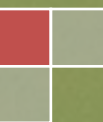


**Committee to finalise Draft  
Amendment to CERC (Sharing of  
Inter State Transmission Charges and  
Losses) Regulations, 2010**

August, 2019



**Constitution of Committee to finalize the Draft Amendment to CERC (Sharing of Inter-State transmission charges and losses) Regulations, 2019**

**Members**

- i) Sh. I.S.Jha, Member, CERC- Chairperson of the Committee
- ii) Sh. S.C.Shrivastava, Chief (Engg.), CERC
- iii) Sh. P.K. Awasthi, Chief (Fin.), CERC
- iv) Sh. V.Sreenivas, Dy. Chief (Legal), CERC
- v) Smt. Shilpa Agarwal, Joint Chief (Engg.)- Member Convener

**Special Invitees**

- i) Ms. Manju Gupta, Sr. G.M.,CTU, POWERGRID
- ii) Sh. Amit Chachan, Manager, CTU, POWERGRID

**Committee to finalize the Draft Amendment to CERC (Sharing of Inter-State transmission charges and losses) Regulations, 2019**

**Foreward**

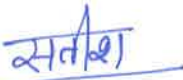
The Commission vide office order No.170/1/2019-CERC dated 15.5.2019 formed a Committee to finalize the draft amendments to CERC (Sharing of Inter-State transmission charges and losses) Regulations, 2019 under Chairmanship of Shri I.S.Jha, Member, CERC with members from CERC. The terms of Reference (ToR) of the Committee were interalia to examine the report of the task force under Sh. A.S. Bakshi and to formulate draft amendment/re-enactment of the CERC (Sharing of Inter-state transmission charges and losses) Regulations, 2010 along with Explanatory Memorandum.

2. The Committee held 5 meetings during June 2019-August 2019 and invited CTU for its views and inputs. The Committee is extremely thankful to CTU for carrying out calculations as per proposed method.

3. The Committee has finalised its report after considering report of the task force under Sh. A.S. Bakshi and hereby submits its report. The report includes draft Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2019. The Explanatory memorandum may be framed on the basis of Report.

  
Shilpa Agarwal,  
Joint Chief (Engg.)- Member  
Convener

  
V.Sreenivas,  
Dy. Chief (Legal), CERC

  
Sh. S.C. Shrivastava,  
Chief (Engg.), CERC

  
Sh. P.K. Awasthi,  
Chief (Fin.), CERC

  
I.S. Jha,  
Member, CERC  
Chairperson of the Committee

## **Report of the Committee to draft regulations for Sharing of ISTS charges under Member (I.S. Jha)**

### **A. Background**

1. Transmission has been categorized as a regulated business under Electricity Act, 2003. Transmission investment has to be recovered through transmission charges as determined by the regulator or as discovered through competitive bidding. The sharing of transmission charges for ISTS transmission systems among ISTS customers has undergone changes with time based on policy requirements and suggestions of stakeholders from time to time.

2. Different methodologies have been adopted for sharing of transmission charges from time to time. Earlier, it was “Regional Postage stamp method” in which charges for regional transmission system were recovered from identified beneficiaries in that region in proportion to their share allocation/ PPA from Inter-State Generating Stations. Subsequently, post Electricity Act 2003, the Tariff policy suggested a tariff mechanism to be sensitive to distance, direction and quantum of flow. Further with introduction of Open Access and de-licensing of generation, a large number of inter-state generation projects were planned under private sector with no identified beneficiaries or beneficiaries across the regions. To align the transmission charge sharing mechanism with the above development, the existing Point of Connection (PoC) mechanism was adopted wherein the sharing of transmission tariff among ISTS customers is based on projected usage of ISTS transmission system by each customer through load flow studies on quarterly basis.

3. The Committee observes that the charges allocated on each ISTS customer under POC mechanism depends on load generation balance considered for load flow studies. Since demand and generation for each ISTS Customer varies across the day/month/season, stakeholders have raised objections regarding the allocation of transmission charges by this method. Further not all the transmission lines are utilized for full capacity all the time as flow in the transmission lines depends on load and generation dispatch. For example, transmission system is planned for Installed capacity of a generation whereas generator is dispatched as per schedule given by beneficiary which may be much less than installed capacity. Further the transmission system is planned to meet contingencies under N-1 and N-1-1 conditions. In the present PoC method, full transmission charges of transmission system are allocated on the ISTS customer utilizing such system.

4. To address the concerns of stakeholders, the Commission constituted a Taskforce under Shri A.S. Bakshi, then Member (CERC). The Taskforce submitted its report to the Commission in March 2019 (hereinafter called as 'Bakshi Taskforce'). Bakshi Taskforce in the Report concluded that POC has served its purpose as enshrined in Tariff Policy namely being sensitive to distance, direction and quantum of flow. Further the mechanism has enabled the growth of power market and has helped in reducing congestion by enabling investment in the sector. However keeping in view concerns of stakeholders, the Taskforce has suggested modifications in the current method. The Taskforce observed that the entire transmission charges for marginally utilized lines are being borne by ISTS customers who are using these lines. It suggested that transmission charges allocation based on usage should be restricted to extent of utilization of transmission line as determined by load flow

studies and the residual portion arising due to inherent characteristics of transmission and varying load-generation scenarios should be allocated to all customers in proportion to their contracted capacity i.e Long Term Access and Medium Term Open Access .

5. In order to implement the recommendations of Bakshi Taskforce, CERC constituted a Committee under Sh. I.S.Jha, Member-Technical (CERC) in May 2019 to formulate the draft Regulations. The Terms of Reference of the Committee is as follows:

- (a) To critically examine the report of the task force and take a view on the various options recommended by the task force.
- (b) To suggest best possible and suggest modifications required in the existing PoC mechanism in due consideration of future power sector scenario.
- (c) To formulate draft amendment /re-enactment of the CERC(Sharing of Inter-state transmission charges and losses) Regulations, 2010.
- (d) Draft an Explanatory Memorandum supporting the draft amendment/re-enactment of the 2010 Sharing Regulations.

6. The Committee under Member (ISJ) held five meetings during June-August 2019, carried out exhaustive discussions on Bakshi Committee report and observes as follows:

(a) Transmission system is planned based on LTA Applications. The major factors affecting transmission planning and subsequent investments are location of generator, generation capacity, quantum of Long term Access and location of the firmed up beneficiaries.

(b) Once transmission lines are constructed, power flow on each line varies under different scenarios such as peak demand, off peak demand, day and night, seasons etc. depending upon demand-generation scenario at a particular instance and

it may happen that some lines may be used more and some less by a particular constituent at a particular time.

(c) Inter-state Transmission System in India constitutes mainly EHV-AC system with a few HVDC systems which have been planned not only for point to point power transfer but also to improve overall stability of the grid and add flexibility in the system. As such, different approach may be adopted for EHV-AC system and HVDC system.

(d) The drawal ICTs at ISTS substations are planned for supplying power to the state based on load projection by the State. Hence it is logical that the state in which drawal ICTs are located, should bear its transmission charges.

(e) Reactive compensation (e.g. Bus reactors, SVC, Statcoms etc.) is planned in transmission system to provide voltage support to the system. Since, its benefits are availed by all the constituents in the region, transmission charge allocation for these assets need to be dealt separately.

(f) As per GoI policy, certain specific renewable energy based generation projects are exempt from paying transmission charges. They are generally planned in potential rich states to inject RE power in the grid and then it is utilized by different DICs to meet their demand and Renewable Purchase Obligations. Sharing of tariff for these RE related system based on utilization through load flow studies shall not be proper. It is suggested to socialize Transmission charges for systems specifically created for renewable energy projects on All India ISTS customers. Bakshi Taskforce report also recommended the same.

7. Keeping above aspects in view, the Committee felt that while determining the mechanism for sharing the transmission charges by different DICs, it should take into account quantum of Long term Access granted on the basis of which transmission system have been planned as well as utilisation of different elements by different DICs which will be determined through load flow studies on actual data. Further for deciding the part of tariff based on LTA quantum, objectives of different transmission elements or systems should be taken into account. For example, if some system or element has been planned keeping in view entire grid, tariff of same should be shared by all the DICs of the grid. If they are planned for the benefit of a particular region, same should be shared by DICs of particular region. In case of transformers which are basically planned to supply to individual DICs, such DIC should share the tariff for it. As the grid mainly comprise of AC transmission lines and substation, its tariff should be shared under the head of AC System component which should comprise of two parts-first part based on utilisation and balance on the basis of contracted capacity of LTA+MTOA.

Keeping this in view transmission charges for different elements of transmission system shall be allocated under following components:

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

Each component is described in following paragraphs:



**(a) National Component shall be the sum of following components:**

- (i) National Component-Renewable Energy (NC-RE); and
- (ii) National Component-HVDC (NC-HVDC).

**(i) National Component-Renewable Energy (NC-RE); Transmission Charges**

**towards Renewable system:** Large quantum of Renewable energy is being planned and getting connected to ISTS grid. It requires sufficient transmission investment to ensure evacuation without constraint. Under the current policy framework, specific renewable projects are exempted from payment of transmission charges. Stakeholders have raised concern about loading of higher transmission charges of such transmission system on the states in which they are located. To address above concern and to facilitate investment in transmission augmentation for RE generation, it is recommended that the transmission charges of the system implemented specifically for RE shall be allocated to all ISTS customers in the ratio of their contracted LTA+MTOA capacity.

**(b) Transmission charges for HVDC Systems**

HVDC Systems shall be recovered under National Component and Regional Component as follows:

- (i) HVDC systems are generally planned for bulk power transfer to a particular region. In addition to this, HVDC systems have control features which provide flexibility and hence more stability to overall Grid. Keeping this in view, few high capacity bipole

HVDC lines have been strategically planned for not only bulk power transfer but to enhance the overall operational performance of the grid. It is suggested that while major part of transmission charges towards HVDC should be shared by the DICs of the receiving region which are major beneficiaries, a part of transmission charges should be shared by DICs of all India towards this. It is suggested that 70% transmission charges for bipole HVDC systems should be shared by ISTS customers in receiving region in the ratio of quantum of LTA+MTOA for each Customer of the region and 30% charges for each bipole HVDC shall be shared among ISTS customers of all regions in the ratio of their LTA+MTOA.

- (ii) However for the following HVDC transmission systems, transmission charges should continue to be shared as per CERC Order.
  - a. Biswanath Chariali /Alipurdwar – Agra – On all India basis in the ratio of LTA+MTOA
  - b. Mundra -Mohindergarh - Transmission charges are being shared by Generator Mundra (Adani) for dedicated usage i.e. 1495MW and balance capacity is being borne by DICs on all India basis in ratio of their LTA+MTOA.
- (iii) Further back to back HVDC, which are primarily used for control functions by system operator shall be shared on all India basis in ratio of their LTA+MTOA, as is being done presently.

**(c) Regional Component : Transmission charges towards Reactive Compensation**

Certain elements of transmission system such as Reactors, SVC, Statcoms etc require a different methodology for their transmission charge allocation since power flow study cannot capture their utilization by a particular beneficiary. The transmission elements such as SVCs, STATCOMs, bus reactors provide static and dynamic reactive compensation thereby enhancing the performance of the grid and hence leading to better reliability and security of the grid by keeping the voltage of the grid at optimum level. Hence their charges should be shared by constituents of the region in which they are located. Where separate transmission charges for these components are not available, the charges may be calculated based on indicative capital cost to be provided by CTU. Transmission charges for these elements shall be shared among ISTS Customers on regional basis in the ratio of their contracted capacity i.e LTA+MTOA. Where separate charges for these systems are not available, the transmission charges shall be considered based on indicative capital cost to be provided by CTU.

**(d) Transformers Component (TC):** Transmission charges for ICTs planned to connect downstream system of states (400/220kV, 220/132kV etc.) for supply of power to States, is proposed to be allocated to respective states in which they are located. Where separate charges for these transformers are not available, the transmission charges shall be considered based on indicative capital cost to be provided by CTU.

**(e) AC System- Usage Based Component**

- (i) This component shall be determined based on actual utilization of AC system (excluding downstream transformers, reactive compensation, RE specific system) on monthly basis.
  
- (ii) Extent of use of the transmission line is determined through load flow studies. In present system of PoC, load flow studies are carried out quarter ahead assuming load and generation figures as projected by ISTS customers for the next quarter. However it has been observed that power flow on the transmission lines so determined on the basis of projected data are generally different than the actual power flow.
  
- (iii) In line with the Bakshi Committee Report, it is suggested that while doing load flow studies, instead of projected load, actual peak ISTS drawal condition for the month shall be simulated and use of transmission lines determined through load flow studies shall be the basis of this component of transmission charges. The transmission charges corresponding its percentage utilization shall be considered for allocation of charges using existing Hybrid method. The percentage utilization for transmission lines considered for the billing month shall be determined by dividing flow in the line in the base case by Surge Impedance Loading of the line. CEA had suggested to consider load flow in ICTs and determine separate utilization of ICTs by users. It is suggested that once downstream ICTs have been suggested to be billed separately, need for determination of ICTs utilization separately doesnot

arise. Moreso, transmission tariff for ICTs is not available elementwise. Hence it is suggested that utilization may be determined only on transmission lines.

- (iv) This will provide Charges in Rs. Crore for each State/ Generator/other ISTS customer. For generators who have firm contracts through PPA, the transmission charges shall be calculated at beneficiary end only as being done currently.

**(f) Balance Component (AC-BC).**

This component shall constitute transmission charges corresponding to balance charges of AC transmission system (excluding downstream transformers, reactive compensation, RE specific system) after allocating the portion of such capacity under “Usage based component- AC-UBC”. These transmission charges could be allocated through following two methods:

**(i) Allocation based on LTA/MTOA quantum (MW)**

In this method balance transmission charges of AC system (excluding downstream transformers, reactive compensation, RE specific system) should be allocated to each ISTS customer based on LTA/MTOA quantum of ISTS Customers. The method is fairly simple. However, sharing of balance transmission charges under this method is more or less postage stamp method which doesnot take into account the distance from where such contract has been done and hence doesnot truly reflect the contract. For example, if a generation located in UP has allocation of 500 MW to UP and 500 MW to delhi, both UP and Delhi in this method will share same

transmission charges whereas longer transmission system would have been built for Delhi, it being far away from UP. This aspect may create issues while planning for new transmission system as it may lead to resistance by home state if high capacity line is planned keeping in view its long distance customer.

**(ii) LTA+MTOA-kM (MW-kM)**

In this method the balance transmission charges of AC system (excluding downstream transformers, reactive compensation, RE specific system) is shared in proportion to MW-kM of each ISTS customer. 'MW' represents Long term Access and Medium term open access granted to the ISTS customer and 'km' represents the aerial distance in kms between location of generation project and Center of State with whom such generator has entered into PPA and has sought LTA or MTOA to such drawl point.

Keeping in view the provisions in tariff policy that tariff should be sensitive to distance as well as the fact that investment in transmission is generally higher for the distant beneficiaries, it is proposed that the distance of the beneficiary from the generator should also be considered while determining allocation of transmission charges based on contracted capacity. Thus, concept of MW-kM is proposed to be used to determine transmission charges allocation of this part.

With implementation of national Grid a state may have PPAs with generation projects located all across the Country. Total Mw-kM for an ISTS Customer such as a State is

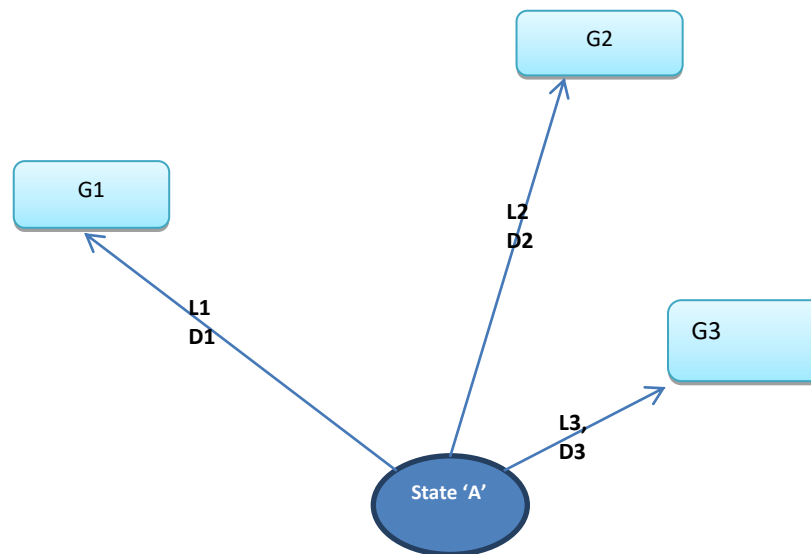
sum total of (MW X kM) of each PPA entered into by such State. Thus, total MW-kM of each ISTS customer shall be calculated.

**Illustration:**

Suppose a State 'A' has LTA L1 MW, L2 MW and L3 MW from 3 generators G1, G2 and G3 situated at an aerial distance of D1 kms ,D2 kms and D3 kms from State A.).

Illustration:

Suppose a State 'A' has LTA L1 MW,L2 MW and L3 MW from 3 generators G1, G2 and G3 situated at an aerial distance of D1 kms ,D2 kms and D3 kms from State A.).



Mw-kM factor for State A=  $L1 \cdot D1 + L2 \cdot D2 + L3 \cdot D3$ . Similarly MW-kM factor for all States and selected generators to be calculated

Transmission charges for State A=

$(L1*D1+L2*D2+L3*D3)*(Trans. \text{ charge to be recovered under AC-BC})$

---

$(\sum_1^n (MW - kM \text{ Factor States} + MW-KM \text{ Factor Gen.}))$

The generic formula for allocation of transmission charges on the basis of Mw-kM shall be as follows:

(a) For all DICs,

$$MW-kM \text{ factor for DIC } i = \sum_1^n \text{ Distance } i * (LTA \ i + MTOA \ i)$$

Where,

- **Distance i** is the distance of DIC from Generator i
- **LTA i** is the LTA of DIC from Generator i
- **MTOA i** is the MTOA of DIC from Generator i

(b) MW- KM factor for Generators having LTA on target region

$$Mw-kM \text{ factor for Gen. } i = \sum_1^n \text{ Distance } i * LTA \ i$$

Where,

- **Distance i** is the distance of Generator from central location of target region
- **LTA i** is the untied LTA of Generator i i.e LTA for which no beneficiary has been identified

Mw-kM Tr. Charge for Generator =



**(Mw-kM factor for Generator \* Total Transmission charge to  
be recovered under AC-BC)**

---

$$(\sum_1^n (\text{MW} - \text{kM Factor DIC} + \text{MW-KM Factor Gen.}))$$

In case of generators with Long term Access to target region the transmission charges shall be allocated at their node to the extent of untied LTA ie. LTA for which beneficiary has not been identified.

**(iii) Recommendation of the Committee**

After carrying out a number of simulations, the Committee observed that difference in transmission charges liability for DICs considering MW-kM concept vs MW concept is not significant. As such the Committee recommends that Balance transmission charges should be allocated to different DICs in proportion to their Long term Access and Medium Term Open Access keeping in view simplicity of the method.

**9. Summary of allocation of transmission charges under proposed components:**

(a) National Component (NC)

National Component shall consist of following parts:

(1) National Component-Renewable Energy (NC-RE)

Transmission charges for systems specifically created for renewable energy projects shall be allocated to all India DICs in the ratio of their contracted capacity

(LTA+MTOA). For Generating stations having untied LTA, the contracted capacity shall be considered as untied LTA for purpose of allocation of proportionate charges. CTU shall identify such system for existing transmission system as well as new transmission system.

(2) National Component-HVDC (NC-HVDC)

The transmission charges shall be allocated to all India DICs in the ratio of their contracted capacity (LTA+MTOA) and in the ratio of untied LTA capacity for Generating stations for HVDCs listed below:

- 1) 30% of transmission charge for bipole HVDC
- 2) 100% transmission charges for Biswanath Chariali /Alipurdwar – Agra
- 3) 100% transmission charges for Back to back HVDC
- 4) 1005 MW capacity of HVDC Mundra -Mohindergarh

**(b) Regional Component (RC)**

This component shall comprise of transmission charge towards High Voltage Direct Current transmission system (HVDC), Static Compensator (STATCOM), Static Var Compensator (SVC), Bus Reactor or any other transmission element identified by CTU being critical for providing stability, reliability and resilience in the grid shall be included under this component.

(1) HVDC:

70% of transmission charges of HVDC Bi-Pole shall be allocated to DICs of drawing region in the ratio of their contracted capacity i.e LTA+MTOA.

Provided that :

i) Transmission charges towards 1495 MW of Mundra-Mohindergarh capacity shall be allocated to Adani Mundra.

ii) 100% transmission charges towards Biswanath Chariali /Alipurdwar – Agra shall be allocated to DICs of all India in the ratio of their contracted capacity i.e LTA+MTOA.

iii) 1005 MW capacity of HVDC Mundra -Mohindergarh shall be allocated to DICs of all India in the ratio of their contracted capacity i.e LTA+MTOA.

(2) Transmission charges for STATCOM, SVC, Bus Reactors, and other identified elements located in a region shall be allocated to DICs of the same region in the ratio of their contracted capacity i.e. LTA+MTOA of the DICs. Where separate charges for these elements are not available, the transmission charges shall be considered based on indicative capital cost to be provided by CTU.

**(c) Transformers component (TC)**

Transmission charges for Inter-connecting transformers planned for drawl of power by a State shall be allocated to the State in which they are located. The list of such transformers shall be provided by CTU to Implementing Agency. The transmission charges as approved by the Commission for such transformers shall be considered. Where separate charges for these transformers are not

available, the transmission charges shall be considered based on indicative capital cost to be provided by CTU.

**(d) AC System Component**

AC system charges shall consist of following parts:

**1. Usage Based Component for AC system (AC-UBC);**

(i) For determining UBC-AC, the base case shall be prepared wherein the injection and drawal data for each node shall be considered as per actual for the peak block of the billing month. The injection or drawl data corresponding to peak block for nodes within a State shall be provided by respective SLDCs. In case of non-availability of such actual data for intra-state points, IA shall estimate such injection or drawl data and include in simulation, so as to approximate the actual drawal or injection at ISTS interface. This is subject to necessary adjustment required for load generation balance by IA.

(ii) For determining charges allocated under UBC-AC for AC transmission system (excluding components at Regulation 4,5,6 above), the percentage utilization for transmission lines considered for the billing month shall be determined by dividing flow in the line in the base case by Surge Impedance Loading of the line.

(iii) The proportionate transmission charges corresponding to utilization as calculated above shall be considered for determination of UBC-AC for each entity by applying Hybrid method. In case of generator having untied LTA, the actual generation by such generator, corresponding to such untied LTA for peak

block shall be considered for transmission charge allocation for such Generating Stations. UBC-AC shall be expressed in Rs. for each DIC.

## **2. Balance Component (AC-BC):**

This component shall be the balance transmission charges for AC system (excluding downstream transformers, reactive compensation, RE specific system) after allocating the charges for AC system on use basis and shall be allocated to DICs in proportion to their Long term Access and Medium Term Open Access.

## **11. Other Issues for draft Regulations**

- (a) Transmission Service Agreement: It is suggested that Model TSA shall not be issued separately as main features of TSA have been included in draft Regulations. Hence signing of TSA under the Sharing regulations have been dispensed with.
- (b) Revenue Sharing Agreement: It is suggested that Model RSA shall not be issued separately since main features of RSA have been included in draft Regulations. If CTU finds need of signing separate Agreement, it may devise such Agreement.
- (c) It is suggested that separate procedure for billing, collection and disbursement shall not be issued by Commission. The salient features of current Procedure have been included in draft regulations. CTU in discharge of its functions under these Regulations may make such procedure and prescribe such

forms as may be necessary for the purpose of Billing, Collection and Disbursement, which is not inconsistent with these regulations or any other regulations of the Commission.

(d) Sharing of transmission Losses: It is suggested that calculation of losses on the basis of slabs as being done currently should be done away with. All India Average ISTS loss should be calculated for the week as difference of net injection into ISTS grid for the week at regional nodes and net drawl from ISTS grid for the week at regional nodes divided by Injection into ISTS grid at regional nodes for the week.

(e) Intra-state transmission lines certified by respective Regional Power Committee being used for inter-State transmission:

Intra-state system is generally planned for transfer of power within the State. Similarly adequate inter-state system has generally been planned for transfer of inter-state power. Under this situation, if intra-state system carries inter-state power or vice versa it is basically due to meshed network. Further, it is observed that such assets are already being included in ARR of the State system. As such, it is not appropriate to include such intra-state system under ISTS on the basis of load flow. Further since AC system has been divided into "AC-UBC" and "AC-BC" and as per simulations, only a portion of lines shall be included under "AC-UBC". Hence it would not be appropriate to allocate charges of such system under "balance component" on other DICs. It is suggested that such systems should be included for recovery under these Regulations only for the tariff period for which tariff has already been approved by this Commission as on date of notification of

these Regulations. No intra-state transmission system other than the one already included that too for the period for which tariff has already been approved shall be considered for allocation of transmission charges under ISTS.

(f) STOA charges:

a. It is observed that buying DICs may not buy power under LTA and may buy power under STOA keeping in view economics of transaction. Such DICs who actually draw power within their LTA quantum should not be charged separately for STOA. Selling DICs who have LTA with identified beneficiaries may not get schedule from such beneficiaries and may sell power under STOA. An entity should be charged transmission charges for power injected or drawn beyond their LTA or MTOA. Hence it is suggested that separate charges for STOA shall not be collected from entities having LTA or MTOA. However they shall be charged deviation bill as per following paragraphs:

b. The third Bill shall comprise of transmission deviation bill and shall be billed along with first bill by the CTU. In case the metered MWs (ex-bus) of a power station or the aggregate demand of a Designated ISTS Customer exceeds, in any time block, the sum of LTA and MTOA, the Designated ISTS Customers shall be charged for such deviations. This part of the bill shall be computed as detailed below:

i. Transmission Deviation Rate (TDR) for a DIC shall be calculated as follows:

(a) TDR for a State =  $1.15^*$  (Transmission charges of the State for the month) / (Long Term Access +Medium Term Open Access of the State for the month)

(b) TDR for Generators = @TDR for State where the Generator is located.

- ii. For hydro generators, the deviation shall be calculated after considering overload capacity of 10% over LTA and MTOA.
  - iii. Any payment on account of additional charges for deviation by the generator shall not be charged to its long term customer and shall be payable by the generator;
  - iv. The agency of the State responsible for the intimation of deviation on account of deviations under CERC DSM Regulations shall be the agency responsible for the intimation of deviation on account of the transmission usage to the respective RPCs, for inclusion of the same in their Regional Transmission Deviation Account (RTDA):
  - v. The charges attributable to a State for deviations shall be calculated for a State as a whole. The contribution of an embedded entity towards such deviation shall be charged by State to its embedded entity.
- a. The governance of the Short Term Open Access Transactions shall be as per the Central Electricity Regulatory Commission (Open Access in inter-State Transmission) Regulations, 2008 and as amended by the



Commission from time to time. No separate transmission Charges for Short Term Open Access Transactions shall be Charged

12. It is suggested that existing Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2010 be reenacted as Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2019 keeping in view multiple changes from existing methodology. The proposed draft Regulations are enclosed. Explanatory memorandum may be framed based on the Report.

13. Tentative simulations for four months (April 2018, July 2018, October 2018, January 2019) was carried out in association with POSOCO and CTU. Element wise Monthly Transmission Charges for Q4 2018-19 (January 2019) has following results:

<b>Transmission Charge Element</b>	<b>Rs Crs</b>
% Tr charges based on usage	656
Contracted capacity as per LTA+MTOA	1642
Downstream ICT	187
SVC+Statcom+Bus Reactor	123
RE System	25
HVDC System	360
<b>Total</b>	<b>2992</b>

**CENTRAL ELECTRICITY REGULATORY COMMISSION**  
**3<sup>rd</sup> & 4<sup>th</sup> Floor, Chanderlok Building, 36, Janpath**  
**New Delhi-110001**

No. 17011/1/2019-CERC

Dated 15.5.2019

**OFFICE ORDER**

**Subject: Constitution of Committee to finalized the Draft amendment to CERC (Sharing of Inter-state transmission charges and losses) Regulations, 2019-**

Commission had set up a Task Force to Review Framework of Point of Connection (POC) Charges under Chairmanship of Shri. A.S. Bakshi. The Report of the Taskforce was submitted to Commission on 13.3.2019.

2. CERC (Sharing of Inter-state transmission charges and losses) Regulations, 2010 would require to be amended keeping in view suggestions of the taskforce.

3. A Committee has been formed to finalize the draft amendments to CERC (Sharing of Inter-state transmission charges and losses) Regulations, 2010. The Committee shall have the following composition:

- (i) Shri I.S. Jha, Member, CERC- Chairperson of the Committee
- (ii) Sh. S.C. Shrivastava, Chief (Engineering), CERC
- (iii) Sh. P.K. Awasthi, Jt. Chief (Finance), CERC
- (iv) Sh. V. Sreenivas, Dy. Chief (Legal), CERC
- (v) Smt. Shilpa Agarwal, Jt.Chief (Engg.), CERC – Member Convener

4. Committee may invite representatives from CTU, POSOCO, CEA and States as required. The Committee may seek assistance from CTU and NLDC for the purpose of study and analysis of date. The Committee may co-opt members as required.

5. The term of reference of the Committee is as follows:

- A. To critically examine the report of the task force and take a view on the various options recommended by the task force.
- B. To suggest best possible options and suggest modifications required in the existing PoC mechanism in due consideration of future power sector scenario.
- C. To formulate draft amendment / re-enactment of the CERC (Sharing of Inter-state transmission charges and losses) Regulations, 2010.
- D. Draft an Explanatory Memorandum supporting the draft amendment / re-enactment of the 2010 Sharing Regulations.

6. The Committee may complete the work and submit its report to the Commission within three months from the date of issue of this Office order.
7. The issues with approval of the Commission.



**(Sanoj Kumar Jha)**  
**Secretary**

To

- (a) Sh. S.C. Shrivastava, Chief (Engineering), CERC
- (b) Sh. P.K. Awasthi, Jt. Chief (Finance), CERC
- (c) Smt. Shilpa Agarwal, Jt.Chief (Engg.), CERC
- (d) Sh. V. Sreenivas, Dy. Chief (Legal), CERC

**Copy for information to:**

PPS to Chairperson, CERC

ES to M(MKI)/PS to M(ISJ)

# **CENTRAL ELECTRICITY REGULATORY COMMISSION**

## **NEW DELHI**

No.....

Dated: .....

### **DRAFT NOTIFICATION**

In exercise of the powers conferred under Section 178 read with Part V of the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, and after previous publication, the Central Electricity Regulatory Commission hereby makes the following regulations:

#### **CHAPTER 1**

##### **PRELIMINARY**

#### **1. Short title, extent and commencement**

- (1) These regulations may be called the Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2019.
- (2) These regulations shall apply to all Designated ISTS Customers, Inter-State Transmission Licensees, National Load Despatch Centre (NLDC), Regional Load Despatch Centres (RLDCs), State Load Despatch Centres (SLDCs) and Regional Power Committees (RPCs).
- (3) These regulations shall come into force from the date to be separately notified by the Commission.

#### **2. Definitions**

- (1) In these Regulations, unless the context otherwise requires,:-

- a) **'Act'** means the Electricity Act, 2003 (36 of 2003);
- b) **'Basic Network'** means the power system of the country at voltage levels 132 kV and above including HVDC transmission network, to which the Generating Stations and loads are connected; and at voltage level of 110 kV and above to which Generating Stations are connected;
- c) **'Billing month'** means the month for which transmission charges are to be apportioned to each DIC in accordance with these Regulations;
- d) **'buyer'** means a person, including beneficiary, purchasing electricity through a transaction scheduled in accordance with the regulations applicable for short-term open access, medium-term open access and long-term access;
- e) **'Date of Commercial Operation' or 'COD'** shall have the same meaning as provided in Grid Code
- f) **'Designated ISTS Customer' or 'DIC'** means the user of any element(s) of the Inter-State Transmission System (ISTS) and shall include generating station, State Transmission Utility, Distribution Licensee including State Electricity Board or its successor company, Electricity Department of State, Bulk Consumer and any other entity directly connected to the ISTS and shall further include any intra-State entity or any trading licensee who has obtained Medium Term Open Access or Long Term Access to ISTS;
- g) **'Grid Code'** means Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 and any subsequent amendments or re-enactments made thereof

- h) **‘Hybrid Methodology’** means hybrid of the Marginal Participation Method and the Average Participation method as detailed in Annexure-I of these Regulations;
- i) **‘Implementing Agency’ or ‘IA’** means the agency designated by the Commission to undertake the computation of apportionment of transmission charges at various nodes or zones for the Billing month and to undertake such other functions as may be assigned by the Commission from time to time. NLDC shall be the Implementing Agency unless notified otherwise by the Commission;
- j) **‘Monthly Transmission Charge’ or ‘MTC’** means the transmission charges for the month as derived from Yearly Transmission Charge;
- k) **‘node’** means a sub-station of a transmission system or a switchyard of a generating station and shall include injection node, drawal node and regional node
- l) **‘Participation Factor’** of a node in any transmission line means the percentage usage of that line by a node,- as explained in Annexure - I of these regulations;
- m) **‘Peak block’** means the block in which sum of net ISTS drawals by all States is maximum during the month.
- n) **‘regional node’** means a injection node or a drawal node which is directly under control area of Regional Load dispatch Centre.
- o) **‘seller’** shall have the same meaning as defined in Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related Matters) Regulation, 2014

- p) **‘Surge Impedance Loading’ or ‘SIL’** means loading on transmission line for various configurations as per Annexure-III to these Regulations;
- q) **‘Target Region’** means the region to which a Generating Station proposes to sell power after obtaining Long-term Access from the Central Transmission Utility and for which beneficiaries in the said region have not been identified;
- r) **‘Tariff Regulations, 2014’** means the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 as amended from time to time;
- s) **‘Tariff Regulations, 2019’** means the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019 as amended from time to time;
- t) **‘Transmission Deviation’** means the deviation from the sum of LTA and MTOA and shall be computed and billed as specified in subclause (c) of clause (2) of Regulation 13 of these regulations;
- u) **‘Untied LTA Capacity’** means the quantum of Long Term Access for which buyers have not been identified;
- v) **‘Yearly Transmission Charges’ or ‘YTC’** means the Annual Transmission Charges as determined or adopted by the Commission for all elements of ISTS which have achieved COD as on the last day of Billing month, and for the transmission lines connecting two States and intra-State transmission lines certified by respective Regional Power Committee as being used for inter-State transmission of electricity;
- (2) Words and expressions used in these Regulations and not defined herein but defined in the Act or regulations made by the Commission, shall have the meanings assigned

to them respectively in the Act, and regulations made by the Commission from time to time.

### **3. Principles of sharing transmission charges**

- (1) The transmission charges shall be shared amongst the Designated ISTS Customers such that:-
  - (a) The Yearly Transmission Charges are fully recovered; and
  - (b) Any adjustment towards Yearly Transmission Charge on account of revision of transmission charges as allowed by the Commission are recovered.
- (2) The computation of share of transmission charges for each DIC shall be based on the technical and commercial information provided by the DICs, inter-State Transmission Licensees, NLDC, RLDCs and SLDCs to the Implementing Agency.
- (3) The transmission charges for transmission system after such transmission system has achieved COD with regular service, shall be shared by DICs in accordance with Regulations 5 to 8 of these regulations.

Provided that in case of a transmission system where COD has been approved in terms of proviso (ii) of clause (3) of Regulation 4 of the Tariff Regulations, 2014 or clause (2) of Regulation 5 of the Tariff Regulations, 2019 or transmission system which has been declared deemed COD in terms of Transmission Service Agreement under Tariff based Competitive Bidding, the Yearly Transmission Charges shall be shared by DICs in accordance with clause (11) of Regulation 11 of these regulations.

Provided further that the transmission charges for transmission system governed by provisions of clause (4) and clause (8) of Regulation 11 of these regulations shall not be shared by DICs in accordance with Regulations 5 to 8 of these regulations.



- (4) Long Term Access or Medium Term Open Access for projects covered under clause (1) of Regulation 11 shall not be considered for apportionment of transmission charges under Regulations 5 to 8 of these regulations.

## **CHAPTER 2**

### **COMPONENTS AND SHARING OF ISTS CHARGES AND LOSSES**

#### **4. Components of transmission charges**

Transmission charges for each DIC shall have the following components:

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

#### **5. Components and sharing of National Component (NC)**

(1) National Component shall be the sum of following components:

- (a) National Component-Renewable Energy (NC-RE); and
- (b) National Component-HVDC (NC-HVDC).

(2) National Component-Renewable Energy shall comprise of transmission charges for transmission systems developed for renewable energy projects as identified by the Central Transmission Utility.

(3) National Component-HVDC shall comprise of the following:

- (a) 100% transmission charges for “Back to Back HVDC” Transmission System;
  - (b) 100% transmission charges for Biswanath Chariali/Alipurdwar – Agra HVDC Transmission System;
  - (c) Proportionate transmission charges of Mundra–Mohindergarh HVDC Transmission System corresponding to 1005 MW capacity; and
  - (d) 30% of transmission charge for all other HVDC Transmission Systems except those covered under subclauses (a), (b) and (c) of this Clause of these regulations.
- (4) Transmission charges for the National Component shall be shared by the drawee DICs in the ratio of their quantum of Long term Access plus Medium Term Open Access.
- (5) Transmission charges for National Component in respect of injecting DICs with untied LTA capacity shall be shared by such injecting DICs in the ratio of their untied LTA capacity.

## **6. Components and sharing of Regional Component (RC)**

- (1) Regional Component shall be the sum of the following components:
- (a) Regional Component of HVDC (RC-HVDC) -70% of transmission charges of HVDC Transmission Systems except those covered under clause (3) of Regulation 5 and clause (6) of Regulation 6;and
  - (b) Transmission charges for Static Compensator (STATCOM), Static VAR Compensator (SVC), Bus Reactors, and any other transmission element(s) identified by Central Transmission Utility being critical for providing stability, reliability and resilience in the grid.

Provided that where separate transmission charges are not available in respect of specific elements, the transmission charges shall be computed based on indicative capital cost to be provided by Central Transmission Utility.

- (2) Transmission charges covered under sub-clause (a) of clause (1) of this Regulation shall be shared by the Drawee DICs in the ratio of their quantum of Long Term Access plus Medium Term Open Access.
- (3) Transmission charges covered under sub-clause (a) of clause (1) of this Regulation in respect of injecting DICs with untied LTA capacity, shall be shared by such injecting DICs in the ratio of their untied LTA capacity for the respective target region.
- (4) Transmission charges covered under sub-clause (b) of clause (1) of this Regulation shall be shared by DICs of the same region in the ratio of their quantum of Long Term Access plus Medium Term Open Access.
- (5) Transmission charges covered under sub-clause (b) of clause (1) of this Regulation, in respect of injecting DICs with untied LTA capacity, shall be shared by such injecting DICs in the ratio of their untied LTA capacity for the respective target region.
- (6) For Mundra-Mohindergarh HVDC transmission system, proportionate transmission charges towards 1495 MW shall be borne by M/s Adani Power (Mundra) Limited or its successor company.

## **7. Components and sharing of Transformers Component (TC)**

- (1) Transformers Component shall comprise of transmission charges for inter-connecting transformers planned for drawal of power by the State. The list of such transformers for each State shall be provided by the Central Transmission Utility to the Implementing Agency.

(2) Transformers Component of transmission charges shall be borne by the State in which they are located.

(3) Where separate transmission charges under clause (1) of this Regulation are not available, the transmission charges shall be computed based on indicative capital cost to be provided by the Central Transmission Utility.

#### **8. Components and sharing of AC System Component (ACC)**

(1) AC System Component shall comprise of transmission charges excluding transmission charges covered under Regulations 5 to 7 of these regulations.

(2) AC System Component shall be divided into the following components:

(i) Usage Based Component (AC-UBC); and

(ii) Balance Component (AC-BC).

(3) Transmission charges for AC-UBC shall be shared by DICs corresponding to their respective usage of transmission lines, in accordance with Regulation 9 of these regulations.

(4) Transmission charges under AC-BC shall be the balance transmission charges for AC transmission system after apportioning the charges for AC-UBC.

(5) Transmission charges covered under AC-BC shall be apportioned to all drawee DICs in the ratio of their quantum of Long term Access plus Medium Term Open Access

(6) Transmission charges covered under AC-BC in respect of injecting DICs with untied LTA capacity shall be shared by such injecting DICs in the ratio of their untied LTA capacity.

## **9. Computation of share of transmission charges under AC-UBC**

- (1) The Base Case file shall be prepared by the Implementing Agency for the Peak Block of the month comprising of the following:
  - (a) Basic Network, which shall be the network file for the power system for the peak block of the month; and.
  - (b) Actual generation and demand, in MW, at each node of the Basic Network for the Peak Block.
- (2) The Implementing Agency shall collect the data for (a) and (b) above and the Yearly Transmission Charges from DICs, transmission licensees, NLDC, RLDCs, SLDCs, RPCs and STUs as per timelines specified in Regulation 21 of these regulations.
- (3) The Monthly Transmission Charges covered under AC-UBC shall be apportioned on transmission lines of the Basic Network whose charges have been included in Yearly Transmission Charge. Such apportionment shall be made on per circuit kilometer basis for each voltage level and conductor configuration as per methodology in Annexure-I to obtain line-wise transmission charges for each voltage level and conductor configuration respectively.
- (4) Implementing Agency shall run AC load flow studies on the Base Case file stated at clause (1) of this Regulation for the month and determine power flow on each transmission line.

Provided that while carrying out the load flow studies, the Implementing Agency may make minor adjustment in the generation and demand data, if required, to ensure load-generation balance.

- (5) Percentage usage of each transmission line shall be computed by dividing power flow in the Base Case as obtained at clause (4) of this Regulation by Surge Impedance Loading of the line.
- (6) Percentage usage of each transmission line computed at clause (5) of this Regulation shall be multiplied by line-wise Yearly Transmission Charges obtained as per clause (3) of this Regulation to obtain modified line-wise transmission charges.
- (7) Transmission charges at each node shall be calculated as per Hybrid Methodology, using modified line-wise transmission charges obtained as per clause (6) of this Regulation.
- (8) The Implementing Agency shall aggregate transmission charges at dawal nodes within the geographical boundary of the State to determine the allocation of charges for the State under AC-UBC.
- (9) Any other injecting DIC with Long Term Access to target region with untied LTA capacity shall be apportioned charges under AC-UBC which shall be separately indicated by the Implementing Agency.

#### **10. Sharing of transmission losses**

- (1) All India Average Transmission losses for ISTS shall be calculated by Implementing Agency for each week, from Monday to Sunday, as follows:

{(Sum of injection into the ISTS at regional nodes for the week) minus (Sum of drawal from the ISTS at regional nodes for the week)}/ Sum of injection into the ISTS at regional nodes for the week X 100 %

- (2) Drawal Schedule of DICs shall be worked out as per provisions of Grid Code after taking into account the transmission losses of previous week as calculated in accordance with clause (1) of this Regulation.
- (3) No transmission loss for ISTS shall be applicable while preparing schedule for injection node including that for Collective Transactions over the Power Exchanges.

### **CHAPTER 3**

#### **SPECIFIC CASES**

#### **11. Transmission charges in specific cases**

- (1)
  - (a) No transmission charges and losses for the use of ISTS shall be payable for solar generation for the useful life of the projects commissioned from 1.7.2011 to 30.6.2017.
  - (b) No transmission charges and losses for the use of ISTS shall be payable for the capacity of the generation projects based on solar or wind resources for a period of 25 years from the date of commercial operation of the such generation projects if they fulfill the following conditions:
    - (i) Such generation capacity has been awarded through competitive bidding; and
    - (ii) Such generation capacity has been declared under commercial operation between 1.7.2017 and 12.2.2018 for solar based resources or between 30.9.2016 till 12.2.2018 for wind based resources; and

- (iii) Power Purchase Agreement(s) have been executed for sale of power from such generation capacity to the Distribution Companies for compliance of their renewable purchase obligation.
  - (c) No transmission charges and losses shall be payable for the generation projects based on solar or wind resources for the use of ISTS, for a period of 25 years from the date of commercial operation of such generation projects if they fulfill the following conditions:
    - (i) Such generation capacity has been awarded through competitive bidding process in accordance with the guidelines issued by the Central Government; and
    - (ii) Such generation capacity has been declared under commercial operation between 13.2.2018 and 31.3.2022; and
    - (iii) Power Purchase Agreement(s) have been executed for sale of such generation capacity to all entities including Distribution Companies for compliance of their renewable purchase obligations.
  - (d) Long Term Access and Medium Term Open Access for Cases covered under sub-clause (a), (b) and (c) of this Clause shall be excluded from the computation of transmission charges under Regulations 5 to 8 of these Regulations.
- (2) Where Generating Stations or sellers have been granted Long term Access or Medium Term Open Access and have entered into Power Purchase Agreement for supply of power under such Long Term Access or Medium Term Open Access, the transmission charges attributable for such tied up power shall be calculated at drawal nodes for AC-UBC.



Provided that prior to COD of the Generating Station, the transmission charges under AC-UBC shall be in terms of clause (4) of this Regulation.

- (3) Where Generating Stations or sellers have been granted Long term Access or Medium Term Open Access and have entered into Power Purchase Agreement for supply of power under such Long Term Access or Medium Term Open Access, the transmission charges towards such Long Term Access or Medium Term Open Access for components identified under Regulations 5 to 8 of these regulations shall be determined at the drawal nodes and zone and billed to the buyer.

Provided that sellers and buyers shall make necessary adjustment or settlement among themselves for transmission charges in terms of their respective Power Purchase Agreements

- (4) Where COD of a generating station or unit(s) thereof is delayed and the Associated Transmission System has achieved COD, which is not earlier than its SCOD, the generating station shall pay Yearly Transmission Charges for the Associated Transmission System corresponding to capacity of generating station or unit(s) thereof which have not achieved COD.

Provided that such transmission charges shall not be considered under Regulations 5 to 8 of these Regulations.

- (5) Where Long Term Access to ISTS is granted to a generating station on existing margins and COD of the generating station or unit(s) thereof is delayed, the generating station shall pay transmission charges @10% of transmission charge for the State where it is located for the quantum of such Long Term Access.

Provided that the amount received on account of payments in the month towards such Long Term Access shall be reimbursed to the DICs in proportion to their shares under the First Bill in the following month.

Provided that such Long Term Access shall be excluded for computation under Regulations 5 to 8 of these regulations.

- (6) Where operationalization of Long Term Access granted to a generating station is contingent upon COD of Associated Transmission System consisting of several transmission elements and only some of the transmission elements have achieved COD, the generating station may seek part operationalisation of Long Term Access. The Central Transmission Utility shall part operationalize Long Term Access corresponding to the capacity sought to be operationalised by the generating station, subject to availability of transmission system. The Yearly Transmission Charges for such transmission elements shall be included in Regulations 5 to 8 of these Regulations.

Provided that for cases not covered above, when only some of the elements of the Associated Transmission System have achieved COD and if such transmission system is certified by the respective Regional Power Committee(s) for improving the performance, safety and security of the grid, such transmission system shall be included under Regulations 5 to 8 of these regulations.

- (7) In case the generating station or unit(s) thereof has achieved COD and transmission system is delayed, the concerned transmission licensee(s) shall make alternate arrangement for dispatch of power in consultation with Central Transmission Utility at the cost of the transmission licensee(s).

Provided that till such alternative arrangement is made, the transmission licensee(s) shall pay to the generating station the transmission charges proportionate to Long Term Access for the transmission system which is delayed .

- (8) Where construction of dedicated transmission line has been taken up by the Central Transmission Utility as part of coordinated transmission planning and is constructed by an inter-State transmission licensee, the Yearly Transmission Charges for such dedicated transmission line shall be payable by the generating station in proportion to the Connectivity granted and for which Long Term Access is not operational. Such transmission charges shall be payable to the inter-state transmission licensee who has constructed such dedicated line.

- (9) Generating stations drawing start-up power shall pay the transmission charges @Transmission Deviation Rate for the State in which they are physically located.

Provided that the amount received on account of payments towards drawal of start-up power shall be reimbursed to the DICs under the First Bill in proportion to their shares in the First Bill in the month next to Billing month.

Provided that where transmission element(s) have been declared COD before its SCOD on request of a generating station for drawal of start-up power, the generating station shall instead pay Yearly Transmission Charges for such transmission element(s) till the generating station achieves COD.

Provided further that Transmission Deviation Rate shall not be applicable for generating stations covered under clause (4) of this Regulation for drawal of start-up power.

- (10) Where a generating station is connected to both ISTS and intra-State Transmission System, the ISTS charges and losses shall be applicable only on quantum of Long

Term Access and Medium Term Open Access connected through ISTS and STU charges and losses shall not be applicable on such capacity connected through ISTS.

Provided that this provision shall be subject to availability of adequate capacity in the intra-State Transmission System to draw allocated quantum of Long Term Access or Medium Term Access as certified by the Central Transmission Utility.

- (11) Where a transmission system has been declared to have achieved deemed COD in terms of Transmission Service Agreement under Tariff Based Competitive Bidding (TBCB) or the Commission has approved the date of commercial operation of such transmission system in terms of clause (2) of Regulation 5 of Tariff Regulations, 2019 or proviso (ii) to clause (3) of Regulation 4 of the Tariff Regulations, 2014, the transmission licensee or generating company whose transmission system or generating station or unit thereof is delayed shall pay the transmission charges of the transmission system till the generating station or unit thereof or the transmission system achieves COD.

Provided that where more than one transmission licensee or both transmission licensee and generating station are getting delayed, the proportionate sharing of above transmission charges shall be as decided by Commission.

- (12) An Intra-State Transmission System already certified by the respective Regional Power Committees being used for inter-State transmission of electricity and for which tariff has already been approved by the Commission, shall be covered under these Regulations:

Provided that such intra-State Transmission System shall be included under these Regulations only for the tariff period for which tariff has already been approved by this Commission.

## **CHAPTER 4**

### **ACCOUNTING, BILLING AND COLLECTION OF TRANSMISSION CHARGES**

#### **12. Accounting**

- (1) Implementing Agency shall notify total transmission charges payable by the DICs for the Billing month in terms of Rs. per MW for each State by dividing total transmission charges payable by the State by its quantum of Long Term Access and Medium Term Open Access.
- (2) Regional Transmission Accounts for the DICs shall be prepared by the respective Regional Power Committee Secretariat on the basis of:
  - (a) Transmission charges for Long Term Access or Medium Term Open Access to be received from the Implementing Agency;
  - (b) DIC-wise transmission charges for the Billing month, in Rs.per MW, to be received from Implementing Agency; and
  - (c) Meter reading to be received from RLDCs, from all Special Energy Meters for computation of deviations from the sum of the Long Term Access and Medium Term Open Access for every time block.
- (3) Regional Power Committees Secretariat shall issue Regional Transmission Accounts and Regional Transmission Deviation Accounts for the Billing month within 3 days of communication of data by the Implementing Agency and receipt of meter reading data from RLDCs to all DICs, Central Transmission Utility and inter-State Transmission Licensees and also display the same on its web site.
- (4) Where the transmission charges were being billed to the distribution companies or any designated agency in the State for purchasing power before coming into force of

these regulations, the distribution companies or the designated agency, as the case may be, shall be treated as DIC in that State for the purpose of preparation of Regional Transmission Account by Regional Power Committees and for the purpose of billing and collection by the Central Transmission Utility.

Provided that after coming into force of these regulations, the States may designate any agency as DIC for the above purpose.

- (5) Timelines for preparation of base case, notification of transmission charges, issue of Regional Transmission Accounts and raising bills shall be as under:
  - (a) Base case for the Billing month shall be prepared by the Implementing Agency by 15<sup>th</sup> day of the month following the Billing month.
  - (b) Payable transmission charges shall be notified by the Implementing Agency by 25<sup>th</sup> day of the month following the Billing month.
  - (c) Based on the notified allocation of charges by the Implementing Agency, Regional Power Committee Secretariat shall issue Regional Transmission Accounts by the end of the month following the Billing month.
  - (d) Central Transmission Utility shall raise bills on DICs based on Regional Transmission Accounts in first week of the second month following the Billing month.

### **13. Billing.**

- (1) Central Transmission Utility shall, after raising the bills for transmission charges, as per timelines in terms of sub-clause (d) of clause (5) of Regulation 12, collect the transmission charges from the DICs and disburse the same to inter-State transmission

licensees and intra-State transmission licensees whose assets are included in Yearly transmission Charges.

(2) The billing for transmission charges for DICs shall be raised by the Central Transmission Utility under the following three categories of bills:

(a) The First Bill shall contain the transmission charges for the Billing month based on the Methodology detailed under Regulations 5 to 8 of these Regulations.

(b) The Second Bill shall be raised to adjust variations on account of any revision in transmission charges as allowed by the Commission including incentives.

Provided that amount to be recovered on account of under-recovery or to be reimbursed on account of over-recovery shall be billed by the Central Transmission Utility to each DIC in proportion to its First Bill over the relevant Billing month.

Provided further that the Second Bill shall be raised on quarterly basis in April, July, October and January.

(c) The Third Bill shall be raised for each month as follows:

i. This shall comprise of bill for transmission deviation and shall be billed along with the First Bill by the Central Transmission Utility.

ii. In case aggregate metered ex-bus MW injection or the aggregate metered MW drawal of a DIC, in any time block exceeds the sum of Long Term Access and Medium Term Open Access, the concerned DIC shall be charged for such deviations @ Transmission Deviation Rate as determined below.

iii. Transmission Deviation Rate shall be calculated as follows:

- a. Transmission Deviation Rate for a State shall be charged at  $1.20 \times$  (transmission charges of the State for the Billing month)/ (quantum of Long Term Access plus Medium Term Open Access of the State for the Billing month)
  - b. Transmission Deviation Rate for generating stations and bulk consumers shall be charged @Transmission Deviation Rate for the State where the generating station or bulk consumer is located.
  - iv. For hydro-generating stations, the transmission deviation shall be calculated after considering overload capacity of 10% over quantum of Long Term Access and Medium Term Open Access.
  - v. Transmission deviation charges shall be borne by the concerned DIC only. ;
  - vi. The agency(ies) of the State responsible for intimating deviations under the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014 as amended from time to time, shall also be the agency responsible for intimating transmission deviation to the respective Regional Power Committee Secretariat for preparation of Regional Transmission Deviation Account.
  - vii. The charges for transmission deviations shall be calculated for a State as a whole. The charges for transmission deviation for an embedded intra-State entity shall be as determined in accordance with the regulations or orders of the respective State Commission.
- (3) No transmission Charges shall be levied for Inter-State transmission system in respect of Short Term Open Access transactions.



- (4) Central Transmission Utility shall be responsible for raising the bilateral bills for transmission systems covered under Regulation 11 of these regulations.
- (5) The bills shall also be posted on website of Central Transmission Utility.

#### **14. Due date**

Due date in relation to any Bill shall mean the forty fifth (45<sup>th</sup>) day from the date on which such Bill is raised by the Central Transmission Utility.

#### **15. Rebate and Late Payment Surcharge**

The rebate and late payment surcharge shall be governed in accordance with the Tariff Regulations, 2019 or the Tariff Regulations for subsequent period to be notified by the Commission, as the case may be.

#### **16. Letter of Credit**

- (1) Not later than 1 (one) month prior to the date of operationalization of Long Term Access or Medium Term Open Access, as the case may be, each DIC shall, through a scheduled bank, open an irrevocable, unconditional and revolving Letter of Credit or any other acceptable payment security mechanism in favour of the Central Transmission Utility, to be made operative from a date prior to the Due Date of its First Bill and shall be renewed annually.
- (2) The Letter of Credit shall have a term of 12 (twelve) months and shall be for an amount equal to 1.05 (one point zero five) times the average amount of the First Bill for a year, where tripartite agreement for securitization on account of arrears against the transmission charges with the Government of India exist.

Provided that where such tripartite agreement does not exist, the DIC shall open the

Letter of Credit for an amount equal to 2.10 (two point one times) the average amount of First Bill for a year.

- (3) If at any time, amount for which Letter of Credit is provided, falls short of the amount specified, the concerned DIC shall replenish such shortfall within 7 (seven) days of communication by Central Transmission Utility
- (4) The amount of Letter of Credit shall be revised in case of revision of transmission charges by the Implementing Agency and the same shall be notified to the DICs by the Central Transmission Utility.
- (5) In case of encashment of the Letter of Credit by the Central Transmission Utility in accordance with these Regulations, the amount of the Letter of Credit shall be replenished by the concerned DICs within 7 (seven) days from the date of such encashment.
- (6) Each DIC shall ensure that the Letter of Credit shall be renewed 30 (thirty) days prior to its expiry.
- (7) If a DIC fails to pay any bill or part thereof on or before the Due Date, the Central Transmission Utility may encash the Letter of Credit, and, for amount of the bill or part thereof that is overdue plus Late Payment Surcharge, if applicable, by presenting to the scheduled bank issuing the Letter of Credit, the following documents:
  - (a) a copy of the Bill, which has remained unpaid or partially paid by such DIC; and
  - (b) a certificate from the Central Transmission Utility to the effect that the Bill at item (a) above, or specified part thereof, is in accordance with these Regulations and that it has remained unpaid or partially paid beyond the Due Date; and
  - (c) Calculations of applicable Late Payment Surcharge, if any.

Provided that the failure on the part of the Central Transmission Utility to present the documents for encashment of the Letter of Credit shall not attract any Late

Payment Surcharge, for the duration of such failure on part of the Central Transmission Utility, on the DIC.

- (8) In the event more than one bill becomes overdue, the amount recovered through the encashment of Letter of Credit shall be appropriated against such overdue Bills as per First-in-First-out method.

## **17. Collection**

- (1) The Central Transmission Utility shall collect transmission charges on account of the First Bill and redistribute the transmission charges collected to inter-State Transmission Licensees in proportion to their Yearly Transmission Charges;
- (2) The Central Transmission Utility shall collect transmission charges on account of the Second Bill and transfer the same to respective inter-State Transmission Licensees;
- (3) The Central Transmission Utility shall collect transmission charges on account of the Third Bill raised in accordance with sub-clause (c) of clause (2) of Regulation 13 of these regulations and the transmission charges collected shall be reimbursed to the DICs, in the following month, in proportion to the First Bill of the respective month.
- (4) All payments and disbursements under provisions of this Regulation shall be executed through National Electronic Funds Transfer (NEFT) or Real Time Gross Settlement (RTGS).
- (5) If payment against any bill raised by Central Transmission Utility under this Regulation is outstanding, the Central Transmission Utility may undertake Regulation of Power Supply on behalf of inter-State Transmission Licensees under the provisions of the Central Electricity Regulatory Commission (Regulation of Power Supply) Regulations, 2010 as amended from time to time and any subsequent enactment thereof.

- (6) Delayed payment in a month by any DIC shall result in pro-rata reduction in disbursement to the inter-State Transmission Licensees and intra-state licensees whose assets are included in Yearly transmission Charges.

#### **18. Event of Default of a DIC**

- (1) The occurrence and continuation of the following events shall constitute a DIC Event of Default:
  - (a) A DIC fails to comply with the prevailing regulations including the provisions of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 as amended from time to time including any subsequent re-enactment thereof or is in material breach of these Regulations and such material breach is not rectified by the said DIC within 60 (sixty) days of receipt of notice in this regard from the concerned inter-State Transmission Licensee or the Central Transmission Utility; or
  - (b) DIC fails to make payments against bills raised by the Central Transmission Utility under these Regulations within 60 days beyond Due Date.
- (2) Upon the occurrence and continuance of a DIC Event of Default, the Central Transmission Utility may serve notice on the concerned DIC, specifying the circumstances giving rise to such Notice.
- (3) Following the issue of such notice by the DIC, the concerned DIC shall take steps to remedy the default within 60 (sixty) days of issue of such notice.
- (4) After the expiry of 60 (sixty) days from the date of issue of notice, unless the circumstances giving rise to such notice as mentioned in clause (1) of this regulation shall have ceased to exist or have been remedied, the concerned DIC shall cease to be a DIC under these Regulations and the Central Transmission Utility shall issue a Termination Notice of 30 (thirty) days to this effect with a copy to the Commission

and the Implementing Agency.

Provided that in case of termination as DIC of an entity on account of DIC's event of default, the Long Term Access or Medium Term Open Access or both of such entity shall be cancelled. Such cancellation shall be treated as relinquishment of Long Term Access or Medium Term Open Access in terms of Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009 and the said entity shall pay the relinquishment charges accordingly.

- (5) Upon termination of the status of DIC, the entity shall not be eligible for interchange of power under any form of open access unless such entity remedies the default and makes payment of all outstanding charges including relinquishment charges.

## **19. Transition Period**

- (1) The Implementing Agency shall ensure smooth transition to the mechanism under these regulations.
- (2) From the date these Regulations come into force, the first month's bill shall be raised in the third month as per the timeline specified in these Regulations. Bills for the previous two months i.e. first and second month, shall be based on earlier mechanism under the Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2010.

## **CHAPTER 5**

### **INFORMATION AND PROCEDURES**

#### **20. Procedures to be framed under these Regulations**

- (1) Implementing Agency shall notify detailed procedures and formats for collection of generation and demand data from each DIC, data pertaining to the Basic Network and for calculation of transmission charges within 90 (ninety) days of the notification of these Regulations and post it on its website.
- (2) The software for the implementation of these regulations shall be audited or cause to be audited by the Commission before it is put to use, and thereafter from time to time as may be decided by the Commission.
- (3) Central Transmission Utility in discharge of its functions under these Regulations may make such procedure and prescribe such forms as may be necessary for the purpose of Billing, Collection and Disbursement, which is not inconsistent with these regulations or any other regulations of the Commission.

## **21. Timeline for furnishing the information**

- (1) On or before end of the Billing Month, all entities whose assets are to be used in the Basic Network shall submit to the Implementing Agency Network data and dates of commercial operation of any new transmission asset in the Billing Month and the Yearly Transmission Charge along with circuit kilometers at each voltage level and for each conductor configuration, as approved by the Commission and any other information required by the Implementing Agency.
- (2) Implementing Agency shall notify, on its website, the peak block for the Billing Month on first day of the following month.
- (3) On or before 7 (seven) days after start of Billing Month, Central Transmission Utility shall submit indicative cost for each voltage level and conductor configuration for transmission lines to the Implementing Agency.

- (4) On or before 7(seven) days after end of Billing Month, DICs shall submit following data:
- (a) MW and MVAR Data for injection or drawal at various nodes or a group of nodes for peak block for each Billing Month.
  - (b) Quantum of power tied up through PPAs for interchange of power under long term access or approved medium term open access.
- (5) In the event of such information as required by the Implementing Agency is not made available within the stipulated timeframe or to the level of details required, the Implementing Agency shall compute transmission charges based on such information from available sources.
- (6) If a DIC doesnot provide the required data, including injection or drawal data for intra-State points within stipulated time period, it shall be levied an additional transmission charge @ 1% of the transmission charges under the First Bill for the month.

## **22. Information to be published by the Implementing Agency**

- (1) The information to be made available, on its website, by the Implementing Agency shall include:
- (a) The Basic Network, generation at nodes and drawal at nodes considered for the base case and the load flow results for each Billing Month, on its website, immediately after its finalization;
  - (b) Assumptions, if any;
  - (c) Details of transformers, transmission system for renewables, list of elements considered under Regional Component and corresponding transmission charge considered for the Billing Month;

- (d) Schedule of transmission charges payable by each constituent for the Billing month with Component-wise break-up;
  - (e) Yearly Transmission Charges as submitted by the transmission licensees covered under this Regulation and computation by Implementing Agency;
  - (f) Zone-wise details of transmission charges with details of transmission lines being used by each DIC and consequent transmission charges being borne by each DIC under AC-UBC component;
  - (g) Details of Long Term Access and Medium Term Open Access for the Billing Month;
  - (h) New transmission lines or transmission systems added during the Billing Month
  - (i) Detailed calculations of indicative cost for arriving at the average cost in respect of each transmission line;
- (2) All information as at clause (1) above shall be available on website of the Implementing Agency in editable user friendly “Excel ” format;
  - (3) An interactive “query” shall be designed to give results like (i) Given generator is meeting which loads and in what proportion, (ii) Given load(s) is met by which generators and in what proportion, (iii) Given DIC is using which transmission lines and in what proportion, (iv) Given transmission is serving which DICs and in what proportion etc.
  - (4) Implementing Agency shall provide sensitive data to the DICs with access control.



## **CHAPTER 6: MISCELLANEOUS**

### **23. Savings and Repeal.**

- (1) Save as otherwise provided in these regulations, Central Electricity Regulatory Commission (Sharing of inter-state transmission charges and losses) Regulations, 2010, as amended from time to time, is hereby repealed.
- (2) Notwithstanding such repeal anything done or any action taken or purported to have been done or taken under the repealed regulations shall be deemed to have been done or taken under these regulations.

### **24. Power to Relax.**

The Commission may, for reasons to be recorded in writing, relax any of the provisions of these regulations on its own motion or on an application made before it by an interested person.

### **25. Power to Remove Difficulties**

If any difficulty arises in giving effect to any of the provisions of these Regulations, the Commission may, by general or specific order, make such provisions not inconsistent with the provisions of the Act, as may appear to be necessary for removing the difficulty.

Secretary

**THE HYBRID METHODOLOGY FOR USAGE BASED TRANSMISSION CHARGES**

1. Utilization of the network is generally determined in terms of either average utilization or marginal utilization of the transmission assets. Pricing of transmission services based on average or marginal utilization of the network branches is known as Average Participation or Marginal Participation method respectively. A usage based methodology tries to identify how much of the power that flows through each of the lines in the system is due to the existence of a certain network user, in order to charge it according to the adopted measure of utilization.

**2. Marginal Participation Method**

2.1 The marginal participation method analyzes how the flows in the grid are modified when minor changes are introduced in the production or consumption of agent  $i$ . The procedure shall be as follows:

- (a) Marginal Participation sensitivities  $A_{ij}$  are obtained that represent how the flow in line  $j$  changes when the injection in bus  $i$  is increased by 1 MW. The increase in 1 MW has to be compensated by a corresponding increase in load or generation at some other bus or buses – called the slack bus(es).
- (b) Total participations for each agent are calculated as a product of its net injection by its marginal participation. If net injection is considered positive for Generating Stations and negative for demands, the total participation of any agent  $i$  in line  $j$  is  $A_{ij}(\text{generation}_i - \text{demand}_i)$ .

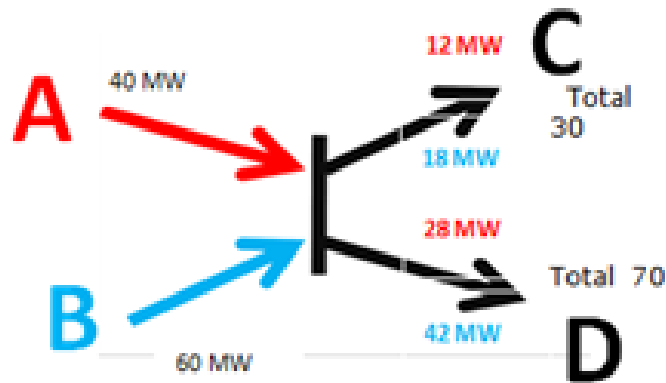
- (c) The cost of each line is apportioned pro-rata to the different agents according to their total participation in the corresponding line.

### **3. Average Participation Method**

3.1 The procedure for average participation shall be as follows:

- (a) For every individual Generating Station  $i$ , a number of physical paths are constructed, starting at the node where the producer injects the power into the grid, following through the lines as the power moves through the network, and finally reaching several of the loads in the system.
- (b) Similar calculations are also performed for the demands, tracing upstream the energy consumed by a certain user, from the demand bus until some Generating Stations are reached. One such physical path is constructed for every producer and for every demand.
- (c) In order to create such physical paths, a basic criterion is adopted: A rule allocates responsibility for the costs of actual flows on various lines from sources to sinks according to a simple allocation rule, in which inflows are distributed proportionally between the outflows. An illustrative example of the proportional allocation mechanism is demonstrated in figure below.

Fig.: Average Participation Method



$$\text{Portion of A at C} = 30 \times \frac{40}{(60+40)} = 12$$

$$\text{Portion of B at C} = 30 \times \frac{60}{(60+40)} = 18$$

$$\text{Portion of A at D} = 70 \times \frac{40}{(60+40)} = 28$$

$$\text{Portion of B at D} = 70 \times \frac{60}{(60+40)} = 42$$

(d) The average participation method calculates the participation of agent  $i$  by tracking the influence in the network of a transit between node  $i$  and several ending nodes that result from the rules that conform the algorithm. In the example above, based on flow in the outgoing lines, the injection of 40 MW (through the red line) is allocated to the outgoing lines in the proportion of the transfers from the two outgoing lines. Thus the outgoing line that transfers 30 MW (i.e., 30% of the total transfer out of the bus) is allocated 30 % of the 40 MW injection from the red line, i.e., 12 MW. Similar allocations are made for the other flows as well.

#### 4. Hybrid Method

Under the Hybrid Method, the slack buses shall be selected by using the Average Participation Method and the transmission charges on each node shall be computed using the Marginal Participation Method.

## **5. Steps to be followed under under Hybrid Method**

5.1 Following steps are involved in the Hybrid Methodology

- (A) Data Acquisition
- (B) Computation of Load Flows on the Basic Network
- (C) Identification of Slack Node(s)
- (D) Hybrid Methodology for the determination of transmission charges
- (E) Determination of Sharing of transmission charges

### **(A) DATA ACQUISITION: INPUTS TO THE MODEL**

5.2 The transmission pricing model requires a set of inputs for peak block of the month as follows:

- Nodal generation information
- Nodal demand information
- Transmission circuits between these nodes and their electrical characteristics required for load flow analysis, the associated lengths of these transmission lines and its capacity, Yearly Transmission Charges (YTC) of each line.
- Identification of a reference node (s)

- 5.3 The DICs will provide actual injection/drawal information {MW and MVAR (or an assumption about the power factor to be used)} at all the nodes or a group of nodes in a zone (identified a-priori by the Implementing Agency (IA)) in the Network. The data provided by the DICs shall be as per the formats prepared by the IA. All drawal DICs shall also submit the generation from their own generating stations for the peak block during the Billing month to the Implementing Agency to prepare the Base Case for load generation balance.
- 5.4 Information provided by the DICs shall be vetted by the Implementing Agency as per the provisions of the Regulations and Detailed procedure notified by Implementing Agency.
- 5.5 ISTS transmission licensees, intra-state licensees whose assets are included in Yearly transmission Charges and the DICs whose assets are being considered in the Basic Network shall supply the Network Data for the existing network, in the format notified by the IA.
- 5.6 The Basic Network shall contain any power system, power plant or line at 132 kV and above except where Generating Stations are connected to the grid at 110 kV. Power flow into a lower voltage system from the voltage levels indicated in the definition of the Basic Network shall be considered as load at that sub-station. Power flow from a lower voltage system into the electricity systems at the voltage levels shall be considered as generation at that sub-station;
- 5.7 The transmission system declared under commercial operation and in use on or before last day of the Billing month shall be considered for transmission charge allocation for the month. However basic network shall be considered as existing for the peak block of the month.

5.8 The dedicated transmission lines constructed, owned and operated by the ISTS Licensees shall be considered to be a part of the Basic Network. However, dedicated lines constructed, owned and operated by the Generating Station shall not be considered as a part of the Basic Network and the Generating Station will be deemed to be connected directly to the ISTS for the purpose of modelling basic network;

5.9 The transmission system covered under clause (2) of Regulation 5 and clause (4) of Regulation 11 shall be considered at “zero cost” in the line wise transmission charges and modified linewise transmission charges at clause (3) and clause (6) of Regulation 9.

5.10 For the transmission system whose transmission charges are to be partly included under Regulation 5 to 8 of these Regulations and partly to be billed to generating station or any other entity under bilateral billing, the circuit kilometers of such transmission line shall be reduced prorata corresponding to the transmission charge to be included under Regulation 5 to 8 of these Regulations.

*Illustration:*

*Suppose Kudgi-Narendara transmission line have 500 circuit kms and half of its transmission charges are to be billed to generating station 'A' and half of it to be included under Regulation 5 to 8 of these Regulations. For calculation of AC-UBC, circuit kms for this line shall be taken as 250 circuit kms.*

5.11 The transmission charge per circuit kilometer for a transmission line for each voltage level and conductor configuration shall be made uniform. The methodology followed shall be as follows:

5.11.1 Central Transmission Utility shall provide indicative cost level per circuit kilometer for a transmission line for each voltage level and conductor configuration.

5.11.2 Total Circuit kms for transmission lines for each voltage level and conductor configuration shall be allocated uniform charges as per ratio methodology in illustrative example.

An Illustrative Example is given below for transmission lines:

Indicative Cost Levels for 4th Quarter of 2018-2019 (As Provided by Central Transmission Utility)					
Type	Cost (Rs Lakh)	Cost (Rs Lakh) /Circuit	Coefficient	Ratio w.r.t c	
765 kV D/C	422	211	a	$x1=c/a$	0.55
765 kV S/C	185	185	b	$x2=c/b$	0.63
400 kV D/C Quad Moose	234	117	c	$x3=c/c$	1.00
400 kV D/C Twin Moose	136	68	d	$x4=c/d$	1.72
400 kV S/C Twin Moose	78	78	e	$x5=c/e$	1.50
220 kV D/C	57	28.5	f	$x6=c/f$	4.11
220 kV S/C	43	43	g	$x7=c/g$	2.72
132 kV D/C	39	19.5	h	$x8=c/h$	6.00
132 kV S/C	23	23	i	$x9=c/i$	5.09
400 kV D/C Triple Snowbird	150	75	j	$x10=c/j$	1.56
400 kV D/C Twin-HTLS	144	72	k	$x11=c/k$	1.63

Suppose Total Circuit kms for each Voltage level and conductor type is as follows:

Line Type	Total ckm	Label
765 kV D/C	19982	A
765 kV S/C	15109	B
400 kV D/C Quad Moose	21493	C
400 kV D/C Twin Moose	68485	D
400 kV S/C Twin Moose	18673	E



220 kV D/C	12227	F
220 kV S/C	4107	G
132 kV D/C	1420	H
132 kV S/C	2091	I
400 kV D/C Triple Snowbird	5970	J
400 kV S/C Twin-HTLS	205.48	K

The uniform rate per ckm for each voltage level and conductor configuration shall be calculated as follows:

Line Type	Label	Circuit km	Rate per circuit km
765 kV D/C	I	315779	=III/x1
765 kV S/C	II	276868	=III/x2
400 kV D/C Quad Moose	III	175100	=MTC/(A/x1+B/x2+C/x3+D/x4+E/x5+F/x6+G/x7+H/x8+I/x9+J/x10+K/x11)
400 kV D/C Twin Moose	IV	101768	=III/x4
400 kV S/C Twin Moose	V	116733	=III/x5
220 kV D/C	VI	42653	=III/x6
220 kV S/C	VII	64353	=III/x7
132 kV D/C	VIII	29183	=III/x8
132 kV S/C	IX	34421	=III/x9
400 kV D/C Triple Snowbird	X	112244	=III/x10
400 kV D/C Twin-HTLS	XI	107754	=III/x11

## **(B) COMPUTATION OF LOAD FLOWS ON THE BASIC NETWORK**

5.12 The Implementing Agency shall run AC load flow on the Basic Network. In the case of an STU / SEB, the total injection at all the Generating Station nodes owned by the STU/SEB shall be equal to the aggregate of injection of the entities connected in the state network. Similarly, the drawal at all the nodes owned by the SEB/STU shall be equal to drawal of all the entities connected in the SEB / STU network.

5.13 In the process of convergence of the Load Flow on the Basic Network, the IA may require to make certain minor adjustments in the load/generation at various buses to ensure load generation balance.

## **(C) IDENTIFICATION OF THE SLACK NODES: USING AVERAGE PARTICIPATION METHOD**

5.14 Due to the Kirchoff's laws, any 1 MW increase in generation (or load) at node  $i$  has to be compensated by a corresponding increase in load (or generation) at some other node or nodes. Thus the calculation of how much an injection (or withdrawal) at a certain bus affects the flows in the network depends on the choice of the node (s) that responds.

5.15 The external slack bus (es) for each node shall be found as follows:

5.15.1 For every node in a particular scenario, Average Participation method will be applied to each generation / load located in the state under consideration. Tracing from load to Generating Station (or from Generating Station to load), a set of Generating Stations (or loads) (including those outside the state) and their contribution to the load (Generating Station) is determined for each load (Generating Station) bus.

5.15.2 Using the above choice of slack buses for each Generating Station and load bus, marginal participation of each Generating Station and load in each transmission line is computed.

#### **(D) HYBRID METHODOLOGY FOR THE DETERMINATION OF TRANSMISSION CHARGES**

5.16 Hybrid Method analyzes how the flows in the grid are modified when minor changes are introduced in the production (or consumption) of agent  $i$ , and it assumes that the relationship of the flow through line  $j$  with the behaviour of the agent  $i$  can be considered to be linear. For each month, the procedure can be described as follows:

5.16.1 Marginal participation sensitivities are obtained that represents how much the flow through each network branch  $j$  increases when the injection/ withdrawal in a bus is increased by 1 MW. Flow variation in each network branch  $j$  incurred by 1 MW injection / withdrawal at each bus is computed for each scenario,  $e$ .

5.16.2 Due to the Kirchoff's laws, any 1 MW increase in generation (or load) at node  $i$  has to be compensated by a corresponding increase in load (or generation) at some other node or nodes (after adjusting for incremental system losses). Thus the calculation of how much an injection (or withdrawal) at a certain bus affects the flows in the network depends on the decision of which is the node that responds. The methodology used to identify such node shall be distributed slack buses as explained above at Clause 5 (C).

5.16.3 Once the flow variation in each line incurred by each agent is obtained, it is possible to compute a usage index for each network user. This index is computed according to equation given below. Only positive increments in the direction of the power flow in

the base case are considered. Increments which reduce burden on lines are neither given any credit nor charged for use of the system.

5.16.4 The index (for each block of months) is computed as:

$$U_{e,i,l} = \left( |F_{le}^i| - |F_{le}| \right) \cdot P_{ie} \cdot \begin{cases} 1 & \text{if } |F_{le}^i| - |F_{le}| > 0, \text{ Sign}(F_{le}^i) \text{ is same as Sign}(F_{le}) \\ 0 & \text{otherwise} \end{cases}$$

Where,

$U_{eil}$  is the monthly usage index in line  $l$  due to injection / drawal at node  $i$

$F_{le}$  is the flow in line  $l$  under scenario  $e$  under base case

$F_{le}^i$  is the flow in line  $l$  under scenario  $e$  due to injection / withdrawal of 1 MW at node

$P_{ie}$  is power dispatch / demand at bus  $i$  under scenario  $e$  under base case

5.16.5 The revenue requirement of each line is allocated pro-rata to the different agents according to their total participation in the corresponding line.

$$Cost\ Allocated_{eil} = \frac{U_{eil}}{\sum_i U_{eil}} \times C_l$$

Where,

$C_l$  is the Transmission Charge of the line as per modified linewise transmission charges obtained under Regulation 9.

$$\frac{U_{eil}}{\sum_i U_{eil}}$$

is the marginal participation factor

**(E) COMPUTATION: DETERMINATION OF SHARING OF TRANSMISSION CHARGES**

5.17 The following steps shall be followed:

5.17.1 Using AC load flow, marginal participation factors shall be computed for determination of transmission system utilization due to marginal injection / drawal at each Generating Station / demand node.

5.17.2 YTC of each line based on modified line wise YTC will then be attributed to injection/drawal for peak block. Such YTC is allocated to each agent in proportion of the change in the flow in network branch affected by that agent.

5.17.3 The following steps shall be followed for calculation of AC-UBC charges:

(a) Following files shall be taken:

- i. Modified YTC file for the month and
- ii. Base case file

(b) Import Base case file in software

(c) Run Load flow and obtain Marginal Flow (MF) file.

(d) Marginal flow file shall be modified as follows:

- For Generators or sellers with identified buyers or beneficiaries for full capacity (for example- Rihand, Sipat etc.)- MF be reduced to zero
- For Generators or sellers having LTA to target region, MF values to be retained as it is.
- For Generators or sellers having part LTA to target region and part tied up capacity - MF for injection corresponding to tied up capacity to be reduced to zero and MF for

injection corresponding to untied capacity is retained (Example is detailed at Clause below).

- (e) Negative Marginal Factors be made zero
- (f) Marginal participation factors of less than 0.0001 shall be taken as zero
- (g) MF file to be normalized so as to make total MF as '1'.
- (h) Multiply MF file (as modified above) with MTC file
- (i) Node wise charges are allocated.

5.17.4 Following illustrative example is for clarity on clause (5.17.3) (d) above

(1) A Generator "A" (1000 MW) is located in Western region. "A" has taken Long term Access to target region as NR-300 MW, WR-400 MW. "A" enters into PPA with Haryana (say) for 250 MW. Now his LTA to target region for untied capacity shall be NR-50 MW, WR-400 MW.

(2) "A" has actual injection of 900 MW for the peak block of the month. This injection has to be segregated into injection corresponding to untied capacity and injection corresponding to long term PPA with Haryana. This shall be done as follows: (i) Injection corresponding to untied capacity of  $(400+50) \text{ MW} = 450 * 900 / 700 = 578.6 \text{ MW}$  (ii) Injection corresponding to capacity tied Long term / Medium term =  $250 * 900 / 700 = 321.4 \text{ MW}$

(3) For the capacity under 2(i) above, Generator A will have to bear the injection charges and its marginal factor shall be retained

(4) For the capacity under 2(ii) above long term buyer of Generator A will bear the drawal Charges and this injection at 2(ii) above shall not be considered while calculating injection charges for Generator A.

- 5.17.5 Transmission charges based on Hybrid Methodology in Rs for each DIC in each month will be computed.
- 5.18 The charges as allocated to each demand node shall be grouped together within geographical boundary of a State .
- 5.19 Usage based charges for billing towards LTA/MTOA shall be calculated only on drawal nodes (as drawal charges) and for Generating Stations who have Long Term Access to target region (as injection charges) corresponding to untied power. Charges shall not be calculated for generating stations or sellers with identified long term customers/medium term customers/ beneficiaries with whom PPA have been signed.
- 5.20 For generating stations having no Long term access or medium term access, the transmission charges attributable to such generators shall be calculated as injection charges (as for generators with LTA to target region with untied capacity) under AC-UBC Component. The charges of other DICs on whom AC-UBC charges have been computed shall be scaled up to the extent of charges attributable to such generators.

## Annexure-II

**Surge Impedance Loading to be considered for determination of utilization of transmission line under these Regulations**

SIL for different voltage levels and conductor configuration		
Voltage(KV)	Number & size of conductor	S.I.L (MW)
765	4x686	2250
765	4x686	614
Op at 400		
400	2x520	515
400	4x420	614
400	3x420	560
400	2x520	455
Op at 220		
220	420	432
132	200	50