

CEA's Draft Distribution Perspective Plan 2030
Comments from Prayas (Energy Group)

April 04, 2024

Introduction

We thank the Central Electricity Authority (CEA) for uploading the [Draft Distribution Perspective Plan 2030](#) for comments in February 2024. This is indeed the logical next step to the publication of CEA's [Electricity Distribution Network Planning Criteria, 2023](#), which elaborates the objectives and methodology for network planning.

While it is true that different DISCOMs in the country have been adopting some methodology and planning their networks, this effort by CEA to develop a comprehensive methodology and detailed plan, would contribute to the overall improvement in the current planning process. But it is not clear if the current draft plan is prepared based on the network planning criteria (2023). Further, the Executive summary of the Draft mentions: *"... CEA in consultation with distribution utilities prepared the Distribution Perspective Plan upto 2029-30 based on the information received from the Discoms"*. It is not clear what inputs were provided by the DISCOMs and if the current draft plan is a consolidation of DISCOM plans or altogether different prepared by CEA. Since distribution is a regulated entity, the final network plans have to be approved by the respective SERCs. Considering this, are these plans to function as a broad input to the DISCOMs, similar to the forecasts in the EPS? If this plan is prepared by CEA, how are they different from the plans prepared by DISCOMs, and why?

Some good features of the Draft plan include consolidation of the efforts under central schemes like RDSS, estimation of all India funds requirement for network expansion, including safety aspects and highlighting the importance of capacity building.

Comments from Prayas (Energy Group) have been prepared with an objective of contributing to the improvement of distribution infrastructure planning and operation. These comments are given in the following sections, under the heads mentioned below:

- a. Scope of the Perspective Distribution Plan
- b. Demand assessment
- c. Network planning approach
- d. Repair and Maintenance requirements
- e. Technology options for smart distribution
- f. Capacity building

We request CEA to consider these comments while finalising the plan. We will be happy to provide any required additional information to the process.

1. Scope of the Perspective Distribution Plan

The scope of the Perspective Plan document should be limited to distribution network planning and should be in consonance with other Rules/Guidelines/ Regulations/Initiatives driven by MoP or CEA. Some observations/suggestions in this regard are:

- a. Chapter 5, “Reforms in Distribution Sector” has a list of reform measures, which need not be included in such a plan document. It would be better to refer to the relevant documents. Some illustrative examples from “Section 5.2: Specific Reforms for Distribution Sector” are:

“Hence, to make the tariff reasonable for all the categories of consumers, the tariffs for all categories of consumers should be brought within the limits of $\pm 15\%$ of average cost of supply.” ;

“Since distribution sector is exclusively within the purview of the State Government, they should provide necessary legal and regulatory frame-work for smooth implementation of public private partnership (PPP) in the states”;

“Timely filing of Tariff Petition to SERCs”

“Discoms should prepare their ARR in such a manner that there should not be any Regulatory Assets which are not agreed by Regulators to pass through in tariff. Regulators should also devise a methodology to liquefy the existing burden of Regulatory assets in a time bound manner.”

- b. CEA’s “[Electricity distribution network planning criteria 2023](#)” is a recent comprehensive document, but it appears that it is not referred to in this draft. Chapter 2 - Stages Involved in System Planning and Chapter 3 - Load Forecasting of the Planning Criteria are much more detailed than what is provided in this Draft. We suggest that the Distribution Perspective plan be prepared as per the Planning Criteria. Considering the fast-changing sector, the “Electricity Distribution network planning criteria” needs to be revised periodically, say once in three years.
- c. MoP Electricity Rules and Amendments have provisions on distribution network. For example, [Electricity \(Second Amendment\) Rules, 2023](#) (dated 26/07/2023) mentions that pass through of distribution asset costs shall be subject to the following conditions:
 - (i) the asset has been created in accordance with the capex roll out plan for the licensee approved by the respective State Commission.
 - (ii) the asset has been procured in competitive and transparent manner.
 - (iii) the asset is geo-tagged and properly recorded in Fixed Asset Register

Section 7.8 of the Draft Plan is about features of Geographical Information Systems and mentions “*Geo coordinates controlled Asset record management*”, but there is no mention about the time scale to operationalise this in Chapter 3 (Planning methodology) or Chapter 4 (Plan Summary). Such aspects should form an integral

part of the draft and provide more elaborate methods and formats for data collection, analysis and evaluation.

- d. Section 1.2 is about RDSS initiative, targets etc. Some of the information is dated (e.g. incentive for completing metering by Dec 2023), perhaps because these sections have been copied from an older document. It is best to refer to the latest information available, say at the REC website.
- e. There are other national/state initiatives like KUSUM, efficient appliance roll-out, roof top solar deployment, energy efficiency audit reporting etc, which also should form a part of this Draft.

Some states have Regulations on network planning, under Resource plan, Business plan, Capital expense plan and network Multi-Year Tariff plans. The Draft plan should collect the best practices from these processes. Chapter 6 covers Best Practices, but these are futuristic suggestions and ideas. There is no prioritisation or action plan in the draft, say in Chapter 3 or 4. Distribution planning should also cover Renovation and Modernisation separately, as done by many DISCOMs. Section 4 of our submission covers this aspect. Draft has Chapter 7 on Smart Distribution, but the it is not clear how the ideas mentioned are integrated to the plan. Section 5 of our submission covers this aspect.

One of the stated objectives of the Draft Distribution Perspective Plan 2030 is to help DISCOMs provide 24 x7 reliable supply to consumers. To ensure that DISCOMs are progressing in this direction, it is necessary to measure improvements in the reliability and quality of supply along with AT & C loss reduction, improvements in distribution network and consumer metering. Hence, DISCOMs can also submit relevant data to CEA and the draft plan can include a trajectory/plan to improve the reliability and quality of network by 2030.

2. Demand assessment

Chapter 2 of the Draft covers demand assessment and uses projections from 20th Electric Power Survey (EPS), which was finalised in 2022, based on data provided by DISCOMs in 2021. The projections are dated with actual demand and projections of some DISCOMs being lower than EPS projections. EPS projections have other limitations too, as has been conveyed to CEA in our earlier interactions. Some major points are listed below.

- a. Realistic assumption of open access and captive power, both of which are crucial for network planning
- b. Demand pattern shifts due to consumer demand changes and growth or cheaper renewable
- c. Change/Increase in energy demand due to increasing electrification – industry, electric vehicles, cooking etc.

- d. Demand estimation based on different scenarios – related to demand, supply mix, efficiency measures etc
- e. Discontinuing the use of load factor to calculate peak demand – the essential need to forecast hourly demand patterns.
- f. Need for mid-term revision of EPS projections

The Draft plan uses DISCOM-wise demand projections of 20th EPS for network planning. As elaborated in Section 3 of this submission, it is important that DISCOMs prepare circle-wise network plans. The importance of circle-wise demand assessment has been recognised in CEA’s Network planning criteria. To quote from Section 3.2 (emphasis added): *Spatial Granularity - The forecasts initially should be prepared at the Discom/State level. In addition, forecast at more granular levels i.e. Zonal level, Circle level, District level, Sub-Station Level, Feeder/Transformer level should also be carried out in case of availability of adequate granular data. Such granular forecasts would be more useful in **power infrastructure planning**.*

3. Network planning approach

Chapter 4 of the Draft gives the network plan summary for 2030. Section 4.2 gives the demand scenario and 4.3 generation scenario in a total of 2 pages. This is followed by Section 4.3 which gives the national network requirement summary with Annexures providing DISCOM-wise details. The approach used to arrive at the network requirements is not mentioned in the Draft. If it was, we could have commented on the methodology too. The network planning criteria document has some more details, but even that document does not provide the method used to arrive at the network addition requirements.

Resource plans of some DISCOMs provide the approach to network planning and at least few of them (e.g. DISCOMs of Andhra Pradesh, Telangana, Madhya Pradesh and Tamil Nadu) prepare circle-wise network plans. To give an idea, the approach in APEPDCL as given in their Resource Plan petition for FY25-29 and FY30-34 is summarised In Table 1 and Figure 1.

Table 1: Steps in network planning

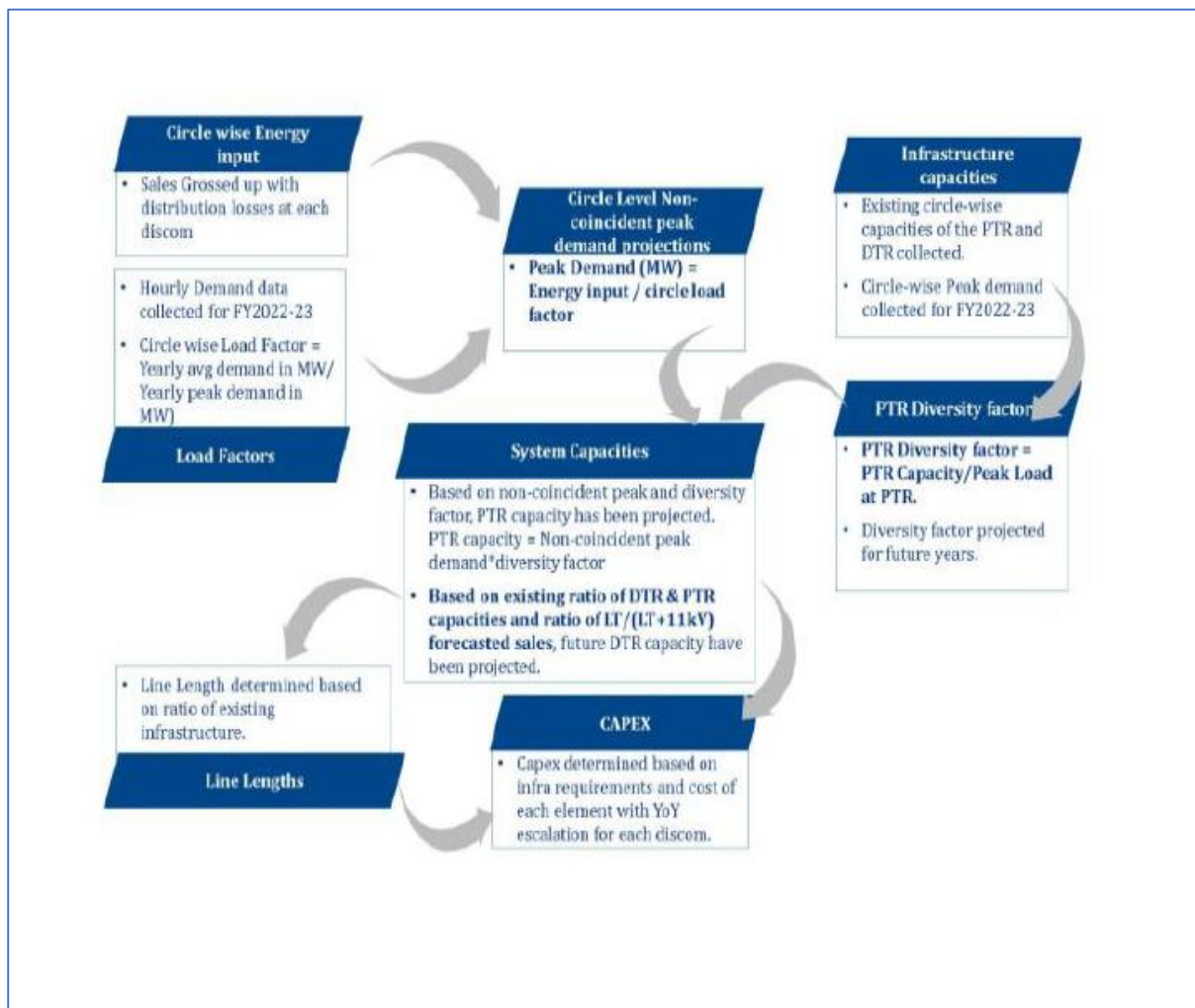
S. No	Description	Reference
1	Category-wise, circle-wise energy forecast prepared, based on CAGR calculated based on 5-year historical trends and few other considerations (open access, RTS, major demand addition plans etc)	Section 3, pp 8-21 and Annexure 7.1.1 (pp 82-94, historical sales), 7.1.2 (No of consumers)
2	Based on Circle-wise historical coincident peak (CP) and non-coincident peak (NCP) demands, historical circle-wise Load Factors (LF) and Diversity Factors (DF) calculated	Section 4, pp 22-23, Annexure 7.2 (pp 108-116, monthly 24-hourly demand data – monthly average for each hour – circle wise and APEPDCL)
3	Historical annual new network capex (Rs Cr) and planned addition as per ongoing schemes are summarised under 7 broad heads (Substation, DTR, Lines, Loss reduction, Technology upgradation & R&M, Civil works)	Section 6.1 (pp 68-72)
4	Existing circle wise network infrastructure is summarised – Power Transformers (PTR), Distribution Transformers (DTRs), Circuit km of 33 kV, 11 kV and LT lines. Based on this, infrastructure norms such as PTR DF, PTR/DTR ratio, Ckt km of lines per PTR and DTR, LT sales ratio (LT sales/11 kV sales + LT sales) are calculated.	Section 6.2.2 (pp 72)
5	Forecasting circle -wise additional network requirements – PTR, DTR, Line Ckt km and funds required, based on NP demand forecast, ongoing infrastructure projects, reliability & voltage regulation requirements, infrastructure norms, and cost norms	Section 6.2.3 to 6.2.7 (pp 73-81)

Source: Prepared by Prayas (Energy Group) based on Resource Plan petition of APEPDCL for FY25-FY34 ¹

CEA's network planning approach should be as good or better than this. There is scope of improving in the approach of APEPDCL in areas like category wise energy forecast, use of more granular data for calculation of load factor and diversity factor, better methods to forecast LF and DF or forecasting demand profile without using LF, incorporating demand shift and energy efficiency, better forecast of open access & captive, correlating reliability and safety indicators to infrastructure and O&M, considering different scenarios with cost benefit studies etc.

¹ APEPDCL Resource Plan petition is available at APERC website [here](#). APSPDCL petition [here](#) and APCPDCL petition [here](#).

Figure 1: Schematic of Network capex planning – APEPDCL



Source: This is a reproduction of Figure 4 (Methodology for CAPEX calculation) from Section 6.2, pp 71 of APEPDCL Resource Plan

Circle-wise demand forecast and network panning should be taken up by CEA. CEA should also suggest that baseline indicators related to reliability, voltage regulation, electricity safety should also be calculated, in addition to distribution loss. Trajectory in the planning horizon should include these indicators also. Examples are percentage DT failure per circle, number of feeder outages/circuit km, mean time to repair DT failure, number of human accidents/population, average voltage deviation, SAIDI, SAIFI etc. Safety should cover public safety and not only DISCOM staff or equipment safety, since nearly 90% of the electricity accidents affect public. Distribution infrastructure and O&M should be planned with a view to improve these indicators, which should also be tracked at circle, DISCOM, State and national levels. CEA could consider hosting a distribution quality dash board to cover all such indicators.

As per CEA’s Network planning criteria, substation siting is to be based on geo-spatial load analysis, identification of load centres and constrained by land availability. A sample study

could be conducted to identify and address any issues faced by DISCOMs in implementing this approach. Since many states prepare network plan as part of Resource plan or MYT plan through a regulatory process, CEA could conduct a study of these planning approaches to develop the most optimal approach.

4. Include Renovation & Modernisation as part of the plan

Renovation & Modernisation (R&M) is already an important aspect of distribution network plan in some DISCOMs, as mentioned in the previous section. R&M could include replacing aging conductors, introducing new technologies to improve efficiency & reliability etc. Many DISCOM resource plans include this component. CEA plan should also include specific suggestions in this important area. Circle-wise requirements for R&M should be prepared along with benchmarks for R&M.

5. Optimal deployment of technology options

Running into nearly 38 pages (out of a total of 155 pages), Chapters 6 (Best practices) and 7 (Smart distribution) of the draft mention a few challenges and have a long list of ideas to improve the distribution system. This includes discharge measurement, root cause analysis, SCADA, DMS, GIS, AMI, ToD tariff, cyber security, vehicle to grid charging, Distribution Management System, ERP, Home automation etc etc. Chapter 6 aims to provide an overview on best practices adopted by DISCOMs as stated in the introduction *“The best practices being followed by the Discoms for management of distribution system to provide reliable and quality power to consumer along with more consumer satisfaction have also been included in the respective chapters.”*

However, details on how relevant measures have been implemented by DISCOMs is not covered. Some measures could be categorised as important and scrutinized by the SERC (for example. 6.3.2 i and 6.3.2. viii). Suggestions on Practices for improved DSM are prescriptive, the actions to be taken by DISCOMs as a part of the distribution perspective plan need to be provided to ensure that these measures are implemented.

There are no case studies, cost benefit analysis, prioritisation or deployment plan for these good practices or technology options. Without such an exercise, such a long list does not have much significance.

6. Capacity building

Chapter 8 of the Draft plan, running to 18 pages is on capacity building and this is a welcome addition to the plan. Chapter provides conceptual and broad outline of the capacity building needs of DISCOM staff. But a detailed plan to implement the capacity building is essential for any DISCOMs to operationalise the plan. If it is not intended to be a part of the Draft plan, then such a framework is best included in some other document, say the Network planning criteria. Another major drawback is that capacity building of non DISCOM staff is not covered in this Draft. Consumers, contractors and general public are also important stake holders in distribution. Building their capacity should also be part of the mandate of DISCOMs.

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