(Draft Regulations)

No	Date

In exercise of the powers conferred under Section 181 of the Electricity Act, 2003 (36 of 2003), read with Section 61, 66, and 86 thereof and all other powers enabling it in this behalf, and after previous publication, the Madhya Pradesh Electricity Regulatory Commission hereby makes the following Regulations, namely –

Madhya Pradesh Electricity Regulatory Commission (Framework for Resource Adequacy)

Regulations, 2023.

Chapter 1

Preliminary

1. Short Title, Extent, and Commencement

- 1.1. These Regulations shall be called the Madhya Pradesh Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2023 {RG 19 (III) of 2023}.
- 1.2. These Regulations shall extend to the whole of Madhya Pradesh.
- 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

3.1. These Regulations shall apply to the generating companies, distribution licensees, State Load Despatch Centre, State Transmission Utility, other grid connected entities and stakeholders within Madhya Pradesh.

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 Madhya Pradesh 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.
 - 1) "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) "MP Power Management Company Limited or MPPMCL" means the holding company of 3 distribution companies of Madhya Pradesh constituted by Government of Madhya Pradesh under M.P. Electricity Reforms Transfer Schemes Rules 2006 as amended.
- o) "Month" means a calendar month as per the British Calendar.
- p) "Net Load" means the load derived upon exclusion of actual renewable generation (MW) from gross load prevalent on the Grid during any timeblock.
- q) "Normalized Energy Not Served" or "NENS" is normalization of the EENS by dividing it by the total system energy (MWh).
- r) "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.
- s) "Power Exchange" means any exchange operating as power exchange for electricity in terms of the regulations issued by the Central Electricity Regulatory Commission.
- t) "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;
- u) "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.
- v) "Resource Adequacy" or "RA" means a mechanism to ensure adequate supply of generation 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 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 Madhya Pradesh;
- aa) **"Year"** means financial year commencing on 1st April of the year and ending on 31st 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 in compliance with specified reliability standards 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. The MP Power Management Company Limited (MPPMCL) on behalf of the 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 MPPMCL in consultation with 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.
- 6.2. Demand assessment and forecasting shall cover hourly or sub-hourly assessment and forecasting of demand within the distribution area of distribution licensee for Long-term and Medium-term using comprehensive input data, policies and scientific modelling tools.
- 6.3. The distribution licensee shall be responsible for providing the category wise consumption data and assessed consumption data of particular class of consumers such as agricultural, domestic etc. to MPPMCL for demand forecasting. The distribution licensee shall submit the category wise consumption information of pervious financial years and any other information as may be required by MPPMCL by 21st April of each year.
- 6.4. MPPMCL shall be responsible for the assessment and forecasting of demand (MW) and energy (MWh).

- 6.5. MPPMCL shall prepare the energy forecast for each consumer category as specified by the Commission in its Retail Supply Tariff Order from time to time.
- 6.6. MPPMCL 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).
- 6.7. MPPMCL 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. MPPMCL 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 6.16 of these Regulations.
- 6.8. For purpose of forecasting energy for a consumer category and the methodology to be used for energy forecasting of a consumer category, MPPMCL shall conduct statistical analysis and select the method for which standard deviation is lowest and R-square is highest.
- 6.9. MPPMCL 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 to distribution Licensee's area.
- 6.10. MPPMCL may 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 24X7 supply to all consumers, LED penetration, efficient use of agriculture pumps, fans/ACs/ appliances, increased use of appliances forcooking/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.
- 6.11. MPPMCL may take into consideration any other factor not mentioned in Regulation 6.10 of these Regulations after providing detailed justification for its consideration.
- 6.12. 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.
- 6.13. The summation of energy forecast (MWh) for various consumer categories after

adjusting captive, prosumer, and Open Access load forecast as per Regulations 6.6 to 6.12 of these Regulations, as the case may be, shall be the energy forecast for the distribution licensee at consumer level.

6.14. MPPMCL shall calculate the energy forecasts (in MWh) of the State by adding Distribution Losses as per loss trajectory proposed by Distribution Licensee, Intra-State Transmission Losses and Inter-State Transmission Losses.

Provided that for the purposes of estimating ARR for ensuring years and approving true-up of previous years, Normative losses' trajectory as specified by the Commission from time to time shall be considered.

- 6.15. 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 MWh) obtained in Regulations 6.14 of these Regulations. If any other appropriate load factor is considered for future years, a detailed justification shall be provided by MPPMCL for its consideration.
- 6.16. MPPMCL 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 atleast three different scenarios (most probable, business as usual, and aggressive scenarios).

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

A. Short-Term Demand Forecast

- 7.1. MPPMCL 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 MPPMCL with inputs from State Load Dispatch Center (SLDC). A detailed explanation for methodology adopted must be provided.
- 7.3. MPPMCL 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 anddrivers etc. as may be applicable to their distribution area.

B. Aggregation of Demand Forecast

- 7.4. MPPMCL shall prepare hourly or sub-hourly 1-year Short-term (ST), 5-year Medium-term (MT) and 10-year Long-term (LT) demand forecasts on a rolling basis.
- 7.5. MPPMCL with inputs from SLDC and based on the demand estimates of the distribution licensees of the State, 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. MPPMCL shall aggregate demand forecasts considering the load diversity, congruency, seasonal variation aspects and submit State-level aggregate demand forecasts for Long-term (MW and MWh) to CEA by 31st May and Short -term to SLDC by 21st May of each year for the ensuring year(s).
- 7.7. SLDC shall submit State-level aggregate demand forecasts for Short-term (MW and MWh) to RLDC and NLDC by 31st May of each year for the ensuring year(s).

Chapter 4

Generation Resource Planning

8. Preparation of Generation Resource Planning

- 8.1. MPPMCL shall plan and asses 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 to 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 State / distribution licensee 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. Minimum up and down 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) Timeline details and transmission expansion plans
- k) Renewable Purchase Obligation (RPO) including Energy Storage Obligation targets, etc.
- Constraints such as penalties for unmet demand, forced outages, , and system emission limits as defined in State and Central electricity grid codes and emission norms specified by the Ministry of Environment, Forest and Climate Changes shall be identified and enlisted.
- 8.4. MPPMCL 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. MPPMCL shall compute Capacity Credit (CC) for their contracted 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 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 Generation for top load 250 hours)/(Installed RE Capacity for top load 250 hours), as per formula below:

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.

- 9.3. For the purpose of Inter-State or Intra-State RE contracted generation, contribution of CC factor for the RE or generation resource where such resource is located into grid (viz. inter-State or intra-State, as the case may be) as contracted by the distribution licensees shall be considered. For this purpose, CC factors as prescribed by Authority or as approved by 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. MPPMCL shall calculate State-specific CC factors based on aggregate State Demand, State Net Load and contracted RE generation available in the State and submit such CC factor information to SLDC by 21st May of each year for the ensuring year(s).
- 9.7. SLDC shall submit such CC factor information to CEA, RLDC and NLDC by 31st May of each year for the ensuing year(s).

10. Assessment of Planning Reserve Margin (PRM)

- 10.1. Planning Reserve Margin (PRM) is a percentage of the capacity over and above the State coincident share in national peak demand required to be considered for the purpose of generation resource planning.
- 10.2. Such 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.
- 10.3. The PRM determined under Regulation 10.2 of these Regulation shall be considered by MPPMCL in their planning for resource adequacy requirement and generation resource capacity planning.
- 10.4. MPPMCL may consider higher planning reserve margins, subject to approval from the Commission.

10.5. The State level resource adequacy planning by MPPMCL/SLDC shall factor in PRM while developing State-level Integrated Resource Plan.

11. Resource Adequacy Requirement and its Allocation

- 11.1. MPPMCL 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 statement form the resource map of the distribution licensees.
- 11.3. MPPMCL 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. MPPMCL 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 that at least three different scenarios (most probable, business as usual, and aggressive).
- 11.5. Based on most probable scenario, MPPMCL 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. Long-term National Resource Adequacy Plan (LT-NRAP) and Short-term National Resource Adequacy Plan (ST-NRAP) reports shall act as guidance for MPPMCL for undertaking the Resource Adequacy exercises.
- 11.7. The Central Electricity Authority will publish the Long-term National Resource Adequacy Plan (LT-NRAP) to determine the optimal Planning Reserve Margin (PRM) requirement at the national level for ensuring reliable supply targets. The report will also include the optimal generation mix for the next 10 years thereby ensuring compliance with Resource Adequacy Requirements while meeting national demand at least cost basis. Further, the report will feature capacity credits for different resource types on a regional basis and prescribe the State contribution towards the national peak demand.

- 11.8. NLDC will publish a one-year look-ahead Short-term National Resource Adequacy Plan (ST-NRAP) report which will include parameters such as demand forecasts, resource availability based on under-construction status of new projects, planned maintenance schedules of existing stations, station-wise historic forced outage rates and decommissioning plans.
- 11.9. Based on the allocated share in national peak provided in LT-NRAP for the State, MPPMCL shall allocate each distribution licensee's share in the national peak within 15 days of the publication of LT-NRAP.
- 11.10. MPPMCL based on the share in national peak provided in LT-NRAP shall plan to contract the capacities over and above the State coincident demand in national peak prescribed by LT-NRAP or procure higher to meet their Resource Adequacy Requirement (RAR) at the time of national peak.
- 11.11. MPPMCL 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 rest to 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.

- 11.12. The contracts mix mentioned under Regulation 11.11 of these Regulations may be periodically reviewed by the Commission.
- 11.13. MPPMCL shall undertake a 10-year period (Long-term Distribution Resource Adequacy Plan (LT-DRAP)) to meet their own peak demand and energy requirement.
- 11.14. MPPMCL while formulating their LT DRAP shall also consider the constraints mentioned in Annexure–I of these Regulations.
- 11.15. MPPMCL may take inputs from the LT-NRAP like PRM, capacity credits, etc., while formulating their LT-DRAP and shall submit their plans to CEA by 30th September of each year for the ensuing year(s) for validation.

- 11.16. MPPMCL/distribution licensees shall submit the LT-DRAP plan duly vetted by CEA along with necessary supporting documents, formats (enclosed as Annexure-II to these Regulations) and details for meeting RAR to the Commission within 15 days from the date of receipt of CEA approval.
- 11.17. MPPMCL 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.
- 11.18. For subsequent three years, MPPMCL shall also furnish a plan to meet estimated requirement of their contribution to meet national peak for the Commission's approval.
- 11.19. The LT-DRAP shall be carried out by MPPMCL on an annual rolling basis considering the contracted capacity as a part of the system and shall optimize for additional capacity required.
- 11.20. MPPMCL 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 MPPMCL shall keep the share of contracts in the range as mentioned under Regulation 11.11 of these Regulations.

- 11.21. The share of long-term contracts in the entire mix of the contracts of the distribution licensees shall be at least 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.
- 11.22. SLDC shall prepare one-year look ahead ST-DRAP (Short term Distribution Resource Adequacy Plan), on an annual basis for operational planning, at the State level based on the LT-DRAP study results. The SLDC shall review the ST-DRAP on a daily, monthly and quarterly basis based on actual availability of

generation resources.

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, MPPMCL 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 MPPMCL in order to avoid stranded of capacity. MPPMCL 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. MPPMCL shall contract the optimal portfolio of resources to meet distribution licensees' future demand and Resource Adequacy Requirement (RAR) obligations, based on the output derived from the LT-NRAP study results.
- 13.4. MPPMCL 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. MPPMCL shall contract additional resources source-wise 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 Madhya Pradesh Electricity Regulatory Commission (Cogeneration and Generation of Electricity from Renewable Sources of Energy), (Revision-II), Regulations, 2021 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. MPPMCL 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) as per the guidelines for tariff based competitive bidding process notified by the Ministry of Power.
- 13.9. MPPMCL may contract power through Central Agencies / Intermediaries / Traders / Aggregators / Power Exchanges or through bilateral agreements / Banking arrangements with other distribution licensees.
- 13.10. MPPMCL may procure power on Short-term and Medium-term basis through DEEP and PUShP portal.

14. Procurement Type and Tenure

- 14.1. MPPMCL, 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.
- 14.2. MPPMCL 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. MPPMCL in its overall power procurement planning approach shall employ

greater emphasis on adequate contracting through Long-Term and Medium-Term arrangements. However, MPPMCL 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. MPPMCL through annual rolling plan shall ensure incremental capacity addition through Long-term/Medium-term/Short-term upon factoring in existing and planned procurement initiatives of the distribution licensees.

15. Sharing of Capacity

15.1. MPPMCL 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 platform for Inter-State capacity sharing or trading
mechanism created by the Central Commission/Central Government and
optimize the capacity costs as far as possible.

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 the MPPMCL shall be subject to the prior approval of the Commission.
- 16.4. MPPMCL 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. The MPPMCL 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 MPPMCL may enter into additional agreement for procurement of power.
- (b) The MPPMCL 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. MPPMCL/Distribution licensees 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 on account of shortfall for Resource Adequacy compliance.

Chapter 7

Roles and Responsibilities and Timelines

19. Data Requirement and Sharing Protocol

19.1. Distribution licensees shall maintain and share all data related to demand assessment and forecasting with MPPMCL and SLDC such as consumer data, historical demand data, weather data, demographic and econometric variables, T&D losses, actual electrical energy requirement and 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 load shape, etc.

19.2. Distribution Licensees shall maintain all statistics and database pertaining to policies and drivers, such as LED penetration, efficient fan/ ACs penetration, appliance penetration, increased usage of electrical appliances for cooking, heating, cooling etc., in households, increase in commercial activities for geographic areas/regions, increase in number of agricultural pumps and solarization within distribution licensees area, changes in specific energy consumption, consumption pattern from seasonal consumers, Demand Side Management (DSM) and Distributed Energy Resources (DERs), Electric Vehicles (EVs) and Open Access (OA), National Hydrogen Mission, reduction of AT&C losses, etc. shall also be shared with MPPMCL.

Provided that statistics and database pertaining to households such as LED penetration, efficient fan penetration, appliance penetration, increased usage of electrical appliances for cooking, etc, shall be utilized by MPPMCL whenever statistical information and database becomes available through distribution licensees.

- 19.3. Distribution Licensees/MPPMCL 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, captivepower plants, insights from load survey, contribution of consumer category to peak demand, seasonal variation aspects, etc. shall also be shared.
- 19.4. MPPMCL/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/NLDC and RLDC for regional/national assessment from time to time.
- 19.5. MPPMCL 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 and MPPMCL shall aggregate generation data and share State-level projections with the Authority and NLDC for assessment of Resource Adequacy requirement.

20. Timelines

- 20.1. The Distribution Licensees shall submit the category wise consumption information of pervious financial years and any other information as may be required by MPPMCL by 21st April of each year for the ensuing year(s).
- 20.2. The MPPMCL / SLDC, on behalf of the distribution licensees in the State shall submit demand forecasts (peak and energy requirement) for the next 10 years, assessment of existing generation resources, CC factor information and such other details as may be required for the LT-NRAP to CEA and ST-NRAP to NLDC by 31st May of every year for ensuring year(s).
- 20.3. CEA will publish the LT-NRAP report by 15th July of each year for the ensuing year(s) and NLDC will publish the ST-NRAP report by 31st July of each year for the ensuing year(s).
- 20.4. MPPMCL shall allocate each distribution licensee's share in the national peak within 15 days of the publication of LT-NRAP report by 15th August of each year for the ensuing year(s).
- 20.5. MPPMCL shall submit the LT-DRAP plans to CEA by 30th September of each year for the ensuing year(s) for validation.
- 20.6. MPPMCL/Distribution Licensees 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.
- 20.7. The Commission shall approve the Resource Adequacy Plan submitted by MPPMCL/Distribution Licensees within 30 days from the date of submission.
- 20.8. MPPMCL shall submit the details of the contracted capacities for the ensuing year for meeting RAR to SLDC within 30 days from the date of approval from the Commission.
- 20.9. SLDCs shall aggregate the total contracted capacities at the State level and submit the information to the RLDC under the intimation to the Commission within 15 days from the date of receipt from MPPMCL.

- 20.10. The contracting for balance capacity shortfall as communicated by NLDC shall be completed by the end of March of each year for the ensuing year(s) by MPPMCL.
- 20.11. MPPMCL after contracting the balance capacity shall submit the information to the Commission by 1st April of each year for the current year(s).

Chapter 8

Miscellaneous

21. Placing of information on websites

- 21.1. The monthly/weekly/day-ahead/intraday power procurements/sale by the MPPMCL and generator schedule shall be made available on the websites of the distribution licensees 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 MPPMCL/Distribution Licensees 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 MPPMCL/ Distribution Licensees 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. MPPMCL/ Distribution Licensees 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 this Regulations.

23. Assessment to involve consultation

The MPPMCL shall make the Resource Adequacy Plan in consultation with State Sector Generating Companies, Distribution Licensees, Central Sector Generating Companies, Transmission Companies, National / Regional / State Load Dispatch Centers, and Central Electricity Authority. It may 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.

24. Power to Issue Orders and Give Practice Directions

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

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

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

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.
- 28.4. The MPERC (Power Purchase and Procurement Process) Regulations, 2023 {RG-19 (II) of 2023} published vide Notification No. No.378/MPERC/2023 dated 17th February 2023 in the Government of MP Gazette and read with all amendments thereto, as applicable to the subject matter of this Regulation are hereby repealed.

(Secretary)

ANNEXURE -I

Methodology of Preparation of Resource Adequacy Plan with constraints

- (a) The hourly demand profile for the distribution licensees shall be projected over the planning period by MPPMCL, based on the forecasted values of annual energy requirement and peak demand trajectory. The annual energy requirement and peak demand shall be forecasted using trend method, time series, econometric methods, or any state-of-the-art methods. The projected hourly demand for the future years shall be used as inputs into the model. MPPMCL shall ensure that the generation expansion planning model chosen is capable of simulating on an hourly chronological resolution¹. This is necessary to capture the behavior of the system with respect to ramping of conventional generation, profiles of RE generation, behavior 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 MPPMCL:
 - ❖ Planning Reserve Margin / Resource Adequacy Requirement: The Resource Adequacy Requirement (RAR) constraint shall ensure that the total Resource Adequacy (Generation capacity) of the distribution licensees fulfils the Planning Reserve Margin as determined by CEA. The resource adequacy requirement for each distribution licensees shall be computed as:

 $RAR = Contribution^2$ 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)³.

¹ It is preferred to simulate all 8760 hours on a chronological resolution in a year. However, if computational challenges are faced, MPPMCL can select the representative periods which may be different. The representative periods chosen are reflective of various projected demand and supply profiles for the base year and future years. Initially, hourly simulation is planned based on hourly data availability, however, the time granularity may be increased to sub-hourly provided there is availability of sub-hourly demand and RE generation data.

² This is calculated as distribution licensee's demand at the time of national peak demand.

³ The calculation of firm capacity is provided in Annexure-C of the guidelines for Resources

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 estimated by CEA4. 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. MPPMCL 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 constraints shall ensure that the total generation within a control area of Region/State/Distribution licensees and the import of power to the control area of region/State/Distribution licensees is equal to the sum of the demand, exports from the control area of region/State/Distribution licensees, any energy not served and curtailment, for each hour.
- ❖ RE Generation constraints: For renewable resources, such as solar and wind, the RE generation constraints 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 licensees 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 maximum and minimum generation limits, ramp rates, spinning reserve offers, plant availability and unitcommitment

Planning Framework for India

Adequacy Planning Framework for India

⁴ The methodologies that can be used to determine capacity credits for generating resources and demand response resources are outlined in Annexure-C of the guidelines for Resources Adequacy

decisions.

- (b) The dispatch (energy offer) plus the reserve offer (specified through CERC/MPERC regulations) 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 capturedby 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 generation for round the clock energy supply backed with storage (Battery and PSP), standalone renewable capacity along with hydro capacity for balancing renewable generation shall be considered while carrying out resource adequacy exercise for distribution licensees.
- Storage constraints: Due to the intermittent nature of renewable generation, the need for resources which can store surplus energy and despatch the stored energy during low RE 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 constraints 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 renewables or meeting contingencies in the 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

Formats Enclosed Separately (1 to 14)

	Demand Forecast (Summary Statement for State and All DISCO	OMs separatel	ly) - Discom w	ise (Name of I	Discom:)			Format-1
		Actu	ıal of Previous	Years		YoY growth		Projections	
Sr. No.	Particulars	Yr-1	Yr-2	Yr-n	Current Year	rate/CAGR - as applicable (%)	Yr-1	Yr-2	Yr-10
1	Energy Sale - MUs (Consumer Category wise as per Retail Supply Tariff Order)								
	Domestic								
	Non-Domestic								
	Public Water Works & Street Light								
	LT Industries								
	Agriculture and Allied Activities								
	E-Vehicle/ E-Rickshaws Charging Stations								
	Railway Traction								
	Coal Mines								
	HT Industrial, Non-Industrial and shopping malls								
	HV-3.1: Industrial								
	HV-3.2: non-Industrial								
	HV-3.3: shopping malls								
	HV-3.4: Power Intensive Industries								
	Seasonal & Non-Seasonal								
	Irrigation, Public Water Works and Other than Agricultural								
	Bulk Residential Users								
	Synchronization/ Start-Up Power								
	E-Vehicle/ E-Rickshaws Charging Stations				+				
	HV-9: Metro Rail								
	Others Category1				+				
	Others Category2								
	· ·				_				
	Others Category3								
	Total Energy Sale (MU)- (Cumulative of all consumer categories)								
	YoY growth rate for total energy Sales (%)								
	Distribution losses - in %								
	Distribution losses - in MU								
	Supply / Requirement at DISCOM Boundary(MU)								
	Intra-State Transmission losses - in %								
	Intra-State Transmission losses - in MU								
	Supply / Requirement at State Boundary(MU)								
	Inter-State Transmission losses - in %								
	Inter-State Transmission losses - in MU								
_	Ex-Bus Requirement of DISCOM (MU) (excluding OACs, Railways) - RESTRICTED								
	Sale by MPPMCL to SEZ (as applicable)								
	Energy Wheeled for Railways/OA Consumers (as applicable)								
15	Ex-Bus Requirement of DISCOM (MU) (including OA, Railways) -RESTRICTED								
	Unsupplied energy due to system constraints (MU)								
14	Ex-Bus Requirement of DISCOM (MU) (excluding OA, Railways) - Unrestricted								
	Ex-Bus Requirement of DISCOM (MU) (including OA, Railways) - Unrestricted								
16	System Load Factor								
17	Peak load of DISCOM (MW) (excluding OA, Railways)								
	Peak load of DISCOM (MW) (including OA, Railways)								
Note:	1. The Demand Forecast would be supported by Graphs showing yearly Demand Pattern for Consumer Category	gory and where	ver possible sam	ple 24hr Load D	uration Curve also	needs to be provided			
	2. The Demand Forecast shall be done in accrdance with Regulation 6 of the MPERC (Framework for Resourc	ce Adequacy) Re	egulations, 2023						
	3. The above format for furnishing information related to Demand Forecasting is subject to change if methodol	logy adopted for	r Demand Forec	asting is other th	han PEUM.				

	N	Monthly Ex-	Bus Energ	gy Requirement	(MU)		Format-2
Month	Actual	of Previous	s Years		Projec	ctions	
Month	Yr-1	Yr-2	Yr-n	Current Year	Yr-1	Yr-2	Yr-10
State (DISC	OMs inclu	ding SEZ, C	ACs, Rai	lways)			
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							
East DISCO	M						
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							
West DISCO	OM	1					
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							

	N	Monthly Ex-	Bus Energ	gy Requirement	(MU)		Format-2
Month		of Previous			Projec	ctions	
Month	Yr-1	Yr-2	Yr-n	Current Year	Yr-1	Yr-2	Yr-10
Central DIS	COM						
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							
OACs and Ra	ilways						
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Jan							
Feb							
Mar							

Power Supply l	Projections-Summary	v Statement	(10 Year Period)
I OWCI Duppiy i	i i o jectionis summiai	y OtalChichic	(10 I cui I ciiou)

Format-3

No.	PARTICULARS			Projections		
NO.	PARTICULARS	Yr-1	Yr-2	Yr-3	Yr-4	Yr-10
1	For DISCOMs & SEZ (MU)					
2	For State (including OA & Railways) (MU)					
3	Energy Requirement (MU) (Ex-Bus)					
4	Energy Availability (MU)					
	MP Genco Thermal Plants					
	MP Genco Hydel Plants					
	ISP, OSP, SSP & Other Hydel					
	Central Sector Stations					
	DVC Plants					
	UMPP & IPPs					
	Wind Genrators Availability					
	Solar Generators Availability					
	Other Generators Availability					
	Availability thorugh banking/Power Market					
5	TOTAL (MU)					
6	Surplus(+)/Deficit(-) (MU) (5-3)					
7	Surplus(+)/Deficit(-)(%) (6/1)					
8	Available Generation Capacity (MW)					
	- MP GENCO Thermal					
	- MP GENCO Hydel					
	- ISP, OSP, SSP & Other Hydel					
	- Central Sector					
	- DVC					
	- UMPP & IPPs					
	-Wind Genrators Capacity					
	-Solar Genrators Capacity					
	-Other Genrators Capacity					
9	TOTAL (MW)					

Note: The Monthly Power Supply Forecast for the State needs to be furnished separately

The Power Supply Position would be supported by Graphs showing yearly and Monthly Pattern

	Peak Power Supply Projections-Sum	mary Statement	(10 Year Period)			Format-4
Peak I	Hours (Morning/Day/Evening)					
No.	PARTICULARS -			Projections		
		Yr-1	Yr-2	Yr-3	Yr-4	Yr-10
1	For DISCOMs & SEZ (MU)					
2	For State (including OA & Railways) (MU)					
3	Energy Requirement (MU) (Ex-Bus)					
4	Peak availability (MU) -(Morning/Day/Evening)					
	MP Genco Thermal Plants					
	MP Genco Hydel Plants					
	ISP, OSP, SSP & Other Hydel					
	Central Sector Stations					
	DVC Plants					
	UMPP & IPPs					
	Wind Genrators Availability					
	Solar Generators Availability					
	Other Generators Availability					
	Availability thorugh banking/Power Market					
5	Peak availability (excluding banking/Power Market)					
6	Peak availability (including banking/ Power Market)					
7	Surplus(+)/Deficit(-) (excluding banking/ Power Market)					
8	Surplus(+)/Deficit(-) (including banking/ Power Market)					
Note:	The Monthly Peak Availability Forecast for the State for morning/day/eveni					
	The Power Supply Position needs to be supported by Graphs showing yearly	or monthly 24 h	r load pattern based o	on Load Research by	the Company.	

	Available/Exis	itng Ge	enerati	on Cap	acitie	s- Summa	ary Statement	t (MW)						Format-5	
	Year: 110														
No.															
1	State Gencos														
2	State Hydels														
3	JV and other Hydels														
4	Central Sector														
5	IPPs														
6	DVC														
7	Renewables (Source Wise)														
8															
Note:	The above format needs to be filled considering the plant wise availablilit	ty of each	ı State/	Central	Gener	ating plan	ts, IPPs, Reneu	vable plants	and other Plan	its for entire 10)-year plan.				

Available/Exisitng Generation Availability- Summary Statement (MWh)																							
	Year: 1																						
No.	Particulars	April	May	June	July	August	September	October	November	December	January	February	March	Total									
1	State Gencos																						
2	State Hydels													•									
3	JV and other Hydels																						
4	Central Sector																						
5	IPPs																						
6	DVC																						
7	Renewables (Source Wise)																						
8	Total Available Generation Capacity of Madhya Pradesh																						
Note:	The above format needs to be filled considering the plant wise availablili	ty of eacl	: State/	Central	Gener	ating plan	ts, IPPs, Renew	vable plants	and other Plan														

	Planned 0	Generat	tion Ca	paciti	es- Su	mmary St	atement (MV	V)						Format-6
														Year: 110
No.	Particulars	April	May	June	July	August	September	October	November	December	January	February	March	Total
1	State Gencos													
2	State Hydels													
3	JV and other Hydels													
4	Central Sector													
5	IPPs													
6	DVC													
7	Renewables (Source Wise)													
8	Total Available Generation Capacity of Madhya Pradesh													
Note:	The above format needs to be filled considering the plant wise availablilit	y of each	ı State/	Central	Gener	ating plan	ts, IPPs, Reneu	vable plants	and other Plan	ts for entire 10)-year plan.		-	

	Planned Generation Availability- Summary Statement (MWh)														
	Year: 1 No. Particulars April May June July August September October November December January February March Tota														
No.	Particulars	April	May	June	July	August	September	October	November	December	January	February	March	Total	
1	State Gencos														
2	State Hydels														
3	JV and other Hydels														
4	Central Sector														
5	IPPs													· · · · · · · · · · · · · · · · · · ·	
6	DVC														
7	Renewables (Source Wise)														
8	Total Available Generation Capacity of Madhya Pradesh														
Note:	The above format needs to be filled considering the plant wise availablilit	y of each	ı State/	Central	Gener	ating plan	ts, IPPs, Renew	vable plants	and other Plan	ts for entire 10)-year plan.				

													ty Avaiable/Planned (Long-Term/Medium-Term/Short-Term)										Format-7
Name of Generating	Type of Plant	COD/ SCOD	Capacity (MW)	MI	Share	Year w	ise Capaci	y (MW)	Peak De	emand Req (MW)	uirement	Sh	ortfall (M	W)	Energ	gy Availat	oility (MU)	Energy	Requiren	nent (MU)		Shortfa	11 (MU)
Stations		SCOD	(14144)	%	MW	Yr-1	Yr-2	Yr-10	Yr-1 Yr-2Yr-10		Yr-1 Yr-2Yr-10		Yr-1 Yr-2Yr-10		Yr-1 Yr-2Yr-10			Yr-1	Yr-2	Yr-10			
Long-Term																							
																						ldot	
																						\longrightarrow	
Medium -Term																							
																						\longrightarrow	
																						\longrightarrow	
																						\longrightarrow	
																						\longrightarrow	
																						\longrightarrow	
Short-Term																							
Total																						لــــــا	

Addition Generation Capacities- Summary Statement (MW) Form										Format-8				
Year: 110														
No.	Particulars	April	May	June	July	August	September	October	November	December	January	February	March	Total
1	State Gencos													
2	State Hydels													
3	JV and other Hydels													
4	Central Sector													
5	IPPs													
6	DVC													
7	Renewables (Source Wise)													
8	Total Available Generation Capacity of Madhya Pradesh													
Note:	ote: The above format needs to be filled considering the plant wise availablility of each State/Central Generating plants, IPPs, Renewable plants and other Plants for entire 10-year plan.													

Addition Generation Availability- Summary Statement (MWh)														
Year: 110														
No.	Particulars	April	May	June	July	August	September	October	November	December	January	February	March	Total
1	State Gencos													
2	State Hydels													•
3	JV and other Hydels													
4	Central Sector													
5	IPPs													
6	DVC													
7	Renewables (Source Wise)													
8	Total Available Generation Capacity of Madhya Pradesh													

	Generating Station Wise Capacity Addition (Long-Term/Medium-Term/Short-Term)														Format-9
Name of Generating	Type of Plant	COD/ SCOD	Capacity (MW)	MI	'Share	Year	wise Cap	acity Add	ition prog	ram (MW)	Energy Availability (M				U)
Stations		SCOD	(17177)	%	MW	Yr-1	Yr-2	Yr-3	Yr-4	Yr-10	Yr-1	Yr-2	Yr-3	Yr-4	Yr-10
Long-Term															
Medium -Term															
Short-Term															
Total															

	Summary - Generating Station Wise Capacity (Long-Term/Medium-Term/Short-Term)														Format-10
Name of Generating	Type of Plant	COD/ SCOD	Capacity (MW)	MP	Share	Year wise Capacity Addition program (MW)						Ene	U)		
Stations		SCOD	(17177)	%	MW	Yr-1	Yr-2	Yr-3	Yr-4	Yr-10	Yr-1	Yr-2	Yr-3	Yr-4	Yr-10
Long-Term															
Medium -Term															
Short-Term															
Total															

Forma	

Sr. No.	Name of Generating Station	Region /State	Installed capacity (MW)	Share of MP (%)	COD/ SCOD	Expected Retirement Year	Fixed Cost (Rs/MW)	Variable Cost (Rs/kWh)	Auxiliary Consumpution (%)	Max Generation Limits (MW)	Min Generation Limits (MW)	Fuel GCV (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)	Plant Availbility Factor (in %) in case of Thermal and Hydro / Capacity Utulisation Factor for renewable based resources	Design Energy in case of Hydro (MU)	Date of signing of PPA	Date of Expiry of PPA	Type of Capacity (Existing/Planned/Ad dition)	Contract Type .ong-Term/Medium Term and Short Term)

		Plan for Renewable Powe								
Sr. No.		Particulars			Projection					
51. No.		r articulais	Yr-1	Yr-2	Yr-3	Yr-4	Yr-10			
1	Ex-Bus Energy	Requirement (MU) (DISCOMs + SEZ)								
2	Energy require	ement to be considered for RPO (MU)								
а	Wind	RPO %								
b	VVIII	RPO (MU)								
С	Other	RPO %								
d	Other	RPO (MU)								
f	НРО	HPO %								
8		HPO (MU)								
3	Year wise Rene	ewable Capacity already tied up (MW)								
а		Wind								
b		Other								
С		НРО								
d		Total								
4	Energy Availal	ble from Existing Renewable Capacity (MU)								
а		Wind								
b		Other								
С		НРО								
d		Total								
5	Additional cap	pacity required for fulfilling RPO (MW)								
а		Wind								
b		Other								
С		НРО								
d		Total								
6	Additional Ene	ergy required for fulfilment of RPO (MU)								
а		Wind								
b		Other								
С		НРО								
d	l real wise i ma	Total								
6		Whenewavie energy required to runnin Kr								
7	(MII)									

Ι	Deviation in Demand Forecast (Summary Statement for State and All DISCOMs separately) - Discon	m wise (Name of Disc	om:)	Format-13
Sr. No.	Particulars	Previous Years approved As per Plan (1)	Actual (2)	Deviation (2-1)	Reasons for deviation
1	Total Energy Sale (MU)- (Cumulative of all consumer categories)				
2	Distribution losses - in %				
3	Distribution losses - in MU				
4	Supply / Requirement at DISCOM Boundary(MU)				
5	Intra-State Transmission losses - in %				
6	Intra-State Transmission losses - in MU				
7	Supply / Requirement at State Boundary(MU)				
8	Inter-State Transmission losses - in %				
9	Inter-State Transmission losses - in MU				
10	Ex-Bus Requirement of DISCOM (MU) (excluding OACs, Railways) - RESTRICTED				
11	Sale by MPPMCL to SEZ (as applicable)				
12	Energy Wheeled for Railways/OA Consumers (as applicable)				
13	Ex-Bus Requirement of DISCOM (MU) (including OA, Railways) -RESTRICTED				
14	Unsupplied energy due to system constraints (MU)				
15	Ex-Bus Requirement of DISCOM (MU) (excluding OA, Railways) - Unrestricted				
16	Ex-Bus Requirement of DISCOM (MU) (including OA, Railways) - Unrestricted				
17	System Load Factor				
18	Peak load of DISCOM (MW) (excluding OA, Railways)				
19	Peak load of DISCOM (MW) (including OA, Railways)				

	Deviation in Energy Availa	ability			Format-14		
Sr. No.	Particulars	Previous Years approved As per Plan (1)	Actual (2)	Deviation (2- 1)	Reasons for deviation		
1	Energy Requirement (MU) (Ex-Bus)						
2	For DISCOMs & SEZ (MU)						
3	For State (including OA & Railways) (MU)						
4	Energy Availability (MU)						
	MP Genco Thermal Plants						
	MP Genco Hydel Plants						
	ISP, OSP, SSP & Other Hydel						
	Central Sector Stations						
	DVC Plants						
	UMPP & IPPs						
	Wind Genrators Availability						
	Solar Generators Availability						
	Other Generators Availability						
	Availability thorugh banking/Power Market						

TOTAL (MU)