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GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
राष्ट्रीय भार प्रेषण केन्द्र / National Load Despatch Centre
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Ref: GRID-INDIA/NLDC/CERC/

Date: 2th Dec 2024

सेवा में,

सचिव,
केन्द्रीय विद्युत विनियामक आयोग
6th, 7th एवं 8th फ्लोर, टावर बी, वर्ल्ड ट्रेड सेंटर
नौरोजी नगर, नयी दिल्ली, 110029

विषय: Suggestions on the Staff Paper on modifications in the GNA Regulations.

महोदय,

The Hon'ble Commission has notified the Staff Paper on Stakeholder's suggestions for necessary modifications in the GNA Regulations on dated 09.10.2024.

The suggestions on behalf of Regional Load Despatch Centres (RLDCs) and National Load Despatch Centre (NLDC) on Staff Paper on modifications in the GNA Regulations are enclosed herewith for kind perusal and consideration of the Hon'ble Commission.

सधन्यवाद,

2/12/24

(एस उषा)

मुख्य महाप्रबंधक, (प्रभारी), रा°भा°प्रे°कें°

Copy to:

1. CMD, Grid-India
2. Dir (MO), Dir(SO) Grid-India
3. Heads of RLDCs

Controller of India Limited
(A Govt. of India Enterprise)
(Formerly Power System Operation Corporation Limited)

Date – 02-12-24

The suggestions on behalf of Regional Load Despatch Centres (RLDCs) and National Load Despatch Centre (NLDC) on Central Electricity Regulatory Commission Staff Paper on Stakeholder's suggestions for necessary modifications in the GNA Regulations

The *Staff Paper on Stakeholder's Suggestions for Necessary Modifications in the GNA Regulations*, focuses on solar and non-solar hour connectivity, address dual connectivity issues, GNA transfer from one entity to another with aims to maximize grid utilization and enhance renewable energy integration. This following review consolidates and evaluates insights from various Regional Load Despatch Centers (RLDCs) and Grid-India's *MOP Concept Note on BESS (Battery Energy Storage Systems)*.

Overview and Context

India's ambitious renewable energy (RE) targets necessitate a regulatory framework that can address variability in solar generation and optimize grid utilization. The key proposal in this staff paper allows solar generators to have differentiated connectivity for solar and non-solar hours, thereby reducing underutilized transmission capacity and promoting energy storage deployment. However, this proposal raises several practical concerns, from the technical feasibility of dual connectivity to cost allocation for transmission infrastructure.

Analysis of Key Proposals

1. Solar and Non-Solar Hour Connectivity through the same Transmission System

Objective: This proposal addresses the mismatch between peak non-solar hour demand and solar generation (limited to daylight hours), proposing a differentiated connectivity framework to improve transmission utilization.

A. Grid-India's Input on the proposal of Solar and Non-solar Hour Connectivity: Grid-India suggests that both existing and the new plant (solar + BESS) shall act as a single plant from grid operations perspective i.e. the maximum injection at any point of time may be limited to the respective connectivity quantum during solar and non-solar hours. Without limiting their physical connectivity to Grid to solar or non-solar hours only, they should be

provided with 24x7 grid connectivity, with suitable mechanisms for limiting their net injection. In this regard a formulation is hereby proposed -

Max Injection during solar hours ≤ Connectivity during solar hours

Max Injection during non-solar hours ≤ Connectivity during non-solar hours

Both – existing and the new plant – shall implement suitable centralized control mechanism in the form of master power plant controller or at the ISTS end of the dedicated line we install a relay which simply trips the line if the injection exceeds the limit for five minutes or more or any such device so as to limit the maximum injection of the combined complex at any point.

The rationale for operations of the existing and the new plant as a single entity is as under:

a) The injection of existing solar plant may not be uniform during solar hours. It would depend on the solar irradiance. The margin available during solar hours also may be utilized by the new plant for any injection of power.

   Generally, the discharging of BESS is expected only during non-solar hours, there might be some instances (contingency conditions, participation in frequency control etc.) where discharging during solar hours might also be required as per the directions of the load despatch centre. Further in case of ramp limitation resource during initial and final hours of the solar hours, to cater load in 2 peaks in winter, BESS can inject in solar hours too. In India all the BESS are coming, they are coming with 2 cycle operation. In such case 1 cycle they need to perform in solar hours.

   Further, if the new plant comes with dedicated solar generation for charging of BESS, there is a possibility that any excess solar generation by this dedicated solar plant may also be injected during solar hours.

   Therefore, it is important that the maximum combined injection (by existing and new plant) at any point is controlled by a centralized controller or the maximum injections beyond the permissible limit may be restricted through protective relays as discussed.

   In that case the controller will restrict the DSM (in MW) also. In a multiple developer scenario, with different PPA rates, QCA being appointed (say), the

master controller should look into only system injection parameter not the commercial parameter.

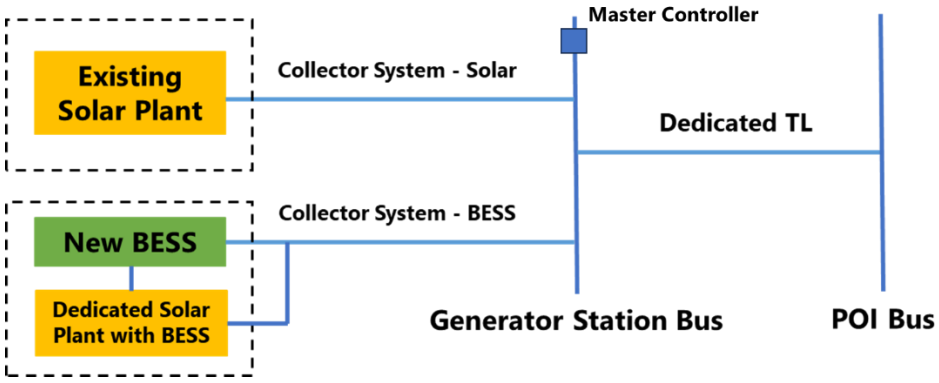


Figure 1: Existing Solar plus New Plant (Solar + BESS) at a single station

b) The existing solar plants during night hours will not be completely disconnected from the grid during non-solar hours (collector system will remain in service). This means that there would be reactive exchange of the existing solar plant with the grid even during non-solar hours. Further, the existing solar plants have the capability to provide voltage control support during non-solar hours also. These plants may participate in voltage support services in future during non-solar hours.

Further, clarification may be provided on the following aspect:

Charging of BESS during solar hours can either be through dedicated solar generation installed by the BESS developer or through the grid via suitable power purchase agreement. If the charging of BESS is through the grid, it needs to be clarified whether the same would also require connectivity during solar hours or it can avail T-GNA for the without connectivity. It may be noted that T-GNA without connectivity is not permitted as per GNA regulation.

Further, following may be specified in the GNA regulation:

The connectivity for the existing and new plant would be for solar and non-solar hours respectively. However, these plants may exchange power with the grid based on the margin availability as per the maximum injection limit and prior approval from the respective RLDC.

B. Grid-India's input on Location Specific Bids for Non-solar hours

a) It is suggested that the new plant (BESS + Solar or only BESS) for non-solar hours shall be bid out through the competitive bidding process with the existing solar developer and any willing developer should be allowed to participate in the competitive bid.

b) Space availability for new BESS + Solar plant in/near the switchyard of existing solar plant needs to be ensured.

c) Holistic agreement between the existing developer and new developer/bidders covering – breakdown and maintenance of dedicated line, operational coordination issues, transmission loss sharing, **installation of master controller/ realys** etc. – would be required.

d) The BESS developer may install a dedicated solar plant for charging of the BESS during solar hours.

In such cases, special protection schemes (SPS) shall be implemented by the existing and new plant developers to ensure that the combined solar injection does not exceed the connectivity quantum in case of tripping of BESS.

C. Grid-India's inputs on bidding parameters of new plants (dedicated solar + BESS)

It is suggested that the following broad parameters shall be specified in the bidding documents for the new plant (dedicated solar + BESS) for non-solar hours:

a. Solar Capacity – "A" MW (if dedicated solar is also being installed for charging of BESS)
b. BESS Capacity – "B" MW
c. Relation between solar capacity and BESS capacity – "B = A x C", where "C" is any number between 0 and 1.
d. BESS Duration – "H" hours
e. BESS Efficiency – "D" %
f. Annual CUF – "E" %
g. Max. solar MW that can be injected in the grid – "F" MW
h. Meters shall be placed on AC side of both solar and BESS

i. CUF shall not exceed the stipulated CUF by +2% to avoid oversizing of the dedicated solar capacity
j. Evaluation shall be on the basis of quoted tariff in Rs/kWh

Further, there can be following configurations for a co-located Solar + BESS plant:

a) AC coupled (AC Hybrid system)
b) DC coupled (DC Hybrid – Loose or Tightly Coupled)

It is suggested that the configuration of Solar + BESS may also be specified upfront.

AC coupled system provides certain advantages in terms of the following:

a) **BESS Charging Flexibility:** AC-coupled systems enable batteries to charge from the grid as well as the solar PV array, so if there is insufficient energy production from the solar PV array, the battery can still charge from the grid.

b) **Resiliency:** In case of an AC-coupled Solar + BESS, if some of inverters go under long outage, this does not impact both – the dedicated solar generation and BESS capacity - simultaneously.

c) **Retrofitting:** AC-coupled BESS can be integrated easily with an existing grid or solar PV installation setups, making them a more versatile choice for retrofits, and more can be added to expand capacity.

d) **Space Flexibility:** AC-coupled systems can have the battery and PV array located completely independently of one another and usually, the space requirements are less in large systems.

e) **Grid Support:** AC-coupled BESS can provide various grid support services independently from the BESS and Solar Inverters.

DC coupled systems have higher efficiency and lower costs (subject to space requirement).

Details are provided in **Annexure-1.**

D. Additional Inputs on solar / non-solar hour connectivity

a) In case of existing Solar and new BESS + Solar plant sharing the same connectivity, the new BESS + Solar developer shall carry out the necessary tuning studies so as to ensure that there is no controller interaction of the new plant with the existing solar generation. The existing solar developer shall provide the necessary data and models to the new developer for study purpose.

b) In case of installation of relays and Special Protection Schemes to restrict maximum injections at any point of time, necessary protection coordination may be done in consultation with RPCs and RLDCs.

c) New BESS + Solar developers shall adhere to the model, study reports submission and other requirements as specified in CTUIL's Connectivity and Grid-India's First Time Energization procedure.

   Further, the responsibility for investment to ensure power quality compliance i.e. installation of filter banks etc. may be agreed by the existing and new developer among themselves.

d) **Bidirectional Inverters in case of DC coupled system:** In case of DC coupled Solar + BESS system, it is suggested that bidirectional inverters shall be installed to facilitate charging of BESS from the grid also under certain conditions.

e) **Standards for BESS:** For deriving essential reliability services from envisaged BESS, it is important that required technical standards are timely notified by CEA.

   Further, most of the RE generation is coming up in remote locations across the country, where extending supply in case of any blackout might take significant time and delay the restoration process. Therefore, it is suggested that the **Black start /Grid-Forming capability may be mandated for at least 10-15% of the BESS inverters**.

f) The capacity during non-solar hours is expected to be maximum of 25% of rated solar capacity. Therefore, the transmission system would be loaded only up to 25% of the rated capacity. In day to day operations, transmission lines are opened in non-solar hours to control the voltages. The transmission system may, therefore, require additional shunt reactors or reactive

absorption during non-solar hours as lines would have to be kept in service for evacuation of 25% non-solar dispatch.

g) The planned outage of the transmission system (ISTS or Dedicated) in solar dominated areas is generally allowed during non-solar hours to avoid RE curtailment. With operation of BESS in non-solar hours, this outage window may get shortened.

h) The impact on SCR (Short circuit ratio) on account of sharing of connectivity (installation of new solar + BESS capacity along with the existing solar plant) may be assessed in advance by the planning agencies.

i) Presently there is no definition of Solar & Non Solar Hours in the Regulation. Definition of Solar Hours and Non Solar Hours needs to be defined in the Regulation. Solar hours are diverse in India. State wise declaration of solar hours need to be published by Grid-India, as within the same region like WR, there is about 40-45min difference in sunrise/sunset timings between Reva and Mundra.

2. Minimum Utilization Requirements for Hybrid ISTS Connectivity

- **Objective**: To mandate a 50% minimum annual utilization rate for hybrid RE facilities connected to ISTS to ensure efficient use of infrastructure.

- **Grid-India Inputs**: The utilization may be calculated based on historical injection levels rather than a flat 50% requirement. This approach would allow for adjustments based on actual performance rather than penalizing facilities for inherent variability.

  Further, it is suggested in the draft discussion paper that *"the quantum of Connectivity equal to the average of maximum injection in any time block of a day over the year (first year after the declaration of COD) may be allowed to be retained by the Connectivity grantee."*

  As RE plants are commissioned in phases, it is suggested that the computation period of one year shall after the complete commissioning of the plant.

  Whether the utilization will be based on energy (MU) terms or MW terms needs to be clarified. It is suggested that, taking utilization in energy terms may be disadvantageous for the existing solar, wind, hybrid plants as it averages out the utilization across all time horizon. This may lead to an impression of underutilization transmission assets on flat basis (the average value may be

misleading here as solar generation is maximum only during solar hours & wind generation is usually maximum only during 3-4 months during the year). Also, in place of taking average of maximum injection (MW) of each day over a year, the 99th or any other suitable percentile value of maximum injection for each day for every time block over a year may be considered.

3. **Issue No. 1: Substitution of GNA quantum under Regulation 17.1(i) to Regulation 17.1(iii) to the GNA Regulations**

Grid-India Suggestions:

i. **Whether such substitution of GNA quantum under Regulation 17.1(i) to GNA/under Regulation 17.1(iii) should be allowed?**

The substitution may be allowed provided -

- The GNA grantee under 17.1(i) is an embedded entity of state and under the control area jurisdiction of state. Whereas, GNA grantee under 17.1(iii) is an entity directly connected to ISTS (without any connectivity with STU) and would be under the control area jurisdiction of RLDC. **In case of substitution from 17.1(i) to 17.1(iii) or vice-versa, the control area jurisdiction of the entity shall be remaining with either SLDC or RLDC for scheduling, metering and settlement purpose and these entities may be mandated to surrender the existing connectivity with STU or ISTS**. **In such case NoC from STU and relinquishment charges to STU may be applicable. However, there will be need for enabling regulatory provisions for shifting of control area jurisdiction from SLDC to RLDC.**
- The change in control area jurisdiction of the entity from SLDC to RLDC may be clearly defined as the entity under Regulation 17.1(iii) will be having full connectivity with ISTS.
-

ii. **If such substitution is allowed, should it be coupled with the following conditions:**

a. the entity shall submit the NOC from the STU

- The entities seeking substitution of GNA may be mandated to obtain the NOC from STU along with confirmation of surrendering connectivity with STU and jurisdiction transfer from SLDC to RLDC.

b. the entity shall be liable for payment of the charges of the intra-State network or relinquishment charges, as applicable

- The liability of payment of transmission charges of the intra-state network and relinquishment charges may be as per the state regulatory provisions.

c. the entity shall be radially connected with the ISTS as 17.1(iii) entity

- It should be radially connected with ISTS as it shall have only ISTS connectivity.
- GNA Regulation 17.1(iii) is applicable for both Bulk Consumer and distribution licensee connected directly to ISTS. As per this clause 17.1(iii), if an entity (Bulk Consumer or Distribution Licensee) obtain GNA from CTU, then it has to surrender its STU connectivity and come under the jurisdiction of RLDC. **But, for a distribution licensee connected to ISTS directly or radially may pose reliability issues. So, Under GNA Regulation 17.1(iii), GNA grant to distribution licensee may be excluded and only Bulk Consumer shall be allowed to apply for GNA.**
- If the entity seeks to keep the existing physical connectivity with STU network in service for redundancy of supply, the entity may be allowed with physical connectivity with STU network subject to NOC from STU with mutual agreement among STU and the entity. **For such cases, commission may direct a methodology to decide the control area jurisdiction of the entity having dual connectivity.**
- In the Western Region, TPL Ahmedabad and TPL Surat are private Distribution Companies (DISCOMs) embedded in Gujarat State. Both entities have allotted deemed General Network Access (GNA) of 44.64 MW as per GNA Regulation Clause 18.1(e) as GNA grantees embedded within the state. The control area jurisdiction for scheduling, accounting, etc., lies with SLDC Gujarat for these DISCOMs. Subsequently, the Central Transmission Utility (CTU) approved additional GNA to TPL Ahmedabad (800 MW) and TPL Surat (100 MW) under Clause 17.1(iii) as distribution licensees directly connected to the Inter-State Transmission System (ISTS). Following the GNA issuance to both entities by CTU as DISCOMs directly connected to the ISTS network under Clause 17.1(iii), TPL Ahmedabad and TPL Surat DISCOMs now have access both from CTU and STU. This arrangement contradicts the GNA Regulation and the observations of the Hon'ble Commission mentioned in the staff paper,

paragraph 2.6.ii(c). Due to this, WRLDC has faced various issues in scheduling, metering, deviation settlement (DSM, RTDA) and RE waiver computations are highlighted in **Annexure-02.**

- The experience of WRLDC w.r.t. Scheduling, Accounting and Settlement in case of dual connectivity granted to TPL Ahmadabad and TPL Surat, along with implementation limitations, is detailed in **Annexure-02.**

4. Issue No. 2: Use of GNA of a Connectivity grantee by an entity connected with an intra-State network that is not a GNA grantee

i. Whether such utilisation of GNA of a GNA grantee can be allowed by an entity that is not a GNA grantee?

- The ISTS transmission system built for meeting the loads of the original grantee might get underutilized. This would have implications for the original state towards the monthly transmission charges. This point needs to be suitably addressed through provisions of appropriate relinquishment charges at STU/CTU level as applicable.
- Nevertheless, transfer may be allowed with provisions as suggested below.

ii. If such use is allowed, should it be coupled with the following conditions:

a. Such request to be made along with the NOC from the STU towards availability of space in the intra-State network for such quantum of GNA and period

- NoC from STU is required subject to availability of margin in intra-state system.
- As we move into the GNA Regime, state wise Bid area configuration will be required. In such case congestions at the state level will become visible. Hence, state level ATC computation will become critical from the perspective for system reliability and market coordination. In recent past it has been witnessed that many States having GNA more than the state ATC. States are giving NOC on top of that. The issue has been highlighted by Grid-India in its comment on Draft GNA Regulation-2021. (https://cercind.gov.in/2022/draft_reg/comment_GNA/POSOCO%20Comments%20with%20Annexures.pdf)
- To begin with such transfers may be restricted within states only. Based on experience gathered same may be extended at intra state level.

- Further, GNA transfer from one entity to other entity may be allowed for minimum period of say one year and maximum period of not exceeding three years at a time.

b. Such request for utilisation of GNA shall be from an entity located in the same State or same region as that of the GNA grantee. The additional conditionality that need to be imposed for considering the GNA utilisation beyond the state.

- The use of GNA provision may allowed from any entity located in the **same state** subject to detailed system study by the Nodal agency (STU) ensuring availability of Intra-State Transmission system.

c. Such request should only be allowed based on the margin available in ISTS, and no augmentation in the ISTS is to be made to facilitate such use of GNA.

- As the nature of GNA usage by other GNA grantee is in short term, so no augmentation shall be allowed to facilitate such use of GNA.

d. Such utilisation shall be restricted to GNA only and not GNARE.

- The use of GNA transfer provision may be extended to GNARE also with following provisions as both the Accesses are similar in all aspects expect the RE Waiver computations.
    - The entity shall be eligible to use GNARE of other grantee if it is already a GNARE grantee or non GNA grantee only.
    - Once the use of GNARE is allowed to non GNA grantee and this entity shall not be eligible for additional GNA and use of GNA from other entity during GNARE period.
    - Further, the provision for conversion of GNARE to GNA to these entities who utilize the GNARE of other grantee shall not be allowed.

iii. Issue of Waiver of transmission charges: If entity 'B' draws power from RE resources, should the GNA grantee 'A' be allowed waiver in respect of such RE power drawl.

RE waiver in case of GNA transfer needs to be deliberated. As per the GNA Regulation liability of ISTS charges to remain with original GNA Grantee. However, the waiver on transmission charges needs to be settled with the new grantee (who has taken GNA on rent). This will require necessary changes in Sharing Regulation-2020. In this regard following suggestions may be considered.

- If the liability of payment of transmission charges is to be kept with original beneficiary (i.e. A), then the RE waiver benefit against drawl of 'B' from RE sources shall be passed on 'A' but the complexity of RE waiver computations will be increased as illustrated below.
    - Say GNA/GNA(**RE)** of GNA Grantee 'A' is used by entity 'B'
    - Agreement between 'A' and 'B' shall be done on mutually agreed terms and conditions on settlement of transmission charges
    - In this case, the waiver % derived for 'B' shall be passed on to the entity 'A' for the quantum of GNA/GNARE used by 'B'. 'A' shall be responsible for payment of total GNA including quantum of GNA/GNARE transferred to other entities
    - The sample computations of RE waiver is shown below.

  Original GNA granted to 'A' = 1000MW

  Original GNA granted to 'B' = 500MW

  GNA transferred under this provision from 'A' to 'B' = 200MW

  Total net GNA of 'A' after transfer = 800MW

  Total net GNA of 'B' after transfer = 700MW

  Assume % waiver of 'A' calculated w.r.t. GNA of 800MW = 90%

  Assume % waiver of 'B' calculated w.r.t. GNA of 700MW = 80%

The following methodology may be followed to pass on the RE waiver of 'B' to original GNA grantee (A) corresponding to GNA of 200MW

Transmission Charges Waiver Computations for GNA Grantee 'A'		
GNA to be considered for computation of Transmission Charges payable by 'A'	1000 MW	GNA of 'A' used by 'A' = 800 MW GNA of 'A' used by 'B' = 200 MW
Transmission Charges payable by 'A' against 1000 MW	**X**	
Transmission Charge Rate (Rs./MW)	**Y**	Y= (X/1000)
%RE Waiver to be considered for 'A'		
% Waiver of transmission charges against GNA of 800 MW used by 'A'	90%	

RE Waiver amount against 800 MW	**Z1**	**Z1=0.9x(800xY)**
% Waiver of transmission charges against GNA of 200 MW used by 'B'	80%	
RE Waiver amount against 200 MW	**Z2**	**Z2=0.8x(200xY)**
Transmission Charges to be payable by A after RE Waiver	**(X)-(Z1)-(Z2)**	

Transmission Charges Waiver Computations for GNA Grantee 'B'		
GNA to be considered for computation of Transmission Charges payable by 'B'	500 MW	GNA of B used by B = 500 MW
Transmission Charges payable by 'B' against 500MW	**V**	
Transmission Charge Rate (Rs./MW)	**W**	W= (V/500)
% RE Waiver to be considered for 'A'		
% Waiver of transmission charges against GNA of 700MW used by 'B'	80%	The total GNA of (500+200MW) shall be used as the waiver computations are to be done against total GNA Schedule
RE Waiver amount against 500MW	**Z3**	**Z3=0.8x(500xW)**
Transmission Charges to be payable by 'B' after RE Waiver	**(V)-(Z3)**	**The 'A's GNA of 200MW used by 'B' shall not be considered in waiver computations of 'B'**

- ***These computations will become more complex if the original GNA grantee allots its GNA to more than one entities.***

Grid-India observation -

It is hereby pertinent to note that such short term transfers of GNA will be based on mutually agreed terms between the grid connected drawee entities, this will practically open secondary market for trading of

transmission rights without the requisite regulatory framework. This may lead to oversubscription of GNA across corridors and subsequent transfer of same at premium. This may ultimately increase cost of transmission in future.

It may be noted that CTU has already granted GNA to entities which is not a GNA grantee and is connected to intra-State network. CTUIL intimation letter in this regard is attached **Annexure-3**.

5. **Issue No. 3: Dual Connectivity to the Bulk Consumer for the same load capacity**

   i. **Whether such grant of GNA to Bulk Consumer through dual connectivity, i.e., for the same load capacity should be allowed or not?**

   - *Dual connectivity to any Bulk Consumer or DISCOM* ***should not to be allowed to ensure jurisdictional sanctity & operational control of respective Load Despatch Centre (be it SLDC or RLDC). However, for DISCOMS is such dual connectivity becomes inevitable for ensuring supply reliability, then the control area jurisdiction of such dually connected DISCOMs must remain with the state.***

   - *In future many* ***Green Hydrogen & Ammonia Plants are expected to get connectivity to ISTS network as bulk consumers****. Dual connectivity of such bulk consumers* ***should not be allowed*** *for reasons cited above.*

     In such case integrated complex of generation and load as a single control area may emerge*.*

     If we have an integrated complex, transmission planning within the complex should be the responsibility of the entity. CTU could plan for its connection to the ISTS including multiple connections from the viewpoint of reliability (In similar line with the BALCO case).

     Changes will be required in the CEA and CERC Regulations to facilitate the same from ***technical requirements*** *to be fulfilled by such entities starting from* ***Resource Adequacy, transmission planning, primary response, defence mechanisms such as UFR*** *etc. and so on.*

     Whether **cross subsidy surcharge shall be payable by such Bulk Consumer/*integrated complex* needs to be clarified. Whether CERC or SERC would determine same and how same will be calculated needs to be detailed out.**

     Following report of PJM may be refereed via. link https://pjm.com/-/media/library/reports-notices/testimony/2024/20241101-statement-of-

stu-bresler-for-ferc-technical-conference-on-colocated-load.ashx *with, where PJM has stated in the FERc Technical conference of the challenges with co-located load and generation facilities and how it impacts Resource Adequacy, reliability besides sharing of transmission charges and Ancillary Services.*

- The difficulties in allowing a Bulk Consumer or DISCOM in dual connectivity are as follows -
    - Modality of control Area jurisdiction issues
    - Tagging of Schedules through different paths (ISTS, STU, ISTS through STU, STU through ISTS etc.)
    - Application of Losses and Charges
    - Calculation of DSM/RTDA
    - Computation of TGNA Collective Charges
- Further, there will be always **possibility of transmission capacity on ISTS being underutilised on account of a separate transmission system for these bulk consumers and Discoms for granting GNA/GNARE**. As mentioned in the staff paper, the reason for requesting dual connectivity for same load capacity is to avail green power as represented of Bulk Consumers. If this provision is facilitated to Bulk Consumers and Discoms, this will ultimately burden the other GNA Grantees as the waiver of transmission charges to be given to these bulk consumers will get loaded to other GNA grantees as per Sharing Regulation. The burden on other GNA grantees will get increased further if these Bulk Consumers are allowed for GNARE as 100% waiver of transmission charges is given to GNARE grantees if they Schedule power for minimum 30% against GNARE quantum. This means the balance 70% of the liability for payment of transmission charges will be passed to other GNA grantees.
- In view of the above, it is suggested that the Bulk Consumers and DISCOMs may not be allowed to grant dual connectivity for same load capacity or even for additional capacity also. But, as suggested above in the Point No. 1, the bulk consumers and Discoms may be allowed to get GNA under 17.1 (iii) and with a provision to convent GNA under 17.1 (i) to 17.1 (iii) along with shifting of control area from SLDC to RLDC.
- WRLDCs experience and observations on existing dual connectivity granted to TPL Ahmadabad and TPL Sural is highlighted in **Annexure-1.**

- It may be noted that CTU has already granted GNA through CTU connectivity to DISCOM IPCL which has original connectivity with West Bengal STU network. CTUIL intimation letter in this regard is attached **Annexure-4**.

5. Platform for NOC Issuance by STU

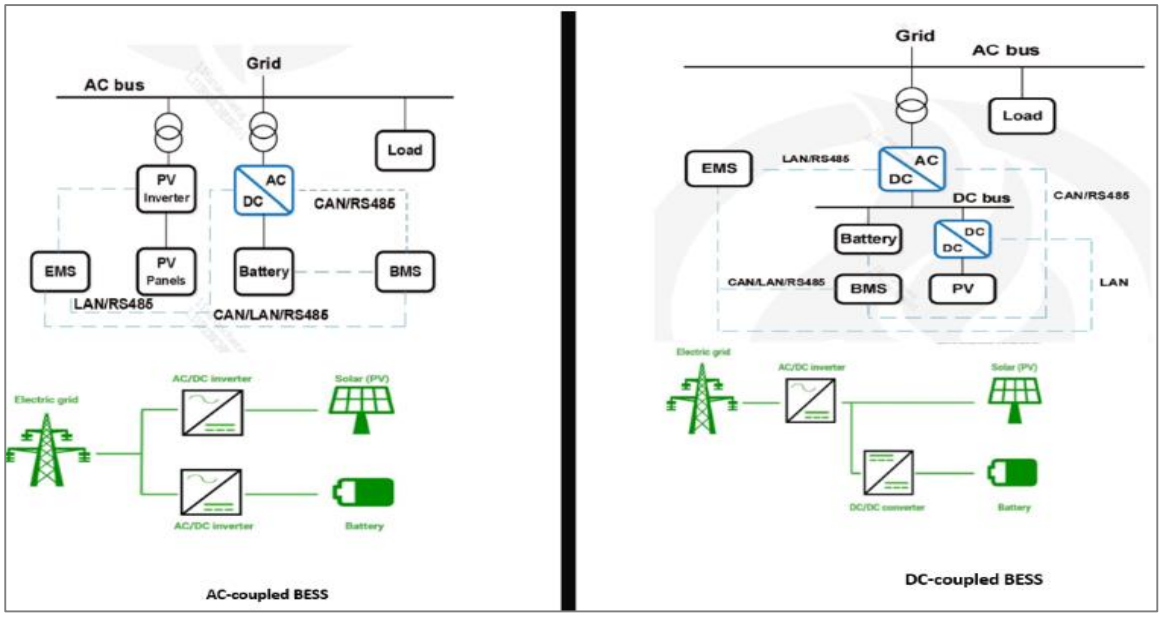
- **Objective**: To streamline the NOC issuance process for entities seeking ISTS access, thereby reducing delays and improving transparency.
- **Recommendation from Grid-India:** While the centralized online platform could streamline the NOC application process, it will be crucial to ensure that it is user-friendly and accessible to all relevant stakeholders, including smaller entities or those less familiar with digital platforms. To address this, a well-designed interface with detailed guidelines and FAQs would be beneficial. Furthermore, the platform must be interoperable with existing systems of the STU, CTU, SLDC, and other relevant entities to ensure that the entire process—from submission to approval/rejection—is seamless. Additionally, there should be a mechanism to handle queries and disputes efficiently, ensuring that the process is not only quick but also fair and comprehensive. This process should have audit trail feature for accountability.
- **The platform can either be a dedicated one developed by CTU or an integrated one with CTU GNA application portal**. However, if such system is already in place at STU level, the same needs to be coordinated with centralised system.

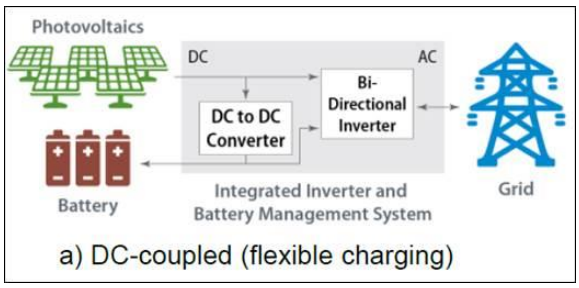
***

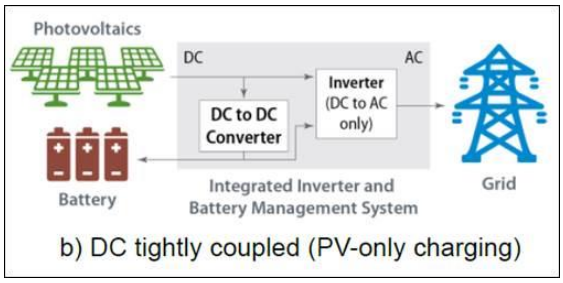
Annexure-1

There can be following configurations of a Solar + BESS plant:

a) AC coupled (AC Hybrid system)
b) DC coupled (DC Hybrid – Loose or Tightly Coupled)







AC-coupled systems involve separate inverters for the PV and battery components, and DC-coupled systems involve a single shared inverter for both the PV and battery. The latter configuration is further divided into two subtypes: loosely coupled systems that use a bidirectional inverter that allows for charging from either the coupled PV or the grid, and tightly coupled systems that involve hardware (or controls) that disallow grid charging.

Some examples of both AC and DC coupled systems deployed across the world are provided at **Appendix-A.**
The comparison of some of the aspects both the systems on various parameters is provided below:

S. No.	Features	DC-Coupled Systems	AC-Coupled Systems
1.	**Inverter Requirements**	Single shared inverter (Bi-directional if flexibility for charging of BESS from the grid is allowed)	Two separate inverters, one each for the BESS and PV array
2.	**Grid Forming Capability**	All inverters need to be of Grid forming nature	Only the BESS inverters can be Grid forming
3.	**Space Requirements**	require more space and solar + BESS must be co-located, as the batteries are interspersed throughout the array	AC-coupled systems can have the battery and PV array located completely independently of one another
4.	**System Costs**	Less expensive due to shared inverters	More expensive as inverters and associated equipment, wiring and installation costs are duplicated
5.	**System Efficiency**	More efficient as system does not typically suffer from PV clipping, increasing overall available PV generation	PV generation is often clipped, due to power constraints of the inverter, leading to lost energy
6.	**Retrofitting**	Difficult - retrofitting existing PV arrays with a battery requires replacement of photovoltaic inverter	Easy - the battery can be added to the system in parallel without affecting the existing DPV system
7.	**Resiliency**	The outage of any inverter would result in outage of both solar and BESS capacity	If an inverter fails, or the battery system is faulty, this does not have any impact on the power generation, and this helps to avoid the risk of a power outage

Grid-India Inputs: It is suggested that the configuration of Solar + BESS may also be specified upfront.

AC coupled system provides certain advantages in terms of the following:

a) **BESS Charging Flexibility:** AC-coupled systems enable batteries to charge from the grid as well as the solar PV array, so if there is insufficient energy production from the solar PV array, the battery can still charge from the grid.

b) **Resiliency:** In case of an AC-coupled Solar + BESS, if some of inverters go under long outage, this does not impact both – the dedicated solar generation and BESS capacity - simultaneously.

c) **Retrofitting:** AC-coupled BESS can be integrated easily with an existing grid or solar PV installation setups, making them a more versatile choice for retrofits, and more can be added to expand capacity.

d) **Space Flexibility:** AC-coupled systems can have the battery and PV array located completely independently of one another and usually, the space requirements are less in large systems.

e) **Grid Support:** AC-coupled BESS can provide various grid support services independently from the BESS and Solar Inverters.

Though DC coupled systems have higher efficiency and lower costs (subject to space requirement), **AC coupled system may be preferred due to the above-mentioned technical advantages.**

1. **Grid-Forming/Black Start Feature in the Inverters:** Most of the RE generation is coming up in remote locations across the country, where extending supply in case of any blackout might take significant time and delay the restoration process. Therefore, it is suggested that Grid-Forming inverters shall be mandated at least for BESS portion in the AC coupled system.

2. **Bidirectional Inverters in case of DC coupled system:** In case of DC coupled Solar + BESS system, it is suggested that bidirectional inverters shall be installed to facilitate charging of BESS from the grid also under certain conditions.

3. **Transmission System and I/C of the Solar Inverters:** It is understood that BESS would usually be charged during solar hours. In case of any DC coupled Solar +

BESS, if total number of inverters installed are only for reduced solar capacity (i.e. Inverter I/C = Solar I/C – BESS I/C), then complete solar generation evacuation in case of BESS outage might not be possible. It is suggested that, if DC coupled system is installed, the installed capacity of inverters shall be equal to the complete solar generation I/C.

The transmission system for evacuation shall also be planned for complete evacuation of solar generation considering the possibility of BESS outage.

4. **Discharging Schedule of BESS:** It is suggested that following provision regarding discharging of BESS may be included:

".....discharging of BESS shall be carried out during non-solar hours. Further, discharging (part or full capacity) during solar hours shall be allowed subject to prior permission from the concerned load despatch centre. This prior permission could also be for participation in ancillary market."

Appendix-A

Examples of AC and DC Coupled Solar + BESS Projects

AC Coupled Solar + BESS Projects

Project Name	**Location**	**Details**
Hornsdale Power Reserve	South Australia	150 MW/193.5 MWh Tesla Big Battery integrated with the Hornsdale Wind Farm, for providing grid stability.
Saticoy Battery Storage System	California, USA	100 MW/400 MWh AC coupled BESS providing grid services and integrating with renewable sources like solar.
Alamo Solar + Storage Project	Texas, USA	Multiple phases of solar PV with integrated AC coupled BESS to enhance grid reliability.
Kennedy Energy Park	Queensland, Australia	Hybrid park with 43.2 MW wind, 15 MW solar, and 4 MWh AC coupled BESS for stable renewable energy supply.

Project Name	Location	Details
Kaua'i Island Utility Cooperative Solar + Storage	Hawaii, USA	13 MW solar PV with 52 MWh Tesla battery, providing dispatchable renewable energy to the island.

DC Coupled Solar + BESS Projects

Project Name	Location	Details
Hawaiian Electric's West Loch Solar + Storage	Oahu, Hawaii	20 MW solar PV with 20 MW/80 MWh BESS. Efficient energy conversion and utilization of solar generation.
Gila River Power Station	Arizona, USA	20 MW solar PV with 10 MW/40 MWh BESS. DC coupled design for peak shaving and grid reliability.
Solar + Storage 1	New Mexico, USA	4 MW solar PV with 4 MW/8 MWh BESS. Early adopter of DC coupled technology.
Springbok 3 Solar Farm	California, USA	90 MW solar PV with 9 MW/36 MWh BESS. Smooths solar generation and provides dispatchable renewable energy.
ESCRI South Australia Project	South Australia	30 MW solar PV with 10 MW/20 MWh BESS. Provides grid support services such as frequency regulation.
Lāwa'i Solar and Energy Storage Project	Hawaii, USA	28 MW solar PV with 20 MW/100 MWh BESS. Provides dispatchable solar power to help meet renewable goals.

Annexure-2

WRLDC's Experience & Observations on Dual Connectivity to DISCOM

In Western Region, TPL Ahmadabad (TPL_Ah) is a **private Discom** in the state of Gujarat and has been allotted deemed GNA of 44.64MW by SLDC Gujarat in line with GNA provisions. This deemed GNA is through Gujarat STU network.

Subsequently, TPL Ahmadabad has approached CTU for additional GNA of 800MW **directly from ISTS** and accordingly CTU has granted GNA of 800MW to TPL_Ah directly from ISTS under Regulation 17.1 (iii) of GNA Regulations in addition to existing deemed GNA of 44.64MW through STU.

GNA Regulation 17.1

"17.1. The following entities shall be eligible as Applicants to apply for grant of GNA or for enhancement of the quantum of GNA:

……..

(iii) A distribution licensee or a Bulk consumer, seeking to connect to ISTS, directly, with a load of 50 MW and above;"

WRLDC and Gujarat SLDC have been facing difficulties in implementation of these both GNAs (800MW through ISTS naming GNA_ISTS and 44.64MW through STU naming GNA_STU) of TPL Ahmadabad with dual connectivity as highlighted below.

Scheduling and Open Access:

As TPL Ahmadabad has two GNAs (GNA_ISTS and GNA_STU), it is difficult for WRLDC/SLDC Gujarat to facilitate the separate scheduling of TPL Ahmadabad against GNA_ISTS and GNA_STU. The schedule against GNA_STU shall be subjected to STU Losses and STU Charges for which separate scheduling within TPL Ahmadabad is required which is not possible with a single entity for which registration of two separate entities are required and separate scheduling is to be done. Scheduling for a single physical entity with two names to tag the schedules (through STU or ISTS) would further complicate the application of transmission charges in collective segments and case to case logics are to be implemented for exemption of transmission charges TGNA collective transactions. The similar issues will be encountered in RTDA computations also.

Further, in case of dual connectivity to intra state entities with GNAs (GNA_ISTS & GNA_STU), entities will get the option to purchase the power either through GNA_ISTS or GNA_STU. This would cause difficulties in computation of RE waivers as waiver computations are done as a single entity.

Control Area Jurisdiction:

In TPL Ahmadabad case, it has connectivity with STU as well as ISTS and CTU has granted GNA directly from ISTS in addition to existing connectivity with STU. The control area jurisdiction is still with Gujarat even after granting GNA of 800MW under Regulation 17.1 (iii) as the case of dual connectivity is not considered by CTU while granting to TPL Ahmadabad.

As the control area jurisdiction is still with SLDC Gujarat in TPL Ahmadabad case even after granting GNA under Regulation 17.1 (iii), the additional GNA of TPL Ahmadabad (800MW) is also considered in Gujarat state GNA only for computation of RTDA.

In the present staff paper, Hon'ble commission has clearly stated that the entities with radial connectivity to ISTS shall be eligible to get GNA granted under 17.1 (iii) as mentioned in para 2.6.ii(c). Further, the commission has clarified that GNA regulations do not permit dual connectivity to intra state entities in the context of Regulation 17.1 (iii) which is applicable for distribution licensee and Bulk consumer.

Similarly, TPL Surat also have been granted GNA of 100MW directly through ISTS along with deemed GNA of 44.64MW through STU and WRLDC is facilitating the same difficulties during implementation.

Further, it is understood that the application of MPSEZ (intra state entity of Gujarat) requesting for GNA directly through ISTS under 17.1 (iii) is under process at CTU without surrendering existing connectivity through STU.

***

Annex-3

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref: CTU/WR/GNA-TRANS-INT-5/2200001246_1278_1310 **Date:** 30.10.2024

To: As per Distribution List

Sub: Intimation for transfer of GNA granted to M/s Reliance Industries Ltd. (RIL) for Use by other GNA grantees.

Ref:

I. CTU letter dated 28.01.2022 (subsequently amended on 21.04.2022) regarding grant of Connectivity for 500MW.
II. CTU letter dated 17.03.2023 regarding grant of LTA for 500MW.
III. CTU letter dated 22.09.2023 regarding conversion of 500MW LTA to deemed GNA under Regulations 37.3 of GNA Regulations, 2022.
IV. CTU letter dated 01.10.2024 regarding effectiveness of 500MW GNA granted to M/s RIL.
V. CTU letter dated 09.08.2024 regarding grant of 1MW GNA to M/s RIL, Naroda against application no. 2200000863.
VI. CTU letter dated 09.08.2024 regarding grant of 1MW GNA to M/s RIL, Vadodara against application no. 2200000864.
VII. CTU letter dated 09.08.2024 regarding grant of 1MW GNA to M/s Sintex Industries Ltd. (SIL), against application no. 2200000867.
VIII. M/s RIL (transferrer) applications no. 2200001246, 2200001278, 2200001310 for transfer of its GNA to other grantees.

Sir,

We write with reference to the grant of GNA for 500MW to M/s RIL (transferrer) vide [Ref. I, II & III] which is made effective from 01.10.2024 vide [Ref. IV] and applications made by M/s RIL (transferrer) for transfer of part quantum of the above GNA to other GNA grantees (transferees; viz RIL Appln. No. 2200000863, 2200000864 & SIL Appln. No. 2200000867) [Ref. V].

The requests for transfer of GNA have been discussed in the 33rd Consultation Meeting for Evolving Transmission Schemes in Western Region (CMETS-WR) held on 29.10.2024 wherein they were agreed for processing with dates of effectiveness being same as that of requested start date of transfer of GNA (as the original 500MW GNA is already effective). **The GNA transfer shall be considered effective from the dates mentioned in this intimation.**

Further, the liability of payment of transmission charges shall continue to be with the original GNA grantee i.e. M/s RIL (transferrer) for the entire capacity of GNA (500MW) irrespective of usage by other GNA grantees (transferees).

Thanking You,

Yours Sincerely

Partha Sarathi Das
Sr. General Manager

Distribution List:

1. **Chief Engineer (PSP&A-I)** Central Electricity Authority Sewa Bhawan, R K Puram New Delhi – 110 066.	2. **Member Secretary** Western Regional Power Committee, F-3, MIDC Area, Marol, Opp. SEEPZ, Central Road, Andheri (East), Mumbai – 400 093
3. **Director (SO)** Grid Controller of India Limited 9th Floor, IFCI Towers, 61, Nehru Place, New Delhi–110 016	4. **Executive Director** Western Regional Load Dispatch Centre F-3, Krantiveer Lakhuji Salve Marg, Santacruz Electronic Export Processing Zone, Andheri East, Mumbai – 400 096
5. **Shri Mukesh Rathod** Vice President Reliance Industries Limited Plot No 103-106, Naroda Industrial Estate, Naroda, Ahmedabad, Gujarat mukesh.rathod@ril.com ashok3.singh@ril.com	

INTIMATION FOR USE OF GNA BY OTHER GRANTEES UNDER REGULATION 23			
1.	Intimation No	:	CTU/WR/ GNA-TRANS -INT-5/ **2200001246_1278_1310**
	Date	:	30.10.2024
2.	Ref. Application No. & Date	:	2200001246 – 18.09.2024 2200001278 – 26.09.2024 2200001310 – 30.09.2024
3.	Name of the Applicant (Transferor)	:	Reliance Industries Limited (RIL)
4.	Address for Correspondence	:	**Shri Mukesh Rathod** Vice President Reliance Industries Limited Plot No 103-106, Naroda Industrial Estate, Naroda, Ahmedabad, Gujarat mukesh.rathod@ril.com ashok3.singh@ril.com
5.	Nature of the Applicant	:	Bulk Consumer connected to ISTS
6.	**ISTS Connectivity details**	:	
I.	Region where Applicant is connected to ISTS	:	WR
II.	Quantum (MW) of GNA granted	:	500
a.	Quantum (MW) of GNA within region	:	500
b.	Quantum (MW) of GNA outside region	:	0
III.	Start Date of GNA	:	01.10.2024
IV.	End Date of GNA	:	01.10.2031

7. GNA transfer details (w.r.t Transferees)

Name of other GNA Grantee	Nature of other GNA Grantee	Quantum (MW) of GNA to be used			Period of usage of GNA	
		Total	Within Region	Outside region	From Date	To Date
Reliance Industries Ltd., Naroda	Drawee entity connected to In-STS	2.5	2.5	0	**02.11.2024**	31.03.2025
Reliance Industries Ltd., Vadodara	Drawee entity connected to In-STS	15	15	0	**10.11.2024**	31.03.2025
Sintex Industries Ltd.	Drawee entity connected to In-STS	47	47	0	**14.11.2024**	31.03.2025

8. Total GNA details (w.r.t Transferor/original GNA Grantee)

Name of GNA Grantee	Nature of GNA Grantee	Quantum (MW) of GNA			Period of GNA	
		Total	Within Region	Outside region	From Date	To Date
Reliance Industries Ltd.	Bulk Consumer connected to ISTS	500	500	0	01.10.2024	01.11.2024
		497.5	497.5	0	02.11.2024	09.11.2024
		482.5	482.5	0	10.11.2024	13.11.2024
		435.5	435.5	0	14.11.2024	31.03.2025
		500	500	0	01.04.2025	01.10.2031

Note: Use of GNA by other GNA grantees is permitted subject to the following Terms and Conditions:

1. The Grantee shall abide by all provisions and its amendments thereof or re-enactment of:
    i) Electricity Act, 2003
    ii) CERC (Connectivity and General Network Access to the inter-State transmission System) Regulations, 2022 and corresponding Detailed Procedure for Connectivity and GNA
    iii) CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007
    iv) CEA (Technical Standards for construction of Electrical Plants and Electric Lines) Regulations, 2022
    v) CEA (Grid Standard) Regulations, 2010
    vi) CEA (Safety requirements for construction, operation and maintenance of Electrical Plants and Electrical Lines) Regulations, 2022
    vii) CEA (Measures relating to Safety and Electricity Supply) Regulations, 2023
    viii) CEA (Installation and Operation of Meters) Regulations, 2022 and amendments thereof
    ix) CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020
    x) CERC (Communication System for Inter –State transmission of Electricity) regulations, 2017

xi) CERC (Indian Electricity Grid Code) Regulations, 2010; Further, as per CERC notification dated 03.08.2023, IEGC 2023 shall come into effect from 01.10.2023 and IEGC 2010 shall stand repealed.

xii) CEA (Cyber Security in Power Sector) Guidelines, 2021

xiii) CEA (Manual of communication planning in Power System operation), March 2022

xiv) CERC Guidelines on "Interface Requirements" 2024 under the CERC (Communication System for inter-State transmission of electricity) Regulations, 2017.

xv) Any other applicable Act / Rules / Guidelines / Standards / Regulations / Procedures etc.

2. That the applicant shall keep the CTU and RLDC/NLDC indemnified at all times and shall undertake to indemnify, defend and keep the CTU, RLDC/NLDC harmless from any and all damages, losses, claims and actions including those relating to injury to or death of any person or damage to property, demands, suits, recoveries, costs and expenses, court costs, attorney fees, and all other obligations by or to third parties, arising out of or resulting from the GNA transaction.
3. The applicant/grantee shall be required to pay applicable ISTS transmission charges as per relevant CERC Regulations/Orders.
4. Even in case of failure to fulfil the conditions of NOC of STU by GNA grantee prior to start date of GNA, the GNA shall be considered effective.

Place: Gurugram
Date: 30.10.2024

Partha Sarathi Das
Sr. General Manager

Annex-4

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref: CTU/E/GNA/Effectiveness/IPCL

Date: 19-09-2024

Director (SO)
Grid Controller of India Ltd.
B-9, Qutab Institutional Area,
Katwaria Sarai, New Delhi -110016

Executive Director
Eastern Regional Load Despatch Center
14, Golf Club Road, Jubilee Park, Golf Gardens, Tollygunge, Kolkata
West Bengal-700095

Subject: Effectiveness of 100MW GNA granted to M/s India Power Corporation Limited (IPCL) as distribution licensee in West Bengal

Ref:
(i) CTU intimation letter ref. no. CTU/E/GNA-INT-2B/1200000617 dated 15-09-2023.
(ii) Addendum in CTU intimation letter ref. no. CTU/E/GNA-INT-2B/1200000617_add dated 13-11-2023.
(iii) Corrigendum in CTU intimation letter ref. no. CTU/E/GNA-INT-2B/1200000617_corrg dated 01-02-2024.
(iv) CTU letter ref. no. CTU/E/GNA/1200000617_Notice dated 04-07-2024

Dear Sir,
This is with reference to 100MW GNA granted under GNA Regulations, 2022 to M/s India Power Corporation Limited (IPCL) as distribution licensee in West Bengal vide CTU intimation & its subsequent revisions referred at ref. (i), (ii) & (iii). M/s IPCL is required to furnish one-time GNA charges (@Rs. 1Lakh/MW) in line with GNA Regulations, 2022. In case of non-receipt of the same, treatment shall be as per provisions in the CERC Regulations.

The said 100MW GNA granted to M/s IPCL is hereby made effective w.e.f. 01-10-2024. M/s IPCL is requested to establish payment security mechanism for payment of transmission charges in favor of CTUIL in terms with CERC Sharing Regulations, 2020 and amendments thereof for which you may contact the following:

ED (Commercial)
Saudamini, Plot No.2, Sector 29,
Near IFFCO Chowk, Gurgaon (Haryana) – 122001
Tel: 0124-2822101

Further, M/s IPCL shall be liable to bear all commercial and operational liabilities as per applicable CERC Regulations & directions issued from time to time.

Thanking you.

Yours faithfully,

राजेश कुमार
19.09.2024

(Rajesh Kumar)
Sr. General Manager (TP-III & CP)

Copy to:

1. **Chief Engineer, I/c (PSP&A-II)** Central Electricity Authority Sewa Bhawan, R.K.Puram New Delhi-110066	2. **Member Secretary** Eastern Regional Power Committee 14, Golf Club Road, Tollygunge Kolkata-700033
3. **CMD** Bihar State Power Transmission Company Ltd. (BSPTCL) Vidyut Bhavan, 4th floor, Bailey Road Patna-800021	4. **CMD** Damodar Valley Corporation DVC Towers, VIP Road Kolkata-700054
5. **CMD** Jharkhand Urja Sancharan Nigam Limited (JUSNL) Engineering Building, HEC, Dhurwa Ranchi-834004	6. **CMD** Odisha Power Transmission Corporation Ltd. (OPTCL), Bhoinagar Post Office, Janpath Bhubaneshwar-751022
7. **Principal Chief Engineer cum Secretary** Power Department Government of Sikkim Gangtok, Sikkim	8. **Managing Director** West Bengal State Electricity Transmission Company Ltd. (WBSETCL) Vidyut Bhavan, 8th Floor, A-Block Salt Lake City, Kolkata-700091

Applicant:

Shri Subir Kumar Das
VP-Technical
India Power Corporation Limited
Plot X 1 2 & 3, Block EP, Sector V Salt,
Lake City, Kolkata, West Bengal – 700091

Copy for kind information:

ED (BCD & Regulatory) CTUIL 7th Floor, CTUIL office, Ircon International Towers (Tower-1) Plot No. 16, Institutional area, Sector-32, Gurugram, Haryana-122003	**ED (Commercial)** Saudamini, Plot No.2, Sector-29 Near IFFCO Chowk Gurugram, Haryana – 122001