

## **7.0 Load Flows Studies on the Basic Network**

- 7.1 The Implementing Agency shall run AC load flow on the all India basic Network, based on the network data obtained from all the DICs, inter-State transmission licensees, intra-state transmission licensees tariff of whose assets have been approved by the Commission as being used for inter-State transmission including the NLDC, RLDCs and SLDCs.
- 7.2 The real power at the generator nodes and the withdrawal nodes in the Basic Network shall be as per actual demand and generation data obtained for peak block during billing period. In case of DIC fails to submit required node wise data, Para 6.3.3 of “Procedure for collection of data and information” shall be followed.
- 7.3 As per Regulation (9) (4) of the Sharing Regulations 2020 and amendments thereof, IA may make minor adjustment in nodal injection and withdrawal data so as to maintain load generation balance in the representative base case in consultation with NLDC/ RLDCs based on the historic injection and demand data available with them.

## **8.0 Methodology of sharing of Inter-State Transmission charges**

Total ISTS Monthly Transmission Charges (MTC) shall have the following components:

- a. National Component (NC)
- b. Regional Component (RC)
- c. Transformers Component (TC) and
- d. AC System Component (ACC)

## **8.1 Computation and sharing of National Component (NC) of transmission charges**

8.1.1 National Component shall comprise of the following components:

- a) National Component-Renewable Energy:

National Component- RE shall comprise of the Yearly Transmission Charges for transmission systems developed for renewable energy projects as identified by the Central Transmission Utility.

- b) National Component-HVDC:

This component shall comprise of the following:

- i. 100% of Yearly Transmission Charges for “back-to-back HVDC” transmission system

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- ii. 100% of Yearly Transmission Charges for Biswanath-Chariali/ Alipurduar to Agra HVDC transmission system
- iii. Yearly Transmission Charges of Mundra–Mohindergarh 2500 MW HVDC transmission system corresponding to 1005 MW capacity
- iv. 30% of Yearly Transmission Charges for all other HVDC transmission systems except those covered under above sections.

8.1.2 Transmission Charges under National Component shall be shared by all drawee DICs in proportion to their quantum of GNA and GNARE.

8.1.3 Proportionate transmission charges of HVDC Mundra-Mohindergarh towards 1495 MW is to be borne by M/s Adani Power (Mundra) Limited or its successor company.

## **8.2 Computation and sharing of Regional Component RC) of Transmission Charges**

8.2.1 Regional Component shall comprise of the following components:

- a) Regional Component of HVDC (RC-HVDC) comprising of 70% of Yearly Transmission Charges of HVDC transmission systems planned to supply power to the concerned region, except HVDC transmission systems covered under National HVDC Component.
- b) Yearly Transmission Charges for static compensators (STATCOMs), static VAR compensators (SVCs), bus reactors, spare transformers, spare reactors and any other transmission element(s) located in the concerned region and identified by the Central Transmission Utility as being critical for providing stability, reliability and resilience in the grid.

8.2.2 Transmission Charges under Regional Component of HVDC shall be shared by drawee DICs of the receiving region in the receiving region, in proportion to their quantum of GNA and GNARE.

8.2.3 Transmission Charges of STATCOMs, SVCs and bus reactor etc. shall be shared by drawee DICs of the region in proportion to their quantum of GNA and GNARE.

## **8.3 Computation and sharing of Transformer Component (TC) of Transmission Charges**

8.3.1 Transformer Component for a State shall comprise of Yearly Transmission Charges for inter-connecting transformers (ICTs) along with their associated bays and downstream bays planned for drawl of power by the concerned State.

8.3.2 For transformers used for drawl requirement of more than one State, Yearly Transmission Charges shall be apportioned to such States in the ratio of number of feeders from such transformers emanating for each State.

8.3.3 Transformer Component for a State shall be borne and shared by the drawee DICs located in the concerned State in proportion to their quantum of GNA and GNARE.

#### 8.4 Computation and sharing of AC System Component (ACC) of Transmission Charges

8.4.1 AC System Component shall comprise of the remaining Yearly Transmission Charges which are not covered under National Component, Regional Component and Transformer Component.

8.4.2 AC System Component shall comprise of AC Usage-Based component and AC Balance component.

8.4.3 Computation of share of Transmission charges under AC usage-based component

- The transmission charge per circuit kilometer for a transmission line for each conductor configuration at each voltage level shall be made uniform.
- Total circuit kilometer for transmission lines for each conductor configuration at each voltage level shall be allocated uniform charges based on the indicative cost per circuit kilometer for a transmission line for each conductor configuration at each voltage level as furnished by CTU.
- The following illustration shall be followed to calculate uniform transmission charges type wise per circuit km.

Type	Cost (Rs Lakh)	Cost (Rs Lakh) /Circuit	Actual ckt-km Type Wise	Equivalent ckt km	Indicative Cost Type Wise per ckt-km
				w.r.t 400 kV D/C Quad Moose	(Rs Lakh/ckt-km)
765 kV - D/C – HEXA	$a_1$	$b_1=a_1/2$	$T_1$	$K_1=T_1 \times (b_1/b_3)$	$I_1=^T C_M \times (K_1/K)/T_1$
765 kV - S/C – HEXA	$a_2$	$b_2=a_2$	$T_2$	$K_2=T_2 \times (b_2/b_3)$	$I_2=^T C_M \times (K_2/K)/T_2$
400 kV - D/C - Quad Moose	$a_3$	$b_3=a_3/2$	$T_3$	$K_3=T_3 \times (b_3/b_3)$	$I_3=^T C_M \times (K_3/K)/T_3$
400 kV - D/C - Twin Moose	$a_4$	$b_4=a_4/2$	$T_4$	$K_4=T_4 \times (b_4/b_3)$	$I_4=^T C_M \times (K_4/K)/T_4$
400 kV - S/C - Twin Moose	$a_5$	$b_5=a_5$	$T_5$	$K_5=T_5 \times (b_5/b_3)$	$I_5=^T C_M \times (K_5/K)/T_5$
220 kV - D/C -	$a_6$	$b_6=a_6/2$	$T_6$	$K_6=T_6 \times (b_6/b_3)$	$I_6=^T C_M \times (K_6/K)/T_6$
220 kV - S/C -	$a_7$	$b_7=a_7$	$T_7$	$K_7=T_7 \times (b_7/b_3)$	$I_7=^T C_M \times (K_7/K)/T_7$
132 kV - D/C -	$a_8$	$b_8=a_8/2$	$T_8$	$K_8=T_8 \times (b_8/b_3)$	$I_8=^T C_M \times (K_8/K)/T_8$
132 kV - S/C -	$a_9$	$b_9=a_9$	$T_9$	$K_9=T_9 \times (b_9/b_3)$	$I_9=^T C_M \times (K_9/K)/T_9$
400 kV - D/C - Triple Snowbird	$a_{10}$	$b_{10}=a_{10}/2$	$T_{10}$	$K_{10}=T_{10} \times (b_{10}/b_3)$	$I_{10}=^T C_M \times (K_{10}/K)/T_{10}$

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400 kV - D/C - Twin HTLS	$a_{11}$	$b_{11}=a_{11}/2$	$T_{11}$	$K_{11}=T_{11} \times (b_{11}/b_3)$	$I_{11}=T_{CM} \times (K_{11}/K)/T_{11}$
		Sum	T	K	

$T_{CM}$  = Monthly Transmission Charge w.r.t. AC System Component

- d) The type wise indicative cost thus computed shall be multiplied with circuit kilometers of each transmission line in order to arrive at average MTC of the transmission line. The total MTC of all transmission lines under this sharing mechanism shall be adjusted to total AC system component by scaling up/ down in case of discrepancy.
- e) Wherever lines belonging to an ISTS Licensee are Looped In Looped Out by an Intra-State Transmission Licensee, the entire length shall be considered for Load flow studies and average cost shall be applied on the whole line.

Similarly, wherever line belonging to an Intra-State Transmission Licensee that is not certified by RPC is Looped In Looped Out by an ISTS Licensee, the charges of such lines shall not be considered in computation. The same may be recovered through scaling up the final charges.

- f) After load flow studies on the basic network, percentage usage of each line shall be computed by dividing the power flow on each line by Surge Impedance Loading (SIL) of the line. In case, power flow on any line is more than Surge Impedance Loading, percentage usage shall be capped at 100%.
- g) Percentage usage of each transmission line shall be multiplied by line wise charges of such transmission line to obtain usage-based transmission line charges.
- h) For the transmission lines covered under National RE-Component, circuit km of such transmission lines shall be considered as “zero”.
- i) Where entire Yearly Transmission Charges are to be billed to a Connectivity grantee under sections 5.5, 5.8 and 5.11 of this procedure, Circuit Km of such transmission lines shall be considered as “zero”.
- j) Where Yearly Transmission Charges are to be partly included for computation of AC usage-based transmission charges and partly to be billed to Connectivity grantee or any other entity covered under section 5 of this procedure, the circuit kilometers of such transmission lines shall be reduced pro rata corresponding to the Yearly Transmission Charges to be included for computation of AC usage-based transmission charges.

Example:

Suppose a transmission line has 500 circuit km and 50% of its Yearly Transmission Charges are to be billed to a connectivity grantee ‘A’ and 50% is to be included for computation of transmission charges in accordance with Regulations 5 to 8 of Sharing regulations 2020 and amendments thereof. For

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calculation of AC-UBC, circuit km for this transmission line shall be taken as 250 circuit km.

- k) The usage-based line cost shall then be attributed to various nodes as per their utilization factors of the line in proportion to the nodal load to arrive at the nodal transmission charges.
- l) The load flow results and usage-based cost of each line of the basic network corresponding to peak block during billing period shall form the basis of calculation of transmission charges and the input to the computation software. The output of the software shall be the computed nodal transmission charges.

Transmission charges (in Rs.) for billing towards GNA and GNARE shall be calculated only on Withdrawal nodes (as Withdrawal charges).

- m) IA shall aggregate transmission charges at drawl nodes (excluding drawl nodes of a DIC having GNA other than distribution licensee of the state located within the state control area) to determine the transmission charges of the state under AC usage-based component. Same shall be applicable for the drawee DIC which is a regional entity.
- n) The demand zones shall normally be the State control areas.

### **8.5 Computation and sharing of AC Balanced Component of Transmission Charges:**

- 8.5.1 The Yearly Transmission Charges under AC-Balanced Component shall be the balance Yearly Transmission Charges for AC System Component after apportioning the charges for AC-Usage-Based Component.
- 8.5.2 Transmission charges under AC-Balanced Component shall be shared by all drawee DICs in proportion to their quantum of GNA and GNARE.

### **9.0 Computation of Transmission Charges for T-GNA and T-GNARE**

- 9.1 State-wise T-GNA rate shall be calculated as follows:

T-GNA Rate for the State (in Rs./MW/time-block)

$$= \frac{1.10 \times \text{Transmission charges for all drawee DICs located in the State, for the billing month (in rupees)}}{\text{number of days in a month} \times 96 \times \{\text{GNA and GNARE quantum (in MW) for all such drawee DICs located in the State considered for billing, for the corresponding billing period}\}}$$

- 9.2 Transmission Charges for T-GNA or T-GNARE transactions shall be payable by entities located in the State, as per the last published T-GNA Rate for the State. In case of drawee entities that are users of RLDC which have no GNA or GNARE, T-

GNA Rate of the state in which they are located shall be applicable.

## 10.0 Determination of Transmission Charges for DICs

10.1 Transmission charges for DICs shall be the sum of charges computed under National Component, Regional Component, Transformer Component and AC System Component.

Example: Transmission Charges (in Rs.) = NC + RC + TC + ACC where,

NC (National Component) = National Component-RE + National Component-HVDC

RC (Regional Component) = Regional Component-HVDC + Charges of STATCOM etc.

TC = Transformer Component

ACC (AC System Component) = AC usage-based component + AC Balance component

10.2 In case of under/over recovery of monthly transmission charges, transmission charges shall be scaled on pro-rata basis.

## 11.0 Calculation of waiver of transmission charges:

11.1 Calculation of waiver of transmission charges in respect of drawee DICs which have obtained GNA and GNARE.

(i) Waiver of a drawee DIC other than a drawee DIC which has obtained “GNARE” shall be calculated based on the following formulae:

$$\text{Waiver(\%)} = 100 \times \frac{\sum_{n=1}^T \frac{SDRG}{SDTG}}{T}$$

Where,

“SDRG” is the drawl schedule (in MW) through ISTS under GNA from the sources eligible for waiver under Regulation 13 of Sharing Regulations 2020 and amendments thereof in nth block;

“SDTG” is the total drawl schedule (in MW) under GNA through ISTS from all sources in nth block;

“n” is the nth time block

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“T” is number of time blocks in a month = 96 X number of days in a month

Provided that in case the “SDTG” for a time block is less than 75% of the maximum schedule corresponding to GNA, the “SDTG” shall be taken as 75% of maximum schedule corresponding to GNA for a time block.

- Maximum schedule corresponding to GNA shall be considered same as the GNA quantum.

(ii) Waiver of a drawee DIC which has obtained “GNARE” shall be calculated based on the following formulae:

$$\text{Waiver(\%)} = 100 \times \frac{\text{Sum of SDRG for all time blocks in the month}}{(\text{Total number of time blocks in the month} \times 0.3 \times \text{GNARE})}$$

Where,

“GNARE” is the GNA to procure power only from the sources eligible for waiver under Regulation 13 of Sharing Regulations 2020 and amendments thereof;

“SDRG” is the drawl schedule (in MW) in a time block through ISTS under GNARE from the sources eligible for waiver under Regulation 13 of Sharing Regulations 2020 and amendments thereof;

Provided that maximum waiver shall be limited to 100%:

Provided further that if such an entity draws power from any source other than the sources eligible for waiver under Regulation 13 (2) of Sharing Regulations 2020 and amendments thereof, except after obtaining additional GNA or T-GNA or converting GNARE into GNA by making an application to CTU, it shall be charged @TDR of the State in which such an entity is located.

- 11.2 Amount of waiver for each drawee DIC shall be determined by multiplying Waiver % as calculated under para 11.1 (i) and (ii) with the transmission charges computed in accordance with Regulations 5 to 8 of Sharing Regulations 2020 and amendments thereof.
- 11.3 Transmission charges for each drawee DIC computed in accordance with Regulations 5 to 8 of Sharing Regulations 2020 and amendments thereof shall be reduced by amount of waiver calculated under para 11.2 of this procedure.
- 11.4 Total amount of waiver shall be calculated as sum of amount of waiver for all drawee DICs calculated under para 11.2 of this procedure.

- 11.5 The first bill shall be sum of transmission charges as calculated under para 11.3 of this procedure and amount arrived at by apportioning the total amount of waiver as arrived under para 11.4 in proportion to transmission charges of each drawee DIC calculated as per para 11.3, and shall be used for billing under **sub clause (b) of Clause (2) of Regulation 15.**
- 11.6 Calculation of waiver of transmission charges in respect of drawee DICs which have obtained T-GNA or T-GNARE:
- The transmission charges for ISTS for T-GNA and T-GNARE shall be computed in accordance with Regulation 11 of Sharing Regulations 2020 and amendments thereof.
  - Waiver of a drawee DIC other than a DIC which has obtained “T-GNARE” shall be calculated based on the following formulae:

$$\text{Waiver(\%)} = 100 \times \frac{\sum_{n=1}^T \frac{SDRTG}{SDTTG}}{T}$$

Where,

“SDRTG” is the drawl schedule (in MW) through ISTS under T-GNA from the sources eligible for waiver under Regulation 13 of Sharing Regulations 2020 and amendments thereof in nth block;

“SDTTG” is the total drawl schedule (in MW) under T-GNA through ISTS from all sources in nth block; and

“n” is the nth time block

“T” is number of time blocks in a month = 96 X number of days in a month

Provided that in case the “SDTTG” for a time block is less than 75% of the maximum schedule corresponding to T-GNA, the “SDTTG” shall be taken as 75% of maximum schedule corresponding to T-GNA for a time block.

- Maximum schedule corresponding to T-GNA shall be considered same as the T-GNA quantum.



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- (iii) Waiver of a drawee DIC which has obtained “T-GNARE” shall be calculated based on the following formulae

$$\text{Waiver(\%)} = 100 \times \frac{\text{Sum of SDRTG for all time blocks in the month}}{(\text{Total number of time blocks in the month} \times 0.3 \times \text{T - GNARE})}$$

Where,

“T-GNARE” is the T-GNA to procure power only from the sources eligible for waiver under Regulation 13 of Sharing Regulations 2020 and amendments thereof;

“SDRTG” is the drawl schedule (in MW) through ISTS under T-GNARE from the sources eligible for waiver under Regulation 13 of Sharing Regulations 2020 and amendments thereof in a time block;

Provided that maximum waiver shall be limited to 100%:

Provided further that if such an entity draws power from any source other than the sources eligible for waiver under Regulation 13 (2) of Sharing Regulations 2020 and amendments thereof, except after obtaining additional GNA or T-GNA or converting T-GNARE into T-GNA by making an application to CTU, it shall be charged @TDR of the State in which such an entity is located.

- 11.7 Amount of waiver for each drawee DIC shall be determined by multiplying Waiver % calculated under para 11.6 (ii) and (iii) with the transmission charges computed under para 11.6(i).
- 11.8 Amount of waiver for each drawee DIC as calculated under para 11.7 shall be reimbursed by CTU from the already paid T-GNA or T- GNARE charges on finalization of schedules, by 15th day of the next month.
- 11.9 As per Regulation 14(1) to Sharing Regulations 2020 and amendments thereof, The Implementing Agency shall publish transmission charges payable by drawee DICs for the billing month in Rupee terms.
- 11.10 Implementing Agency shall provide the following information to RPC on completion of computation of transmission charges:
- Corresponding GNA and GNARE (MW) data for each month based on the details received from CTU.
  - Component-wise breakup of Transmission charges (in Rs) payable by each drawee DIC for the billing month.
  - Direct drawl as specified in Annexure-II of GNA Regulations 2022 and amendments thereof; for preparation of Regional Transmission Deviation Account.

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- 11.11 Based on the information furnished by the Implementing Agency, Secretariat of the respective Regional Power Committee shall issue Regional Transmission Accounts and shall publish the same on its website.
- 11.12 The Regional Transmission Deviation Account shall be prepared by RPC from the processed metered data of all SEMs furnished by RLDC to RPC on weekly basis for DSM account, Schedule drawl under GNARE/T-GNARE furnished by RLDC and direct drawl furnished by IA as per para 11.10(c).

## 12.0 Time lines for various activities under this procedure

Sl.No.	Name of the Activity	Time line
1	Data and information of ISTS assets to be furnished by all ISTS licensees and Non-ISTS Licensees whose assets are approved by CERC as being used for Inter-state Transmission of electricity	By last day of each billing period
2	Data and information of any new ISTS assets achieved COD by last day of the billing period	On 1 <sup>st</sup> day of each month following billing period
3	Notification of Peak Block by IA	On 1 <sup>st</sup> day of each month following billing period
4	Data and information to be furnished by all DICs/ CTU to RLDCs/ IA	By 7 <sup>th</sup> day of each month following billing period
5	Availability of finalized MTC to be considered for computations of the billing period to all ISTS Licensees and Non-ISTS Licensees whose assets are approved by CERC as being used for Inter-state Transmission of electricity for review and comment	On 10 <sup>th</sup> day of each month following billing period
6	Comments to be sent by ISTS Licensees on finalized MTC to be considered for computations of the billing period	By 12 <sup>th</sup> day of each month following billing period
7	Preparation of basic network by each RLDC	By 12 <sup>th</sup> day of each month following billing period
8	Availability of finalized GNA and GNARE agreement profile to RLDCs for review and comment	On 12 <sup>th</sup> day of each month following billing period
9	Furnishing feeder-wise SEM data and scheduled quantum for each time block by RLDC for computation of “Direct drawal” as per GNA Regulations.	On 12 <sup>th</sup> day of each month following billing period
10	Comments to be sent by all RLDCs on the details of GNA and GNARE agreement profile	By 15 <sup>th</sup> day of each month following billing period