CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

Draft Central Electricity Regulatory Commission (Transmission Planning and other related matters) Regulations, 2017

Explanatory Memorandum

1. Background:

1.1. Transmission infrastructure is backbone for operation of a competitive electricity market. The Electricity Act, 2003 ushered an era of de-licensed generation and Open Access. Transmission is the link which synergises these two. However, achieving synchronization between a licensed activity of transmission and an open market & de-licensed generation coupled with Open Access poses few challenges as compared to the planning carried out with identified location & capacity of Inter-State Generating Station (ISGS) and their identified beneficiaries.

1.2. After implementation of the Electricity Act, 2003 and Open Access in Inter-state Transmission System (ISTS), for development of a robust transmission system in the country, the Commission in 2004 framed Regulations on Open Access in inter-state transmission system which were modified in 2009 namely Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access to the inter-State Transmission and related matters) Regulations, 2009 (Connectivity Regulations). The Commission also notified regulations like Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2010 (Sharing Regulations) and Central Electricity Regulatory Commission (Grant of Regulatory Approval for execution of Inter-State Transmission Scheme to Central Transmission Utility) Regulations, 2010 keeping in view spirit of the Act, National Electricity Policy and National Tariff Policy.

1.3. The Commission has received views of Transmission System Planners namely CEA and CTU and the System Operator, POSOCO on the Connectivity Regulations. IPPs have also raised their concerns in regard to the present mechanism and issues faced by them. Further, CEA and CTU are moving ahead from their initial position of requiring firm beneficiaries of Inter-State Generating Stations (ISGSs) in advance to a more market friendly approach and CEA mooted the concept of General Network Access (GNA) to address the issues raised by CEA, CTU, POSOCO and IPPs.

1.4. In view of the issues raised by CEA, CTU, POSOCO and IPPs, the Commission decided to have a relook at the prevailing Regulations and accordingly published "Staff Paper on Transmission Planning, Connectivity, Long Term Access, Medium Term Open Access and other related issues (Staff Paper) in September, 2014 to seek views of Stakeholders on important issues of Transmission Planning, Connectivity and Access to ISTS in the country vide public notice dated 19.9.2014.

1.5. Subsequently, the Commission vide Office Order dated 20.2.2015 constituted a Task Force for giving input for framing of Draft Regulations on Transmission Planning under Chairmanship of Sh. A. Saxena, Chief (Engg.), CERC. The Task Force submitted its report along with draft regulations to the Commission in the month of February, 2016. The report of the Task Force is attached at Annexure-I.

1.6. The Commission vide office order dated 8.12.2015 constituted a Committee to review transmission planning, connectivity, long term access, medium term open access and other related issues under Chairmanship of Sh. Mata Prasad, power system expert. The Committee has submitted its report to the Commission in the month of September, 2016. The report of the Committee is attached at Annexure-II.

1.7. While framing draft regulations on transmission planning, the Commission has considered recommendations of both the Taskforce and the Committee as stated above.

1.8. The transmission planning criteria published by CEA covers the planning philosophy, the information required from various entities, reliability criteria, broad scope of system studies, etc. These Regulations on Transmission Planning will cover the governance aspects of transmission planning. The regulatory provisions would be enforceable through the powers of the Commission specified in the Electricity Act 2003.

1.9. Further, CEA has been mandated to formulate short-term and perspective plans for development of the electricity system and co-ordinate the activity of the planning agencies for optimal utilization of resources under Section 73(a) of the Act. In order to fulfil this function, CEA has constituted Regional Standing Committees for Power System Planning (SCPSP) to firm up transmission addition proposals.

1.10. CTU has been mandated to discharge all functions of planning and co-ordination relating to inter-State transmission system with STUs, Central Government, State Governments, RPCs, CEA and transmission licensees to ensure development of an efficient, coordinated and economical system of inter-State transmission lines for smooth flow of electricity from generating stations to the load centres under Section 38 of the Act.

1.11. Regulation 3.7 of the CERC (Indian Electricity Grid Code) Regulations, 2010 provides connection between transmission planning and its actual implementation whereby it is provided that the actual program of implementation of transmission lines, interconnecting transformers, reactors/capacitors and other transmission elements will be in accordance with the Detailed Procedure under Central Electricity

Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009 as amended from time to time.

1.12. We note that CERC (Indian Electricity Grid Code) Regulations, 2010 provides in Part-3, Planning Code for inter-state transmission which provides for Planning philosophy and Planning criterion. In view of the proposed draft planning regulations it is proposed that Part-3 of CERC (Indian Electricity Grid Code) Regulations, 2010 shall be deleted.

2. Need for separate Transmission Planning Regulations

2.1 The issue of requirement of a separate Regulations on transmission planning was deliberated during meetings of the Task Force for giving input for framing of Draft Regulations on Transmission Planning under Chairmanship of Sh. A. K. Saxena, Chief (Engg.), CERC whereby all the participants agreed that the Regulations on transmission planning would facilitate transmission planning process. A separate Regulation shall cater to following needs:

(i) To explicitly define roles and responsibilities of various entities to facilitate and strengthen transmission planning process.

(ii) To streamline the procedure for transmission planning, collection and exchange of data among different stakeholders and constituents

(iii) To align the transmission planning with changing scenario in power sector such as development of power market, integration of renewable and increase in congestion

(iv) To involve DISCOMs in the transmission planning process;

(v) To monitor implementation of ISTS and associated intra-State transmission system for timely completion and proper utilization

(vi) To put in place a mechanism to review transmission plan;

(vii) To create archive to retain year-wise/quarter-wise data base and corresponding system studies files for future references.

(viii) To ensure adequate and trained manpower for conducting transmission planning exercises in CTU as well as in STUs.

3. Salient Features of the Draft Regulations

3.1 Important definitions:

The Draft Regulations suggested by the Taskforce have proposed to form two study Committees viz. Central Study Committee and Regional Study Committee with following functions:

3.1.1 **Regional Study Committee**

(a) The Regional Study Committee shall be constituted in each region comprising of members from CEA, all STUs, DISCOMs, SLDCs, RLDC and RPC in the region. The Regional Study Committee shall be headed by CEA and CTU shall be coordinator. Further, one STU of the region shall take the lead role among STUs on rotational basis and represent the Regional Study Committee in the Central Study Committee and shall also be responsible for collecting data, as defined in the Detailed Procedure to be formulated by CTU and conducting studies at regional level for recommending to the Central Study Committee.

(b) The data to be compiled by Regional study Committee may consist of anticipated load and generation addition within the state, existing / planned transmission network within the state, status of planned transmission system within the State.

(c) Additional role of coordinating matching intrastate transmission system has been given to Regional study Committee. This has been done in view of many instances of mismatch between inter-state and intra state transmission system coming to light. The same was observed during various Orders of the Commission including Order dated 5.8.2015 in Petition No. 11/SM/2014. It was observed in Petition No. 11/SM/2014 as follows:

"20. Keeping in view the mismatch between commissioning of transmission system by an ISTS licensee and upstream/downstream system of STU, we are Order in Petition No. 155/MP/2016 Page 18 of 19 of the view that ISTS transmission licensees and STUs should also sign such Implementation Agreement for development of ISTS and

downstream system in coordinated way to avoid any mismatch. We direct staff of the Commission to examine this aspect and propose necessary changes required in the 2014 Tariff Regulations to enable an ISTS licensees and STUs to enter into Implementation Agreement".

(d) It is desired that Regional study Committee should periodically monitor the status of matching downstream system as well as associated intrastate system which is necessary for optimum utilisation of inter-state system.

3.1.2 **Central Study Committee**

The Central Study Committee shall comprise of members form CEA, CTU, one STU from each region on rotational basis, NLDC, all RPCs. The Central Study Committee shall be headed by CEA and shall be responsible for compiling data and studies received from the Regional Study Committees and conducting studies at national level for discussion in Standing Committee Meeting on Transmission Planning to finalize the transmission plan.

3.2 Central Repository of Generators

3.2.1 Further Mata Prasad Committee has suggested formation of Central Repository of Generators. It has been indicated that at present, there is no central repository of generators which are in planning and construction stage and this causes an information-lag for the planners of transmission system. A number of IPPs have been commissioned in the 11th and 12th Plan which were not being monitored by the CEA and were not considered in the system studies undertaken by CEA and CTU for transmission Planning. After de-licensing of generation, the need for a central repository is more vital than ever. Such a repository should contain information in regard to the likely generation additions including Renewable Energy projects interconnected to ISTS as well as Intra-State Transmission System, starting from inception of the

Generating Station till its commercial operation with periodic update of their status.

3.2.2 Periodicity of update regarding specified milestones and other details should be specified in the Detailed Procedure to be prepared by CEA. The Committee recommended that the frequency of updating of status may be monthly for the units to be commissioned during the ensuing year and quarterly for other units. In addition, a generator should also indicate status of signing of PPA in its periodic update to Central Repository. This would also be in line with the duty entrusted upon Generators under Section 10(3) of the Act. Section 10(3) (a) of the Act provides for submitting technical details to Appropriate Commission and Authority and Section 10(3) (b) provides for coordination with CTU or STU as the case may be.

3.2.3 Accordingly, it is suggested that a Central Repository of Generators be created in CEA where any generation project developer proposing to set up a new generation plant must register itself. CEA may seek requisite information from the generation project developer under Section 74 of the Act. This will not only provide vital data for the transmission planning process but would alleviate problems due to uncoordinated generation additions. CEA may indicate the format in which the information has to be furnished by the Generators at the Central Repository.

3.3 Roles and responsibilities of various entities:

3.3.1 The draft Regulations specifies roles of various entities like CEA, CTU, Central Study Committee, Regional Study Committee, STU, NLDC, RLDC, SLDC, Generators and DISCOM/Bulk Consumer/Transmission Licensee as required vide the proposed Regulations. The roles of entities assigned in these regulations are in addition to roles defined in the Act and other Regulations framed under the Act and shall be read in conjunction with the Act and regulations framed under the Act as amended from time to time.

3.3.2 The Regulations has proposed to introduce State power Committee at State level. Mata Prasad Committee Report has provided as follows:

"6.14.4 Formation of State Power Committee

A State Power Committee similar to Regional Power Committee may be established at State level to coordinate issues affecting state involving all stakeholders within States. Such a committee should coordinate between STU and DISCOMs for assessment of GNA and between SLDC and DISCOMs for demand/load forecasting. Such a Committee may also see that State has a balanced purchase portfolio. There should also be need of coordination between Regional Power Committee and State Power Committee."

Accordingly we have proposed the formation of State Power Committee by State Government. The Committee is proposed to have functions as proposed above in addition to any other functions to be assigned by State Government.

3.3.3 The Regulations have proposed to include Member Secretary of State Power Committee as a member of Central Study Committee. Till the time that State Power Committee is framed by States, respective STUs shall be member of Central Study Committee.

6.14 **Need for a National level Standing Committee on Transmission Planning**:

6.14.4 Presently, Standing Committee on Transmission Planning is held under the aegis of CEA at regional level.

6.14.5 In view of the evolution of National Integrated Grid, a need has been felt for conducting Standing Committee on Transmission Planning for all India Grid at National Level. Hence, these regulations propose to conduct one National Standing Committee on Transmission Planning in place of Regional Standing Committees. CEA may like to give its views.

6.15 **Transparency in Planning Process**:

6.15.4 We have considered FERC Order 890 and Order 1000 which provides for principles of planning as specified by FERC. We agree with the FERC

order that transmission planning should be done in a transparent manner involving all stakeholders. Considering this and the need of transparency following is required to be ensured by CEA, CTU & STU while carrying out planning of transmission system:

(a) Transmission planning meetings must be open to all affected parties including, but not limited to, all transmission and interconnection customers and other stakeholders.

(b) Transmission providers to disclose to all customers and other stakeholders the basic criteria, assumptions, and data that underlie their transmission system plans.

(c) Transmission providers are required to provide in writing and make available the basic methodology, criteria, and processes they use to develop their transmission plans.

(d) The Stakeholders themselves or through their independent third party can replicate the results of the transmission planning studies and discrepancies/comments can be furnished to Central Study Committee or CTU or STU.

(e) Critical energy infrastructure information and commercially sensitive data may be withheld by planning agencies. Provided that CEA shall be the final Authority to decide any information to be withhold.

6.15.5 The broad principles of transmission planning shall be as follows:

(a) To plan transmission system for optimal utilisation of resources to subserve the interests of the national economy with due consideration to power market.

(b) Likely closing of old/inefficient plants.

(c) Facilitate realization of the policy objectives for RES,

(d) Duly considering adequacy of system from the perspective of black start /start-up supply.

(e) Requirement of Reactive Power

(f) R-O-W Limitations

(g) New and Emerging Technologies

(h) Cost-benefit analysis

(i) Upgradation of existing system

(j) Other considerations like public policy, cross border interconnection, etc.

6.15.6 If required by CEA, it may add principles of planning through a separate procedure to be notified under these Regulations.

6.16 **Studies to be done while Planning**:

(a) During meeting of the Task Force, the representative of CEA stated that it should be left to the discretion of the transmission system planners to choose types of studies to be conducted by them and assumptions to be considered for transmission planning. Therefore, the studies required for planning transmission system have not been explicitly covered in these Regulations and shall be as specified by CEA in Transmission Planning Criteria issued by CEA.

During meeting of the Task Force, few objective functions like loss of load expectation, congestion hour target, average POC target and average transmission loss target were proposed to be covered under principles of transmission planning. Further it was suggested that Network Modelling Guidelines, Zone-wise Reliability Indices and Value of Lost Load (VOLL), etc. defined from time to time should be specifically specified by CEA. We agree that all these components are important for robust planning. However more deliberations and Sector maturity is required before we consider them and hence the same shall be considered in future.

6.17 Transmission Planning Criteria:

3.6.1 The draft Regulation specifies that the Technical criteria to be followed by planning agencies shall be Transmission Planning Criteria published by CEA as amended from to time and also lists the documents issued by CEA, CERC and MoP to be considered while planning.

3.6.2 Mata Prasad Report have made additional comments on technical aspects which should be considered while planning as follows:

(i) Central Electricity Authority (CEA) prepares the "Perspective Plan for Power" based on "Annual Power Survey" while CTU executes the Planning of Transmission lines for evacuating power from the integrated power plants in the integrated All India Synchronous Grid.

(ii) Earlier the power system planning was done on regional self-sufficiency basis involving all the five Electrical Regions in India and any surplus or deficit was managed through interconnected power flow. From about 1994 the power generation has witnessed major developments through Public and Private sector power plants and affected the evacuation/transmission system in the grid. The transformation from Regional Grids to all India-Synchronous grid and the development of hybrid network with bulk power evacuation through HVDC system have expanded the network, and the density of network has increased. This has resulted in more transmission lines in some areas while some other areas suffer constraints due to inadequate or inapt transmission.

(iii) The planning criteria, adopted in India, has so far been deterministic, although probabilistic considerations are being considered but good amount of data acquisition regarding growth expansion in generation and transmission need collation for use in Planning.

(iv) It has been felt that normal planning practice needs extensive studies that include load flow and stability simulations with numerous outage contingencies based on grid operation and reliability as also system security considerations for such a vast synchronous grid. It is worth noting that both these organizations have, as on date, necessary tools to carry out these types of studies and these tools are being upgraded continually.

(v) Even though these two organizations have at their disposal advanced software/tools to perform system planning studies both

these organizations suffer from acute and chronic shortage of skilled and trained engineering manpower. The available resources are too meagre and require strengthening to undertake such an enormous task on their own, at this time. A look into the corresponding figures of the System Studies department in China and Brazil staffed with highly qualified experts, with advanced training possessing M. Tech and Ph. D. in various disciplines of power system planning that includes technical, financial and commercial aspects, and handle extensive generation expansion with associated transmission studies as per international standards and practices. The expertise cannot be built overnight and the engineering Committee to handle the Indian power system planning need good amount of planned training before they can be entrusted to handle proper system studies to meet the challenge of power evacuation to the same degree of reliability and security standards that are followed in the industrialized countries. It is not an understatement to say as to how much is needed to supplement the power system departments of CEA and CTU to meet such a challenge. The Administration/Government responsible for both CEA and PGCIL has to look into such shortages as fast as possible and plan their specialized training so that the All Indian Synchronous Grid can be planned and built to meet high standards; if not, then system planning in India would continue to suffer and will continue to be insecure leading to uneconomical and unreliable system. Now reverting to technical aspect of system planning in India the committee feels that following be incorporated in the System Planning Criteria on 2013 which, in itself, is quite exhaustive.

(vi) CTU should carry out systematic load flow studies covering all credible contingencies with possible voltage constraints. It is also important to execute and determine the load characteristic in relation to frequency and voltage parameters. This should be jointly done by PGCIL and POSOCO with the association of CPRI and IITs. At present we are using the load characteristics (PQ Versus V and f)

as defined by Kundur or PTI and this may not be realistic to the Indian Grid.

(vii) The Dynamic Stability Studies of heavily loaded transmission system with High Gain Static Excitation system along with PSS and Limiters in action should be carried out.

(viii) Voltage Stability Studies should be done in detail. In this connection it is advised that CEA and CTU in particular should refer to WSCC Document entitled "Voltage Stability Criteria, Undervoltage Load Shedding and Reactive Power Reserve Monitoring" issued in 1998. This document was a result of findings of two major grid disturbances that took place in July/August 1996, similar to what Indian Power System experienced in July 2012. This document defines very well the methodology of conducing reactive power studies and reactive power reserve margins. The development of VQ curves under the worst contingency has been described in detail.

(ix) It is necessary to evaluate the impact of SCR and Inertia Constants of large size generators in the Public and Private Sectors on load-ability of lines. Refer to a classic paper by Kimbark-Clark diagram that shows the steady state stability limits as influenced by loads and reactive sources at intermediate bus-bars.

(x) The liberal application of reactive sources on the lines in the form of shunt reactors, passive and dynamic compensation and in special cases use of Phase Angle Regulators at strategic nodes to control the loop power flows and optimize the loadings on lines needs to be addressed. The line connected shunt reactors applied on EHV lines are essential part of the line and should not be disconnected. If required the same lines could be provided with SC or TCSC as the case may be to maintain an acceptable voltage profile.

(xi) It is strongly felt that appropriate allocation of shunt reactors on transmission lines as un-switched reactors, switched reactors on EHV busbars and MV reactors on tertiary winding of ICT should be managed in an approved sequence so that the EHV lines and the power system maintain the normal voltage profile within limits.

(xii) Besides the passive shunt reactors provided in the system as indicated above, the need of dynamic support in the form of SVC or STATCOM is warranted to take care of post-fault developments. The quantum of dynamic resources in the form of SVC and STATCOM would be over and above the quantum of passive compensation provided and as a thumb rule it could be around 50 % of passive capacitive resources. Such provision of dynamic resources is quite normal and practiced all around the developed world.

(xiii) Appropriate management of dynamic resources must consider the necessity of "assured" quantum of dynamic compensation. In this connection attention may be drawn to a paper " Static Compensators and their relation to system stability" by Tanguay and McGillis from Hydro-Quebec indicating the methodology to determine the number of SVCs required in addition to that considered in System studies. This is important as several fairly large sized and good number of SVC/STATCOMs have been planned in the Indian network and their availability and system reliability has to be assured.

(xiv) There should not be any confusion of load-ability limits of EHV transmission lines. In Integrated grid operation with appropriate compensation prevalent wind and temperature conditions under peak load period no constraints on the load flow limits on the line is expected and depending upon the weather and temperature conditions, the line loading can exceed the thermal limits.

(xv) In all these efforts in adaptation of latest techniques and software for system studies by CEA, PGCIL and POSOCO, it may be desirable some assistance is taken from reputed consultants like Hydro-Quebec, Teshmont, RBJ all from Canada and PRDC from India with whom PGCIL had good exposure.

(xvi) CEA, Transmission Planning Criteria provides that during operation, following the instructions of the System Operator, the generating units shall operate at leading power factor as per their respective

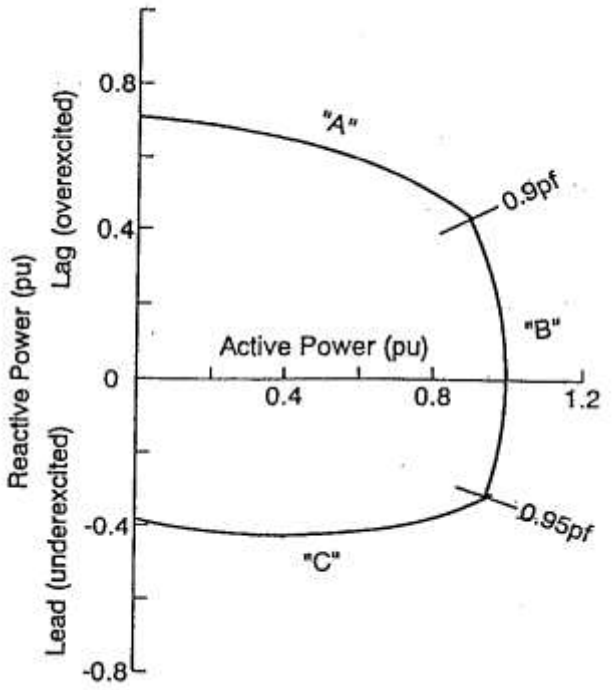
capability curves. In this regard a short description on understanding of Generator Capability Curves is as detailed below:

a) The Supplier of Generating units furnish the Generator Capability or Performance Curves that indicate Power output, Maximum Stator Current, Maximum Rotor current, maximum lagging output, leading reactive power output, rotor angle limiter and end-iron heating limit. This is the Capability Curve defined by limiting values. For practical operational purposes realistic output of P and Q over the full range of power factor should be prepared by the Plant Operator and use as Operating Instructions for the power plant.

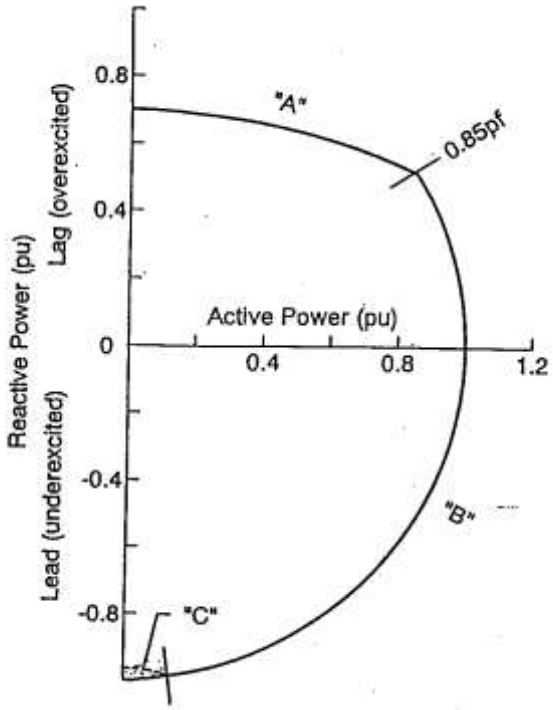
b) The rated power factor of all the Generating Units installed so far has been 0.85 lagging with given rated output P at this Power factor. The corresponding Q output is around 55% of rated MVA of machine. Although the unit can supply lagging Vars to the system to the tune of 55% but this is not practical, especially with generators remote from load centres, as the lagging Var requirements of the load have to be met and managed locally and not transported over the system. Such transportation will be creating more power loss and affect the voltage profile. This results into a situation where the Generators are operated at about 0.95 instead of 0.85 pf lagging. Such operation results into loss of about 15-20% in the stability margin. See reference [1].

c) The Turbo-Generators with SCR around 0.5 have limited MVAR absorption capabilities and that too is restricted by end-iron heating, rotor angle limiter of around 75° and further need of keeping an operating margin of atleast 10%. This means under steady state operating conditions the thermal has limited reactive power absorption capability. With restraints of Quadrature Axis Vibration, the loading pattern on Generator becomes quite restrictive and should not be violated without endangering the life of the Generating units.

d) To meet such operational requirements of the network, the system must be provided with suitable reactive power absorption devices, especially under light load conditions.



Thermal Generator Typical Capability Curve



Hydro Generator Typical Capability Curve

(xvii) There is a need to assess the Available Transfer Capacity (ATC) of existing system through independent experts. It is recommended that Commission may entrust the task to third party for independent assessment of ATC for existing system and measures that can be employed to enhance the transfer capability of existing system may be through SVCs/STATCOMs etc.

(xviii) Keeping above points in view a few technical aspects have been included in draft Regulations.

4. Introduction of General Network Access

The concept of General Network Access has been proposed by the Mata Prasad Committee. It is proposed to be equal to maximum injectable

capacity for a generator and anticipated quarterly injection / drawal for a State. Although elaborate procedures on application of GNA by a State as well as generators shall be notified in a separate regulations, but the input of GNA shall be used for planning and hence is being covered in these Regulations also.

5. Broad Procedure for Transmission Planning:

5.1. Staff Paper on Transmission Planning, Connectivity, Long Term Access, Medium Term Open Access and other related issues (Staff Paper) in September, 2014 proposed following formulation for Connectivity and Long Term Access:

A. Alternative-I

(i) Transmission expansion is initially attributable to generators and later shifted to beneficiaries.

(ii) Choice of product will be given to applicant and in accordance with the choice, applicant will get transmission service.

(iii) Construction BG to be furnished by applicant would be equivalent for capital investment to be made in transmission system. In case applicant has full site control (Availability of land, Water, Environment clearance, etc.) then amount of bank guarantee would be less.

(iv) In case of no transmission system augmentation is required, BG will be corresponding to seven year zonal transmission charges.

(v) Three types of products are proposed to be offered in Alternative-1:

Option-A: Connectivity plus Full Network Access

Option-B: Connectivity Access

Option-C: Connectivity plus Injection Access

Summary of Option-A, Option-B and Option-C is given below:

Type	Network	Bank Guarantee (BG)	Facility	Exit	Transmission Charges

A	Connectivity plus network Access	Connectivity line (non-refundable) plus Network Access - Adjustable BG	Full Access	12 year NPV of transmission tariff for new assets	Usage based
B	Connectivity	For full cost of Connectivity Line (non-refundable)	Only assured connectivity	Bank Guarantee will not be refunded	Fixed Monthly tariff for connectivity line plus 25% of Average Access charge for installed capacity (Adjustable against STOA
C	Connectivity plus injection	Connectivity (non – refundable) plus 50% of Network- Adjustable BG	Only target Region access	12 year NPV of transmission tariff for new assets	Usage based
^ For construction of connectivity portion, cash advance will be taken while for Access portion Bank Guarantee may be taken. ^^ The Bank Guarantee shall be initially valid for 5 years .It should be issued by Bank / Financial institution approved by CTU.					

B. Alternative 2: GNA

Under Alternative 2 transmission planning execution and transmission cost allocation should be based on GNA concept as proposed by CEA and CTU as detailed under:

(i) Whenever a Generator or Drawal customer wants connectivity and access to ISTS, it will declare its GNA requirement.

(ii) For Generator, GNA would correspond to its Net Installed Capacity (i.e. Installed capacity – Auxiliary consumption). Generator should also consider its overload capacity and that shall be considered as its GNA.

(iii) Transmission system shall be planned based on GNA requirement of Generator and demand customer and 100 % evacuation irrespective of target region is proposed to be assured.

(iv) To handle the scenario when drawl GNA is less than Injection GNA then planned transmission system would be developed in

accordance with drawal GNA. In this situation option would be given to Generators to bear both injection and withdrawal GNA for differential i.e. for an application period if additional (new) demand GNA requirement is say 7000 MW and application for injection GNA is 10000 MW then Generator may be asked to bear GNA responsibility of both injection and withdrawal for 3000 MW in addition to 7000 MW injection GNA.

(v) Confirmation from Generators and demand customers may be sought before starting the tendering activities for planned transmission system and transmission planning, if required, may be modified.

(vi) A status check of progress of statutory clearances like land, fuel, water and environment clearance may be checked before commencement of execution of transmission system. In case it is found to deficient to a large extent, the executing agency for transmission system may approach Commission for guidance.

(vii) Both Generator and demand customer shall submit bank guarantee corresponding to their GNA.

5.2. Mata Prasad Committee has suggested following with respect to transmission planning.

5.2.1. "We note that many of the stakeholders and experts have pointed out difficulty in planning of transmission system based on LTA as many of the DISCOMs are not inviting Case-1 bids which in turn leads to lack of long-term PPAs and lack of LTA applications. The generators have, therefore, been seeking LTA with target region but in due course of time find need for change in target region depending on Case-1 bids in which they succeed. In such a situation, generators are required to pay relinquishment charges in the target region for which they had sought LTA initially and be in the queue for seeking LTA or MTOA in the region in which they have entered into PPA.

5.2.2. We also find that NEP and Tariff Policy specify that CTU/STU should undertake network expansion after identifying the requirements in consonance with the National Electricity Plan and in consultation with stakeholders, and taking up the execution after due regulatory approvals and prior agreement with beneficiaries would not be a pre-condition for network expansion.

5.2.3. There has been huge generation capacity addition in the country in last five years resulting in availability of substantial spare untied generation capacity in the system. Some of these stations are capable of providing power at cheap rates. Availability of National Grid facilitates transfer of power from available cheaper sources. This has opened up opportunities for economic despatch of stations. Many states are backing down their own generating stations or not scheduling power from costlier ISGS and buying power from other sources through medium /short term open access. This type of situation was not envisaged earlier and has not been incorporated in planning process. The present transmission planning philosophy doesn't take care of economic dispatch principle.

5.2.4. In view of these provisions and the difficulties arising due to present planning process, we feel that there is a need for change in the basis for transmission planning.

5.2.5. Alternative-1 brought out in the staff paper is similar to currently prevailing dispensation which may pose difficulties such as generators seeking only connectivity, part LTA, lack of involvement of 'Withdrawal DICs' in regard to their drawal requirement from ISTS as listed in Chapter-2. Suppose a generator initially only seeks Connectivity Access (Option-B of Alternative-1). It will seek LTA or MTOA subsequently only when DISCOM(s) call for bids or in the absence of Case-1 bids, it may seek LTA with target region(s). Thus, the development of ISTS would continue to face the difficulties which

are being faced currently. In case, a generator applies for LTA only after it qualifies in Case-1 bids called by a DISCOM for long-term supply, LTA can get operationalized only if the margins are available in the existing transmission system or after augmentation of transmission system for evacuating the power of generator to the LTA beneficiary(ies). Thus, development of transmission system would still remain dependent on PPAs, which is not the intent of NEP and Tariff Policy. Further, Alternative-1 does not seek any involvement of Withdrawal DICs for whom transmission system is being developed. This will pose problem in development of transmission system which should be adequate for delivery of power from desired sources to beneficiaries.

5.2.6. *Most of the stakeholders have suggested that Shallow Connection may be allowed for renewable projects and a few have opined that Shallow Connection may be resorted to for renewable as well as conventional projects. Planning of transmission system in the context of large scale development of renewable energy sources contemplated by Government of India have been suggested by stakeholders and listed in Chapter-4.*

5.2.7. *GNA based development of transmission system, on the other hand, is not linked to PPAs. Development of transmission system under GNA would be based on (a) anticipated generation scenario (b) Withdrawal GNA representing the quantum of power each STU/Bulk Consumer anticipates to draw from the ISTS (c) Injection GNA. This would address the problems being faced presently on account of generators not seeking LTA or seeking LTA for a quantum much less than Installed Capacity and would also get requisite participation of and contribution from the Withdrawal DICs, who are in best position to project their drawal requirements, as part of the transmission planning process.*

5.2.8. While some of the STUs/DISCOMs have supported GNA based transmission planning, some of them have made an observation that concept of GNA is not fully understood by them and it may need discussion. A short note in regard to the concept of GNA was circulated on 11.5.2016 before inviting STUs/DISCOMs with a request to furnish their comments in the meeting to be held on 17.5.2016. The concerns raised by STUs/DISCOMs have been taken care of while formulating the proposed GNA in this report.

5.2.9. We find that the main concern of DISCOMs/STUs is difficulty in proper assessment of 'Withdrawal GNA' in view of uncertainties in regard to demand forecasting and procurement of power from sources outside the State depending on relative cost economics of their generation and levy of penal charges for drawal beyond GNA. Few States have expressed that it may not be possible for them to forecast their import/export requirement from ISTS four years in advance since it will change due to change in policies of Government for attracting investment in the State and addition of renewable capacity and change in scenario of open access customers. They have raised a concern that their withdrawal requirement changes seasonally.

5.2.10. The Committee agrees to the point underlined by CEA that the State entities are in best position to project their drawal from ISTS keeping in view various State specific factors in regard to demand, internal generation, open access, etc. Further, STU is obligated under Section 39(2) (b) of the Electricity Act 2003 to discharge all functions of planning and co-ordination relating to intra-state transmission system and under Section 39(2) (c) of the Electricity Act 2003 to ensure development of an efficient, co-ordinated and economical system of intra-State transmission lines for smooth flow of electricity from a generating station to the load centres. In our opinion, as part of the process to fulfil this mandate, the STU needs to assess the anticipated withdrawal from ISTS in different seasons. We have, therefore,

proposed that the STUs may assess demand incident on ISTS in coordination with DISCOMs, generators located in the State, CTU, etc., as obligated under Section 39(2) (b) of the Act. Further, Withdrawal/Injection GNA so assessed by the STUs would be discussed in a Validation Committee under the aegis of CEA, wherein collective wisdom and knowledge of concerned players based on the load flow studies for different scenarios carried out by CTU based on economic principles of merit order operation would enable a fair assessment of demand incident on ISTS in different seasons. The Committee suggests that States should be allowed to seek seasonal GNA. The Committee also recommends that STU may revise its GNA quantum for the sixth year. Regarding the contention of STUs/ DISCOMs regarding uncertainty of GNA due to open access customers, it is to be noted that even if a customer avails power under open access from outside the state, overall GNA of STU would remain same considering that in such case STU's drawal from ISTS for supply to consumers other than open access consumers will be less and to that extent the drawal of open access consumers will increase. STU may develop a mechanism for charging deviation transmission charges from its consumers as per Regulations framed by SERC. Further, the DISCOMs/ Bulk Consumers would be required to pay transmission charges on the basis of drawal from ISTS as captured in the Base Case for determination of PoC charges. Keeping in view the uncertainties and difficulties in regard to assessment of demand as expressed by STUs/DISCOMs, Committee recommends that additional transmission charges be levied only if drawal of STU/DISCOMs in a State from the ISTS is beyond 120% of the Withdrawal GNA projected for the corresponding period in respect of the STU. The Committee is of the view that the additional transmission charges for the drawal above 120% of GNA may be kept equal to 125% of the normal transmission charges.

5.2.11. The Committee finds that GNA based transmission planning has by and large been found to be acceptable to CEA, CTU as well as POSOCO. We also find a fair degree of in-principle acceptance of GNA by DISCOMs and STUs but for certain clarifications. We feel that the proposed methodology detailing the Connectivity, Access, time lines for application/grant of Connectivity and Access, sharing of transmission charges on the basis of usage, treatment of mismatch between commissioning of generating station and transmission system, etc., as detailed herein would set at rest most of their concerns."

5.3. Keeping in view the suggestions of Mata Prasad Committee Report it is proposed to carry out transmission planning based on GNA applications (as and when made effective) of Generators, States, other stakeholders as provided for.

6. Features of GNA of State

6.1. States shall be required to apply for GNA as a separate application to CTU. The modalities of GNA shall be covered in separate Regulations. However for clarity the same is explained here. The projected/anticipated quarterly maximum import/ export requirement in respect of a State from ISTS will be provided by the State Transmission Utility (STU) 4 years before for a period of 5 years to CTU. For example, in January 2018, STU should provide its peak quarterly requirement from ISTS (Injection/ Withdrawal GNA) for years 2022, 2023, 2024, 2025 and 2026. Such data should be provided on Annual rolling basis i.e. in January 2018, STU should provide its GNA for 2022-2026.

6.2. Such data should be provided by concerned STU after taking into account the anticipated demand figures from each DISCOM in the State and likely generation from the generating companies having generating stations in the State. STU can revise its projected GNA for the year 2023 in the year 2019 but would not be allowed to revise the same for the

year 2022 keeping in view construction timeline for transmission system being of the order of 3 years plus 1 year processing time. For the first year of implementation of GNA, STU should provide Injection/Withdrawal data for immediate 4 years also. In the present example for years 2018, 2019, 2020 and 2021. This will aid in estimating projected GNA for subsequent years.

7. Planning for Renewable:

7.1. Mata Prasad Committee has stated as follows:

a) Few states have suggested that renewable be connected at lower voltage levels so that losses in overall system are reduced. They have also suggested that at present Renewable Energy (RE) is not considered in totality in transmission planning as during peak load period most of RE sources would be generating less. In future RE would make power flow unpredictable and maximum RE would prevail for only few hours (typically 3 to 4 hours in a day) and would have temporal variation. Transmission planning for RES should consider emergency rating for transmission lines.

b) The Committee is of the view that transmission system may be planned by CTU/CEA based on estimated capacity additions in perspective plan and RPO of each State and approach CERC for regulatory approval for the same. In addition, the Standing Committee on Transmission Planning may consider margins to cater to renewable capacity additions. Sensitivity analysis may be carried out for low, moderate and high renewable capacity addition.

c) Accordingly the above has been included in draft Regulations.

8. Frequency of standing committee meeting.

8.1. Many stakeholders during the meeting of the Task Force have expressed that the SCMs should be conducted at least 4 times in a year. The Commission has also vide order dated 16.2.2015 in petition no. 92/MP/2014 observed that there is a requirement to undertake studies for system augmentation within a period of 3 months from the last date

of the month in which applications were received and intimate about the identified system strengthening within a period of next 3 months so that the applications are disposed of within a period of 180 days as required under Regulation 7 of the Connectivity Regulations. Vide the said Order, the Commission directed the Staff of the Commission to examine this issue in detail and submit proposal to the Commission for consideration. The relevant extract of the said order dated 16.2.2015 is reproduced as under:

"122. ……. The Detailed Procedure also provides that where there is more than one application for long term access in the same complex in similar timeframe, CTU shall take joint studies and prepare a consolidated proposal for transmission system strengthening. The system strengthening requirement including transmission voltage level, conductor configuration, broad cost estimates, expected commissioning schedule etc. shall be identified by CTU in consultation with CEA and respective regional constituents and intimated to the LTA applicants. It is noticed that Regulation 7 provides for a timeframe of 180 days from the last day of the month in which the application was received by CTU for processing the application for long term access requiring augmentation of transmission system. However, the Detailed Procedure outlines a timeline of about 6 to 11 months for processing the LTA applications requiring system augmentation. In our view, there is requirement to undertake studies for system augmentation within a period of 3 months from the last date of the month in which applications were received and intimate about the identified system strengthening within a period of next 3 months so that the applications are disposed of within a period of 180 days as required under Regulation 7 of the Connectivity Regulations. This should require amendment of third proviso to Regulation 10 of the Connectivity Regulations to provide that the application shall be considered as on 31st March, 30th June, 30th September and 31st December of the year for the purpose of studies to decide on the

system strengthening for grant of long term access in line with the coordinated transmission plan. We direct the staff of the Commission to initiate the process for amendment of the Connectivity Regulations and CTU to propose the amendment to the Detailed Procedure in this regard...."

8.2 Mata Prasad Committee Report has suggested for Regulatory approval of all transmission plans by the Commission. Keeping in view new requirements of GNA and the Regulatory approval, yearly planning has been proposed in the draft Regulations.

9. Review of Transmission Plan:

9.1. During the meeting of the Task Force, representatives of POSOCO and CTU stated that there should be a timeframe for implementation of transmission schemes and implementations should be monitored closely during Standing Committee Meetings for timely completion as well as proper utilization.

9.2. The Act also provides for coordination with project developer to ensure development of efficient, coordinated and economical transmission system.

9.3. Further, the issue of review of transmission plan has also been highlighted by the Commission vide order dated 12.7.2016 in petition no. 315/MP/2013. The relevant extract of the said order dated 12.7.2016 is reproduced as under:

"32. CTU should take periodic review of progress of generating projects and its transmission system and re-plan/review the transmission plans in case there is adverse progress in generation projects. The review of transmission system would depend upon status of execution of transmission system. In case works for execution of transmission system has not been awarded, CTU can re-plan according to system studies at Standing Committee Meeting. In case works for execution of transmission project has been awarded and need arises to replan, CTU should discuss the same at Standing

Committee Meeting and endeavour to ensure that transmission system required for the system conveying different meaning is only built and beneficiaries not to be saddled with charges of the system which is not required……"

9.4. In view of the above, these Regulations propose to put in place a mechanism to review implementation of transmission plan i.e. ISTS and associated intra-State transmission system.

10. Manpower Deployment for Transmission Planning:

10.1. These Regulations propose that there should be proper and adequate manpower for conducting transmission planning exercise in the utilities. CTU/STU must demonstrate that they have adequate manpower to carry out roles and responsibilities mentioned in these Regulations for planning transmission system.

10.2. CEA in consultation with CTU may prepare scheme for certification of personnel involved in planning at STU/CTU similar to the system in place for System Operators.