



पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड

(भारत सरकार का उद्यम)

POWER SYSTEM OPERATION CORPORATION LIMITED

(A Government of India Enterprise)



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संदर्भ: NLDC/SO/GNA/

दिनांक: 10th Nov 2022

सेवा में,

All the Stakeholders

विषय: Stakeholder suggestions on Draft Procedure for Allocation of Transmission Corridor for Scheduling of General Network Access (GNA) and Temporary General Network Access (T-GNA) Transactions

संदर्भ: Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022

महोदय/महोदया,

Central Electricity Regulatory Commission has notified the Connectivity and General Network Access to the inter-State Transmission System Regulations, 2022 on 7th June 2022. In accordance with the regulations, a draft Procedure for "**Allocation of Transmission Corridor for Scheduling of General Network Access (GNA) and Temporary General Network Access (T-GNA)**" has been prepared and is enclosed herewith. The aforementioned procedure has also been published on POSOCO website and is available at: <https://posoco.in/notices/>

Suggestions/feedback on this draft procedure are invited and these may be kindly forwarded to nldcreliability@posoco.in by **30th November 2022**.

सधन्यवाद,

भवदीय,

सुरजीत

(सुरजीत बनर्जी)

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Encl: As above

Copy for kind information:

1. Secretary, CERC

**Power System Operation Corporation Limited
National Load Despatch Centre (NLDC)**



**Procedure
for
Allocation of Transmission Corridor for Scheduling of
General Network Access (GNA) and Temporary General
Network Access (T-GNA) Transactions**

Prepared in Compliance

to

Central Electricity Regulatory Commission

Connectivity and GNA

Regulations, 2022

Nov 2022

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Allocation of Transmission Corridor under General Network Access (GNA) and Temporary General Network Access (T-GNA) to the Inter-State Transmission System

1. Background

- 1.1.** This procedure is in accordance with *clause 36 of the Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022.*
- 1.2.** The procedure lays down the guidelines for allocation of the transmission corridor for scheduling of GNA and T-GNA transactions as the provisions stipulated in aforementioned GNA regulations and Indian Electricity Grid Code (IEGC).

The procedure will supplement NLDC's *Procedure for Temporary General Network Access (T-GNA) to the inter-State Transmission system through National Open Access Registry (NOAR)* prepared in accordance with the aforementioned regulations.

2. Definitions

2.1. Applicant' means Trader on behalf of eligible buyers or engaged in cross border trade of electricity/State Electricity Board/Authorised agency/Inter State Generating Station/Independent Power Producer/Distribution licensee /Captive Power Plant/Power Exchange or any other entity eligible as per the Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022 and willing to apply for TGNA.

Provided that the Generating station including REGS can only apply as buyers for meeting its auxiliary consumption or start-up power or for meeting its supply obligations in terms of clause (3) of Regulation 6 of the Power Market Regulations;

2.2. 'Bid Area' is defined as the largest geographical area within which market participants are able to exchange energy without capacity allocation.

2.3. 'Commission' means the Central Electricity Regulatory Commission referred to in Section 76 of the Electricity Act.

2.4. 'Cross Border Transaction' means transactions involving import or export of electricity between India and any of the neighbouring countries and shall also include transactions across India involving neighbouring countries.

2.5. 'Day' means a day starting at 00:00 hours and ending at 24:00 hours.

2.6. 'Power System Operation Corporation (POSOCO)' means the wholly Government owned independent Company notified by Central Government under Section 26 and subsection (2) of Section 27 of the Act vide notification dated 19th December 2016. POSOCO is operating all the five RLDCs and the NLDC w.e.f. 1st October, 2010;

Words and expressions used in this procedure and not defined herein but defined in the Act or any other regulations specified by the Central Commission shall, unless the context otherwise requires, have the meanings assigned to them under the Act or other regulations specified by the Central Commission, as the case may be.

3. Declaration of Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM)

3.1 Transfer Capability

- a) "Total Transfer Capability (TTC)" means the amount of electric power that can be transferred reliably over the inter-control area transmission system under a given set of operating conditions considering the effect of occurrence of the worst credible contingency.
- b) "Transmission Reliability Margin (TRM)" means the amount of margin earmarked in the total transfer capability to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions.
- c) "Available Transfer Capability (ATC)" means power transfer capability of the inter-control area transmission system or across electrical regions or between ISTS and state network or between cross-border interconnections available for scheduling transactions in a specific direction, taking into account the network security declared by the concerned load despatch centre. Mathematically, ATC is the Total Transfer Capability less Transmission Reliability Margin.
- d) TTC is dependent upon the network topology, point and quantum of injection /drawl and power flows in other paths of the interconnected network as well as prevailing voltage profile in the network during the assessment period.
- e) TTC is directional in nature and the transfer capability for import of power in a region or control area from another region or control area may be different from the transfer capability for export of power from that region or control area to the other region or control area.
- f) Total Transfer Capability is time variant and there could be different figures for different times of the day/month/season/year.
- g) Transfer Capability is mentioned in MW.

3.2 Assessment and Declaration of Transfer Capability

- a) The import and export Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) shall be computed for all the bid areas/control areas/group of control or bid areas where a control or bid area can be a separate region, state, union territory (UT), part of region/state/UT or any combination of the same.

- b) The Central Transmission Utility (CTUIL) shall assess and declare the Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) of the inter-regional links/corridors as well as of the individual control/bid areas within the region for the purpose of grant of GNA. The CTUIL shall also provide interface for communicating approved GNA quantum to NLDC.
- c) The National Load Despatch Centre (NLDC), Regional Load Despatch Centres (RLDCs) and State Load Despatch Centre (SLDCs) shall refer to the quantum declared by CTUIL while assessing the TTC, TRM and ATC for the purpose of scheduling of GNA and grant/scheduling of T-GNA transactions.
- d) The National Load Despatch Centre (NLDC) shall assess the Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) of the inter-regional links/corridors in consultation with Regional Load Despatch Centres. The TTC, ATC, and TRM figures for the month along with the details of basis of calculations, including assumptions, if any, shall be published on the website of NLDC and concerned RLDCs at least eleven (11) months in advance. The specific constraints indicated by the study shall also be published on the website.
- e) The State Load Despatch Centres (SLDCs), in consultation with Regional Load Dispatch Centres (RLDCs) shall assess the Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) of the individual control/bid areas within the region. Regional Load Despatch Centres shall assess TTC, TRM and ATC for the group of control/bid areas within the region (if required). The computed TTC, TRM and ATC figures shall be published on the website of respective SLDCs and RLDCs, along with the details of basis of calculations, including assumptions, if any, at least eleven (11) months in advance. The specific constraints indicated by the study shall also be published on the website.
- f) The consolidated bid area/control area/combination of control areas/inter-region wise TTC, TRM and ATC shall also be published on NLDC/POSOCO website.
- g) NLDC, RLDC and SLDCs shall perform the TTC computation studies such that all anticipated operating conditions are covered. In the studies, the worst credible contingency shall be considered to ensure equipment loadings, voltage stability, and transient stability limits. The detailed procedure for computation of TTC is enclosed at **Annexure-I**.

Provided further that NLDC and/or concerned RLDCs and SLDCs in consultation with each other may revise the TTC, ATC and TRM of respective control areas due to change in system conditions, which includes change in network topology or change in anticipated active or reactive generation or load, on account of outage or otherwise, of one or more generators or

transmission lines, at any of the nodes in the study. Revised TTC, TRM and, ATC shall be published on website of NLDC and concerned RLDCs and SLDCs and shall clearly state the reasons of revision thereof.

The TTC, ATC and TRM may also be revised near to the operating horizon depending on the anticipated system conditions at that time.

4. Allocation of Transmission Corridor

In order to determine whether the drawl schedules as requisitioned by the GNA/T-GNA grantees can be allowed, RLDCs shall check the availability of the margin for each and every time block against the available regional import/export transfer capability followed by the intra-regional and bid/control area import/export transfer capability. This process shall be carried out for all the bid area (s) / control area (s) / group of control or bid areas.

For the purpose of transmission corridor allocation, all states shall be configured as bid-areas. Further, additional bid areas/group of bid areas may also be configured as and when the need arises. NLDC shall be responsible for configuration/reconfiguration of these bid area(s) based on the anticipated congestion and prevailing grid conditions. Power Exchanges shall keep the provision in their respective systems for configuration of bid areas as and when intimated by NLDC.

First, the GNA grantees shall be eligible to schedule power within the GNA granted to them subject to the available import and export transfer capability of the concerned bid area (s)/control area (s)/group of control or bid area (s). After allocation of the corridors to the GNA grantees, concerned RLDC shall allow the drawl schedules as requisitioned by the T-GNA grantees based on the available margin. The detailed procedure for the same is provided below.

4.1. Allocation of Transmission Corridor and Scheduling of Transactions under GNA

- a) Respective SLDCs on behalf of the intra-state entities which are drawee GNA grantees shall furnish the details of the contracts/power purchase agreements (PPAs) including the injection point at least 3 days prior to the day of scheduling (i.e. by 0800 hrs of 'S-3' day with 'S' being the day of scheduling) so as to configure these details in the scheduling system. The requisite information shall be provided in the Web based Scheduling Software (WBES).

Other drawee GNA grantees which are regional entities shall also furnish the details of the contracts/PPAs including the injection point at least 3 days prior to the day of scheduling (i.e. by 0800 hrs of 'S-3' day).

- b) Respective SLDCs on behalf of the intra-State entities which are drawee GNA grantees, shall furnish time block-wise requisition for drawl to the concerned RLDC in accordance with the contracts by 0800 hrs of 'S-1' day, 'S' day being the day of scheduling. The requisition shall be punched in the Web based Scheduling Software (WBES).

Other drawee GNA grantees which are regional entities shall also furnish the time block wise requisition for drawl to the concerned RLDC in accordance with the contracts by 0800 hrs of 'S-1' day.

- c) RLDCs shall check if drawl schedules as requisitioned by the drawee GNA grantees can be allowed based on the available transmission capability.

For this, the RLDCs shall check the availability of the corridor for each and every time block of the next day against the available regional import/export transfer capability followed by intra-regional import/export transfer capability and import/export bid area transfer capability. This process shall be carried out for all the bid area (s) / control area / group of control areas.

Provided that in case of any constraint in the transmission system, the available transmission corridor shall be allocated to the drawee GNA grantees in proportion to their granted GNA within the region or from outside the region, depending upon the transmission constraint, whether it is within the region or from outside the region, as the case may be.

4.2. Allocation of Transmission Corridor and Scheduling of Transactions under Advance Application Category

- a) After the day-ahead schedule is finalised for the GNA grantees, schedule for T-GNA grantees under Advance application category of T-GNA shall be finalised over the balance transmission margin.
- b) The T-GNA grantees shall furnish the details of the power purchase agreements (PPAs) including the injection point at least 3 days prior to the day of scheduling (i.e. by 0800 hrs of 'S-3' day with 'S' being the day of scheduling) so as to configure these details in the scheduling system. The requisite information shall be provided in the Web based Scheduling Software (WBES).
- c) The T-GNA grantees shall furnish the time block wise requisition for drawl for the advance T-GNA applications to the concerned RLDC in accordance with the contracts by 0800 hours of S-1 day in Web based Scheduling Software (WBES).

The available margin for transactions under advance bilateral category shall be determined for each bid area /control area /group of control areas as:

Margin for scheduling of advance bilateral category of T-GNA transactions:

- Import T-GNA margin = import ATC – import schedule (GNA) + 'A'% approved export (GNA)
- Export T-GNA margin = export ATC – export schedule (GNA) + 'B'% approved import (GNA)

Where, 'A' and 'B' are the percentage export/import in the opposite direction which shall be determined by NLDC from time to time based on RE variability and other system exigencies.

- d) RLDCs shall check if the drawl schedules as requisitioned by the drawee T-GNA grantees can be allowed based on the available import/export transfer capability.

For this, the RLDCs shall check the availability of corridor for each and every time block of the next day against the available regional import/export transfer capability followed by intra-regional and bid area import/export transfer capability. This process shall be carried out for all the bid area (s) / control area / group of control areas.

Provided that in case the day ahead scheduling request of T-GNA grantees for full quantum of T-GNA cannot be accommodated due to non-availability of sufficient transmission corridor, then the available transmission corridor shall be allocated for scheduling on pro-rata basis to the T-GNA grantees in proportion to their granted T-GNA quantum.

- e) The same information shall be transferred from RLDC scheduling application to NOAR at 1030 hours on S-1 basis.
- f) In case, any T-GNA grantee does not schedule power up to its T-GNA quantum at the time of making the scheduling request, the unutilised quantum of T-GNA shall be released in the following sequence for:
- i. Collective transactions under day ahead market
 - ii. Bilateral transactions under exigency T-GNA applications for applications received till 1300 hrs of S-1
 - iii. Bilateral transactions under exigency T-GNA applications for applications received after 1300 hrs of S-1
 - iv. Schedule revision by GNA grantees
 - v. Collective transactions under real time market

Inter-se, the revisions and exigency applications after 1400 hours shall be scheduled as per chronology of receipt of applications.

The above-mentioned sequence/timelines are as per provisions specified in draft IEGC, 2022 and would subsequently be aligned with the sequence/timelines specified in final IEGC.

4.3. Allocation of Transmission Corridor and Scheduling of Collective Transactions

- a) After allocation of the transmission corridor to the GNA grantees and T-GNA grantees under Advance application category, the balance transmission margin shall be released for collective transactions under day ahead market. The available margin for collective transactions shall be determined for each bid area /control area /group of control areas as:

Margin for day-ahead market collective category of transactions:

- Import T-GNA margin = import ATC – scheduled import (GNA + advance TGNA) + 'M'% scheduled export (GNA+TGNA)
- Export T-GNA margin = export ATC – scheduled export (GNA + advance TGNA) + 'N'% scheduled import (GNA + TGNA)

Where, 'M' and 'N' are the percentage export/import in the opposite direction which shall be determined by NLDC from time to time based on RE variability and other system exigencies.

- b) Power Exchanges shall fetch the required standing clearance data from NOAR portal by 1000 hours. Further, power exchange(s) shall ensure that the scheduling request for each registered participant is within the limit for each time block as specified by the respective SLDC/RLDC, as the case may be in the standing clearance.
- c) Power exchange(s) shall furnish the interchange flow on the various bid area/ control area / group of control areas along with the information of total drawl and injection for each region by 1200 hours.
- d) Based on the information furnished by power exchange(s) and the available margin, NLDC shall check for congestion through NOAR. If there is no congestion, NLDC shall send a NIL congestion report to the power exchanges, so that the applications can be accepted and scheduled subsequently. However, in case of congestion, NLDC shall inform the power exchange(s) by 1230 hours through NOAR regarding the period of congestion and the available scheduling limit on each bid area/ control area/ group of control areas, in the respective power exchange.
- e) In case of congestion in any of the bid area/ control area / group of control areas, the allocation of available corridor margin among the power exchanges shall be in the ratio of the initial trade volume in MW submitted by the respective power exchanges for the particular time block in the

congested corridors. For uncongested corridor, the margin shall be the requisition in MW plus residual quantum (in that particular uncongested corridor left over after the total requisition from all power exchange in that time block) in proportional to the Integrated Day Ahead Market (IDAM) provisional volume for the respective exchanges.

- f) The Power exchange(s) shall ensure that scheduling request for day ahead collective transaction is within the limits for each time block as intimated by NLDC through NOAR.
- g) The Power Exchange(s) shall submit the final trade schedules to NLDC for regional entities and to SLDC for intra-State entities by 1300 hrs of 'S-1' day.

4.4. Allocation of Transmission Corridor and Scheduling of Exigency Bilateral Transactions

- a) After finalisation of the collective transactions under day ahead market, Exigency applications for grant of T-GNA received till 1300 hrs of 'S-1' day or such time as specified in the Grid Code, shall be allocated the transmission corridor. The available margin for transactions under exigency category shall be determined for each bid area /control area /group of control areas as:

Margin for Scheduling of Exigency Bilateral Transactions:

- Import T-GNA margin = import ATC – scheduled import (GNA + TGNA) + 'X'% scheduled export (GNA+TGNA)
- Export T-GNA margin = export ATC – scheduled export (GNA + TGNA) + 'Y'% scheduled import (GNA + TGNA)

Where, 'X' and 'Y' are the percentage export/import in the opposite direction which shall be determined by NLDC from time to time based on RE variability and other system exigencies.

- b) An application for grant of exigency T-GNA for a bilateral transaction through NOAR may be submitted on (S) day for grant of T-GNA with scheduling for (S) day or (S+1) day or (S+2) day, with a minimum start time of 7 (seven) or 8 (eight) time blocks, as the case may be from the time of approval of the T-GNA application.
- c) Separate exigency application for each day for grant of T-GNA may be submitted for any time block(s) between 0000 hours to 2400 hours of the day of scheduling through NOAR.

- d) RLDCs shall process applications received till 1300 hours of the day immediately preceding the day of scheduling through NOAR on first-come-first-served basis by 1400 hours of the day immediately preceding the day of scheduling.
- e) Applications received after 1300 hours of the day immediately preceding the day of scheduling or on the day of scheduling shall be processed within 4 (four) time blocks from the time of receipt of application in NOAR on first-come-first-served basis.
- f) For each and every time block of a particular day, the requests shall initially be checked against the available regional import/export transfer capability followed by intra-regional and bid area import/export transfer capability. This process shall be carried out for all the bid area (s) / control area / group of control areas.
- g) Based on the above, nodal RLDC shall therefore approve / reject / partially approve the transactions as the case may be.
- h) In the event T-GNA as applied for cannot be granted for full quantum and full period as sought in the application, in view of constraints in transmission system, the application shall be rejected. However, in case the applicant has given consent in its application through NOAR that T-GNA for part quantum or part period or both may be granted to it, T-GNA for such part quantum and part period or both shall be granted as per available transfer capability.
- i) T-GNA granted under exigency application category shall be considered as schedule, which cannot be revised, except in case of transmission constraint and in view of grid security. Based on the information on scheduling in NOAR on S+1 day at 0800 hours, the information shall be transferred to RLDC scheduling application by NOAR automatically.
- j) RLDC shall check the availability of corridor for each and every time block of the next day against the available regional import/export transfer capability followed by intra-regional and bid area import/export transfer capability. Accordingly, the scheduling request shall be accorded in the RLDC scheduling application. This process shall be carried out for all the bid area (s) / control area / group of control areas.
- k) The same information shall be transferred from RLDC scheduling application to NOAR at 1030 hours on S+1 basis.
- l) In case of constraint in transmission system, the power can't be scheduled up to the approved T-GNA quantum, then the available transmission corridor shall be allocated for scheduling to the T-GNA grantees in proportion to their granted T-GNA quantum.

m) After the allocation of transmission corridors to the GNA grantees, T-GNA grantees under Advance application category, Collective Transactions and day-ahead Exigency Bilateral Transactions, the balance transmission corridor may be utilised by GNA grantees by way of revision of schedule, as stipulated in the Grid Code, under any contract within its GNA or under Exigency application category or Real time market based on time stamp for such request.

4.5. Allocation of Transmission Corridor and Scheduling of Real Time Collective Transaction

- a) All the entities participating in the real-time market may place their bids and offers on the Power Exchange(s) in 'T' time block for purchase or sale of power in 'T+5/T+6' time block.
- b) Before the bidding session, in T-1 time block (T = Bid time block, T+5/T+6 = Delivery Time Block), Power Exchanges shall fetch the required standing clearance details from the NOAR portal.
- c) After the end of Real Time Market (RTM) bidding session, power exchange(s) shall furnish the interchange flow on the various bid area/ control area / group of control areas along with the information of total drawl and injection for each region in T+1 time block.
- d) NLDC shall verify through NOAR the combined trade volume submitted by the power exchange (s) against the available margin for all bid area/ control area / group of control areas in T+1 time block. The available margin for real time market collective category of transactions shall be determined for each bid area /control area /group of control areas as:

For real time market collective category of transactions:

- Import T-GNA margin = import ATC – scheduled import (GNA + TGNA) + 'G'% scheduled export (GNA+TGNA)
- Export T-GNA margin = export ATC – scheduled export (GNA + TGNA) + 'H'% scheduled import (GNA + TGNA)

Where, 'G' and 'H' are the percentage export/import in the opposite direction which shall be determined by NLDC from time to time based on RE variability and other system exigencies.

- e) If the combined trade of the power exchange(s) is within the available transmission margin limits, then the initial request submitted by power exchange(s) shall be confirmed by NLDC to the power exchange(s) through NOAR in T+1 time block.
- f) In case the combined trade volume submitted by the power exchange(s) exceeds the available transmission margin limit for any of the bid area/ control area / group of control areas, the

allocation of available corridor margin for a particular time block among the power exchanges shall be in the ratio of the initial trade volume submitted by the respective power exchanges for the particular RTM session for all corridors.

- g) Accordingly, the above shall be communicated to the power exchanges through NOAR in T+1 time block. The power exchanges shall thereafter submit the final scheduling request through NOAR, in conformity with the available corridor margin as provided by NLDC in T+1 time block. In case of no congestion, the provisional scheduling request shall be considered as final scheduling request.
- h) For a particular RTM session, if the cleared volume by a particular power exchange (s) is (are) more than the margin provided by NLDC through NOAR, then NLDC shall consider the trade quantum of all bid area/ control area / group of bid or control areas for the particular power exchange(s) to be zero and send an exception report to the corresponding power exchange(s) through NOAR in T+2 time block.
- i) Under extreme circumstances, including but not limited to failure of communication and/or any such other reason e.g. data transfer failure, if the final cleared trades are not received by NLDC for scheduling through RLDCs or if the information regarding transmission margin is not received by power exchange(s) then, the schedules for such RTM session(s) shall be made zero (0) and power exchange(s) shall settle accordingly.
- j) Information regarding zero (0) schedules in a particular RTM session shall be communicated by NLDC to the power exchange(s) in T+2 time block.

4.6. Scheduling of Cross Border transactions

- a) Scheduling of cross border T-GNA transactions shall be done in accordance with the Procedure for approval and facilitating Import/Export (Cross Border) of Electricity) by the Designated Authority (DA), Cross Border Trade of Electricity) Regulations, 2019 and amendments thereof and Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State transmission System) Regulations, 2022 and amendments thereof.
- b) All import/ and export of electricity through cross border electricity transactions shall take place only after approval of the Designated Authority (DA).
- c) Approval of the Designated Authority will not be necessary where the import/ export is taking place under the Inter Government-to-Government Agreement signed by India and neighbouring country for specific project(s). However, such Indian Entity, as applicable, would need to apply

for transmission access as per applicable CERC Regulations either directly or through licensed traders in India, as the case may be.

- d) Indian entity(ies) trading the power of domestic origin, in Day Ahead Market (DAM) in power exchanges shall not require any approval from Designated Authority. However, if an Indian entity intends to trade in other than DAM of Power Exchange, where establishment of one-to-one transaction is possible, then the Indian entity shall require approval from Designated Authority.
- e) Trading licensee on behalf of cross border buyer(s) in terms of the Cross Border Regulations for injection into or drawal from the Indian grid may apply for T-GNA. In case there is direct Power Purchase Agreement (PPA) between an Indian seller and cross border entity, the SNA shall apply on behalf of the cross-border entity.
- f) The approval under T-GNA bilateral transaction and scheduling thereof, shall be at par with the grant of T-GNA and scheduling procedure of an Indian entity.

5. Revision of Schedules under GNA and T-GNA

5.1. Real time congestion management and curtailment thereof:

- a) When to maintain the grid security in the opinion of NLDC/RLDC/SLDC because of interstate/intrastate transmission constraint other than outage of dedicated transmission lines owned and operated by the generating station itself, it becomes necessary to curtail the power flow on a transmission corridor, the transactions already scheduled shall be curtailed in the manner which in the opinion of NLDC/RLDC/SLDC as the case may be, would relieve transmission constraints and/ or enhance grid security.
- b) NLDC/RLDC/SLDC shall initiate the process of curtailment of transactions for all such bid area/ control area/ block of control areas and the same shall become effective from 7th or 8th time block for any revision in schedule made in odd or even time blocks respectively, counting the time block in which the schedule revision made by the RLDC as first-time block.
- c) When because of transmission constraint in the neighbouring countries it becomes necessary to curtail power flow on a bid area/ control area/ block of control areas/ transmission corridor, concerned NLDC of the country shall intimate the transactions to be curtailed to NLDC, India. Subsequently, curtailment shall become effective from 7th or 8th time block for any revision in schedule made in odd or even time blocks respectively, counting the time block in which the schedule revision made by the RLDC as first-time block.
- d) The transactions already scheduled may be curtailed by the Regional Load Despatch Centre as per the following sequence:
 - i. Schedule under T-GNA shall be curtailed first followed by schedule under GNA.
 - ii. Within schedule under T-GNA, bilateral transactions shall be curtailed first followed by collective transactions under integrated day ahead market followed by collective transactions under real time market.
 - iii. Within integrated day ahead market, day ahead market transaction shall be curtailed followed by the green day ahead market
 - iv. Within bilateral transactions under T-GNA, curtailment shall be done first from generation sources other than wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage), pro rata based on their T-GNA quantum.
 - v. The generation from wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage) shall be curtailed

- pro rata based on T-GNA, after curtailment of generation from other sources, within T-GNA.
- vi. Within bilateral transactions under T-GNA, curtailment shall be on pro rata basis based on advance and exigency T-GNA scheduled.
 - vii. Within transactions under GNA, curtailment shall be done first from generation sources other than wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage), on pro rata basis based on their GNA quantum.
 - viii. The generation from wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage) shall be curtailed pro rata based on their GNA quantum, after curtailment of generation from other sources, within GNA.
 - ix. The priority of restoration of transactions shall be in the reverse order of that of curtailment as specified in points (i.) to (viii.)

5.2. Revision of Schedules under GNA

- a) GNA grantees (SLDCs, regional entity generating stations, regional entity ESSs, beneficiaries, buyers or cross-border entities) may revise their schedules under GNA in accordance to their respective contracts.
- b) The request for revision of scheduled transaction for 'S day, shall be allowed to be made in any time block starting 1400 hrs on 'S-1' day as per the relevant provisions of the grid code.
- c) Any revision in schedule made in odd time blocks shall become effective from 7th time block and any revision in schedule made in even time blocks shall become effective from 8th time block, counting the time block in which the request for revision has been received by the RLDCs to be the first one.
- d) While finalizing the drawl and despatch schedules, if any congestion is foreseen in any of the bid area/ control area / group of bid or control areas or in case of technical constraints of a generating station, the concerned RLDC shall moderate the schedules as required, under intimation to the concerned regional entities.

5.3. Revision of Schedules under T-GNA

Scheduled transactions under T-GNA once scheduled can't be revised other than in case of congestion management as mentioned in 6.1 of this procedure and following cases:

a) Revision due to forced outage of a generator

Scheduled transactions shall be revised in case of forced outage of a unit of a generating station having capacity of the said unit size as 100 MW and above. Extant regulations and NLDC T-GNA procedure shall be referred for carrying out such revisions.

b) Revision in case of Grid disturbance of category GD-5

- i. GD-5 is defined in CEA Grid Standards Regulations, 2010 as a disturbance when *“forty percent or more of the antecedent generation or load in a regional grid is lost”*.
- ii. In case of any disturbance of GD-5 category, scheduled generation of all the affected regional entity generating stations supplying power under bilateral transactions shall be deemed to have been revised to be equal to their actual generation for all the time blocks affected by the grid disturbance.
- iii. In case the beneficiaries or buyers of such regional entity generating station are also affected by such grid disturbance, the scheduled draws of such beneficiaries or buyers shall be deemed to have been revised to corresponding actual generation schedule of regional entity generating stations. Further, in case the beneficiaries or buyers of such regional entity generating station are not affected by such grid disturbance and they continue to draw power, the scheduled draws of such beneficiaries or buyers shall not be revised.
- iv. The scheduled generation of all the affected regional entity generating stations supplying power under collective transactions shall be deemed to have been revised to be equal to their actual generation.
- v. The declaration of grid disturbance shall be done by the concerned RLDC at the earliest. A notice to this effect shall be posted at its website by the RLDC of the region in which the grid disturbance has occurred which shall be considered as declaration of the grid disturbance by RLDC. All regional entities shall take note of the grid disturbance and take appropriate action at their end.
- vi. The generation and drawl schedules revised by the RLDC shall become effective from 7th block or 8th time block depending on the block in which the schedule has been revised as first block.

Procedure for Assessment of Transfer Capability National Load Despatch Centre

1. Background

- 1.1 This procedure is issued to supplement NLDC's "Procedure for Allocation of Transmission Corridor under General Network Access (GNA) and Temporary General Network Access (T-GNA) to the Inter-State Transmission System."
- 1.2 This procedure will be implemented with effect from the date of approval by the Commission.

2. Transfer Capability

- 2.1. "Total Transfer Capability (TTC)" means the amount of electric power that can be transferred reliably over the inter-control area transmission system under a given set of operating conditions considering the effect of occurrence of the worst credible contingency.
- 2.2. "Transmission Reliability Margin (TRM)" means the amount of margin earmarked in the total transfer capability to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions.
- 2.3. "Available Transfer Capability (ATC)" means power transfer capability of the inter-control area transmission system or across electrical regions or between ISTS and state network or between cross-border interconnections available for scheduling transactions in a specific direction, considering the network security declared by the concerned load despatch centre. Mathematically, ATC is the Total Transfer Capability less Transmission Reliability Margin.
- 2.4. TTC is dependent upon the network topology, point and quantum of injection /drawl and power flows in other paths of the interconnected network as well as prevailing voltage profile in the network during the assessment period.
- 2.5. TTC is directional in nature and the transfer capability for import of power in a region or control area from another region or control area may be different from the transfer capability for export of power from that region or control area to the other region or control area.
- 2.6. Total Transfer Capability is time variant and there could be different figures for different times of the day/month/season/year.
- 2.7. Transfer Capability is mentioned in MW.

3. Methodology for assessment of TTC, TRM and ATC

3.1. The import and export Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) shall be computed for all the bid areas/control areas/group of control or bid areas where a control or bid area can be a separate region, state, union territory (UT), part of region/state/UT or any combination of the same.

3.2. The TTC, ATC and TRM shall be assessed with the help of simulation studies such that all anticipated operating conditions in a particular month are covered. For this, the TTC computation studies shall be carried out for at least following four time periods (i.e. considering load-generation balance of four cardinal points on the monthly load curve) of a typical day of the month.

- Solar Peak Period
- Non-Solar Peak Period
- Non-Solar Off-peak Period
- Morning Peak Demand Period

If required, further granular resolution i.e. hourly, sub-hourly (15 min.) may also be considered for TTC assessment and declaration.

3.3. The TTC assessment simulation studies may require setting up of a power system model and obtaining a power flow solution. The construction of an accurate base case simulation model is of utmost importance for accurate assessment of TTC. The modelling and input data guidelines to be followed for TTC assessment are as under:

3.4. Modelling of Power System Elements

3.4.1. EHV transmission network shall be normally modeled down to at least 220 kV level with exceptions for generating units connected at lower voltage level and for North Eastern Region, where the network shall be modeled down to at least 132 kV level.

3.4.2. Normally, all the conventional generating units greater than 50 MW and connected at 110 kV and above shall be modeled. Smaller generating units (particularly hydro) may be lumped for study purposes.

3.4.3. For Renewable Energy (solar, wind, solar-wind hybrid) Battery Energy Storage plants, equivalent modelling at a voltage level not less than 33 kV shall be considered.

- 3.4.4. Load shall be generally lumped at 220 kV or 132 kV, as the case may be. Actual system data wherever available shall be used for power system modeling. In cases, where data is not available, standard data as given in the CEA Manual on Transmission Planning Criteria shall be considered.
- 3.4.5. The requirements at clauses 3.4.1 to 3.4.4 are for use of data by RLDCs and NLDC. The SLDCs may consider lower voltage level and smaller units, if required.
- 3.4.6. Separate base cases for computing the export and import capability corresponding to at least four load - generation scenarios (as specified in point 3.2 above) for the time frame for which transfer capability is to be assessed shall be used in the simulation studies.

3.5. **Input Data for Base Case Preparation**

- 3.5.1 **Network Topology:** Shall be as per network data obtained from CTU and STUs. If the updated network details are not received from respective agencies, network details as available with NLDC/RLDCs/SLDCs shall be used for TTC computation studies.

New transmission elements shall be considered only after the date of commissioning of that asset and duly considering their reliability during initial period.

3.5.2 **Unit Commitment and Generation Dispatch:**

The unit commitment (on-bar units) and source-wise dispatch in the base case shall be considered as per the output of the **Short-Term Resource Adequacy/Production Cost Modelling Studies** carried out by states/RLDCs/NLDC.

In the absence of such data, following may be considered for source-wise dispatch:

- a) **Solar and Wind Dispatch:** The solar and wind generation dispatch shall be considered based on the historical dispatch factors available with SLDCs/RLDCs/NLDC corresponding to each study scenario. For newer plants,

either the profile data available as specified in CEA's Manual on Transmission Planning Criteria or historical dispatch of nearby existing plants may be considered.

- b) **Nuclear Dispatch:** Shall be considered as per the past trend of Plant Load Factor available with Central Electricity Authority (CEA) or SLDCs/RLDCs/NLDC while suitably factoring in the maintenance schedule finalized by Regional Power Committees (RPCs).
- c) **Hydro Dispatch:** Shall be considered as per the past trend available at SLDCs/RLDCs/NLDC. The current inflow pattern shall also be suitably considered in the studies.
- d) **Gas Dispatch:** Shall be considered as per the past trend of Plant Load Factor available with Central Electricity Authority (CEA) or SLDCs/RLDCs/NLDC while suitably factoring in the maintenance schedule finalized by Regional Power Committees (RPCs).
- e) **Coal Fired Thermal Dispatch:** The regional/control area/bid area wise thermal dispatch may be arrived at by deducting the anticipated generation from other sources the total anticipated generation requirement. While deciding the distribution of thermal generation, the merit order dispatch of thermal generators shall be considered.

Further, the generation shall be considered as per the anticipated ex- bus generation of the thermal generating units arrived after deducting a normative auxiliary consumption as per the norms specified by Central Commission and suitably factoring in the maintenance schedule finalized by Regional Power Committees (RPCs).

- f) **Nodal MW Demand:** Shall be considered as per the node-wise load forecast provided by SLDCs. Independent load forecasts by RLDCs/NLDC shall be considered in case of absence of SLDC data.
- g) **Nodal MVAR demand:** As per the anticipated power factor provided by SLDCs. In the absence of data from SLDCs, the load power factor shall be taken as specified in the latest CEA's Manual on Transmission Planning Criteria. This, however, shall be verified, post facto, with actual data, and if different, shall be revised for accurate assessment in the future.

- h) **Reactive power capability of generating units:** Shall be considered as per the actual/demonstrated generator capability curve or as per the assumptions recommended in the latest CEA's Manual on Transmission Planning Criteria.
- i) In case, the data from any of the sources mentioned above is unavailable or in case of additional data requirement, reasonable assumptions shall be made.

3.5.3 The Total Transfer Capability between two areas shall be assessed by increasing the load in the importing area and increasing the generation in the exporting area or vice versa till the constraints are hit for a credible N-1 contingency.

The credible N-1 contingencies shall be as specified in the latest CEA Manual on Transmission Planning Criteria.

In the studies, the worst credible contingency shall be considered to ensure the following limits:

- Equipment Loading (Thermal Limit)
- Voltage Stability
- Transient Stability

3.5.4 During assessment of Total Transfer Capability, it shall be ensured that the permissible Normal and Emergency limits for transmission elements as well as the Reliability Criteria specified for N-1 and N-1-1 contingencies in the latest CEA Manual on Transmission Planning Criteria are satisfied.

3.5.5 The Transmission Reliability Margin (TRM) shall be kept in the total transfer capability to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in the system conditions. Computation of TRM for a region or control area or group of control areas may be based on the consideration of the following:

- a) Two percent (2%) of the total anticipated peak demand met in MW of the control/bid area/group of control or bid areas (to account for forecasting uncertainties)
- b) Size of largest generating unit in the control or bid area/group of control or bid areas

4. Procedure for declaration of TTC, TRM, ATC and Anticipated Constraints

- 4.1 The State Load Despatch Centres (SLDCs), in consultation with Regional Load Despatch Centres (RLDCs) shall assess the Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) of the individual control/bid areas within the region. Regional Load Despatch Centres shall assess TTC, TRM and ATC for the group of control/bid areas within the region (if required). The computed TTC, TRM and ATC figures for the month shall be published on the website of concerned SLDCs and RLDCs, along with the details of the basis of calculations, including assumptions, if any, at least eleven (11) months in advance. The specific constraints indicated by the study shall also be published on the website.
- 4.2 The National Load Despatch Centre (NLDC) shall assess the Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) of the inter-regional links/corridors in consultation with Regional Load Despatch Centres. The TTC, ATC, and TRM figures for the month along with the details of basis of calculations, including assumptions, if any, shall be published on the website of NLDC and concerned RLDCs at least eleven (11) months in advance. The specific constraints indicated by the study shall also be published on the website.
- 4.3 The National Load Despatch Centre (NLDC), Regional Load Despatch Centres (RLDCs) and State Load Despatch Centre (SLDCs) shall refer to the quantum declared by CTUIL while assessing the TTC, TRM and ATC for the purpose of scheduling of GNA and grant/scheduling of T-GNA transactions.

Sample format for declaration of TTC/TRM/ATC is enclosed as **Format-I**.

- 4.4 The consolidated bid area/control area/combination of control areas/inter-region wise TTC, TRM and ATC shall also be published on NLDC/POSOCO website.
- 4.5 NLDC and/or concerned RLDCs/SLDCs in consultation with each other may revise the TTC, ATC and TRM of respective control areas due to change in system conditions, which includes change in network topology or change in anticipated active or reactive generation or load, on account of outage or otherwise, of one or more generators or transmission lines, at any of the nodes in the study. Revised TTC, TRM and, ATC shall be published on website of NLDC and concerned RLDCs and SLDCs and shall clearly state the reasons of revision thereof.

The TTC, ATC and TRM may also be revised near to the operating horizon depending on the anticipated system conditions at that time.

4.6 SLDCs / RLDCs / and NLDC shall designate Main and Alternate officers as *“Reliability co-coordinator(s) for TTC Computation and Declaration”*.

5. Revision in Procedure

As and when required, the procedure shall be reviewed and revised by NLDC with prior approval of the Commission.

Format-I

National / _____ Regional/ _____ State Load Dispatch Centre
TOTAL TRANSFER CAPABILITY FOR MMM, YYYY

Issue Date:

Issue Time:

Revision No.

| Corridor/ Control Area | Date | Time Period | Time Blocks | Total Transfer Capability (TTC) (MW) | Reliability Margin (RM) (MW) | Available Transfer Capability (ATC) (MW) | Approved GNA (MW) | Margin for T- GNA (MW) | Changes in TTC w.r.t last revision | Remarks |
|---------------------------------------|-------------|-------------------------------|------------------------|---|---|---|----------------------------------|---|---|----------------|
| | | Solar Peak | | | | | | | | |
| | | Non- Solar Peak | | | | | | | | |
| | | Non- solar Off- Peak | | | | | | | | |
| | | Morning Peak | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Assumptions:

A. Load and Generation (MW)

| Region / Control Area | Scenarios | | | |
|-----------------------|------------|----------------|--------------------|--------------|
| | Solar Peak | Non-Solar Peak | Non-solar Off-Peak | Morning Peak |
| | | | | |
| | | | | |

B. HVDC Settings

| Name of the HVDC Link | Direction of Operation | Power Order (MW) |
|-----------------------|------------------------|------------------|
| | | |
| | | |
| | | |

C. Constraints

| Corridor / Control Area | Limiting Constraints for TTC |
|-------------------------|------------------------------|
| | |
| | |
| | |

D. Revision History

| Revision Number | Date of Revision | Reason for Revision | Corridors Involved |
|-----------------|------------------|---------------------|--------------------|
| | | | |
| | | | |
| | | | |

E. Miscellaneous

Note: The format is not explicit and may be changed suitably based on the requirement to accommodate all the necessary data with approval of the commission.