

Central Electricity Regulatory Commission
3rd & 4th floors, Chanderlok Building, 36, Janpath, New Delhi-11001
Telephone: 011-23753917

No: CERC/Engg/Trans/Transmission Planning/2015

19th November, 2015

To

The Members of the Task Force
(As per List Enclosed)

Subject: Minutes of the 3rd Meeting of the Task Force for giving inputs for framing of Draft Regulation on Transmission Planning.

Madam/Sir,

Please find enclosed herewith minutes of the 3rd Meeting of the “Task Force for giving inputs for framing of Draft Regulation on Transmission Planning” held in CERC on 10.10.2015.

Encl.: As above

Yours faithfully,

SD/-

(Shilpa Agarwal)
Dy. Chief (Engineering)
(Convenor of Task Force)

Members of the Task Force

Sl. No.	Name of the Member	Name of Organisation	Designation
1.	Shri A.K. Saxena	CERC	Chief (Engg.)
2.	Mr. Karuna Sarma	AEGCL	AGM (E)
3.	Ms. Arundhati Ghosh	WBSETCL	Chief Engineer, CPD
4.	Mr. Rajiv Porwal	POSOCO	AGM (System Operation)
	Mr. Vivek Pandey (Alternate Member)	POSOCO	Chief Manager (System Operation)
5.	Mr. Ashok Pal	POWERGRID	AGM (CTU)
6.	Mr. Suman Guchh	UPPTCL	CE, Transmission Planning & Power System Studies
7.	Mr. Pardeep Jindal	CEA	Director (SP & PA)
8.	Mr. Omprakash k Yempal	MSETCL	Director (Operation/Projects)
9.	Mr. Ch. V. Subba Rao	APTRANSCO	Superintending Engineer/Power Systems
	Mr. A. Satyanarayana	APTRANSCO	Superintending Engineer/Planning
10.	Ms. Shilpa Agarwal	CERC	Dy. Chief (Engg.)

Minutes of 3rd Meeting of the Task Force for giving inputs for forming of Draft Regulations on Transmission Planning held on 10.10.2015 at CERC, New Delhi

List of participants is enclosed at Annexure-I.

1. The representative of POWERGRID stated that they have in consultation with CEA prepared the outline of Transmission Planning Process for deliberation by the members of the Task Force. He stated that as per the outline, there will be two study teams, namely, Central Study Team and Regional Study Team. The Central Team will comprise of CEA (in lead role), CTU, one STU from each region NLDC and RPCs. The Regional Study Team will comprise of STUs in the region (one of the STUs on rotational basis to take the lead role and represent in the Central Study Team), RLDC and SLDCs.
2. It was discussed that representative of CEA should also be a member in Regional Study Team. It was decided that CEA would be present as Coordinator of Regional Study Team. In addition to CEA, representative of DISCOMS, CTU and RPC would also be a member of this team.
3. Dy. Chief (Engg.), CERC enquired about role of Regional Study Team. CTU clarified that Regional team will be responsible for collection of data for their regional constituents and prepare transmission planning alternatives. Formation of such a Regional team will facilitate data collection and planning. CTU shall provide indicative list of data to be collected by Regional team, definition of database in the procedure to be framed under this Regulation. It was decided that system study files will be frozen by CTU and circulated to Regional Study Team.
4. The representative of AEGCL stated that they have already submitted their views. The views of AEGCL are attached at *Annexure-II*.
5. The representative of CEA stated that earlier CEA was responsible for integrated planning in respect of development of thermal power stations and hydro power stations. However, after delicensing of generation, all decisions are taken based on commercial considerations. He stated that POSOCO grants STOA on the margins available in the transmission system which is similar to the grant of MTOA by CTU. He further added that the Electric Power Survey should be taken as base for projecting load growth in the State. However, STUs can predict load growth on their own based on the past load-generation data but the projection must be supported by data. The representative of CEA stated that DISCOMs are an integral part of transmission planning and therefore, they should also be invited to provide comments. On the issue of monitoring of execution of generation / transmission systems, he stated that report of monitoring of by the identified agencies should be taken as final by CEA and the same report should be used as input by all the agencies.

6. The representative of UPPTCL stated that presently Standing Committee meetings are conducted region wise once or twice in a year. He stated that Standing Committee Meetings should be conducted at least four (4) times in a year as States may face some issues which require immediate discussion in SCM. Hence there should be provision that in case agenda requiring immediate attention is there, Standing Committee meeting may be held in a shorter time span. He also stated that planning should be optimal considering both state and central needs. He further added that optimal utilization of transmission system i.e. 20% to 30% of transmission capacity should be ensured. He gave examples of Fatehpur-Agra in which flow is just 34 MW when line is for 3400 MW. He also stated that generating company should take a feedback from transmission planner whether transmission evacuation is possible or not if he plans to install a generating plant at a particular location. He also stated that all assumptions while planning transmission system should be listed. In case a generator is not coming, transmission corridor should not be built.

The representative of CEA clarified that earlier only a generator more than 200 MW capacity and transmission system 220 kV and above of state was being considered in Standing Committee meetings. However during 36th SCM of Southern Region it was decided to consider intra-state system keeping in view meshed nature of transmission system.

7. The representative of CTU proposed that window to apply LTA/ Connectivity to ISTS shall be open for 2 months twice in a year as per the proposed timeline. The representative of CERC stated that there should be a continuous window to apply for LTA/ Connectivity. In case system has margins, the same may be permitted as per procedure framed under connectivity Regulations. In case new lines have to be built, the same may be clubbed together as per the Regulations.
8. Representative of West Bengal stated that Discoms should also be included in Transmission planning process.
9. It was decided that representative of SLDC should be included in the Regional Study Team. Representative of POSOCO stated that Regional Study Team should carry out the studies and provide options to Central team. Other comments furnished by POSOCO in track change mode are attached at *Annexure-III*.
10. Representative of CEA stated that cost- benefit analysis should be done before implementing transmission system. He also suggested 3 methodologies for calculation of benefit as follows
 - a. Loss of load probability
 - b. Social benefit i.e decrease in carbon footprint
 - c. Based on loss factor. System with total expenditure including losses to be compared with total installed capacity which can be saved.

11. Representative of CTU stated that cost benefit analysis may not be accurate since future requirement of lines are seen while planning. Few higher voltage lines are charged on lower voltage initially which may not provide adequate benefit as compared to cost initially.
12. It was decided that PMU related installation in planning stage shall also be considered under role of STU.
13. It was decided that Role of Power Exchange as proposed by POSOCO will not be considered under the proposed Regulations. The planning period shall be considered as per Government of India Niti Ayog plan.
14. The outline of transmission planning process was deliberated in detail during the meeting by the members of the Task Force wherein some corrections were suggested by the members which were incorporated in the document submitted by POWERGRID. The outline of transmission planning process as discussed and modified during the meeting is attached at *Annexure-IV* (in track change mode). Further the draft Regulations were also discussed and modified.(copy attached in track change mode at Annexure-V.)

Views of AEGCL:

- 1.0 The ISTS are to be planned in such a way that it can handle 50% of Peak demand of the Region. For example, let us consider the case of NER:
 - (a) NER is connected with the other Region through the Chicken Neck (Limitations on RoW).
 - (b) The present TTC declared is about 1500MW against NER total demand of approx. 2500MW. As the NER is mostly dependant on hydro power only, during high hydro season, the system designed so far is OK, but during lean hydro, the NER is primarily dependant on other Region, where again NER has to face severe crisis because of ATC constraints.
 - (c) Cross Country corridor is the only solution to eliminate the transmission constraints, envisaged in up-coming plan period.

- 2.0 In the proposed Regulation, **connectivity to NER may be treated as National Transmission Highway and to relieve the NER from PoC mechanism and introduction of Cross Country Transmission Corridor.**

- 3.0 Signing of of TSA for lines under ISTS for projects under TBCB shall be the responsibilities of CTU, since the PoC mechanism is well accepted.

- 4.0 NER states are unable to execute it's planned projects because of following regions even after preparing short, medium and long term perspective plan:
 - (a) Geographically as well as demographically NER states differs to other states of our country.
 - (b) Development of NER states are mostly dependant on it's politico-economy. For instance, in Assam, no single transmission element was added during the period from 1985 to 2005.
 - (c) Because of economical backwardness, the STUs of NER are dependant mostly on grant from Central Government. In spite of introduction of different developmental agency for development of NER, procedural delays take lots of time and thus sufferit's Plan.

Suitable Regulation may be introduced separately on Review Mechanism on planned projects for NER.

- 5.0 Regulatory compliance may be introduced against DISCOMs regarding submission of data on load growth by the end of each calendar year, so that STU may prepare year wise rolling plan.

**Central Electricity Regulatory Commission
New Delhi**

Task Force for framing input for Draft (Transmission Planning and other related matters) Regulations, 2015

The Terms of Reference of Task Force are

- a) To specify the principles, procedures and criteria which shall be used for planning and development of Inter State Transmission System (ISTS) in different time horizons and associated Intra-State Systems;
- b) To promote co-ordination amongst all Users, STUs, SLDCs and CTU, RLDCs, NLDC, RPCs and CEA in any proposed development of the ISTS;
- c) To provide methodology and information exchange amongst Users, STU/SLDC and CTU/RLDC, RPC, NLDC and CEA in the planning and development of the ISTS.

Note covering inputs available from various sources so as to have deliberations

The manual on transmission planning criteria published by CEA covers the planning philosophy, the information required from various entities, permissible limits, reliability criteria, broad scope of system studies, modeling and analysis, and gives guidelines for transmission planning. The Regulations on Transmission Planning shall cover the governance aspects of transmission planning. The regulatory provisions would be enforceable through the powers of the Commissions specified in the Electricity Act 2003.

1. Objective:

The objectives of these regulations are as follows:

a) To plan and develop an efficient, reliable and economical system of ISTS and associated intra-State Systems.

~~a) b) To specify the principles and procedures to be used for planning and development of inter-State Transmission System (ISTS) and associated intra-State Systems.~~

~~b) To promote co-ordination amongst all Users, CTU, STUs, SLDCs, RLDCs, NLDC, RPCs and CEA in any proposed development of the ISTS.~~

c) To provide methodology for information exchange amongst generators connected with ISTS Users, STU, SLDC, and CTU, RLDC, RPC, NLDC and CEA for coordinated planning and development of the ISTS.

~~d) Planning keeping in view protection of consumer interest,~~

The regulations of Transmission Planning specifies the following:

a. Objectives and principles to be adopted for plan and developing an efficient, reliable and economical system of ISRS and associated intra-state systems;

b. Responsibilities of all the agencies involved in the planning process;

c. Degree and process of stakeholder involvement;

d. Information to be exchanged between Users and the planners and the mechanisms thereof;

e. Protocol to be adopted for Transmission Planning and revision in plans;

f. Indices for reliability and economic evaluation of transmission projects;

g. Information to be shared in public domain by Nodal agencies for planning to ensure transparency in decision making;

h. Methodology for execution of transmission plans and monitoring its progress;

i. Dispute resolution protocol

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2. Scope:

This Regulation shall be applicable to CEA, CTU, Inter State Transmission Licensees, SEBs/STUs, SLDC, RLDCs, NLDC, RPCs, NPC, DICs and other utilities involved in the transmission planning process

3. **Nodal Agency:**

The nodal agency for the Central Electricity Regulatory Commission (Transmission Planning and other related matters) Regulations, 2015 shall be the CEA / Central Transmission Utility (CTU) for ISTS and respective STU for intra-state transmission system.

4. **Roles and responsibilities of various organisations:**

The Electricity Act, 2003 recognizes that transmission planning process is a coordinated activity in which CTU and STUs need to coordinate among themselves in addition to coordination with Central Electricity Authority, Licensees, Generating companies, Regional Power Committees, Central & State Governments. Under the Act, the generating companies are also required to coordinate with CTU or the STU as the case may be for transmission of electricity generated by them.

This Part defines the ~~functions~~-role of the various organizations involved in the field of Power System Planning and their organizational linkages so as to facilitate planning and development of ISTS and associated upstream and downstream intra-state systems.

4.1. **Role of CEA:**

The Central Electricity Authority shall be responsible for

- a) Formulation of perspective plans as per functions specified under Section 73 of Electricity Act 2003.----where is it utilised???
- b) Coordinating & conducting Standing Committee Meetings for Transmission planning.

4.2. **Role of CTU in planning of ISTS:**

The Central Transmission Utility shall be responsible for

- (a) Discharging all functions of planning and co-ordination relating to ISTS with
 - i. State Transmission Utilities;
 - ii. Central Government;
 - iii. State Governments;
 - iv. Generating companies;
 - v. Regional Power Committees;
 - vi. Central Electricity Authority;
 - vii. Transmission Licensees;
 - viii. Any other person notified by the Central Government in this behalf;

(b) Ensuring development of an efficient, co-ordinated and economical system of ISTS for smooth flow of electricity from generating stations to the load centres.

(c) Preparation of the Active and Reactive Power Balance (based on the inputs received from the Users) to be considered for Transmission Planning

(e)(d) Preparation of Master Transmission Plan (to be defined under this Regulation) in accordance with the guidelines mentioned in these Regulations.

~~—Planning based on Long term Access (LTA) / GNA???~~

(e) To specify the format and input data to be furnished by the ISTS Users for planning ISTS and associated intra state system

(f) To provide data to STU with every addition.

Comment [C1]:

Comment [C2]: Redefine "master" word

4.3. Role of STU:

STU shall be responsible for

- (a) Preparation of base case of the state for Master Transmission Plan;
- (b) Providing inputs to SLDCs for preparation of state base case which is further used for preparation of operational plans;
- (c) Coordinated planning of intra state network along with inter-state network. match with state transmission plan---put in procedure

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4.4. Role of NLDC:

National Load Despatch Centre shall be responsible for providing periodic Operational statistics and Feedback as per section 4(j) of NLDC Rules, 2005.

Comment [C3]: To define in procedure—load profile of state/behaviour of generators-wind/hydro

4.5. Role of RLDCs:

~~Regional Load Despatch Centre shall be responsible for providing inputs to NLDC for periodical operational feedback for factoring in the planning of ISTS.~~

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4.5.

4.6. Role of SLDCs:

State Load Despatch Centre shall be responsible for providing operational statistics and Feedback to STU for factoring in the planning of intra-State Transmission System.

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3.7 Role of Generators

Generators connected/likely to be connected to ISTS shall be responsible for providing technical data as provided under CERC Connectivity Regulations and LTA/GNA

4.7 Role of Users: To submit data as specified by the CTU. In the planning stage the Generators seeking connectivity shall submit models specified by CTU for consideration in simulation studies. After commissioning of unit the validated model shall be re-submitted to CTU.

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4.8 Role of RPC: Monitoring of progress, giving feedback on prolonged generation/transmission outage

4.9 Role of PX: Submit trajectory of Congestion as a feedback to the CTU/CEA

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4.10 Role of the Standing Committee for Transmission Planning

The Standing Committee for Transmission Planning shall comprise of representatives from CEA, CTU, SEBs/STUs, SLDCs, RLDCs, NLDC, RPCs, and invited experts from the industry and research organizations.

(FICCI may suggest to Member (PS), CEA, the names of qualified key resource persons on transmission planning etc.who can provide useful inputs in the sector)

Role of standing committee should also be to monitor progress of transmission system execution and delay/early commissioning etc and changes in the overall master plan accordingly.

Criterion of planning

5. Considerations in Transmission Planning: to be deliberated

- (a) Planning Period
- (b) Load Forecast and transmission usage projection
- (c) Generation Resources (location, type, etc.)
- (d) Different alternatives
- (e) Economic and Financial Constraints
- (f) R-O-W Limitations
- (g) New and Emerging Technology
- (h) Various Uncertainties and Risks
- (i) Service Reliability and Cost Considerations

Principles of planning

Principles for transmission planning to be proposed by CEA & CTU in a procedure shall form a part of this Regulation.

- Generation and Transmission expansion shall be co-optimized
- Planning shall focus on cost economics and should be market driven.
- Transmission System shall be planned to enable closing down of inefficient power plants from the perspective of safeguarding the environment
- Transmission shall be adequate to facilitate realization of the policy objectives for RES and clean energy

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- Apart from the credible contingency, identified rare contingencies and natural calamities shall be duly considered in the transmission plan
- Lag in planning and lag in implementation shall be considered
- Resilience of the system and adequacy of system from the perspective of black start /start-up supply shall be envisaged at the planning stage itself.
- LOLP /Loss of Load Expectation (1 day in 10 years ???)
- Average ISTS Transmission loss target
- Average PoC target
- Congestion hours target
- Control Area adequacy Indices: STOA as % of Own Generation or STOA as % of (LTA+MTOA)

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6. Proposed Approaches to Transmission Planning:

CEA and CTU may give a presentation in regard to present and proposed approaches. Some of the approaches as available from a few sources is given at Annexure-I.

7. Planning of Transmission System:

7.1. Planning of Transmission System shall be done in following time horizons:

- a) CEA would formulate perspective transmission plan for inter-State transmission system as well as intra-State transmission system for 20 years' time horizon.
- b) CTU would formulate "Master Transmission Plan" for inter-state transmission system of 5 year time horizon on an annual rolling basis in coordination with STUs.

7.2. Planning of Transmission System shall be done by CTU/CEA/STU in accordance with:

7.2.1. Existing Documents

- a) National Electricity Policy, 2005 and Tariff Policy, 2006;
- b) Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009;
- c) Central Electricity Authority (Technical Standards for Connectivity to the Grid), Regulations, 2007;
- d) Load forecasts issued by CEA and nodal forecasts provided by STUs, special economic zones;
- e) CEA Transmission Planning Standards
- f) Any other relevant regulations issued by the CERC/CEA.
- g) Policies with respect to emissions, renewable energy, energy conservation, etc, issued by the Government of India from time to time.
- h) New roles expected from the planning agencies:
The Central and State transmission utilities need to be aware about power market condition like availability of cheaper source of power, elasticity of demand of different consumers, system constraints and

renewable penetration, etc. and based on system configuration, and usage pattern CEA/ CTU may suggest transmission as a replacement of new generating capacity. It requires integrated system planning study based on anticipated price of electricity generation in various areas/zones in addition to conventional inputs like fuels and plant locations.

7.2.2. Documents proposed and to be prepared by CEA/CTU

- a) Network Modelling Guidelines developed separately by CEA;
- b) Zone-wise Reliability Indices, Value of Lost Load (VOLL), etc. defined from time to time.

8. Perspective Transmission Plan:

- (1) The perspective transmission plan shall include the following:
 - a) State wise / Fuel wise / River Basin wise Generation addition plans;
 - b) Yearly anticipated load of each state;
 - c) Broad requirement of transmission system;
- (2) The perspective transmission plan shall be released by CEA in the public domain latest by 31st March of the year preceding start year of the five year and updated every five years similarly

9. Master Transmission Plan

9.1. Input data considered while preparing the Master Transmission Plan

9.1.9.2. Classification of Transmission Plans:

The transmission plans shall be classified under following categories:

- a) **Reliability Upgrade:** These are the transmission plans which shall make the system compliant to transmission planning criteria. This shall be done for older systems. New systems shall be planned as per Transmission planning criterion.
- b) **Economic Upgrade:** These are the transmission plans which shall relieve congestion to avoid market splitting in power exchanges or decrease transmission losses.
- c) **Interconnection Upgrade:** These are the transmission plans which shall be planned to interconnect new generating station with the grid. The new connection should not adversely affect the existing grid.
- d) **International Interconnections:** These are the transmission plans which shall be planned for international interconnections.
- e) **Public policy Upgrade:** These are the transmission plans which are planned as public policy assets.

-The Master Plan shall include the details of the intra State system whose execution that needs to be to facilitate realization of the benefits of the proposed ISTS

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Comment [AS4]: POSOCO to elaborate

9.3 Import and Export Transfer Capability along with the top five limiting constraints of the each Injection and Withdrawal Zone for every plan.

9.4 Anticipated Point of Connection charges and losses of each Injection and Withdrawal Zone for every plan

9.5 Evaluation of options

9.49.6 Execution schedule along with the major implementation risks

The milestones for realizing the benefits of the proposed transmission project may be stated. This may include

identify the process by which the CTU will monitor and determine whether the milestones identified above are met

Procedure for Transmission Planning

9.2.9.3. Preparation of Master Transmission Plan:

- (a) Rolling Master Transmission Plan shall be formulated by CTU biannually based on the following inputs:
- i. Perspective plan formulated by CEA;
 - ii. Electric Power Survey of India published by CEA;
 - iii. Renewable capacity addition plan issued by Ministry of New and Renewable Energy Sources (MNRE), Govt. of India;
 - iv. Anticipated Commissioning of new Generating Stations and requests for granting Long Term Access;
 - v. Operational feedback prepared by NLDC/RLDC/SLDC;
 - vi. Pattern of prices discovered in power exchanges during the preceding year;
 - vii. Load forecasts issued by CEA and nodal forecasts provided by STUs, special economic zones;
 - viii. Policies with respect to emissions, renewable energy, energy conservation etc. issued by the Government from time to time.
 - ix. Zone-wise Reliability Indices, Value of Lost Load (VOLL) etc. defined from time to time.
 - x. Any other information, report or publication as may be available on the said subject matter.
- (b) Each STU shall submit to the CTU/CEA the load-generation disposition node wise, transmission elements, etc, in the form of a base case for 5 year ahead scenario biannually. This base case shall also include new state generating stations and planned intra state transmission system. This shall be based on maximum injection / withdrawal. Necessary format for providing the information shall be developed by CTU in consultation with CEA. There shall be five year rolling master

transmission plan. All the entities seeking connectivity to ISTS and Intra-State Transmission System shall be required to submit information to CTU & STUs respectively by January/August every year and this will be considered as final for next six months i.e. no new request for connectivity or Access shall be entertained during the ensuing six months.

For example: In year 2013-2014, STUs shall submit the base case of 2014-15, 2015-16, 2016-17, 2017-18 and 2018-2019 which will be rolled biannually with updation as required.

(c) The base case prepared by STUs shall include all transmission elements up to 132kV level including generators connected at 110 kV level.

(d) The Planning agencies shall inform the Commission, in case information is not filed by concerned STU so that necessary action for non compliance of Commission's Regulation may be taken. **(Legal)**

(e) A study Committee comprising representatives of CTU, STU, RLDC, SLDCs, generator, RPC under leadership of CEA to validate data

~~(e)~~(f) A validation committee comprising representative from CEA, CTU, POSOCO, STUs and RPCs shall be incorporated in the Grid Code for this purpose

~~(f)~~(g) The validation committee shall take into consideration the data submitted by STUs. The committee shall take trend of injection and drawal from the ISTS from the implementing agency in respect of Point of Connection Charges for last three years. Based on this, a profile of ISTS injection and drawal for next five years shall be prepared every year in the month of March. The validation committee shall finalise this transmission system requirement profile which shall be published on the web site of CTU for comments of stakeholders. The approved transmission system requirement profile shall be published.

~~(g)~~(h) Final document shall form the basis of transmission planning in the country. The Standing Committee for Transmission Planning in each Region while formulating or modifying a transmission scheme shall take this document as reference.

~~(h)~~(i) Apart from injection and drawal data, complete data about network along with planned addition of generation and load within the STU area shall be given by all users/entities to STU in January every

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year. STU may in consultation with their SERC formulate penalties to handle deviation beyond a specified percentage/quantum of estimated generation and demand in their area. STUs need to submit consolidated data within their area to CTU to enable it to do optimum planning.

~~(j)~~(i) It is proposed to devise regulatory compliance of data submission for transmission planning in line with FERC Form No. 715 1- Annual Transmission Planning and Evaluation Report. The format shall be finalised by CEA and CTU in consultation with the stakeholders. Commission will issue necessary order for its implementation.

~~(j)~~(k) For each of the proposed upgrade, CTU shall prepare at least 3 alternatives. These options shall be evaluated by CTU based on techno-economic analysis.

~~(k)~~(l) All the proposed transmission plans must satisfy the criteria laid down in the documents mentioned in these Regulations.

~~(j)~~(m) All the proposed transmission plans shall be accompanied with the following studies results:

- i. Steady State Power Flow Study
- ii. Interconnection Study
- iii. Short Circuit Study
- iv. EMTP Studies
- v. Point of Connection Charges Study
- vi. Studies for special cases such as Sub-synchronous Resonance (SSR)
- vii. Dynamic Power Flow Study
- viii. All other studies specified in the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007

9.3.9.4. Consultation Process for finalisation of Master Transmission Plan:

A three tier consultation process would be followed for transmission planning and investment thereof:

- (a) At the first level of consultation, the proposed transmission plans shall be published by CTU on the public domain for comments of all stakeholders. The feedback received from the stakeholders along with the analysis of the feedback by CTU shall be uploaded on the website of CTU. It shall elaborate the manner in which the views of the stakeholders were being considered in the plan. The rationale for rejecting any view shall also be duly explained.

- (b) After considering the comments of the stakeholders, the CTU shall submit the revised plan, if any, before the Standing Committee on Transmission Planning which would be the second level of consultation. The proposed transmission plans shall be discussed in the standing committee meeting of the concerned region. In case of inter-regional transmission system, the transmission plan shall be discussed in standing committee meeting of the concerned regions.
- (c) The Standing Committee shall comprise of representatives from CEA, CTU, STUs, RPC Secretariats, SLDCs, RLDCs and NLDC and invited experts from the industry or academia. The CEA would prepare a Conduct of Business Rules for the proceedings of the Standing Committee on Transmission Planning covering the quorum, submission of comments, basis of decisions, etc.
- (d) The meeting of the standing committee shall be held bi-annually preferably in August and February.
- (e) The proposed transmission plan shall form the agenda of the standing committee meeting and following key deliverables shall also be made available by CTU for each transmission plan:
- i. Category of transmission plan
 - ii. Details of Transmission Elements along with dedicated lines, reactive compensation (Static, Dynamic) if any
 - iii. Basic Network / Snapshot pertaining to the proposed transmission plan
 - iv. Assumptions, if any
 - v. Request for LTA associated with the transmission plan, if any--- Whether Transmission Planning shall be based on GNA or LTA.— Issues at Annexure-II.
 - vi. Timeline for execution of the proposal alongwith key milestones and implementation risks (such as RoW, resource etc.)
 - vii. Prerequisite coordination or priority for commissioning of transmission elements within any transmission plan
 - viii. Inter-Regional Transfer Capability
 - ix. Estimated Cost of the Planned Transmission System and its impact on uniform PoC rate
 - x. Results for various contingencies studied taking intermittency of renewable generation into consideration
 - xi. Environmental Issues, if any
- (f) The proposed transmission plans shall be evaluated based on techno-economic analysis. Each option shall be evaluated with respect to reliability standards and the planning criteria used for the assessment of transmission system capability

- (g) The transmission plan thus prepared shall be submitted by CTU to the Authority for approval which would be the third stage of consultation.
- (h) The final transmission plan approved by CEA shall be published on the website of CTU and CEA along with the response of CTU on each comment received.
- (i) Similar process would be followed when the plan is reviewed and updated.

10. Execution of the transmission projects: The selection of Transmission Service Provider for execution of transmission projects shall be through TBCB or through nomination basis or as specified by appropriate govt from time to time

10.11. Review of Transmission Plan:

Transmission Plan needs to be reviewed/updated keeping in view of inputs regarding generation such as deviation from commissioning schedule, shifting of target region, retirement of units, operational feedback provided by RLDCs and SLDCs, exit from LTA/GNA (threshold required for review??), system constraints, market conditions, etc.

A balanced view needs to be taken in regard to liability of generators, avoidance of building underutilized assets and protecting consumer interest for the period during which asset is underutilized. For this, there is a need to formulate commitment mechanism for both generator and drawee entity.

10. Information Exchange timeline:

The timeline for exchange of information and other activities involved in the transmission planning shall be as follows:

Activity	Responsibility	Suggested Timeline
Standing Committee Meeting in August		
Submission of anticipated network scenario in the form of a base case	STU	15 th April
Preparation of All India Network Scenario	CTU	15 th May
Publishing transmission plans for public comments	CTU	First week of June
Comments of Stakeholders	Stakeholders	First week of July
Issue of agenda of standing committee	CEA	First week of July
Standing Committee Meeting	CEA	First week of August
Approval of Transmission Plan	Authority	First Week of September
Final approved transmission plans	CTU	First week of October
Standing Committee Meeting in February		

Submission of anticipated network scenario in the form of base case	STU	15 th October
Preparation of All India Network Scenario	CTU	15 th November
Publishing finalised transmission plans for public comments	CTU	First week of December
Comments of Stakeholders	Stakeholders	First week of January
Issue of agenda of standing committee	CTU	First week of January
Standing Committee Meeting	CEA	First week of February
Approval of Transmission Plan	Authority	First Week of September
Final approved transmission plans	CTU	First week of April

12. Software Applications to be used in transmission planning

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Nodal agency may deploy appropriate software for simulating the behaviors of the power system under different operating conditions during transient and steady state. It may also deploy software for co-optimization of generation resources and transmission system for 8760 hours for the planning year.

13. Manpower Deployment in Transmission Planning

Proper and adequate manpower for conducting planning exercise in the utilities shall -be ensured. CTU/STU must demonstrate that they have adequate manpower for planning. CEA / CTU may prepare scheme for certification of personnel involved in planning at STU/CTU similar to the system in place for System Operators

14. Monitoring and execution coordination of Transmission Plan

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15. Dispute resolution

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Annexure-I

Approaches to Transmission Planning:

a) Scenario Approach to Address Uncertainties:

- The scenarios may be based on a set of likely possibilities or selected on the basis of reasonable extremes like competition, load growth, upcoming IPPs, ROW, fuel resources, environmental issues, renewable integration, etc.

b) Horizon Year & Staging Approach:

- Cost optimised transmission plan for the horizon year (20th year in a 20 year planning study) is developed;
- Once an optimized horizon year plan is available, several transmission staging plans may be developed for the planning period:
 - The staging intervals may be different from one stage to the next.
 - Staging at every 5 years is usually considered appropriate.
 - In a high growth system, staging at say 3 or annual plans may be required.
- Keeps in focus the long-term needs of the system in proper perspective;
- Once the staging plans are complete, the present worth or other types of analysis may be performed for different horizon year and corresponding staging year plans;
- The selection of the most suitable plan among the low cost plans may be accomplished, via the alternative approach.

c) Trade off and Risk Analysis Approach:

- Perform trade-off and risk analysis for each future plants and find a global set;
- Measure the robustness of each plan in the global decision set;
- If no plan is completely robust, reasonable compromises may be applied. The planners need to eliminate unacceptable or inferior plans, based on multiple objectives and focus on a small set of plans.

Annexure-II

Issues to be addressed in GNA

1. Injection GNA more than demand GNA: In the event of injection (Generation) GNA being more than Demand GNA, the transmission system will be developed as per injection GNA or it will be downsized to match with demand GNA.
2. Methodology for planning when Generators shall not have to declare target beneficiaries.
3. Handling difference in planning scenario and operational scenario: How to take care of the situation arising in the operational timeframe because the projection or assumptions which were made at the planning stage did not materialise.
4. Price for flexibility: It has been proposed that the Generators shall have access to ISTS grid with flexibility for point of drawal subject to conditions laid down at the time of grant of GNA. This issue continue to leave stranded assets. In real option economic theory, every flexibility has a price and whether generators are ready to pay sufficient price for this flexibility or the consequences of flexibility are falling on other consumers. This issue needs to be addressed.
5. Determining stranded capacity in a meshed network: How the concept of GNA would take care of issue of relinquishment charges especially in view of the fact that CTU has been expressing difficulty in stranded assets in the event of generators for whom the transmission system has already been developed or it is under execution, either downsizing, rescheduling or simply quitting and seeking relinquishment of their LTA. CTU is taking a stand that it is difficult for them to determine stranded capacity in a meshed network.
6. Planning input from Drawee entities: The mismatch in transmission planning is due to the fact that generator wants transmission system to be developed without identifying customers and customers who will ultimately draw power from ISTS are not coming out with their future requirement. GNA is trying to force a commitment from drawee entity based on a fixed figure to be given four years in advance. With unbundling and open access it may practically be very difficult for state agencies to firm up their transmission requirement. This issue remains unanswered in GNA and it is presumed that correct input would come from state utilities as liability is pre-decided and power drawal more than GNA would **(be priced higher)** not be allowed. This may not come true and it may only increase the tendency to under-declare transmission requirement. The

integrated resource planning with collaborative efforts in forecasting demand and supply scenario in which cost of power is going to play a major role in deciding to opt for importing power from outside against costly generation inside the generation will ultimately decide real time system operation. So system should be flexible to accommodate all type of access and as experience shows that drawee entities are ready to bear for slightly higher transmission charges to avail the benefit of flexibility. How to incentivise or penalise states to declare their correct GNA requirement?

7. Connectivity as separate product: GNA does not propose connectivity as a separate product. However grant of Connectivity not only helped the Generator in financial closure but it also benefitted the generator & the grid through improved reliability. The existing provision of Connectivity is an important product for generator for its financial closure. For this either investment is to be made by generator or CTU in which case there are certain lock-ins like availability of land / issue of EPC contract (which is 10% of project value) to provide sufficient safety. Regulation also prohibits any injection in absence of any type of access even if connectivity is granted. So generator is taking the risk of bottling up his power if he did not seek full LTA. The process of payment based on LTA further discourages him declaring his actual requirement because till he finds a customer, payment of transmission charge is his responsibility. Such type of generator can inject only under STOA and STOA is given based on available margins. This type of product is available in US power market also. However as discussed in the Central Advisory Committee (CAC) meeting, this connectivity may be given with a charge like upfront payment of capital cost of connectivity line or an exclusive liability to pay for the tariff of connectivity line.
8. Options & Scenario based Planning: GNA based planning is capital intensive where for each generator, request equivalent transmission investment needs to be made, optimum planning take advantage of seasonal and diurnal diversity of demand and some margins available in transmission system are utilised for short term transactions. It should be kept in mind that with POWERGRID in its dual role of planner (CTU) and executor of transmission projects should not over plan the system. Therefore, there is a need on check and balance in transmission planning process where all stakeholders participate and it is done, not only on a fixed figure of GNA but it is to be done on options and scenario based analysis where all alternatives including non transmission based solutions like Demand Side Management, Special Protection Schemes, etc., are also need to be taken into consideration.
9. Planning for Renewables: The existing system and the GNA based system are not very conducive for development of transmission system for

Renewable Generation which is a public policy investment. Due to their location away from load centres, low utilization factor and lack of identified beneficiaries in the regime of RPO and REC mechanism, either of the system if applied as it is, will hamper growth of Renewables.

Outline of Transmission Planning Process to be covered under Planning Regulation

Central Study Team

Constitution of Central Study Team

1. CEA (Lead role)
2. CTU
3. One STU from each region
4. [NLDC& RLDCs/NLDC](#)
5. RPCs [_____](#)

Role of Central Study Team

1. To prepare a detailed procedure covering ~~the~~ detailed time-line of activities, ~~standards/criteria to be followed~~, studies to be carried out based on laid down standards/criteria, outputs to be declared etc for planning of transmission ISTS system.
2. To prepare format for the data base to be filled up and updated by the Regional Study Team (for Intra-state system) and CTU (open access data) in every year.
3. To prepare year-wise/quarter-wise data base and corresponding load-flowsystem studies files.
3. ~~To prepare format for the data base to be filled up and updated by the Regional Study Team (for Intra-state system) and CTU (open access data) in every year.~~
4. Validation of the data submitted by Regional Study Team, Study and Proposal of New Transmission Plan, conducting meetings between the Central and Regional Study Team for discussion on the New Transmission System

Regional Study Team

Constitution of Regional Study Team

1. [CEA as coordinator](#)
2. [STU represented in the Central Team \(lead role\)](#)
3. [Other STUs in the region \(One of the STUs on rotational basis to take the lead role and represent in the Central Study Team\)](#)
4. [RLDC](#)
5. [SLDCs](#)
6. [DISCOMs](#)
7. [CTU](#)
8. [RPC](#)

Role of Regional Study Team

1. To ~~assist coordinate with~~ the STUs in the region in preparation of their data base and ~~corresponding load-flowsystem studies~~ files in each region.
2. ~~To validate and fill up the data base prepared by the Central Study Team.~~
3. To prepare transmission options planning alternatives and refer the same issues in the Region to the Central Study Team.

Role of Central Electricity Authority

1. To prepare National Electricity Plan (NEP) ~~in~~ every 5 years and an intermediate updation of the same.
2. To conduct Standing Committee Meetings as per the timeline.

Role of CTU

1. To conduct regular meeting as and when needed based on the [open transmission](#) access application.
2. To provide information ~~available~~ based ~~on open transmission access application~~ to ~~the data base of~~ the Central Study Team on the basis of transmission access applications.

Role of NLDC/ RLDC / SLDC

1. To refer the operational issues to the Central [Study](#) Team.

Time-line of Activities

	Activity	Responsibility	Suggested Timeline
A	Standing Committee Meeting in August		
1	<ul style="list-style-type: none"> • Last date for consideration of LTA application filed by DICs/Prospective DICs for first block of year to apply seeking requirement of transmission service for long term use to CTU 	DICs	Received up to 31st March to 30th April
2	<ul style="list-style-type: none"> • Data base to be submitted by the Regional Study Team to Central Study Team for this block of the year • Operational Issues if any, to be submitted by NLDC/ RLDC to Central Team • Data received from DICs for long term transmission requirement to be submitted to Central Study Team 	Regional Study Team NLDC/RLDC CTU	15 th May
3	Validation of the data	Central Study Team	30 th May
4	Study and Proposal of New Transmission Plan	Central Study Team	15 th July
5	Meeting between the Central and Regional Study Team for discussion on the New Transmission System Plan	Central Study Team	30 th July
6	Recommendation of the New Transmission System to be taken up in the standing committee Agenda	Central Study Team	15 th Aug
7	Issue of agenda for the meeting of standing committee	CEA	30 th Aug
8	Standing Committee Meeting	CEA	15 th Sept

9	Approval of Transmission Plan	CEA	30 th Sept
B	Standing Committee Meeting in February		
1	<ul style="list-style-type: none"> <u>Last date for consideration of LTA application filed by DICs/Prospective DICs for second block of year. DICs/Prospective DICs to apply seeking requirement of transmission service for long term use to CTU</u> 	DICs	4st Sep. to 30 th Oct.
2	<ul style="list-style-type: none"> Data base to be submitted by the Regional Study Team to Central Team Operational Issues to be submitted by NLDC/ RLDC to Central Team Data received from DICs for long term transmission requirement to be submitted to Central Team 	Regional Study Team NLDC/RLDC CTU	15 th Nov
2	Validation of the data	Central Study Team	30 th Nov
3	Study and Proposal of New Transmission Plan	Central Study Team	15 th Jan
4	Meeting between the Central and Regional Study Team for discussion on the New Transmission System	Central Study Team	30 th Jan
5	Recommendation of the New Transmission System to be taken up in the standing committee Agenda	Central Study Team	15 th Feb
6	Issue of agenda of standing committee	CEA	28 th Feb
7	Standing Committee Meeting	CEA	15 th March
8	Approval of Transmission Plan	CEA	31 st Marh

**Central Electricity Regulatory Commission
New Delhi**

Task Force for framing input for Draft(Transmission Planning and other related matters) Regulations, 2015

The Terms of Reference of Task Force are

- a) To specify the principles, procedures and criteria which shall be used for planning and development of Inter State Transmission System (ISTS) in different time horizons and associated Intra-State Systems;
- b) To promote co-ordination amongst all Users, STUs, SLDCs and CTU, RLDCs, NLDC, RPCs and CEA in any proposed development of the ISTS;
- c) To provide methodology and information exchange amongst Users, STU/SLDC and CTU/RLDC, RPC, NLDC and CEA in the planning and development of the ISTS.

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Note covering inputs available from various sources so as to have for deliberations

The manual on transmission planning criteria published by CEA covers the planning philosophy, the information required from various entities, permissible limits, reliability criteria, broad scope of system studies, modeling and analysis, and gives guidelines for transmission planning. The Regulations on Transmission Planning shall 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. Objective:

The objectives of these regulations are as follows:

- a) To plan and develop an efficient, reliable and economical system of ISTS and associated intra-State Systems.
- a) b) To specify the principles and procedures to be used for planning and development of inter-State Transmission System (ISTS) and associated intra-State Systems.
- b) ~~To promote co-ordination amongst all Users, CTU, STUs, SLDCs, RLDCs, NLDC, RPCs and CEA in any proposed development of the ISTS.~~
- c) To provide methodology for information exchange amongst generators connected with ISTS Users, STU, SLDC, and CTU, RLDC, RPC, NLDC and CEA for coordinated planning and development of the ISTS.
- d) Planning keeping in view protection of consumer interest,

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The regulations of Transmission Planning specifies the following:

- a. Objectives and principles to be adopted for planning and developing an efficient, reliable and economical system of ISTRS and associated intra-state systems;
- b. Responsibilities of all the agencies involved in the planning process;
- c. Degree and process of stakeholders involvement;
- d. Information to be exchanged between Users and the planners and the mechanisms thereof;
- e. Protocol to be adopted for Transmission Planning and revision in plans;
- f. Indices for reliability and economic evaluation of transmission projects;
- g. Information to be shared in public domain by Nodal agencies for planning to ensure transparency in decision making;

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h. Methodology for ~~execution~~~~explanation~~~~implementation~~ of transmission plans and monitoring its progress;

i. Dispute resolution protocol

2. Scope:

This Regulation shall be applicable to CEA, CTU, Inter State Transmission Licensees, SEBs/STUs, SLDC, RLDCs, NLDC, RPCs, NPC, DICs and other utilities involved in the transmission planning process

3. Nodal Agency:

The nodal agency for the Central Electricity Regulatory Commission (Transmission Planning and other related matters) Regulations, 2015 shall be the CEA/ Central Transmission Utility (CTU) for ISTS and respective STU for intra-state transmissionsystem.

4. Roles and responsibilities of various organisations:

The Electricity Act, 2003 recognizes that transmission planning process is an coordinated activity in which CTU and STUs need to coordinate among themselves in addition to coordination with Central Electricity Authority, Licensees, Generating Ceompanies, Regional Power Committees, Central & State Governments. Under the Act, the generating companies are also required to coordinate with CTU or the STU, as the case may be, for transmission of electricity generated by them.

This Part defines ~~the functions~~ role of ~~the~~ various organizations involved in ~~the field of~~ Power System Planning and their organizational linkages so as to facilitate planning and development of ISTS and associated upstream and downstream intra-state systems.

4.1. Role of CEA:

The Central Electricity Authority shall be responsible for

- a) Formulation of perspective plans as per functions specified under Section 73 of Electricity Act 2003. ~~where is it utilised???~~
- b) Coordinating & conducting Standing Committee mMeetings for Transmission Planning.

4.2. Role of CTU in Planning of ISTS:

The Central Transmission Utility shall be responsible for

- (a) Discharging all functions of planning and co-ordination relating to ISTS with

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- i. State Transmission Utilities;
 - ii. Central Government;
 - iii. State Governments;
 - iv. Generating companies;
 - v. Regional Power Committees;
 - vi. Central Electricity Authority;
 - vii. Transmission Licensees;
 - viii. Any other person notified by the Central Government in this behalf;
- (b) Ensuring development of an efficient, co-ordinated and economical system of ISTS for smooth flow of electricity from generating stations to the load centres.

(c) Preparation of the Active and Reactive Power Balance (based on the inputs received from the Users) to be considered for Transmission Planning

(e)(d) Preparation of Master Transmission Plan **(to be defined under this Regulation)** in accordance with the guidelines mentioned in these Regulations.

~~— Planning based on Long term Access (LTA)/ GNA???~~

(e) To specify the format and input data to be furnished by the ISTS Users for planning ISTS and associated intra state system

(f) To provide data to STU with every addition and the format for the same.

Comment [C1]:
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4.3. Role of STU:

STU shall be responsible for

- (a) Preparation of base case of the state for Master Transmission Plan;
- (b) Providing inputs to SLDCs for preparation of state base case which is further used for preparation of operational plans;
- (c) Coordinated planning of intra state network along with inter-state network. **match with state transmission plan--put in procedure**

4.4. Role of NLDC:

National Load Despatch Centre shall be responsible for providing periodic Operational **statistics and** feedback as per section 4(j) of NLDC Rules, 2005.

4.5. Role of RLDCs:

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~~4.6. Regional Load Despatch Centre shall be responsible for providing inputs to NLDC for periodical operational feedback for factoring in the planning of ISTS.~~

~~4.7.4.5.~~

~~4.8.4.6. **Role of SLDCs:**~~

~~State Load Despatch Centre shall be responsible for providing operational statistics and feedback to STU for factoring in the planning of intra-State Transmission System.~~

~~3.7 Role of Generators~~

~~Generators connected/likely to be connected to ISTS shall be responsible for providing technical data as provided under CERC Connectivity Regulations and LTA/GNA~~

4.7 Role of Users: To submit data as specified by the CTU. In the planning stage the Generators seeking connectivity shall submit models specified by CTU for consideration in simulation studies. After commissioning of unit the validated model shall be re-submitted to CTU.

4.8 Role of RPC: Monitoring of progress, giving feedback on prolonged generation/transmission outage

~~4.9 Role of PX: Submit trajectory of Congestion as a feedback to the CTU/CEA~~

4.10 Role of the Standing Committee for Transmission Planning

The Standing Committee for Transmission Planning shall comprise of representatives from CEA, CTU, SEBs/STUs, SLDCs, RLDCs, NLDC, RPCs, and invited experts from the industry and research organizations.

(FICCI may suggest to Member (PS), CEA, the names of qualified key resource persons on transmission planning etc. who can provide useful inputs in the sector)

Role of standing committee should also be to monitor progress of transmission system execution and delay/early commissioning etc and changes in the overall master plan accordingly.

Criterion of planning

5. Considerations in Transmission Planning: to be deliberated

(a) Planning Period

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- (b) Load Forecast and transmission usage projection
- (c) Generation Resources (location, type, etc.)
- (d) Different alternatives
- (e) Economic and Financial Constraints
- (f) R-O-W Limitations
- (g) New and Emerging Technology
- (h) Various Uncertainties and Risks
- (i) Service Reliability and Cost Considerations

Criteria for cost-benefit analysis to be notified by the Commission

Principles of planning

Principles for transmission planning to be proposed by CEA & CTU in a procedure shall form a part of this Regulation.

- [Generation and Transmission expansion shall be co-optimized](#)
 - [Planning shall focus on cost economics and should be market driven.](#)
 - [Transmission System shall be planned to enable closing down of inefficient power plants from the perspective of safeguarding the environment](#)
 - [Transmission shall be adequate to facilitate realization of the policy objectives for RES and clean energy](#)
 - [Apart from the credible contingency, identified rare contingencies and natural calamities shall be duly considered in the transmission plan](#)
 - [Lag in planning and lag in implementation shall be considered](#)
 - [Resilience of the system and adequacy of system from the perspective of black start /start-up supply shall be envisaged at the planning stage itself.](#)
- LOLP/Loss of Load Expectation(1 day in 10 years ???)
 - Average ISTS Transmission loss target
 - Average PoC target
 - Congestion hours target
 - Control Area adequacy Indices: STOA as % of Own Generation or STOA as % of (LTA+MTOA)

6. Proposed Approaches to Transmission Planning:

CEA and CTU may give a presentation in regard to present and proposed approaches. Some of the approaches as available from a few sources is given at Annexure-I.

7. Planning of Transmission System:

7.1. Planning of Transmission System shall be done in following time horizons:

- a) CEA would formulate perspective transmission plan for inter-State transmission system as well as intra-State transmission system for 20 years' time horizon.

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- b) CTU would formulate “Master Transmission Plan” for inter-state transmission system of 5 year time horizon on an annual rolling basis in coordination with STUs.

7.2. Planning of Transmission System shall be done by CTU/CEA/STU in accordance with:

7.2.1. Existing Documents

- a) National Electricity Policy, 2005 and Tariff Policy, 2006;
- b) Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009;
- c) Central Electricity Authority (Technical Standards for Connectivity to the Grid), Regulations, 2007;
- d) Load forecasts issued by CEA and nodal forecasts provided by STUs, special economic zones;
- e) CEA Transmission Planning Standards
- f) Any other relevant regulations issued by the CERC/CEA.
- g) Policies with respect to emissions, renewable energy, energy conservation, etc, issued by the Government of India from time to time.
- h) New roles expected from the planning agencies:

The Central and State transmission utilities need to be aware about power market condition like availability of cheaper source of power, elasticity of demand of different consumers, system constraints and renewable penetration, etc. and based on system configuration, and usage pattern CEA/ CTU may suggest transmission as a replacement of new generating capacity. It requires integrated system planning study based on anticipated price of electricity generation in various areas/zones in addition to conventional inputs like fuels and plant locations.

7.2.2. Documents proposed and to be prepared by CEA/CTU

- a) Network Modelling Guidelines developed separately by CEA;
- b) Zone-wise Reliability Indices, Value of Lost Load (VOLL), etc. defined from time to time.

8. Perspective Transmission Plan:

(1) The perspective transmission plan shall include the following:

- a) State wise / Fuel wise / River Basin wise Generation addition plans;

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- b) Yearly anticipated load of each state;
 - c) Broad requirement of transmission system;
- (2) The perspective transmission plan shall be released by CEA in the public domain latest by 31st March of the year preceding start year of the five year and updated every five years similarly

9. Master Transmission Plan

9.1. Input data considered while preparing the Master Transmission Plan

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9.1.9.2. Classification of Transmission Plans:

The transmission plans shall be classified under following categories:

- a) **Reliability Upgrade:** These are the transmission plans which shall make the system compliant to transmission planning criteria. This shall be done for older systems. New systems shall be planned as per Transmission planning criterion.
- b) **Economic Upgrade:** These are the transmission plans which shall relieve congestion to avoid market splitting in power exchanges or decrease transmission losses.
- c) **Interconnection Upgrade:** These are the transmission plans which shall be planned to interconnect new generating station with the grid. The new connection should not adversely affect the existing grid.
- d) **International Interconnections:** These are the transmission plans which shall be planned for international interconnections.
- e) **Public policy Upgrade:** These are the transmission plans which are planned as public policy assets.

Comment [AS4]: POSOCO to elaborate

The Master Plan shall include the details of the intra State system whose execution that needs to be to facilitate realization of the benefits of the proposed ISTS

9.3 Import and Export Transfer Capability along with the top five limiting constraints of the each Injection and Withdrawal Zone for every plan.

9.4 Anticipated Point of Connection charges and losses of each Injection and Withdrawal Zone for every plan

9.5 Evaluation of options

9.49.6 Execution schedule along with the major implementation risks

The milestones for realizing the benefits of the proposed transmission project may be stated. This may include

identify the process by which the CTU will monitor and determine whether the milestones identified above are met

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Procedure for Transmission Planning

9.2.9.3. Preparation of Master Transmission Plan:

- (a) Rolling Master Transmission Plan shall be formulated by CTU biannually based on the following inputs:
- i. Perspective plan formulated by CEA;
 - ii. Electric Power Survey of India published by CEA;
 - iii. Renewable capacity addition plan issued by Ministry of New and Renewable Energy Sources (MNRE), Govt. of India;
 - iv. Anticipated Commissioning of new Generating Stations and requests for granting Long Term Access;
 - v. Operational feedback prepared by NLDC/RLDC/SLDC;
 - vi. Pattern of prices discovered in power exchanges during the preceding year;
 - vii. Load forecasts issued by CEA and nodal forecasts provided by STUs, special economic zones;
 - viii. Policies with respect to emissions, renewable energy, energy conservation etc. issued by the Government from time to time.
 - ix. Zone-wise Reliability Indices, Value of Lost Load (VOLL) etc. defined from time to time.
 - x. Any other information, report or publication as may be available on the said subject matter.
- (b) Each STU shall submit to the CTU/CEA the load-generation disposition node wise, transmission elements, etc, in the form of a base case for 5 year ahead scenario biannually. This base case shall also include new state generating stations and planned intra state transmission system. This shall be based on maximum injection / withdrawal. Necessary format for providing the information shall be developed by CTU in consultation with CEA. There shall be five year rolling master transmission plan. All the entities seeking connectivity to ISTS and Intra-State Transmission System shall be required to submit information to CTU & STUs respectively by January/August every year and this will be considered as final for next six months i.e. no new request for connectivity or Access shall be entertained during the ensuing six months.

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For example: In year 2013-2014, STUs shall submit the base case of 2014-15, 2015-16, 2016-17, 2017-18 and 2018-2019 which will be rolled biannually with updation as required.

(c) The base case prepared by STUs shall include all transmission elements up to 132kV level including generators connected at 110 kV level.

(d) The Planning agencies shall inform the Commission, in case information is not filed by concerned STU so that necessary action for non compliance of Commission's Regulation may be taken. **(Legal)**

(e) A study Committee comprising representatives of CTU, STU, RLDC, SLDCs, generator, RPC under leadership of CEA to validate data

~~(e)~~(f) A validation committee comprising representative from CEA, CTU, POSOCO, STUs and RPCs shall be incorporated in the Grid Code for this purpose

~~(f)~~(g) The validation committee shall take into consideration the data submitted by STUs. The committee shall take trend of injection and drawal from the ISTS from the implementing agency in respect of Point of Connection Charges for last three years. Based on this, a profile of ISTS injection and drawal for next five years shall be prepared every year in the month of March. The validation committee shall finalise this transmission system requirement profile which shall be published on the web site of CTU for comments of stakeholders. The approved transmission system requirement profile shall be published.

~~(g)~~(h) Final document shall form the basis of transmission planning in the country. The Standing Committee for Transmission Planning in each Region while formulating or modifying a transmission scheme shall take this document as reference.

~~(h)~~(i) Apart from injection and drawal data, complete data about network along with planned addition of generation and load within the STU area shall be given by all users/entities to STU in January every year. STU may in consultation with their SERC formulate penalties to handle deviation beyond a specified percentage/quantum of estimated

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generation and demand in their area. STUs need to submit consolidated data within their area to CTU to enable it to do optimum planning.

(j)(i) It is proposed to devise regulatory compliance of data submission for transmission planning in line with FERC Form No. 715 1- Annual Transmission Planning and Evaluation Report. The format shall be finalised by CEA and CTU in consultation with the stakeholders. Commission will issue necessary order for its implementation.

(j)(k) For each of the proposed upgrade, CTU shall prepare at least 3 alternatives. These options shall be evaluated by CTU based on techno-economic analysis.

(k)(l) All the proposed transmission plans must satisfy the criteria laid down in the documents mentioned in these Regulations.

(j)(m) All the proposed transmission plans shall be accompanied with the following studies results:

- i. Steady State Power Flow Study
- ii. Interconnection Study
- iii. Short Circuit Study
- iv. EMTP Studies
- v. Point of Connection Charges Study
- vi. Studies for special cases such as Sub-synchronous Resonance (SSR)
- vii. Dynamic Power Flow Study
- viii. All other studies specified in the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007

9.3.9.4. Consultation Process for finalisation of Master Transmission Plan:

A three tier consultation process would be followed for transmission planning and investment thereof:

(a) At the first level of consultation, the proposed transmission plans shall be published by CTU on the public domain for comments of all stakeholders. The feedback received from the stakeholders along with the analysis of the feedback by CTU shall be uploaded on the website of CTU. It shall elaborate the manner in which the views of the stakeholders

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were being considered in the plan. The rationale for rejecting any view shall also be duly explained.

- (b) After considering the comments of the stakeholders, the CTU shall submit the revised plan, if any, before the Standing Committee on Transmission Planning which would be the second level of consultation. The proposed transmission plans shall be discussed in the standing committee meeting of the concerned region. In case of inter-regional transmission system, the transmission plan shall be discussed in standing committee meeting of the concerned regions.
- (c) The Standing Committee shall comprise of representatives from CEA, CTU, STUs, RPC Secretariats, SLDCs, RLDCs and NLDC and invited experts from the industry or academia. The CEA would prepare a Conduct of Business Rules for the proceedings of the Standing Committee on Transmission Planning covering the quorum, submission of comments, basis of decisions, etc.
- (d) The meeting of the standing committee shall be held bi-annually preferably in August and February.
- (e) The proposed transmission plan shall form the agenda of the standing committee meeting and following key deliverables shall also be made available by CTU for each transmission plan:
 - i. Category of transmission plan
 - ii. Details of Transmission Elements along with dedicated lines, reactive compensation (Static, Dynamic) if any
 - iii. Basic Network / Snapshot pertaining to the proposed transmission plan
 - iv. Assumptions, if any
 - v. Request for LTA associated with the transmission plan, if any--- Whether Transmission Planning shall be based on GNA or LTA.--- Issues at Annexure-II.
 - vi. Timeline for execution of the proposal alongwith key milestones and implementation risks (such as RoW, resource etc.)
 - vii. Prerequisite coordination or priority for commissioning of transmission elements within any transmission plan
 - viii. Inter-Regional Transfer Capability
 - ix. Estimated Cost of the Planned Transmission System and its impact on uniform PoC rate

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- x. Results for various contingencies studied taking intermittency of renewable generation into consideration
 - xi. Environmental Issues, if any
- (f) The proposed transmission plans shall be evaluated based on techno-economic analysis. Each option shall be evaluated with respect to reliability standards and the planning criteria used for the assessment of transmission system capability
- (g) The transmission plan thus prepared shall be submitted by CTU to the Authority for approval which would be the third stage of consultation.
- (h) The final transmission plan approved by CEA shall be published on the website of CTU and CEA along with the response of CTU on each comment received.
- (i) Similar process would be followed when the plan is reviewed and updated.

10. Execution of the transmission projects: The selection of Transmission Service Provider for execution of transmission projects shall be through TBCB or through nomination basis or as specified by appropriate govt from time to time

10.11. Review of Transmission Plan:

Transmission Plan needs to be reviewed/updated keeping in view of inputs regarding generation such as deviation from commissioning schedule, shifting of target region, retirement of units, operational feedback provided by RLDCs and SLDCs, exit from **LTA/GNA** (threshold required for review??), system constraints, market conditions, etc.

A balanced view needs to be taken in regard to liability of generators, avoidance of building underutilized assets and protecting consumer interest for the period during which asset is underutilized. For this, there is a need to formulate commitment mechanism for both generator and drawee entity.

10. Information Exchange timeline:

The timeline for exchange of information and other activities involved in the transmission planning shall be as follows:

Activity	Responsibility	Suggested Timeline
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Standing Committee Meeting in August		
Submission of anticipated network scenario in the form of a base case	STU	15 th April
Preparation of All India Network Scenario	CTU	15 th May
Publishing transmission plans for public comments	CTU	First week of June
Comments of Stakeholders	Stakeholders	First week of July
Issue of agenda of standing committee	CEA	First week of July
Standing Committee Meeting	CEA	First week of August
Approval of Transmission Plan	Authority	First Week of September
Final approved transmission plans	CTU	First week of October
Standing Committee Meeting in February		
Submission of anticipated network scenario in the form of base case	STU	15 th October
Preparation of All India Network Scenario	CTU	15 th November
Publishing finalised transmission plans for public comments	CTU	First week of December
Comments of Stakeholders	Stakeholders	First week of January
Issue of agenda of standing committee	CTU	First week of January
Standing Committee Meeting	CEA	First week of February
Approval of Transmission Plan	Authority	First Week of September
Final approved transmission plans	CTU	First week of April

12. Software Applications to be used in transmission planning

Nodal agency may deploy appropriate software for simulating the behaviors of the power system under different operating conditions during transient and steady state. It may also deploy software for co-optimization of generation resources and transmission system for 8760 hours for the planning year.

13. Manpower Deployment in Transmission Planning

Proper and adequate manpower for conducting planning exercise in the utilities shall be ensured. CTU/STU must demonstrate that they have adequate manpower for planning.

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

14. Monitoring and execution coordination of Transmission Plan

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15. Dispute resolution

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Annexure-I

Approaches to Transmission Planning:

a) Scenario Approach to Address Uncertainties:

- The scenarios may be based on a set of likely possibilities or selected on the basis of reasonable extremes like competition, load growth, upcoming IPPs, ROW, fuel resources, environmental issues, renewable integration, etc.

b) Horizon Year & Staging Approach:

- Cost optimised transmission plan for the horizon year (20th year in a 20 year planning study) is developed;
- Once an optimized horizon year plan is available, several transmission staging plans may be developed for the planning period:
 - The staging intervals may be different from one stage to the next.
 - Staging at every 5 years is usually considered appropriate.
 - In a high growth system, staging at say 3 or annual plans may be required.
- Keeps in focus the long-term needs of the system in proper perspective;
- Once the staging plans are complete, the present worth or other types of analysis may be performed for different horizon year and corresponding staging year plans;
- The selection of the most suitable plan among the low cost plans may be accomplished, via the alternative approach.

c) Trade off and Risk Analysis Approach:

- Perform trade-off and risk analysis for each future plants and find a global set;
- Measure the robustness of each plan in the global decision set;
- If no plan is completely robust, reasonable compromises may be applied. The planners need to eliminate unacceptable or inferior plans, based on multiple objectives and focus on a small set of plans.

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Annexure-II

Issues to be addressed in GNA

1. Injection GNA more than demand GNA: In the event of injection (Generation) GNA being more than Demand GNA, the transmission system will be developed as per injection GNA or it will be downsized to match with demand GNA.
2. Methodology for planning when Generators shall not have to declare target beneficiaries.
3. Handling difference in planning scenario and operational scenario: How to take care of the situation arising in the operational timeframe because the projection or assumptions which were made at the planning stage did not materialise.
4. Price for flexibility: It has been proposed that the Generators shall have access to ISTS grid with flexibility for point of drawal subject to conditions laid down at the time of grant of GNA. This issue continues to leave stranded assets. In real option economic theory, every flexibility has a price and whether generators are ready to pay sufficient price for this flexibility or the consequences of flexibility are falling on other consumers. This issue needs to be addressed.
5. Determining stranded capacity in a meshed network: How the concept of GNA would take care of issue of relinquishment charges especially in view of the fact that CTU has been expressing difficulty in stranded assets in the event of generators for whom the transmission system has already been developed or it is under execution, either downsizing, rescheduling or simply quitting and seeking relinquishment of their LTA. CTU is taking a stand that it is difficult for them to determine stranded capacity in a meshed network.
6. Planning input from Drawee entities: The mismatch in transmission planning is due to the fact that generator wants transmission system to

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be developed without identifying customers and customers who will ultimately draw power from ISTS are not coming out with their future requirement. GNA is trying to force a commitment from drawee entity based on a fixed figure to be given four years in advance. With unbundling and open access it may practically be very difficult for state agencies to firm up their transmission requirement. This issue remains unanswered in GNA and it is presumed that correct input would come from state utilities as liability is pre-decided and power drawal more than GNA would (be priced higher)not be allowed. This may not come true and it may only increase the tendency to under-declare transmission requirement. The integrated resource planning with collaborative efforts in forecasting demand and supply scenario in which cost of power is going to play a major role in deciding to opt for importing power from outside against costly generation inside the generation will ultimately decide real time system operation. So system should be flexible to accommodate all type of access and as experience shows that drawee entities are ready to bear for slightly higher transmission charges to avail the benefit of flexibility.How to incentivise or penalise states to declare their correct GNA requirement?

7. Connectivity as separate product: GNA does not propose connectivity as a separate product. However grant of Connectivity not only helped the Generator in financial closure but it also benefitted the generator & the grid through improved reliability. The existing provision of Connectivity is an important product for generator for its financial closure. For this either investment is to be made by generator or CTU in which case there are certain lock-ins like availability of land / issue of EPC contract (which is 10% of project value) to provide sufficient safety. Regulation also prohibits any injection in absence of any type of access even if connectivity is granted. So generator is taking the risk of bottling up his power if he did not seek full LTA. The process of payment based on LTA further discourages him declaring his actual requirement because till he finds a customer, payment of transmission charge is his responsibility. Such type of generator can inject only under STOA and STOA is given based on available margins. This type of product is available in US power market also. However as discussed in the Central Advisory Committee (CAC) meeting, this connectivity may be given with a charge like upfront payment of capital cost of connectivity line or an exclusive liability to pay for the tariff of connectivity line.

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8. Options & Scenario based Planning: GNA based planning is capital intensive where for each generator, request equivalent transmission investment needs to be made, optimum planning take advantage of seasonal and diurnal diversity of demand and some margins available in transmission system are utilised for short term transactions. It should be kept in mind that with POWERGRID in its dual role of planner (CTU) and executer of transmission projects should not over plan the system. Therefore, there is a need on check and balance in transmission planning process where all stakeholders participate and it is done, not only on a fixed figure of GNA but it is to be done on options and scenario based analysis where all alternatives including non transmission based solutions like Demand Side Management, Special Protection Schemes, etc., are also need to be taken into consideration.

9. Planning for Renewables: The existing system and the GNA based system are not very conducive for development of transmission system for Renewable Generation which is a public policy investment. Due to their location away from load centres, low utilization factor and lack of identified beneficiaries in the regime of RPO and REC mechanism, either of the system if applied as it is, will hamper growth of Renewables.

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