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MINISTRY OF POWER

केंद्रीय विद्युत प्राधिकरण

CENTRAL ELECTRICITY AUTHORITY

**Guidelines
for
Medium and Long Term
Power Demand Forecast**

**JULY 2023
NEW DELHI**

घनश्याम प्रसाद
अध्यक्ष तथा पदेन सचिव भारत सरकार
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FOREWORD


Electricity demand forecast is an important exercise for power procurement planning and investment in power sector. It provides the basis for making decisions in power system planning and operation. Central Electricity Authority (CEA) has been carrying out the demand forecast of the country for medium term and long-term periods through Electric Power Surveys (EPS) on a periodic basis to bring out National Electricity Plan.

The “Guidelines on Medium and Long term demand forecast” is an attempt to bring out, the forecasting methodology adopted by CEA in its EPS exercises, in public domain with an aim to provide guidance to power utilities at state level to carry out their demand forecast holistically. It aims to serve as a guiding document for realistic assessment of future electricity demand of DISCOMs/States by keeping in view the uncertainties in electricity demand due to various emerging factors such as penetration of electric vehicles, solar rooftop and green hydrogen etc. and government schemes.

These guidelines encourage DISCOMs/States to carry out year-wise forecast at DISCOM/State level for at least three scenarios – Optimistic scenario, Business As Usual (BAU) scenario & Pessimistic scenario. However, the concept delineated in these guidelines could be extended for more granular (in terms of “Time” as well as “Spatial”) forecasting exercises also.

The guidelines recommend adopting such methodologies for medium & long term forecasting that focus on analyzing past consumption data of each category separately and factoring in the impacts of emerging aspects to arrive at appropriate future growth trends. Central Electricity Authority traditionally adopts the Partial End Use Method (PEUM) for carrying out Electric Power Survey (EPS) exercises and the “Econometric Method” for validating its findings. It allows DISCOMs/States to incorporate more variables (such as GDP, rate of industrialization, etc.) over which the electricity demand depends, based on the availability of data in their forecasting models.

I would also like to commend the officers of PS&LF Division who have taken initiative and prepared the guidelines taking inputs from various stakeholders in power sector. I am sure that that the guideline would prove helpful and facilitate the demand forecasting exercise carried out by power utilities & other stakeholders for achieving the overall objective of reliable and uninterrupted power supply.


(Ghanshyam Prasad)



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Preface

With pleasure and pride, the comprehensive guidelines on long-term and medium-term demand forecast are presented. These guidelines have been developed with an objective to provide power utilities and other stakeholders a valuable resource that will aid them in realistic assessment of electricity demand. It covers all the important aspects that need to be taken into consideration while carrying out demand forecast.

A fairly accurate electricity demand projection is very important requirement in power system planning in order to ensure the availability of supply of electricity and avoid over and under-utilization of capital assets. In addition to ensuring the reliable operation of power systems, it will have an excellent cost-saving potential for the power utilities.

I would also like to place on record my appreciation of the efforts made by the officers and staff of PS&LF Division, CEA. I am confident that these guidelines will be of great help to utilities in planning their operation in most efficient way so that the varying level of demands prevailing in the grid can be met.

July 2023


(A. Balan)

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Acknowledgement

The “Guidelines on Medium and Long term demand forecast” is an attempt to outline the method of carrying out demand forecast in a holistic manner. It aims to serve as a guiding document for realistic assessment of future electricity demand by DISCOMs/States and to align with the methodology followed at central level. It prescribes the Partial End Use Method (PEUM) for carrying out the electricity demand forecasting and its validation preferably through Econometric method and any other method to provide flexibility in approach.

The guidelines suggests to carry out future forecasts at more granular levels i.e. Zonal level, Circle level, District level, Sub-Station Level, Feeder/Transformer level based on availability of adequate granular level data. Such forecasts would be more useful in better power infrastructure planning and would also help in generating more revenues for DISCOMs due to assurance to the potential customers for meeting their power requirements reliably as they will already be a part of the planning process.

I am thankful to Chairperson, CEA and Member (Planning), CEA for their support, worthy suggestions and guidance in preparing these guidelines. Further, I wish to extend my appreciation to Sh. Deepak Kumar, Director (PS&LF) and all other officers of PS&LF Division of CEA for taking initiative and preparing the guidelines. Further, I would also like to express my sincere thanks to various stakeholders/individuals and power utilities who have provided their valuable suggestions/comments in finalizing these guidelines.

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(Irfan Ahmad)

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General

**(Term, Periodicity, Scenarios,
Methods of the forecast)**

A. General (Term, Periodicity, Scenarios, Methods of the forecast)

- A.1 The guidelines aim at providing a basic framework of medium term and long term power demand forecast for a DISCOM/State/UT.
- A.2 The forecast should be prepared for medium term (more than 1 year and up to 5 years) and also for longer term.
- A.3 The long term forecast should be for the next 10 years at least.
- A.4 The detailed power demand forecasting exercise should be undertaken in every 5 years. However, the forecast should be reviewed on yearly basis and updated, if required. The suggested timeline for the yearly review of forecasts is placed at **Annexure-I**.
- A.5 The forecast should be prepared/reviewed/updated in consultation with all stakeholders such as industrial department, agricultural department, municipal corporation, drinking water department, weather department, transport department, Bureau of Energy Efficiency, State Planning department, captive power plant owners, state nodal agencies for renewable energies and any other department entrusted with planning and implementing any electrical energy intensive plan/scheme.
- A.6 The base year for the forecast should ideally be taken as the three-year (T-3) preceding the year during which forecast exercise is being carried out. This is to be done to test the performance of the forecasting model by comparing the forecast results obtained for (T-2) and (T-1) years with actual available data (termed as Out of Sample Validation). For example, if forecasting exercise is being done in 2022-23, then the base year for the forecast should be 2019-20 and performance of the forecasting model should be tested by comparing the forecast results obtained for the years 2020-21 and 2021-22 with actual available data.

Note - If the data for T-3 year is showing some abnormal trends due to various factors such as extreme weather conditions, pandemic etc., then the last normal year till which some definite trends were observable should be considered as the base year.