

**Chhattisgarh State Electricity Regulatory Commission**

**Irrigation Colony, Shanti Nagar, Raipur**

Raipur, Dated --/09/2024

**(Draft Regulations)**

No. D-20/CSERC/2024 -- In exercise of powers conferred under Section 181 of the Electricity Act, 2003 (36 of 2003), read with Section 61, 66 and 86 of the Electricity Act, 2003 and all other powers enabling it in this behalf, the Chhattisgarh State Electricity Regulatory Commission hereby makes the following regulations:

**Chhattisgarh State Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2024.**

**Chapter1  
Preliminary**

**1. Short Title, Extent, and Commencement**

- 1.1. These Regulations shall be called the Chhattisgarh State Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2024.
- 1.2. These Regulations shall extend to the whole of Chhattisgarh.
- 1.3. These Regulations shall come into force from such date as may be notified by the Commission separately.

**2. Objective**

- 2.1. The objective of these Regulations is to enable the implementation of Resource Adequacy framework by outlining a mechanism for planning of generation resources for reliably meeting the projected demand in compliance with specified reliability standards for serving the load with an optimum generation mix.
- 2.2. The Resource Adequacy framework shall cover a mechanism for demand assessment and forecasting, generation resource planning, procurement planning, its monitoring and compliance.

**3. Scope and Applicability**

These Regulations shall apply to the generating companies, distribution licensees, State Load Despatch Centre, Transmission Companies, other grid connected

entities and stakeholders within Chhattisgarh State.

#### 4. Definitions

4.1. In these Regulations, unless the context otherwise requires,

- a) **“Act”** means the Electricity Act, 2003 (No.36 of 2003) and subsequent amendments thereof.
- b) **“Authority”** or **“CEA”** means Central Electricity Authority referred to in sub-section (1) of Section 70 of the Act.
- c) **“Capacity Credit”** or **“CC”** means a percentage of a resource’s nameplate capacity that can be counted towards resource adequacy requirements.
- d) **“Commission”** means the Chhattisgarh State Electricity Regulatory Commission.
- e) **“Electric Power Survey”** or **“EPS”** means a periodic electric power survey conducted by the Central Electricity Authority to assess the electricity demand on medium and long-term basis for each DISCOM/State/Union Territory/Region and for the country.
- f) **“Expected Energy Not Served”** or **“EENS”** means the expected amount of energy (MWh) that may not be served for each year within the planning period for Resource Adequacy planning.
- g) **“Long-Term”** means duration exceeding five years for development of demand forecasting and generation resource planning.
- h) **“Long-Term Power Procurement”** means procurement of power under any arrangement or agreement with a term or duration exceeding five years.
- i) **“Long-Term Distribution Resource Adequacy Plan”** or **“LT-DRAP”** means plan for assessment of long-term resource adequacy by the distribution licensee.
- j) **“Loss of Load Probability”** or **“LOLP”** means probability that a system’s load may exceed the generation and firm power contracts available to meet that load in a year.
- k) **“Medium-Term”** means duration exceeding one year and upto five years for development of demand forecasting and generation resource planning.
- l) **“Medium-Term Power Procurement”** means procurement of power under any arrangement or agreement with a term or duration exceeding one year and up to five years.
- m) **“Medium-Term Distribution Resource Adequacy Plan”** or **“MT- DRAP”** means plan for assessment of medium-term resource adequacy by the distribution

licensee.

- n) **“Month”** means a calendar month as per the British Calendar.
- o) **“Net Load”** means the load derived upon exclusion of actual renewable generation (MW) from gross load prevalent on the Grid during any time-block.
- p) **“Normalized Energy Not Served”** or **“NENS”** is normalization of the EENS by dividing it by the total system energy (MWh).
- q) **“Planning Reserve Margin”** or **“PRM”** means a percentage of the capacity over and above the State’s coincident share in national peak demand as may be prescribed by Authority or approved by the Commission from time to time for the purpose of generation resource planning.
- r) **“Power Exchange”** means any exchange operating as power exchange for electricity in terms of the regulations issued by the Central Electricity Regulatory Commission.
- s) **“Power Purchase Agreement (PPA)”** means the agreement entered into between the Procurer(s) and the Seller pursuant to which the Seller shall supply power to the Procurer(s) as per the terms and conditions specified therein;
- t) **“Power Sale Agreement (PSA)”** shall mean the back-to-back agreement entered into between the Buying Entity(s) and the Intermediary Procurer/trader for onward sale of power purchased under any power purchase agreement.
- u) **“Power Supply Agreement (PSA)”** shall mean the agreement entered into between the procurer(s) and the Seller pursuant to which the Seller shall supply power to the Procurer(s) as per the Ministry of Power Guidelines for long-term procurement of electricity from thermal power stations.
- v) **“Resource Adequacy”** or **“RA”** means a mechanism to ensure adequate generation resources to serve expected demand (including peak, off peak and in all operating conditions) reliably in compliance with specified reliability standards for serving the load with an optimum generation mix and with a focus on integration of environmentally benign technologies after taking into account the need, inter alia, for flexible resources, storage systems for energy shift, and demand response measures for managing the intermittency and variability of renewable energy sources.
- w) **“Short-Term”** means duration upto one year for development of demand forecasting and generation resource planning.
- x) **“Short-Term Power Procurement”** means procurement of power under any

arrangement or agreement with a term or duration of upto one year.

y) **“Short-Term Distribution Resource Adequacy Plan”** or **“ST-DRAP”** means plan for assessment of short-term resource adequacy by the distribution licensee.

z) **“State”** means the State of Chhattisgarh;

aa) **“State Load Dispatch Centre (SLDC)”** means the centre established under Sub-section (1) of Section 31 of the Act.

bb) **“Year”** means financial year commencing on 1<sup>st</sup> April of the year and ending on 31<sup>st</sup> March of the succeeding year.

4.2. All other words and expressions used in these Regulations, although not specifically defined herein above, but defined in the Act or other Regulations of the Commission or CEA Guidelines, shall have the meaning assigned to them in the Act or other Regulations of the Commission or CEA Guidelines. The other words and expressions used herein but not specifically defined in these Regulations or in the Act but defined under any law passed by the Parliament applicable to the electricity industry in the State shall have the meaning assigned to them in such law.

## **Chapter 2**

### **General**

#### **5. Resource Adequacy Framework**

- 5.1. Resource Adequacy framework shall comprise of planning of generation resources for reliably meeting the projected demand for serving the load with an optimum generation mix.
- 5.2. Resource Adequacy framework shall cover following steps:
  - a) Demand assessment and forecasting
  - b) Generation resource planning
  - c) Procurement planning
  - d) Monitoring and compliance
- 5.3. The Resource Adequacy exercise shall be developed and prepared for a planning period of 10 (Ten) years on annual rolling basis.
- 5.4. Distribution licensees shall develop and prepare Long-Term Distribution Resource Adequacy Plan (LT-DRAP), Medium-Term Distribution Resource Adequacy Plan (MT-DRAP) and Short-Term Distribution Resource Adequacy Plan (ST-DRAP) in accordance with these Regulations.

## **Chapter 3**

### **Demand Assessment and Forecasting**

#### **6. Long-Term and Medium-Term Demand Forecast**

6.1. The distribution licensees shall develop and prepare demand assessment and forecasting considering the guidelines for Long-term and Medium-term power demand forecast issued by Central Electricity Authority (CEA) from time to time. Demand assessment and forecasting shall cover hourly or sub-hourly assessment and forecasting of demand for Long-term and Medium-term using comprehensive input data, policies and scientific modelling tools.

6.2. Distribution licensees shall be responsible for providing the category wise consumption data and assessed consumption data of class of consumers such as agricultural, domestic etc. to SLDC for purpose of State level demand forecasts.

Provided that, distribution licensees shall submit the category wise consumption information of previous financial years and any other information as may be required by SLDC by 21<sup>st</sup> April of each year.

6.3. Distribution licensees shall prepare the energy forecast for each consumer category as specified by the Commission in its Retail Supply Tariff Order from time to time.

6.4. Distribution licensees shall determine the energy forecast for a consumer category by adopting any of the following and/or combination of following methodologies:

- a) Trend Analysis i.e., Year on Year /Compounded Annual Growth Rate (CAGR) for past period and time series analysis;
- b) End Use or Partial End Use method;
- c) Auto-Regressive Integrated Moving Average (ARIMA);
- d) AI including machine learning, ANN techniques; and
- e) Econometric Modelling (specifying the parameters used, algorithm, and source of data).

6.5. Distribution licensees may use Electric Power Survey (EPS) projections as base and/or any methodology other than the above-mentioned methodologies after providing detailed justification for the methodology adopted for demand forecasting. Further, distribution licensees shall use best fit of various methodologies for the purpose of demand forecast after taking into consideration various scenarios such as (viz. most probable, business as usual, aggressive) as specified under Regulation 6.14 of these Regulations.

- 6.6. For purpose of forecasting energy for a consumer category and the methodology to be used for energy forecasting of a consumer category, distribution licensees shall conduct statistical analysis and select the method for which standard deviation is lowest and R-square is highest.
- 6.7. Distribution licensees shall utilize state-of-the-art tools, scientific and mathematical methodologies, and comprehensive database such as, but not limited to, weather data, historical data, demographic and econometric data, consumption profiles, impact of policies and drivers etc. as may be applicable.
- 6.8. Distribution licensees shall modify the energy forecast obtained for each consumer category, by considering the impact for each of the but not limited to the following activities. The impact shall be considered by developing trajectories for each of the activities based on the economic parameters, policies, historical data, and projections for the future:-
- a) Demand-Side Management;
  - b) Open Access;
  - c) Distributed Energy Resources;
  - d) Deviation Settlement Mechanism and demand response measures;
  - e) Electric Vehicles and E- Vehicle / E- Rickshaws Charging Stations;
  - f) Tariff Signals including Time of the Day (ToD) Tariff;
  - g) Changes in specific energy consumption;
  - h) Increase in commercial activities with electrification;
  - i) For agricultural loads, the season wise change, temperature, area wise rainfall pattern, impact of water level in agricultural pockets, irrigation facilities, area wise type of crop, number of crops, increase in number of agricultural pump sets and its solarization;
  - j) Changes in consumption pattern of seasonal consumers including seasonal variations for rabi/kharif season and other crops;
  - k) Impact of important festivals, working days or non-working days, Peak and Off-Peak hours load pattern; and
  - l) Policy influences such as 24×7 supply to all consumers, LED penetration, efficient use of agriculture pumps, fans/ACs/ appliances, increased use of appliances for cooking/heating/ cooling applications, electrification policies, distributive energy resources, storage, and policies, which can

impact econometric parameters, impact of national hydrogen mission. For each policy, a separate trajectory should be developed for each consumer category.

- 6.9. Distribution licensees may take into consideration any other factor not mentioned in Regulation 6.8 of these Regulations after providing detailed justification for its consideration.
- 6.10. The long and medium-term load profiles of the consumer categories for which load research has been conducted may be refined on the basis of load research analysis. A detailed explanation for refinement conducted must be provided.
- 6.11. The summation of energy forecast (MU) for various consumer categories after adjusting captive, prosumer, and Open Access load forecast as per Regulations 6.4 to 6.10 of these Regulations, as the case may be, shall be the energy forecast for the distribution licensee at consumer level.
- 6.12. Distribution licensees shall calculate the energy forecasts (in MUs) of the State by considering distribution losses and Intra/Inter-State transmission losses as per realistic loss trajectory.  
Provided that for the purposes of estimating ARR for ensuing years and approving true-up of previous years, distribution/aggregate technical and commercial (AT&C) losses trajectory as specified by the Commission from time to time shall be considered.
- 6.13. The peak demand (in MW) shall be determined by considering the average load factor, load diversity factor, seasonal variation factors for the last three years and the energy forecasts (in MUs) obtained in Regulations 6.12 of these Regulations. If any other appropriate load factor is considered for future years, a detailed justification shall be provided by distribution licensees for its consideration.
- 6.14. Distribution licensees shall conduct sensitivity and probability analysis to determine the most probable demand forecast. It shall also develop long-term and medium-term demand forecasts for possible scenarios, while ensuring that at least three different scenarios (most probable, business as usual, and aggressive scenarios) are developed.

## **7. Short-Term Demand Forecast and Aggregation of Demand Forecast**

### **A. Short-Term Demand Forecast**

- 7.1. Distribution licensees shall develop a methodology for hourly or sub-hourly demand forecasting and shall maintain a historical database.
- 7.2. For the purpose of ascertaining hourly load profile and for assessment of

contribution of various consumer categories to peak demand, load research analysis shall be conducted and influence of demand response, load shift measures, time of use shall be factored in by distribution licensees with inputs from SLDC. A detailed explanation for methodology adopted must be provided.

- 7.3. Distribution licensees shall utilize state-of-the-art tools, scientific & mathematical methodologies, and comprehensive data such as but not limited to weather data, historical data, demographic and econometric data, consumption profiles, policies and drivers etc. as may be applicable.

**B. Aggregation of Demand Forecast**

- 7.4. Distribution licensees shall prepare hourly or sub-hourly as may be decided by the Commission from time to time, 1-year Short-term (ST), 5-year Medium-term (MT) and 10-year Long-term (LT) demand forecasts on a rolling basis and submit to SLDC by 30<sup>th</sup> April of each year for the ensuing year.
- 7.5. SLDC with inputs from distribution licensees, shall estimate, in different time periods, namely Long-term, Medium term and Short-term, the demand for the entire State duly considering the diversity of the State.
- 7.6. SLDC shall aggregate demand forecasts by distribution licensees, considering the load diversity, congruency, seasonal variation aspects and submit State-level aggregate demand forecasts for Long-term (MW and MUs) to CEA and Short-term to NLDC and RLDC by 31<sup>st</sup> May of each year for the ensuing year(s).

## **Chapter 4**

### **Generation Resource Planning**

#### **8. Preparation of Generation Resource Planning**

- 8.1. Distribution licensees shall plan and assess the required generation resources considering their existing resources, upcoming resources (not yet commissioned), capacity credit and incremental capacity requirement to meet forecasted demand including planning reserve margin (PRM).
- 8.2. Generation resource planning shall involve the following steps namely,
  - a) Capacity crediting of generation resources,
  - b) Assessment of planning reserve margin, and
  - c) Ascertaining resource adequacy requirement and allocation for obligated entities within control area (State/distribution licensees).
- 8.3. The Generation resource planning shall include the following data, but not limited to:-
  - a) Planning Reserve Margin
  - b) Actual demand met by the distribution licensees in hourly time block resolutions for last 5 years
  - c) Estimated load growth during the planning period
  - d) Critical characteristics, machine characteristics, hydrology for hydro machines and technical parameters of thermal and hydro generation plants, such as:
    - i. Name of plant, location (State/Region)
    - ii. Capacity (MW) (for existing and planned capacities)
    - iii. Heat Rate for thermal generating stations,
    - iv. Auxiliary Consumption (MW),
    - v. Maximum and Minimum Generation Limits (MW)
    - vi. Ramp Up and Ramp Down Rate (MW/min)
    - vii. Start-up time;
    - viii. Plant Availability Factor (% of time), etc. and
    - ix. Capacity utilization factor (CUF) for renewable resource-based power plants.
  - e) All the characteristics and parameters with their values for each generating plants considered shall be provided in the resource plan.
  - f) Under-construction capacity /retirement of generation capacity/contracted

capacity/bilateral contracts.

- g) Potential technologies, gestation periods and lifetime of different assets.
- h) Capacities and generation profile of renewable generation
- i) Historical forced outage rates and planned maintenance rates of generation capacities.
- j) Renewable Purchase Obligation (RPO) including Energy Storage Obligation targets, etc.
- k) Constraints such as penalties for unmet demand, forced outages and system emission limits as defined in State Grid Code and Indian Electricity Grid Codes and emission norms specified by the Ministry of Environment, Forest and Climate Changes shall be identified and enlisted.

8.4 Distribution licensees shall map all its existing resources, upcoming resources, and retiring resources to develop the existing resource map in MW for the Long-term and Medium-term power procurement plan.

## **9. Capacity Crediting of Generation Resources**

- 9.1. Distribution licensees shall compute Capacity Credit (CC) for their contracted RE generation resources by applying the net load-based approach as outlined under Regulation 9.2 of these Regulation. The average of the Capacity Credit (CC) factor for each type of the contracted generation resource for the preceding five years on a rolling basis shall be considered as Capacity Credit factor for the purpose of generation resource planning.
- 9.2. The Net Load based approach/methodology for determination of Capacity Credit (CC) factors for generation resources shall be adopted as under:
  - a) For each year, the hourly recorded Gross Load for 8760 hours (or time-block) shall be arranged in descending order.
  - b) For each hour, the Net Load is calculated by subtracting the actual wind or solar generation corresponding to that load for 8760 hours (or time-block) and then arranged in descending order.
  - c) The difference between these two load duration curves mentioned under Regulation 9.2 (a) and (b) of these Regulations represents the contribution of capacity credit factor of wind generation or solar generation, as the case may be.
  - d) Installed capacity of wind or solar generation capacity shall be summed up corresponding to the top 250 load hours as computed in Regulation 9.2(c)

of these Regulations. The selection for 250 top load hours shall be considered from the arranged descending order of Net Load hours.

- e) Total generation from wind or solar generation corresponding to these top 250 hours is summed up.
- f) Resultant CC factor is (Total RE Generation for top load 250 hours)/(Installed RE Capacity for top load 250 hours), as per formula below:

$$* \text{ CC factor} = \frac{\text{Sum of RE Generation for top load 250 hours (MWh)}}{\text{Sum of RE Capacity for top 250 hours (MWh)}}$$

- g) The process for CC factor determination shall be undertaken for each year for duration of past five-years and the resultant CC is the average of CC values of past 5 years.

Provided that at the time of determining CC factor considering past five-years duration values, distribution licensees shall exclude abnormal values during the year for following events or circumstances, but not limited to:-

- i. Act of God including but not limited to lightning, drought, fire and explosion, earthquake, volcanic eruption, landslide, flood, cyclone, typhoon, tornado, geological surprises, natural disaster or exceptionally adverse weather conditions, which are in excess of the statistical measures for the last hundred years; or
- ii. Any disaster declared by the Central Government under Disaster Management Act as amended from time to time; or
- iii. Any act of war, invasion, armed conflict or act of a foreign enemy, blockade, embargo, revolution, riot, insurrection, terrorist or military action.

- 9.3. For the purpose RE generation contracted by distribution licensees, CC factors as specified by the Authority or the Commission shall be considered.
- 9.4. CC factors for hydro generation resources shall be computed based on water availability with different CC factors for run-of-the-river hydro power projects and dam-based/storage-based hydro power projects.
- 9.5. CC factor for thermal resources shall be computed based on coal availability and planned/forced outages.
- 9.6. The computation for CC factor for the storage technology shall be determined using Top Net Load Hours approach or such other methodology as may be prescribed by the Authority.
- 9.7. Distribution licensee shall inform such CC factors along with justification to SLDC by 21<sup>st</sup> May of each year for the ensuing year(s). SLDC shall calculate State-specific CC factors based on aggregate State Demand, State Net Load and contracted RE generation available in the State and submit the same to CEA, RLDC and NLDC by 31<sup>st</sup> May of each year for the ensuing year(s).

#### **10. Assessment of Planning Reserve Margin (PRM)**

- 10.1. Planning Reserve Margin (PRM) shall be based on the reliability indices in terms of Loss of Load Probability (LOLP) and Normalized Energy Not Served (NENS) as may be prescribed by the Authority.

- 10.2. The PRM determined under Regulations 10.1 of these Regulation shall be considered by distribution licensees in their planning for resource adequacy requirement and generation resource capacity planning.
- 10.3. Distribution licensees may consider higher planning reserve margins, subject to approval from the Commission.
- 10.4. The State level resource adequacy planning by SLDC shall factor in PRM while developing State-level Integrated Resource Plan.

## **11. Resource Adequacy Requirement and its Allocation**

- 11.1. Distribution licensees shall determine capacity requirement to meet demand and PRM considering available capacity adjusted for capacity crediting for existing and planned contracted generation resources.
- 11.2. The available capacity as determined in Regulation 11.1 shall be then plotted over a time axis of 15-minute intervals or longer, but not more than one hour. This shall form the resource map of the distribution licensees.
- 11.3. Distribution licensees shall subtract the resource map developed in Regulation 11.2 from the demand forecast developed in Regulation 6 of these Regulations to identify the resource gap.
- 11.4. Distribution licensees shall conduct sensitivity and probability analysis to determine the most probable resource gap. It shall also develop Long-term, Medium-term, and Short-term resource gap plans for possible scenarios, while ensuring at least three different scenarios (most probable, business as usual, and pessimistic scenario) as specified by the CEA in guidelines Medium and Long-term Power Demand forecast issued from time to time.
- 11.5. Based on most probable scenario, distribution licensees shall undertake development of Long-term, Medium-term, and Short-term Distribution Resource Adequacy Plan of each year to meet Resource Adequacy requirement.
- 11.6. LT-NRAP as published by the CEA to determine the optimal PRM and ST-NRAP as published by the NLDC shall act as guidance for distribution licensees for undertaking the Resource Adequacy exercises.
- 11.7. Based on the allocated share in national peak provided in LT-NRAP for the State, SLDC shall allocate each distribution licensees share in the State peak within 15 days of publication of LT-NRAP based on the average of the percentage share in the State Coincident Peak Demand (CPD) and percentage share in the State Non-Coincident Peak Demand (NCPD).
- 11.8. The distribution licensees based on the above allocation shall plan to contract the

capacities to meet their Resource Adequacy Requirement (RAR) while ensuring that their own peak demand plus PRM is met.

- 11.9. Distribution licensees shall keep the share of Long-term contracts in the range of 75-80% of the RAR and Medium-term contracts in the range of 10-20% of the RAR, while the balance of RAR shall be met through Short-term contracts:

Provided that power procurement through Day-Ahead Market (DAM), shall not be considered towards the contribution for meeting RAR.

- 11.10. The contract mix mentioned under Regulation 11.9 of these Regulations may be periodically reviewed by the Commission.

- 11.11. Distribution licensees shall prepare a 10-year Long-term Distribution Resource Adequacy Plan (LT-DRAP) to meet the peak demand and energy requirement.

- 11.12. Distribution licensees while formulating the LT-DRAP shall also consider the constraints mentioned in Annexure-I of these Regulations.

- 11.13. Distribution licensees may take inputs from the LT-NRAP like PRM, capacity credits, etc., while formulating the LT-DRAP and shall submit their plans to CEA by 30<sup>th</sup> September of each year for the ensuing year(s) for validation.

- 11.14. Distribution licensees shall submit the LT-DRAP duly vetted by CEA along with necessary supporting documents, formats (enclosed as Annexure-III to these Regulations) and details for meeting RAR, to the Commission within 15 days from the date of receipt of CEA approval.

- 11.15. Distribution licensees shall also demonstrate to the Commission 100% tie-up for the first year and a minimum 90% tie-up for the second year to meet the requirement of their contribution towards meeting national peak. Only resources with long / medium/short-term contracts shall be considered to contribute to the RAR.

- 11.16. For subsequent three years, distribution licensees shall also furnish a plan to meet estimated requirement of their contribution to meet national peak for the Commission's approval.

- 11.17. The LT-DRAP shall be carried out by distribution licensees on an annual rolling basis considering the contracted capacity as a part of the system, which shall be optimized for additional capacity required.

- 11.18. Distribution licensees through LT-DRAP, shall demonstrate to the Commission their plan to meet their Peak demand and energy requirement with a mix of Long-term, Medium-term, and Short-term contracts, including Power Exchanges:

Provided that distribution licensees shall keep the share of contracts in the range as mentioned under Regulation 11.9 of these Regulations.

- 11.19. The share of long-term contracts in the entire mix of the contracts of the distribution

licensees shall be at least equal to the maximum of the quantum of long-term contracts determined for meeting RAR of national peak and quantum obtained from LT-DRAP for fulfilling own energy and peak requirement.

## **Chapter 5**

### **Procurement Planning**

12. Procurement planning shall consist of:

- (a) Optimal power procurement resource mix;
- (b) Modalities of procurement type and tenure; and
- (c) Sharing of Capacity.

#### **13. Procurement Resource Mix**

- 13.1. In power procurement strategy, distribution licensees shall ensure an optimal procurement generation resource mix and also facilitates smooth RE integration in its portfolio of power procurement resource options while meeting reliability standards and Renewable Purchase Obligation. Further, the future capacity mix may comprise of existing capacities, planned capacities and capacity addition required to meet the increasing demand of the utility considering appropriate gestation period of the generation resource.
- 13.2. For identification of the optimal generation procurement resource mix, optimization techniques and least-cost modelling shall be employed by distribution licensees in order to avoid stranded capacity. Distribution licensees shall also engage in adoption of least cost modelling and optimization techniques and demonstrate the same in its overall power procurement planning exercise to be submitted to Commission for approval.
- 13.3. Distribution licensees shall contract the optimal portfolio of resources to meet its future demand and Resource Adequacy Requirement (RAR) obligations, based on the output derived from the LT-NRAP study results.
- 13.4. Distribution licensees shall consider Long / Medium / Short-term contracts of generation resources towards the contribution for meeting RAR.  
Provided that Power procurement through Day-Ahead Market, shall not be considered towards the contribution for meeting RAR.
- 13.5. Distribution licensees shall contract source-wise additional resources based on the LT- DRAP to meet its own peak demand.
- 13.6. The power capacity procurement from renewable energy sources for fulfilling the RPO targets shall be carried out as per Chhattisgarh State Electricity Regulatory Commission (Renewable Purchase Obligation and REC framework Implementation) Regulations, 2011. and amendments thereof.
- 13.7. The power procurement from Wind, Solar PV, Wind Solar Hybrid, Round the Clock (RTC) generations shall be carried out as per the guidelines for Tariff Based Competitive Bidding process notified by the Ministry of Power.

- 13.8. Distribution licensees shall contract storage capacity corresponding to the results of LT- DRAP capacity addition requirement for future years from Battery Energy Storage System (BESS) and Pump Storage Projects (PSP) or any other cost-effective energy storage technology as per the guidelines for tariff based competitive bidding process notified by the Ministry of Power/.
- 13.9. Distribution licensees may contract power through State generating stations, Central generating stations, Independent Power Producers (IPPs), Captive Power Plants (CPPs), Renewable Power Plants including Co-Generation Plants, Central/State Agencies Intermediaries, Traders, Aggregators, Power Exchanges or through bilateral agreements , Banking arrangements with other distribution licensees and any other sources as may be approved by the Commission.
- 13.10. Distribution licensees may procure power on Short-term and Medium-term basis through DEEP and PUSHp portal.

#### **14. Procurement Type and Tenure**

- 14.1. Distribution licensees, while determining the modalities and tenure of procurement of resources, shall ensure that procurement contract shall be decided first within the region subject to the least cost resource availability considering transmission constraints and cost of transmission for procurement from outside the region and then across regions if necessary.

Provided that SLDC shall declare available transmission corridor on web portal, accessible to all stake holders, to enable the distribution licensee to plan its power purchase accordingly.

- 14.2. Distribution licensees shall identify the generation resource mix and also procurement strategy in Long-term, Medium-term and Short-term period and seek approval of the Commission.
- 14.3. Distribution licensees in its overall power procurement planning approach shall employ

greater emphasis on adequate contracting through Long-Term and Medium-Term arrangements. However, distribution licensees shall ensure that entering into new Long-Term and Medium-Term contracts does not contribute towards accumulation of stranded capacity and additional burden to the consumers on account of fixed cost associated with stranded capacity.

- 14.4. Distribution licensees through annual rolling plan shall ensure incremental capacity addition through Long-term/Medium-term/Short-term upon factoring in existing and its planned procurement initiatives.

## **15. Sharing of Capacity**

- 15.1. Distribution licensee shall duly factor in the possibility of Long-term/Medium-term/Short-term capacity sharing while preparing the Resource Adequacy plan and optimally utilize the capacity available within the state through competitive sharing arrangements or other mechanisms, and then use the platform for inter-state capacity sharing or trading mechanism if created by the Central Commission or other mechanisms as the case may be and optimize the capacity costs as far as possible. Provided that all generators and distribution licensees shall declare extra capacity available indicating quantum and period on shared portal, accessible to all stakeholders.

## **16. Approval of Power Purchase Agreement**

- 16.1. Any new Capacity arrangement/tie-up shall be subject to the prior approval of the Commission in view of necessity, reasonableness of cost of power purchase and promotion of working in an efficient, economical and equitable manner.
- 16.2. All procurement of Long/Medium/Short-term power from various sources shall be carried out as per the Guidelines/Rules/Regulations/Policies issued by the Central Government/Appropriate Commission from time to time.
- 16.3. Any new power purchase agreement for Long/Medium-term or amendments to existing Long/Medium-term Power Purchase Agreement (PPA's)/ Power Sale Agreement (PSA) entered into by distribution licensee shall be subject to the prior approval of the Commission.
- 16.4. Distribution licensee shall submit the list of all existing Power Purchase Agreements executed with different conventional power plants as well as RE Generators along with the Resource Adequacy plan.

## **17. Variation in Power Purchase**

- 17.1 Distribution licensee shall undertake additional power procurement during the year, over and above the approved resource adequacy procurement plan on account of

following exemptions:-

- (a) In case, where there has been an unanticipated increase in the demand for electricity or a shortfall or failure in the supply of electricity from any approved source of supply during the year or when the sourcing of power from existing tied-up sources becomes costlier than other available alternative sources, the distribution licensee may enter into additional agreement for procurement of power.
- (b) Distribution licensee may enter into a Short-term arrangement or agreement for procurement of power when faced with emergency conditions that threaten the stability of the grid, or when directed to do so by the SLDC/RLDC to prevent grid failure or during exigency conditions and for banking with other States on Short-term basis without prior approval of the Commission. Provided that the details of such Short-term procurement shall be submitted to the Commission within 45 days from date of procurement of power.

## **Chapter 6**

### **Monitoring and Compliance**

#### **18. Monitoring and Compliance**

- 18.1. Distribution licensee shall comply with the Resource Adequacy requirement, and its compliance and in accordance with the timelines specified under Regulations 20 of these Regulation. In case of non-compliance, appropriate non-compliance charges as may be determined by the Commission, shall be applicable.

## **Chapter 7**

### **Roles and Responsibilities and Timelines**

#### **19. Data Requirement and Sharing Protocol**

- 19.1. Distribution licensee shall maintain and share all data related to demand assessment and forecasting with SLDC, such as:
- a) Categories wise consumer data;
  - b) Historical demand data;
  - c) Weather data;
  - d) Demographic and econometric variables;
  - e) Distribution losses and Intra/Inter-State Transmission losses;
  - f) Actual energy requirement;
  - g) Availability including curtailment, peak electricity demand, and peak met along with changes in demand profile (e.g.: agricultural shift, time of use, etc.), historical hourly loadshape, etc.
- 19.2. Distribution licensee shall maintain all statistics and database pertaining to policies and drivers, such as:
- a) LED penetration, efficient fan/ACs penetration, appliance penetration, increased usage of electrical appliances for cooking, heating, cooling etc., in households;
  - b) Increase in commercial activities for geographic areas/regions;
  - c) Increase in number of agricultural pumps;
  - d) Solarization within distribution licensees area;
  - e) Changes in specific energy consumption;

- f) Consumption pattern from seasonal consumers;
  - g) Demand Side Management (DSM);
  - h) Distributed Energy Resources (DERs);
  - i) Electric Vehicles (EVs);
  - j) Open Access (OA);
  - k) National Hydrogen Mission;
  - l) Reduction of AT&C losses, etc:
- 19.3. Distribution licensee shall maintain at least past 10 years of statistics in its database pertaining to consumption profiles for each class of consumers, such as domestic, commercial, public lighting, public water works, agricultural/irrigation, LT industries, HT industries, railway traction, bulk (non-industrial HT consumers), open access, captive power plants, insights from load survey, contribution of consumer category to peak demand, seasonal variation aspects, etc.
- 19.4. SLDC shall maintain the licensee-specific as well as aggregate for state as whole, the statistics and database pertaining to aggregate demand assessment and forecasting data mentioned above and share state-level assessment with the Authority and the NLDC for national assessment from time to time.
- 19.5. Distribution licensee shall share information and data pertaining to the existing and contracted capacities with their technical and financial characteristics including hourly generation profiles to SLDC for computation of State-level capacity credit factors and for preparation of State-level assessment.
- 19.6. SLDC shall aggregate generation data and share State-level projections with the Authority and NLDC for assessment of Resource Adequacy requirement.

## **20. Timelines**

- 20.1. Distribution licensees shall submit demand forecasts to SLDC by 21<sup>st</sup> April of each year for the ensuing year(s).
- 20.2. SLDC, on behalf of distribution licensees in the State, shall aggregate and submit state-level forecasts to the Authority and the NLDC by 31<sup>st</sup> May of each year for the ensuing year(s).
- 20.3. As per the timelines provided in Annexure-F of Guidelines for Resource Adequacy Planning Framework for India notified by Ministry of Power dated 28<sup>th</sup> June, 2023, LT-NRAP report is to be published by CEA by 15<sup>th</sup> July of each year for the ensuing year(s) and NLDC will publish the ST-NRAP report by 31<sup>st</sup> July of each year for the ensuing year(s).

- 20.4. SLDC shall allocate each distribution licensee's share in national peak within 15 days of publication LT-NRAP report.
- 20.5. Distribution licensee shall perform ST-DRAP exercise by 31<sup>st</sup> August of each year for the ensuing year(s).
- 20.6. SLDC shall submit LT-DRAP to CEA by 30<sup>th</sup> September of each year for the ensuing year(s) for validation.
- 20.7. SLDC on behalf of distribution licensee shall submit the LT-DRAP plan duly vetted by CEA along with details for meeting the RAR to the Commission within 15 days from the date of receipt of CEA approval. The Commission shall approve RA plans within 45 days from the date of submission.
- 20.8. Distribution licensee shall submit details of contracted capacity for the ensuing year for meeting RAR to SLDC within 30 days from the date of approval by the Commission.
- 20.9. SLDC shall submit state-level aggregated contracted capacity to RLDC/ NLDC under intimation to the Commission by the month of January of each year.
- 20.10. As per the timelines provided in Annexure-F of Guidelines for Resource Adequacy Planning Framework for India notified by Ministry of Power dated 28<sup>th</sup> June, 2023, RLDC has to aggregate the capacities at the regional and submit the information to the NLDC by month of February.
- 20.11. The contracting for the balance capacity shortfall as communicated by NLDC shall be completed by the end of March of each year for the ensuing year(s) by distribution licensee.

Provided that in case of the distribution licensee contracts the balance capacity shortfall through Long/Medium-term power procurement the same shall be subjected to prior approval of the Commission as per Regulation 16.3 of these Regulations.

- 20.12. Distribution licensee after contracting the balance capacity shall submit the information to the SLDC and Commission by 31<sup>st</sup> March of each year for the ensuing year(s).

Provided that in case there is delay in communication by NLDC for balance capacity shortfall, distribution licensee may seek approval from the Commission for time extension for contracting the balance capacity by 25<sup>th</sup> March of each year.

## **Chapter 8**

### **Miscellaneous**

#### **21. Placing of information on websites**

- 21.1. The monthly/weekly/day-ahead/intraday power procurements/sale by distribution licensee and generator schedule shall be made available on the websites of distribution licensee and SLDC within 45 days of such procurements/sale with ease of access to the current as well as archived data.
- 21.2. SLDC shall also publish the monthly Merit Order Dispatch (MoD) stack along with per unit variable cost of each generating station on its website.

#### **22. Constitution of dedicated cells**

- 22.1. The distribution licensee shall establish a planning cell for Resource Adequacy within three months of the Regulation coming into force. The cell shall have the requisite capability and tools for demand forecast, capacity, RE integration etc.
- 22.2. Another round the clock dedicated cell shall also be constituted by distribution licensee for power purchase/sell in real-time, and also undertake intra-day, day-ahead, week ahead power procurement through Power Exchanges or any other means. Distribution licensee shall frame suitable guidelines for the modus operandi of the dedicated cells in line with the spirit of these Regulation and shall apprise the Commission for the same within 45 days from the date of coming into force of these Regulations.

#### **23. Assessment to involve consultation**

- 23.1 The distribution licensee shall make the Resource Adequacy Plan in consultation with State Sector Generating Companies, Central Sector Generating Companies, Transmission Companies, National/Regional/State Load Dispatch Centers, premium research Institutes such as IITs/IIMs/NITs/agencies with relevant experience and Central Electricity Authority. It shall also make enquiries with the Trading Companies and States with surplus power to estimate the likely availability and price of power across the country for peak, off-peak and normal periods.

Provided that distribution licensee may also consult with research agencies with relevant experience.

#### **24. Power to Issue Orders and Give Practice Directions**

- 24.1 Subject to the provisions of the Electricity Act, 2003 and these Regulations, the Commission may from time to time issue such orders and practice directions as considered appropriate for the implementation of these Regulations and procedure to be followed.

## **25. Power to Relax**

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

## **26. Power to Remove Difficulties**

- 26.1 If any difficulty arises in giving effect to any of the provisions of these Regulations, the Commission may, by an order, make such provisions, not inconsistent to the provisions of the Act and these Regulations, as may appear to be necessary for removing the difficulty/difficulties.

## **27. Power to amend**

- 27.1 The Commission may from time to time add, vary, alter, modify or amend any provisions of these Regulations after following the necessary procedures.

## **28. Repeal and Savings**

- 28.1. Nothing in these Regulations shall be deemed to limit or otherwise affect the inherent power of the Commission to make such orders as may be necessary to meet the ends of justice or to prevent abuses of the process of the Commission.
- 28.2. Nothing in these Regulations shall bar the Commission from adopting in conformity with the provisions of the Act a procedure, which is at variance with any of the provisions of these Regulations, if the Commission, in view of the special circumstances of a matter or class of matters and for reasons to be recorded in writing, deems it necessary or expedient for dealing with such a matter or class of matters.
- 28.3. Nothing in these Regulations shall, expressly or impliedly, bar the Commission dealing with any matter or exercising any power under the Act for which no Regulations have been framed, and the Commission may deal with such matters, powers and functions in a manner it thinks fit.

**(Secretary)**

## ANNEXURE -I

### Methodology of Preparation of Resource Adequacy Plan with constraints

- (a) The hourly demand profile shall be projected over the planning period by distribution licensee, based on the forecasted values of annual energy requirement and peak demand trajectory. The annual energy requirement and peak demand shall be forecasted using the methods specified in Regulation 6.7 of these Regulations. The projected hourly demand for the future years shall be used as inputs into the model. Distribution licensee shall ensure that the generation expansion planning model chosen is capable of simulating on an hourly chronological resolution. This is necessary to capture the behaviour of the system with respect to ramping of conventional generation, profiles of RE generation, behaviour of energy storage, etc.
- (b) After establishment of demand profile for all future years, the model would undertake an optimization exercise to minimize the total system cost to meet the future demand adhering to all power system parameters. Following constraints should be considered while modelling by distribution licensee:

- ❖ **Planning Reserve Margin / Resource Adequacy Requirement:** The Resource Adequacy Requirement (RAR) constraint shall ensure that the total Resource Adequacy (Generation capacity) of distribution licensee fulfils the Planning Reserve Margin as determined by CEA. The resource adequacy requirement for each Distribution Licensee shall be computed as:

$$RAR \text{ Contribution to forecasted national peak demand in GW} \times (1 + PRM)$$

From the supply side, the RAR shall be the sum of the "firm capacity" or "capacity credits" of contracted / planned capacities (including renewables, storage, other resources such as demand response) along with derated interconnection limits (imports).

Both, supply side and demand side RAR shall match. The Thermal capacity credit shall be calculated by reducing the auxiliary consumption and the forced outage rate from the installed capacity.

The capacity credits for generating resources and demand response resources to meet the national peak shall be as estimated by CEA. The capacity credits published by CEA for each resource type may differ between existing and new resources and between resources in different regions. For example, a solar based power plant in the Southern Region will have

a capacity credit, which could be different compared to a solar plant in the Northern Region. Similarly, an upcoming wind-based power plant could have a different capacity credit compared to an already commissioned wind plant in the same region. Distribution licensee shall use these capacity credits while planning to meet their RAR. For example, a Distribution Licensee having a PPA with an existing solar based power plant located in a southern State would use the capacity credit of existing solar based power plants in the Southern Region.

**Portfolio balance constraints:** The portfolio balance shall ensure that the total generation within a control area of distribution licensee and the import of power to the control area of distribution licensee is equal to the sum of the demand, exports from the control area of distribution licensee, any energy not served and curtailment, for each hour.

**RE Generation constraints:** For renewable energy resources, such as solar and wind, the RE generation shall be constrained as per the hourly profile of the resource. Historic profiles of renewable sources shall be used to generate the hourly profiles. Additional constraints shall ensure that the distribution licensee's overall renewable generation targets are met and included while formulating LT-DRAP.

**Conventional Generation constraints:**

(a) Unlike solar and wind, thermal resources are dispatchable. However, the thermal resources are bound by constraints such as maximum and minimum generation limits, ramp rates, spinning reserve offers, plant availability and unit commitment decisions.

(b) The dispatch (energy offer) plus the reserve offer for each generator is constrained to be within the maximum and minimum generation limits. Generation between two consecutive time blocks also must be within the ramping capabilities of the resources. Unit commitment decisions, such as start-up/shut-down, minimum up and down times, etc., require binary variables to implement and are to be included. Additionally, generation units may have periods of outages, which may need to be captured by using an availability factor.

(c) The capacity for each year needs to be tracked by a constraint, which shall ensure that the capacity in a particular year is equal to the capacity last year plus any new capacity investment minus capacity retirement, if any.

**RPO constraints:** Fulfilment of Renewable Purchase Obligation shall be considered as one of the objectives of Resource Adequacy. Technology options like renewable energy generation for round the clock energy supply backed with storage (Battery and PSP),

standalone renewable energy capacity along with hydro capacity for balancing renewable energy generation shall be considered while carrying out resource adequacy exercise.

**Storage constraints:** Due to the intermittent nature of renewable energy generation, the need for resources, which can store surplus energy and despatch the stored energy during low RE generation periods becomes vital. Storage charge and discharge at any instant are constrained by the storage level or the state of charge (SoC) of the storage resource, and the maximum charge / discharge limit. The resource shall only discharge if there is sufficient energy present due to prior charging of the resource. To implement this, considering the chronological sequence of time is also important. Since, storage resources convert electricity to other forms of energy, there are also some efficiency losses (round-trip efficiency) which shall be accounted for. Different technologies may have different discharge periods (energy limits), power outputs (maximum charge / discharge) and levels of efficiency.

**Operating (Spinning) Reserve constraints:** Operating reserve shall ensure that sufficient resources are in the system and kept online or on standby each hour to account for load forecast errors, intermittency of RE or meeting contingencies in real time. The thumb rule for operating reserve requirement shall be defined based on discussions with the SLDC and shall be considered as an input parameter to the model.

**Demand Response:** Potential for demand side management such as shifting of load or demand response can be considered while undertaking the Resource Adequacy Plan (RAP). The constraints such as periods when load shifting can occur, and the maximum quantum of load, which can be shifted over a period shall be included.

## ANNEXURE -II

**The firm capacity to meet the resource Adequacy Requirement (RAR) shall be calculated as shown below:**

$$\begin{aligned} RAR = & \sum_{i=1}^{num\_solar} Solar\_Capacity * Solar\_Capacity\_Credit \\ & + \sum_{i=1}^{num\_wind} Wind\_Capacity * Wind\_Capacity\_Credit \\ & + \sum_{i=1}^{num\_Hydro} Hydro\_Capacity * Hydro\_Capacity\_Credit \\ & + \sum_{i=1}^{num\_thermal} Thermal\_Capacity * Thermal\_Capacity\_Credit \\ & + \sum_{i=1}^{num\_nuclear} Nuclear\_Capacity * Nuclear\_Capacity\_Credit \\ & + \sum_{i=1}^{num\_storage} Storage\_Capacity * Storage\_Capacity\_Credit \\ & + \sum_{i=1}^{num\_other} Other\_Resource\_Capacity * OtherResource\_Capacity\_Credit \\ & + \sum_{i=1}^{num\_other} Import\_limit * capacity\_credit \end{aligned}$$

**ANNEXURE -III**

**Formats (1 to 13) enclosed separately**

Demand Forecast (Summary Statement for State) - (Name of Discom: .....)						
Sr. No.	Particulars	Actual of Previous Years			Current Year	YoY growth rate/CAGR - as applicable (%)
		Yr-1	Yr-2	Yr-n		
1	Energy Sale - MUs ( <i>Consumer Category wise as per Retail Supply Tariff Order</i> )					
2	Total Energy Sale (MU)- ( <i>Cumulative of all consumer categories</i> )					
3	YoY growth rate for total energy Sales (%)					
4	Distribution losses - in %					
5	Distribution losses - in MU					
6	Supply / Requirement at DISCOM Boundary (MU)					
7	Intra-State Transmission losses - in %					
8	Intra-State Transmission losses - in MU					
9	Supply / Requirement at State Boundary (MU)					
10	Inter-State Transmission losses - in %					
11	Inter-State Transmission losses - in MU					
12	Ex-Bus Requirement of DISCOM (MU) – RESTRICTED					
13	Energy Wheeled for OA Consumers (as applicable)					
14	Ex-Bus Requirement of DISCOM (MU) (including OA) -RESTRICTED					
15	Unsupplied energy due to system constraints (MU)					
16	Ex-Bus Requirement of DISCOM (MU) (excluding OA) – Unrestricted					
17	Ex-Bus Requirement of DISCOM (MU) (including OA) – Unrestricted					
18	System Load Factor					
19	Peak load of DISCOM (MW) (excluding OA)					
20	Peak load of DISCOM (MW) (including OA)					
Note:	1. The Demand Forecast would be supported by Graphs showing yearly Demand Pattern for Consumer Category and wherever possible sample 24hr Load Duration Curve also needs to be provided					
	2. The Demand Forecast shall be done in accordance with Regulation 6 of the ----- (Framework for Resource Adequacy) Regulations, 2024					
	3. The above format for furnishing information related to Demand Forecasting is subject to change if methodology adopted for Demand Forecasting is other than PEUM.					

Name of DISCOM:.....							Format-2.1
Monthly Ex-Bus Energy Requirement (MU)							
Month	Actual of Previous Years			Projections			
	Yr-1	Yr-2	Yr-n	Current Year	Yr-1	Yr-2	...Yr-10
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							



Monthly Ex-Bus Energy Requirement (MU)							Format-2.2
Month	Actual of Previous Years			Projections			
	Yr-1	Yr-2	Yr-n	Current Year	Yr-1	Yr-2	...Yr-10
OACs							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							
SEZ							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							

Monthly Ex-Bus Energy Requirement (MU)							Format-2.3
Month	Actual of Previous Years			Projections			
	Yr-1	Yr-2	Yr-n	Current Year	Yr-1	Yr-2	...Yr-10
All DISCOMs including SEZ OACs							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							

Power Supply Projections						Format-3
No.	Particulars	Projections				
		Yr (n+1)	Yr (n+2)	Yr (n+3)	Yr (n+4)	...Yr (n+10)
1	<b>Ex-Bus Requirement of State (MU)</b>					
	<i>For DISCOMs (MU)</i>					
	<i>For SEZ (MU)</i>					
	<i>For OA (MU)</i>					
2	<b>Energy Availability (MU)</b>					
	<i>CG Genco Thermal Plants</i>					
	<i>CG Genco Hydel Plants</i>					
	<i>ISP, OSP, SSP &amp; Other Hydel</i>					
	<i>Central Sector Stations</i>					
	<i>UMPP &amp; IPPs</i>					
	<i>Wind Genrators Availability</i>					
	<i>Solar Generators Availability</i>					
	<i>Other Generators Availability</i>					
	<i>Availability thorough banking/Power Market</i>					
	<i>Others Sources (If any)</i>					
	<b>TOTAL (MU)</b>					
3	<b>Surplus(+)/Deficit(-) (MU)</b>					
4	<b>Surplus(+)/Deficit(-)(%)</b>					
Note:	1. The yearly Energy requirement/Supply should tally with monthly requirement/supply forecast as indicated in Format-2					
	2. The Power Supply Position would be supported by Graphs showing yearly and Monthly Pattern					

Peak Demand and Availability Projections					Format-4
(Peak Hours/Off-Peak Hours)					
No.	Particulars	Projections			
		Yr (n+1)	Yr (n+2)	Yr (n+3)	Yr (n+4) ...Yr (n+10)
1	Available Generation Capacity (MW)				
	CG Genco Thermal Plants				
	CG Genco Hydel Plants				
	ISP, OSP, SSP & Other Hydel				
	Central Sector Stations				
	UMPP & IPPs				
	Wind Generators Availability				
	Solar Generators Availability				
	Other Generators Availability				
	Availability through banking/Power Market				
	Others Sources (If any)				
	<b>TOTAL (MW)</b>				
2	Peak Load of State (MW)				
3	Peak Availability (MW)				
	CG Genco Thermal Plants				
	CG Genco Hydel Plants				
	ISP, OSP, SSP & Other Hydel				
	Central Sector Stations				
	UMPP & IPPs				
	Wind Generators Availability				
	Solar Generators Availability				
	Other Generators Availability				
	Availability through banking/Power Market				
	Others Sources (If any)				
	<b>TOTAL (MW)</b>				
4	Surplus(+)/Deficit(-) (MW)				
5	Surplus(+)/Deficit(-) (%)				
Note:	1. This format is to be submitted for Peak Hours and Off-Peak Hours Separately				
	2. The Power Supply Position needs to be supported by Graphs showing yearly or monthly 24 hr load pattern based on Load Research by the Company.				
	3. Peak Hours and Off-Peak Hours shall be as specified in the Retail Supply Tariff Order				



Details of Planned/Upcoming Capacities for future years alongwith Energy Availability												Format-6	
No.	Name of Project	Capacity (MW)	State Share (MW)	SCOD	Year wise Capacity Addition (MW)				Energy Availability (MU)				
					Yr (n+1)	Yr (n+2)	Yr (n+3)	...Yr (n+10)	Yr (n+1)	Yr (n+2)	Yr (n+3)	...Yr (n+10)	
1	CG Genco Thermal Plants												
2	CG Genco Hydel Plants												
3	ISP, OSP, SSP & Other Hydel												
4	Central Sector Stations												
5	Wind Genrators Availability												
6	Solar Generators Availability												
7	Other Generators Availability												
8	Availability thorough banking/Power Market												
9	Others Sources (If any)												
Total													
Note:	1. This format is to be submitted Separately for Long-Term/Medium-Term/Short-Term												
	2. The above format needs to be filled considering the plant wise availability of each State/Central Generating plants, IPPs, Renewable plants and other Plants for entire 10-year plan.												

Month-Wise Energy Availability from Available/Exisitng Generation Capacities													Format-7
No.	Name of Project	Monthly Energy Availability (MU)											
		April	May	June	July	August	September	October	November	December	January	February	March
1	CG Genco Thermal Plants												
2	CG Genco Hydel Plants												
3	ISP, OSP, SSP & Other Hydel												
4	Central Sector Stations												
5	Wind Genrators Availability												
6	Solar Generators Availability												
7	Other Generators Availability												
8	Availability through banking/Power Market												
9	Others Sources (If any)												
Total													
Note:	1. This format is to be submitted Separately for Long-Term/Medium-Term/Short-Term												
	2. This format is to be furnished year-wise for entire 10-years separately												
	3. The above format needs to be filled considering the plant wise availability of each State/Central Generating plants, IPPs, Renewable plants and other Plants for entire 10-year plan.												

Month-Wise Energy Availability from Planned/Upcoming Generation Capacities													Format-8
No.	Name of Project	Monthly Energy Availability (MU)											
		April	May	June	July	August	September	October	November	December	January	February	March
1	CG Genco Thermal Plants												
2	CG Genco Hydel Plants												
3	ISP, OSP, SSP & Other Hydel												
4	Central Sector Stations												
5	Wind Genrators Availability												
6	Solar Generators Availability												
7	Other Generators Availability												
8	Availability through banking/Power Market												
9	Others Sources (If any)												
Total													
Note:	1. This format is to be submitted Separately for Long-Term/Medium-Term/Short-Term												
	2. This format is to be furnished year-wise for entire 10-years separately												
	3. The above format needs to be filled considering the plant wise availability of each State/Central Generating plants, IPPs, Renewable plants and other Plants for entire 10-year plan.												

Summary of Month wise Energy Requirement and Energy Availability (MU)													Format-9
No.	Particulars	Monthly Energy Availability (MU)											
		April	May	June	July	August	September	October	November	December	January	February	March
1	Yr (n+1)												
	Energy Requirement												
	Energy Availability												
	Surplus(+)/Deficit(-) (MU)												
	Surplus(+)/Deficit(-)(%)												
2	Yr (n+2)												
	Energy Requirement												
	Energy Availability												
	Surplus(+)/Deficit(-) (MU)												
	Surplus(+)/Deficit(-)(%)												
3	Yr (n+3)												
	Energy Requirement												
	Energy Availability												
	Surplus(+)/Deficit(-) (MU)												
	Surplus(+)/Deficit(-)(%)												
..... 10	.....Yr (n+10)												
	Energy Requirement												
	Energy Availability												
	Surplus(+)/Deficit(-) (MU)												
	Surplus(+)/Deficit(-)(%)												
Note:	1.This format figures should tally with Format-2, Format-7 and Format-8												
	2. This format is to be furnished year-wise for entire 10-years separately												
	3. The above format needs to be filled considering the plant wise availability of each State/Central Generating plants, IPPs, Renewable plants and other Plants for entire 10-year plan.												

Generating Stations Details																Format-10
Sr. No.	Name of Generatin gStation	Region /State	Installed capacity (MW)	Share of CG (%)	COD/ SCOD	Expected Retirement Year	Fixed Cost (Rs/MW)	Variable Cost (Rs/kWh)	Auxiliary Consumption (%)	Max Generation Limits (MW)	Min Generation Limits (MW)	Fuel GC V (GJ/kg)	Heat Rate ( at full Load)	Heat rate (at part load i.e. 55% )	Ramp Up rate ( MW/min)	Ramp down rate ( MW/min)

Continued...

[illegible]

Plan for Renewable Power Obligation (RPO)							Format-11
Particulars		Unit	Projection				
			Yr (n+1)	Yr (n+2)	Yr (n+3)	Yr (n+4)	...Yr (n+10)
Ex-Bus Energy Requirement (MU) (DISCOMs + SEZ)		MU					
Wind RPO	RPO	%					
	RPO	MU					
	Availability from Qualified Tied up (including consented) projects						
	Availability from Wind Component of RE RTC projects						
	Year wise Balance RPO quantum to be met						
	Additional Capacity required up to fulfill RPO	MW					
HPO	RPO	%					
	RPO	MU					
	Availability from Qualified Tied up (including consented) projects						
	Year wise Balance RPO quantum to be met						
	Additional Capacity required up to fulfill RPO	MW					
Other RPO	RPO	%					
	RPO	MU					
	Old WPP's Contribution						
	Old Hydro Project's Contribution						
	Availability from Tied up Solar projects (including consented)						
	Availability from Solar Component of RERTC projects						
	Total Contribution from Tied up Projects						
	Remaining RPO Quantum						
	Additional Capacity required up to fulfill RPO	MW					
Total RPO	RPO	%					
	RPO	MU					
	RPO	MW					
ESO	Energy Storage Obligation	%					

	Energy to be procured through Storage	MU					
	Energy to be procured through Storage	MW					

Deviation in Demand Forecast (Summary Statement for State and All DISCOMs separately) - Discom wise (Name of Discom:_____)					Format-12
Sr. No.	Particulars	Previous Years approved As per Plan (1)	Actual (2)	Deviation (2-1)	Reasons for deviation
1	<b>Total Energy Sale (MU)-</b> <i>(Cumulative of all consumer categories)</i>				
2	Distribution losses - in %				
3	Distribution losses - in MU				
4	<b>Supply / Requirement at DISCOM Boundary(MU)</b>				
5	Intra-State Transmission losses - in %				
6	Intra-State Transmission losses - in MU				
7	<b>Supply / Requirement at State Boundary(MU)</b>				
8	Inter-State Transmission losses - in %				
9	Inter-State Transmission losses - in MU				
10	<b>Ex-Bus Requirement of DISCOM (MU)</b>				
11	<i>Sale by Distribution licensee to SEZ</i>				
12	<i>Energy Wheeled for OA Consumers</i>				
13	<b>Ex-Bus Requirement of State (MU)</b>				
14	<b>Peak load of DISCOM (MW)</b>				
15	<b>Peak load of State (MW)</b>				

Deviation in Energy Availability					Format-13
Sr. No.	Particulars	Previous Years approved As per Plan (1)	Actual (2)	Deviation (2-1)	Reasons for deviation
1	<b>Ex-Bus Requirement of State (MU)</b>				
	<i>For DISCOMs (MU)</i>				
	<i>For SEZ (MU)</i>				
	<i>For OA (MU)</i>				
2	<b>Energy Availability (MU)</b>				
	<i>CG Genco Thermal Plants</i>				
	<i>CG Genco Hydel Plants</i>				
	<i>ISP, OSP, SSP &amp; Other Hydel</i>				
	<i>Central Sector Stations</i>				
	<i>UMPP &amp; IPPs</i>				
	<i>Wind Genrators Availability</i>				
	<i>Solar Generators Availability</i>				
	<i>Other Generators Availability</i>				
	<i>Availability through banking/Power Market</i>				
	<i>Others Sources (If any)</i>				
5	<b>TOTAL (MU)</b>				