HIMACHAL PRADESH ELECTRICTY REGULATORY COMMISSION

Draft Notification

No.HPERC/RA/TTE/0225 The 27.02 . 2025

Whereas, for the past few years, India has been the fastest growing large economy in the World; currently, being the fifth largest economy; and is poised to become the third largest economy by the year 2030. As sufficient electricity Power is key to this growth, it is essential to add the generation capacity at a pace matching or slightly ahead of the growth in demand of power, so that the shortage of electricity does not slow down the pace of this growth; and

Whereas, the Resource Adequacy Planning is designed to ensure this by timely adding to the adequate genetation capacity to match the projected demand and supply reliable electricity 24x7 by judicious mix of long term, medium term and short term contracts of energy at a least cost (without over reliance on the electricity market) and combat climate change, as a part of Nationally Determined Contributions (NDCs);

Now, therefore, in exercise of the powers conferred under section 181 of he Electricity Act, 2003 (36 of 2003), read with sections 61, 66 and 86 thereof and all other powers enabling it in this behalf, the Himachal Pradesh Electricity Regulatory Commission hereby proposes to make the following draft Regulations, namely; the Draft **Himachal Pradesh Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2025** and as required by sub-section (3) of section 181 of the said Act and rule 3 of the Electricity (Procedure for Previous Publication) Rules, 2005, the Draft Regulations are hereby

published for the information of all the persons likely to be affected thereby; and notice is hereby given that the said Draft Regulations will be taken into consideration after the expiry of thirty (30) days from the date of its publication in the Rajpatra, Himachal Pradesh, together with objections or suggestions, if any, received within the aforesaid period in respect thereto.

The text of the aforesaid Draft Regulations is available on the website of the Commission i.e http.//www.hperc.org.

The objections or suggestions in this behalf should be addressed to the Secretary, Himachal Pradesh Electricity Regulatory Commission, Vidyut Aayog Bhawan, Block-37, SDA Complex, Kasumpti-171009(HP).

Draft Regulations

1. Short tttle, commencement, extent and application**.-** (1) These Regulations may be called the "Himachal Pradesh Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2025."

(2) These Regulations shall come into force from the date of publication in the Official Gazette.

(3) These Regulations shall extend to the whole State of Himachal Pradesh.

(4) These Regulations shall apply to the generating companies, distribution licensees, State Load Dispatch Centre, State Transmission Utility, other grid connected entities and stakeholders within the State of Himachal Pradesh.

2. Objective.- (1) The objective of these Regulations is to enable the implementation of Resource Adequacy framework by outlining a mechanism for planning of generation and transmission resources for reliably meeting the projected demand in compliance with the specified reliability standards for serving the load with an optimum generation mix.

(2) The Resource Adequacy framework shall cover a mechanism for demand assessment and forecasting, generation resource planning, procurement planning, its monitoring and compliance.

3. Definitions.- (1) In these Regulations, unless the context otherwise requires,

(a) "Act" means the Electricity Act, 2003 (Act 36 of 2003);

(b) "Authority" or "CEA" means Central ElectricityAuthority referred to in sub-section (1) of section70 of the Act;

(c) "Bidding Guidelines" means the Guidelines for determination of tariff by bidding process for procurement of power by Distribution Licensee(s) issued by the Ministry of Power, Government of India under section 63 of the Act;

(d) "Capacity Credit"or "CC"means a percentage of a resource's name plate capacity that can be counted towards resource adequacy requirements;

(e) "Commission" means the Himachal Pradesh Electricity Regulatory Commission;

(f) "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;

(g) "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;

(h) "Long-Term" means duration of ten years for development of demand forecast, generation resource plan and procurement plan;

(i) "Long-Term Distribution Resource Adequacy Plan" or "LT-DRAP" means plan for assessment of long-term resource adequacy by the distribution licensee with ten years planning period;

(j) “Loss of Load Probability”or“LOLP”means the 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 of five years for development of demand forecast, generation resource plan and procurement plan;

(l) “Medium-Term Distribution Resource Adequacy Plan” or “MTDRAP” means plan for assessment of medium-term resource adequacy by the distribution licensee with five years planning period;

(m) "Net Load”means the load derived upon exclusion of actual renewable generation (MW) from gross load prevalent on the Grid during any time block;

(n) “Normalized Energy Not Served” or “NENS” is the total expected load shed due to supply shortages (MWh) as a percent (%) of the total system energy and is normalization of the EENS by dividing it by the total system energy (MWh);

(o) “Planning Reserve Margin” or “PRM” means a specified percentage of the available capacity over and above the peak demand as may be stipulated by Authority or Commission from time to time for the purpose of generation resource planning;

(p) “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;

(q) “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;

(r) “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;

(s) ““Short term”means duration of one year for development of demand forecast, generation resource plan and procurement plan;

(t) “Short-Term Distribution Resource Adequacy Plan”or“ST-DRAP” means plan for assessment of short-term resource adequacy by the distribution licensee with one year planning period; and

(u) “Year”means financial year commencing on 1st April of the year and ending on 31st March of the succeeding year.

(2) All other words and expressions used in these Regulations, although not specifically defined hereinabove, but defined in the Act or other Regulations of the Commission, shall have the meaning assigned to them in the Act or other Regulations of the Commission or any law passed by the Parliament and applicable to the electricity industry in the State shall have the meaning assigned to them in such law.

Chapter 2 General

4. Resource Adequacy Framework**.- (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 at least cost and in a secure manner.

(2) Resource Adequacy framework shall cover following steps:-

(a) Demand assessment and forecasting;

(b) Generation resource planning;

(c) Procurement planning; and

(d) Monitoring and compliance.

(3) The time periods under the Long Term, Medium Term and Short Term for the purpose of Resource Adequacy Planning under these Regulations shall be as defined under sub-regulation (1) of Regulation 3 of these Regulations.

(4) The Resource Adequacy exercise shall be planned, developed and prepared for a period of 10 (Ten) years on annual rolling basis.

(5) The Distribution Licensee 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 the conditions outlined under these Regulations.

Chapter 3

Demand Assessment and Forecasting

5. Long-Term and Medium-Term Demand Forecast**.-** (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.

(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.

(3) The distribution licensee shall be responsible for considering the category wise consumption data and assessed consumption data of particular class of consumers such as agricultural, domestic etc. for demand forecasting. The distribution licensee shall be responsible for the assessment and forecasting of demand (MW) and energy (MWh) within its own control area.

(4) The distribution licensee shall prepare the energy forecast for each consumer category as specified by the Commission in its Tariff Order from time to time.

(5) The distribution licensee shall determine the energy forecast for a consumer category by adopting any of the following methodologies and/or combination thereof :-

(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) The distribution licensee 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. The distribution licensee 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) of these Regulations.

(7) For the purpose of forecasting energy for a consumer category and the methodology to be used for energy forecasting of a consumer category, the distribution licensee shall conduct statistical analysis and select the method for which standard deviation is lowest and R-square is highest.

(8) The distribution licensee shall utilize state-of-the-art tools, scientific and mathematical methodologies, and comprehensive data base 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.

(9) The distribution licensee may modify the load / 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) ElectricVehicles and EV 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 pumpsets 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 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.

(10) The distribution licensee may take into consideration any other factor not mentioned in sub-regulation (9) of this Regulation after providing detailed justification for its consideration.

(11) 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.

(12) The summation of energy forecast (MWh) for various consumer categories after adjusting captive, prosumer, and Open Access load forecast as per sub-regulations (5) to (11) of this Regulation, as the case may be, shall be the energy forecast for the distribution licensee at consumer level.

(13) The distribution licensee shall calculate the energy forecasts (in MWh) of the State by adding Distribution Losses as per loss trajectory

approved by the Commission, Intra- State Transmission Losses and Inter-State Transmission Losses.

(14) 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) calculated as per sub-regulation (13) of this Regulation. If any other appropriate load factor is considered for future years, a detailed justification shall be provided by the distribution licensee for its consideration.

(15) The distribution licensee 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.

6. Short-Term Demand Forecast and Aggregation of Demand Forecast.- (1) Short-Term Demand Forecast-

(a) The distribution licensee shall develop a methodology for hourly or sub-hourly demand forecasting and shall maintain a historical database;

(b) 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 the distribution licensee with inputs from State Load Dispatch Center (SLDC). A detailed explanation for methodology adopted must be provided;

(c) The maintenance schedule of own generating units, Bhakra Beas Management Board (BBMB), Central and other Power Plants etc. shall also be kept in view; and

(d) The distribution licensee 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 to their distribution area.

(2) Aggregation of Demand Forecast-

(a) The distribution licensee 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 and submit to SLDC by 30th April of each year for the ensuing year (s);

(b) STU with inputs from SLDC and based on the demand estimates of the distribution licensees of the State, shall estimate, in different time horizons, namely long- term, medium term and short term, the demand for the entire State duly considering the diversity of the State; and

(c) SLDC shall aggregate demand forecasts by distribution licensees, consider the load diversity, congruency, seasonal variation aspects and shall submit State-level aggregate demand forecasts (MW and MWh) to theAuthority and NLDC and RLDC by 31st May of each year for the ensuring year(s).

Chapter- 4

Generation Resource Planning

7. Preparation of Generation Resource Planning**.-** (1) The distribution licensee shall plan and asses the required generation resources considering their existing resources, upcoming resources (not yet commissioned but PPA signed), Allocation of free power of government where clear commitment for given period exists, capacity credit and incremental capacity requirement to meet forecasted demand including planning reserve margin (PRM).

(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.

(3) The distribution licensee 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. The Distribution Licensee shall also be guided by the methodology adopted in the latest electricity power survey of CEA for the State.

(4) The Generation resource planning shall include the following, 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) Banking Power arrangements; and

(e) 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;

(f) Maintenance/renovation schedule of own generating units, Bhakra Beas Management Board (BBMB), Central and other Power Plants etc.;

(g) All the characteristics and parameters with their values for each generating plants considered shall be provided in the resource plan.;

(h) Under-construction capacity / retirement of generation city/contracted capacity /bilateral contracts;

(i) Potential technologies, gestation periods and lifetime of different assets;

(j) Capacities and generation profile of renewable generation;

(k) Timeline details and transmission expansion plans;

(l) Renewable Purchase Obligation (RPO); and

(m) Constraints such as 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. Capacity Crediting of Generation Resources.- (1) The distribution licensee shall compute Capacity Credit (CC) for their contracted generation resources by applying the net load-based approach as outlined under sub-regulation (2) of this 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.

(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/8784 hours in leap year (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 / 8784 hours as the case may be (or time block) and then arranged in descending order;

(c) The difference between these two load duration curves mentioned under sub-regulation (2) (a) and (b) of this Regulation 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 sub-regulation (2) (c) of this Regulation. 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:-

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

(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.

(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 licensee shall be considered. For this purpose, CC factors as prescribed by Authority or as approved by the Commission shall be considered.

(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.

(5) CC factor for thermal resources shall be computed based on coal availability and planned/forced outages.

(6) The distribution licensee 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.

(7) SLDC shall calculate estate-specific CC factors considering the aggregate State Demand and State Net Load and contracted RE generation resources available in the State and shall submit such CC factor information to the Authority and NLDC and RLDC from time to time.

9. Assessment of Planning Reserve Margin (PRM).- (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.

(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.

(3) The PRM determined shall be considered by the distribution licensee in their planning for resource adequacy requirement and generation resource capacity planning.

(4)The State level resource adequacy planning by the distribution licensee/SLDC shall factor in PRM while developing State-level Integrated Resource Plan.

10. Resource Adequacy Requirement and its Allocation.- (1) The distribution licensee shall determine capacity requirement to meet demand and PRM

considering available capacity adjusted for capacity crediting for existing and planned contracted generation resources.

(2) The available capacity as determined in sub-regulation (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.

(3) The distribution licensee shall subtract the resource map developed in sub-regulation (2) from the demand forecast developed in Regulation 5 of these Regulations to identify the resource gap.

(4) The distribution licensee 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 atleast three different scenarios (most probable, business as usual, and aggressive) are developed.

(5) Based on most probable scenario, the distribution licensee shall undertake development of Long-term, Medium-term, and Short-term Distribution Resource Adequacy Plan of each year to meet Resource Adequacy requirement.

(6) Long-term National Resource Adequacy Plan (LT-NRAP) and Short-term National Resource Adequacy Plan (ST-NRAP) reports shall act as guidance for the distribution licensee for undertaking the Resource Adequacy exercises.

(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 optima generation mix for the next10 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.

(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.

(9) The distribution licensee 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.

(10) The distribution licensee is suggested to keep the share of Long-term contracts in the range of more than 85% of the RAR and Medium–term contracts in the range of 10% - 15% of the RAR while the rest to be met through Short-term contracts not more than 5% of RAR; Provided that power procurement through Day-Ahead Market (DAM), shall not be considered towards the contribution for meeting RAR.

(11) The distribution licensee shall undertake a 10-year period (Long-term Distribution Resource Adequacy Plan (LT-DRAP)) to meet their own peak demand and energy requirement.

(12) The distribution licensee while formulating their LT DRAP shall also consider the constraints mentioned in Annexure–I of these Regulations.

(13) The distribution licensee 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 validation.

(14) The distribution licensee shall submit the LT-DRAP plan duly vetted by CEA along with necessary supporting documents and details for meeting RAR to the Commission within 15 days from the date of receipt of CEA approval.

(15) The distribution licensee 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.

(16) For subsequent three years, the distribution licensee shall also furnish a plan to meet estimated requirement of their contribution to meet national peak for the Commission’s approval.

(17) The LT-DRAP shall be carried out by the distribution licensee on an annual rolling basis considering the contracted capacity as a part of the system and shall optimize for additional capacity required.

(18) The distribution licensee 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.

(19) 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.

(20) 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 STDRAP on a daily, monthly and quarterly basis based on actual availability of generation resources.

Chapter- 5

Procurement Planning

11. Procurement planning shall consist of.-

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

12. Procurement Resource Mix**.-** (1) In power procurement strategy, the distribution licensee shall ensure an optimal procurement generation resource mix and also facilitates smooth RE integration in its portfolio of power procurement resource option 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.

(2) For identification of the optimal generation procurement resource mix, optimization techniques and least-cost modelling shall be employed by the distribution licensee in order to avoid stranded capacity. The distribution licensee shall also engage in adoption of least cost modeling and optimization techniques and demonstrate the same in its overall power procurement planning exercise to be submitted to Commission for approval.

(3) The distribution licensee 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.

(4) The distribution licensee shall contract additional resources source-wise based on the LTDRAP to meet its own peak demand.

(5)The power capacity procurement from renewable energy sources for fulfilling the RPO targets shall be carried out as per the Himachal Pradesh Electricity Regulatory Commission (Renewable Purchase Obligation and its Compliance) Regulations, 2023, and amendments thereof.

(6) The power procurement from Wind, Solar PV, Wind Solar Hybrid, Round the Clock (RTC) generations shall mandatorily be carried out as per the guidelines for tariff based competitive bidding process notified by the Ministry of Power.

(7) The distribution licensee may contract power through Central Agencies / Intermediaries / Traders /Aggregators / Power Exchanges or

through bilateral agreements / Banking arrangements with other distribution licensees.

(8) The distribution licensee may procure power on Short-term and Medium-term basis through DEEP and PUShP portal.

13. Procurement Type and Tenure.- (1) The distribution licensee, 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.

(2) The distribution licensee 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.

(3) The distribution licensee in its overall power procurement planning approach shall employ greater emphasis on adequate contracting through Long-Term and Medium Term arrangements. However, the distribution licensee 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.

(4) The distribution licensee 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.

14. Sharing of Capacity**.-** (1) The 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 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.

(2) The distribution licensee shall submit information about contracted capacity to the SLDC and the STU for compliance verification.

(3) The distribution licensee, the STU and the SLDC shall seek approval of the Commission to the procurement plan as well as Annual Rolling Plans.

15. Approval of Power Purchase Agreement.- (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.

(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 Commission / Central Government from time to time.

(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 distribution licensee shall be subject to the prior approval of the Commission in respect of,-

(a) Necessity;

(b) Reasonability of cost;

(c) Promoting efficiency , economy, equitability and competition;

(d) Conformity with requirements of quality, continuity and reliability of supply;

(e) Conformity with safety and environmental standards;

(f) Conformity with criterion of power purchase as laid down by the Commission; and

(g) Conformity with policy directives of the State Government and policies issued by the Government of India viz. National Electricity Policy, Tariff Policy, long term and short term power procurement guidelines etc..

(4)The distribution licensee shall submit the list of all existing Power Purchase Agreements executed with different conventional power plants as well as RE Generators alongwith the Resource Adequacy plan.

16. Variation in Power Purchase.- The 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) The distribution licensee may enterin to 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

17. Monitoring and Compliance.- The Distribution licensee shall comply with the Resource Adequacy requirement, and its compliance and in accordance with the timelines specified under Regulation 19 of these Regulations. 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

18. Data Requirement and Sharing Protocol.- (1) The Distribution licensee shall maintain and share all data related to demand assessment and forecasting 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 alongwith changes in demand profile (e.g. agricultural shift, time of use, etc.), historical hourly load shape, etc. with SLDC.

(2) The Distribution Licensee 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.

(3)The Distribution Licensee shall maintain atleast past 10 years of statistics in its database pertaining to consumption profiles for each class of consumers, such as domestic, commercial, industry ,public lighting, bulk supply etc., contribution of consumer category to peak demand, seasonal variation aspects etc.

(4)The distribution licensee / SLDC shall maintain the 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.

(5) The 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.

(6) SLDC and the distribution licensee shall aggregate generation data and share State- level projections with the Authority and NLDC for assessment of Resource Adequacy requirement.

19. Timelines.- (1) The distribution licensee shall submit the LT-DRAP plans to CEA by 30th September of each year for validation.

(2) The distribution licensee shall submit the LT-DRAP plan duly vetted by CEA alongwith details for meeting the RAR to the Commission within 15 days from the date of receipt of CEA approval.

(3)The distribution licensee 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.

(4)SLDCs shall aggregate the total contracted capacities at the State level and submit the information to the RLDC under the intimation to the Commission within15 days from the date of receipt from the distribution licensee.

(5)The distribution licensee after contracting the balance capacity shall submit the information to the Commission by 1st April of each year.

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Miscellaneous

20. Placing of information on websites.- SLDC shall also publish the monthly Merit Order Dispatch (MoD) stack along with per unit variable cost of each generating station on its website.

21. Assessment to involve consultation.- The distribution licensee may consult with Central Sector Generating Companies, Transmission Companies, National / Regional /State Load Dispatch Centers, and Central Electricity Authority to make the Resource Adequacy Plan. 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.

22. Power to issue Orders and give directions.- Subject to the provisions of the Act, 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.

23. Power to relax.- The Commission may, by general or special order, for reasons to be recorded in writing, relax any of the provisions of these Regulations on its own motion or on an application made before it by an interested person.
24. 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 in consistent to the provisions of the Act and these Regulations, as may appear to be necessary for removing the difficulty.
25. Power to amend.- The Commission may, from time to time, add,vary, alter, modify or amend any of the provisions of these Regulations.
26. Transitional Provision.- Nothing contained in these Regulations shall limit or otherwise affect the inherent powers of the Commission from adopting a procedure, which is at variance with any of the provisions of these Regulations, if the Commission, in view of the special circumstances of the matter or class of matters and for reasons to be recorded in writing, deems it necessary or expedient to depart from the procedure specified in these Regulations.

ANNEXURE-I

Methodology of Preparation of Resource Adequacy Plan with constraints

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 the distribution licensee:

- **Planning Reserve Margin/Resource Adequacy Requirement:** The capacity credits for generating resources and demand response resources to meet the national peak shall be 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. The 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.
- **Port folio balance constraints:** The portfolio balance constraints shall ensure that the total generation and the import of power to the control area of Distribution licensee is equal to th esum of the demand, exports from the control area of 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:** Unlike solar and wind, thermal resources are dispatchable. However, the thermal resources ar bound by constraints such maximum and minimum generation limits, ramp rates, spinning reserve offers, plant availability and unit commitment decisions.

  The dispatch (energy offer) plus there serve offer (specified through 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 mayhave periods of outages which may need to be captured by using an availability factor.

  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),stand alone renewable capacity along with hydro capacity for balancing renewable generation shall be considered while carrying out resource adequacy exercise.
- **Storage constraints:** Due to the intermittent nature of renewable generation, the need for resources which can store surplus energy and dispatch 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 renewable sormeeting contingencies in the realtime.The thumb rule for operating reserve requirement shall be defined based on discussions withthe SLDC and shall be considered as an input parameter to the model.
- **Demand Response:** Potential for demand side management such as shiftingof loador 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.

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Secretary
Himachal Prsadesh Electricity Regulatory Commission.