are asking high cost wind and solar generators to back down throughout the day, without asking State thermal generator to back down upto its technical limit or without reducing central sector share.

It is suggested that the term "Grid Security" can be defined as below,

> "*Whenever there is change in the basic parameter of power system (i.e. Voltage* variation, frequency variation, df/dt and dv/dt response, thermal loading of the equipment) beyond allowable limit which can affect the performance of the system should be considered as GRID SECUTIRY".

Hence, it is requested to IEGC to define allowable limits of above parameters for implementation in grid code.

10. Clause 6.5, 23 (iii): Revision in Schedules

Existing provision:

> *"The schedule by wind and solar generators which are regional entities (excluding collective transactions) may be revised by giving advance notice to the concerned RLDC, as the case may be. 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.*

Suggestions:

Wind and Solar power forecasting depends on the atmospheric condition, wind speed and incoming radiation of particular location. The energy generation forecasting problem is closely linked to the problem of weather variables forecasting. This makes the forecasting of solar power plant unpredictable up to certain extent. Frequent Revisions in schedule will help the generator to cover this error. Allowing frequent revision in schedule, wind and solar generators can go for few minutes ahead forecasts and explore the commercial benefits to wind and solar farms by investing in forecasting technology and examine factors that affect the accuracy of forecasts in different weather, operational conditions and geographies.

Moreover, Revision request submitted by wind and solar Generators should be made effective from 2nd time block, counting the block in which revision was requested to be the first one.

In view of above, restriction of "one revision for each time slot of one and half hours" should be removed and revised schedule should be made effective from 2nd time block,

11. Applicability of DSM for Renewable Energy participating in collective transaction

Renewable Energy (RE) Seller participating in DAM, will be selling Renewable Energy at market determined price, on which DSM charges notified separately for RE generators should be made applicable. Such dispensation would facilitate in boosting RE capacity addition (wind and solar) without entering long-term PPA.

12. Centralized Forecasting of wind and solar generation by SLDC/RLDC

Currently there are requirement of forecast by individual wind farm/solar project. Setting up of a reliable and workable mechanism for accurate forecasting and scheduling of wind/solar power involves substantial investment in equipment for telemetry, SCADA, communications etc, and also in human resources and consultant fees. Therefore, the centralized forecasting, covering large number of solar/wind plants spread across large geographical area would be a more suitable arrangement acceptable to all wind and solar generators and SLDC/RLDC.

SLDC/RLDC can deploy technology capable of dealing with feeds from multiple forecast engines and blending the same for improved accuracy over time. The costs incurred for undertaking the forecasting and scheduling based on the forecast would, however, be borne by the wind and solar energy generator. A framework as prevalent in some states in the US and in some countries in Europe, wherein the wind/solar generators are allowed to generate as per resource availability and the cost of balancing the variability and uncertainty is socialized across all market participants.

13. Planning code for Interstate Transmission

Planning Criterion

Suggestion:
Transmission system planning and development is undertaken based on prospective requirement, lead time for development of the infrastructure considering area specific issues. Therefore it is imperative to develop the system anticipating the future demand and the assets put to use only in phased manner. Therefore it may happen during early days after commissioning of the assets the loading / utilization of the bays will be lower and which is unavoidable phenomenon, hence Transmission Licensee shall not be held responsible for creation of excess assets.

CERC / SERC do not allow the CAPEX / O & M till assets are put to use i.e. capitalization is considered post utilization. This will affect the Transmission network development and reliability of the network, therefore it is suggested that above perspective should be covered under the proposed amendment of IEGC such that the Transmission network development is undertaken in holistic manner.

Regulation 3.5 (a) i) a.
Suggestion – Following criteria to be added under planning
While planning of transmission network in Megacities, Metro cities, Urban area etc., it is to be based on N-1-1/ N-2 Criteria without load shedding.

Rationale: Important METRO cities and Capital cities need reliable Transmission Network and continuity of supply is of very much importance considering economic, Law & Order considerations. Therefore there is need for differentiation for Transmission planning for METRO cities. It is suggested that at least N-2 criteria should be mandatory for METRO cities.

3.6 Planning Data

Suggestion: System base case/ network simulation studies may be shared with all Transmission Licensees to facilitate system planning activities on need basis.

Rationale: Presently planning data / base case is not shared with all Transmission licensees, hence if any of the Transmission Licensee likes to undertake study of the network related to its Transmission assets or future development it is not possible to study or provide meaningful inputs in view of already planned / proposed network.

14. IEGC Part 5 – Operating Code

5.3 Demand Estimation for Operational Purpose

Suggestion: Each Regional Entity, SLDC and Intrastate DISCOM develop and implement Statistical based scientific Demand forecasting system which considers historical demand data , weather data and other parameters for effective operational planning and operations of the Grid this will ensure LGB as well as effective contingency planning.

Rationale: Above provisions are already part of existing IEGC, however as can be seen demand estimation is not very scientific at all levels and there is need for adopting a robust statistical system for demand estimation which will help operational planning. These provisions need to be implemented in timely manner and NLDC / central agency may be given a task to review the implementation progress. This is also the need of the hour in line with the operating frequency band tightening being undertaken through DSM Regulations.

5.4 Demand Management & Demand disconnection

Suggestion: Monitoring of demand and deviations w.r.t schedules of Regional entities and State entities should be based on real time AMI/AMR data based on instantaneous meter parameter of Active power and Reactive power (instead of SCADA data as per current practice). Also in order to ensure redundancy and accuracy of data, meter wise SCADA data should also be used in such a way that in case of non-availability of some of the meter data due to failure of communication or some other issue, specific meter to be replaced with SCADA data as both systems are independently communicating to the Control centre. Monthly report of the SCADA data and Meter data should be published by all control centres.

Rationale:

Under the DSM Regulations the State / Participants are subjected to stringent limits and penalty is applicable if the deviations are higher. It is observed that the real time operations and decision making is done based on the SCADA data whereas the billing is based on the SEM data. There are large variations observed in both data which has financial implications on Pool participants. On many occasions there are operational issues between RLDC and SLDC's as there is difference in the data at the interface. Therefore there is need for accurate online data with back-up plan. This can be achieved with the implementation of the AMI with real time data refresh. This will not only help to reduce financial burden it will also help in improving the Grid Operations. Hence this should be mandated through IEGC for effective implementation and uniform policy for all stakeholders.

Redundancy of data source is also important, if one of the meters is not communicating, the data source can be replaced with SCADA data to avoid major difference in data. This will

ensure that the operations and settlement are done on same data and decisions taken by System Operators are based on correct data.

15. Other Suggestions

a) The definition of spinning reserve shall include the BESS (Battery Energy Storage System) located at both the transmission line or at the generating stations.
b) Uniform methodology for preparation of Merit Order Dispatch (MOD) and implementation of Availability Based Tariff (ABT) across all States and at regional level.
c) Existing provisions of Ancillary Services Regulations may be extended to balancing the market due to large variation in the schedule from actual generation of Wind/ Solar generators.
d) To provide clarity for charges on account of usage of the auxiliary power from transformer tertiary terminal.