**MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO.LTD.**
**CIN NO. U40109MH2005SGC153646**
**Maharashtra State Load Dispatch Center**
**Office of The Executive Director**
Maharashtra State Load Dispatch Center, Thane-Belapur Road, P.O. Airoli,
Navi Mumbai Pin – 400 708.
Tele :91-22-27601765/1766/1931/2937, Fax :91-22-27601769/2936
Email : edmsebholding@gmail.com
Website : http://www.mahasldc.in

**Ref. MSLDC/Tech/SO/No.** No 02252 **Date:** 30 OCT 2024

To,
The Secretary,
Maharashtra Electricity Regulatory Commission (MERC)
Centre No.1, 13th Floor, Cuffe Parade,
Mumbai-400005.

**Sub: Submission of the state-aggregated capacity shortfall in compliance to Resource Adequacy regulation 2024.**

**Ref:-** 1) Maharashtra Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2024.

2) Revision timeline Notification of MERC, dt. 25.10.2024

Respected Sir,
Please find enclosed herewith Resource adequacy study for state of Maharashtra in compliance with Maharashtra Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2024. Clause no. 19.1. Monitoring and Reporting.

Thanking you.

ENCL: 1) RA study
2) Annexures I to III in soft form

Yours faithfully,

**(Shashank Jewalikar)**
**Executive Director**
**MSLDC, Kalwa**

**Copy s. w. r to:**
1) The Director (Operations), MSETCL, Mumbai.

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**Resource Adequacy Study for the state of Maharashtra**

**Preamble:**

With reference to Maharashtra Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2024. Clause no. 19.1. Monitoring and Reporting, based on the MT-DRAP and ST-DRAP, STU and MSLDC shall communicate the state-aggregated capacity shortfall to the Commission by 15th September of each year for the ensuring year(s).

As per revised timeline the date for submission of state-aggregated capacity shortfall to the commission by 30th October 2024.

Accordingly, all distribution licensees except Railways have submitted their ST-DRAP and MT-DRAP to this office along with requisite data

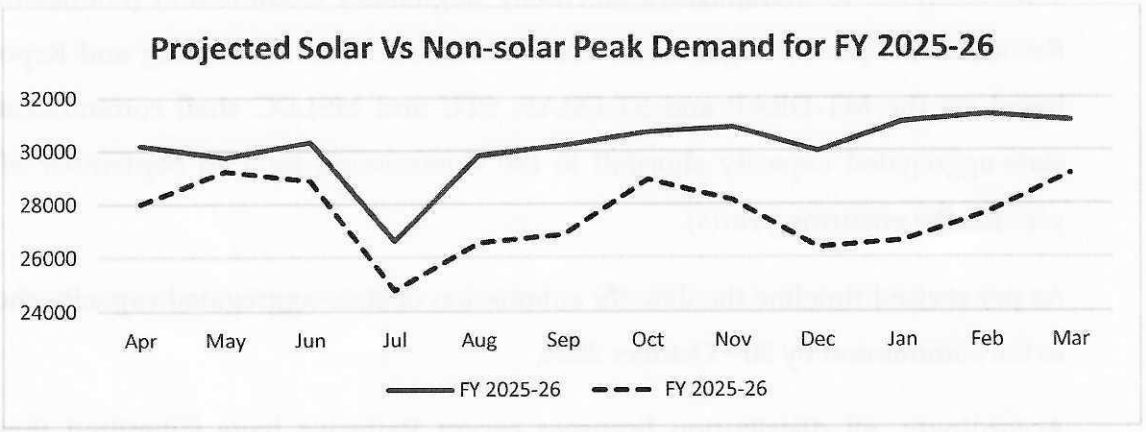
Based on the data submitted by distribution licensees and historical data available with MSLDC the Resource Adequacy study carried out by MSLDC as below: -

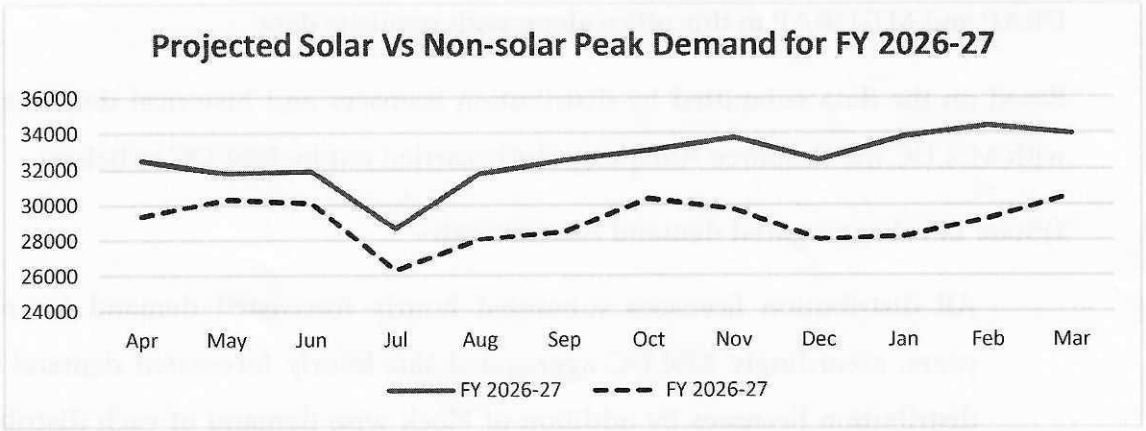
**1)State Level aggregated demand Assessment: -**

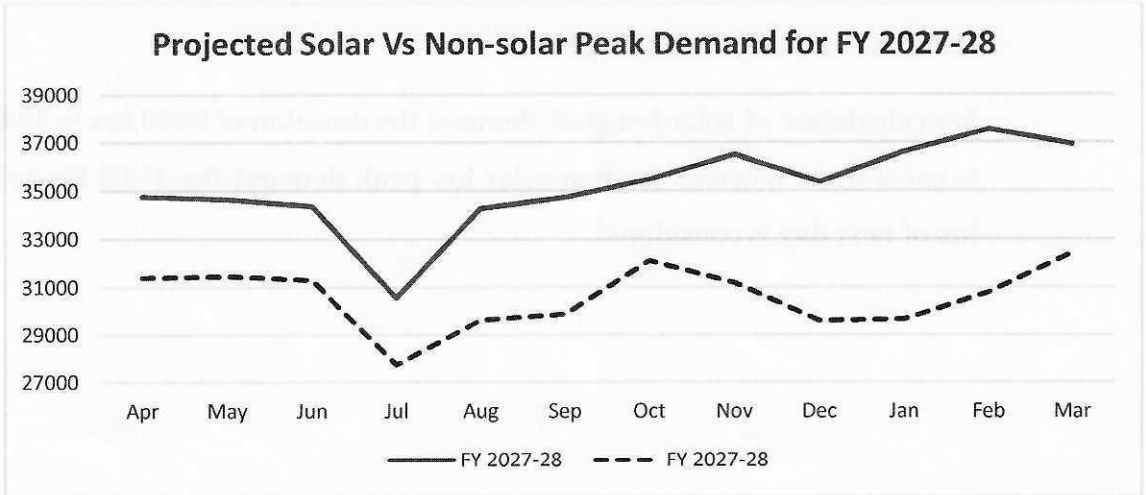
All distribution licensees submitted hourly forecasted demand for next 5 years, accordingly MSLDC aggregated this hourly forecasted demand of all distribution licensees by addition of block wise demand of each distribution licensees and calculated solar hrs peak demand and non-solar hrs peak demand for the state on monthly basis. The peak demand of state so calculated is non coincident peak

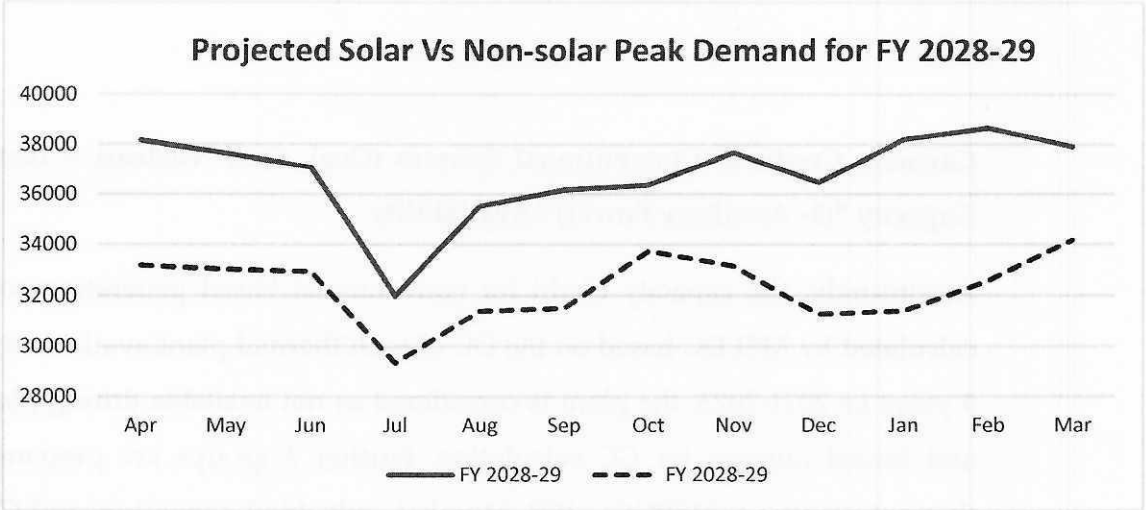
For calculation of solar-hrs peak demand the duration of 06:00 hrs to 18:00 hrs is considered whereas for non-solar hrs peak demand the 18:00 hrs to 06:00 hrs of next day is considered.

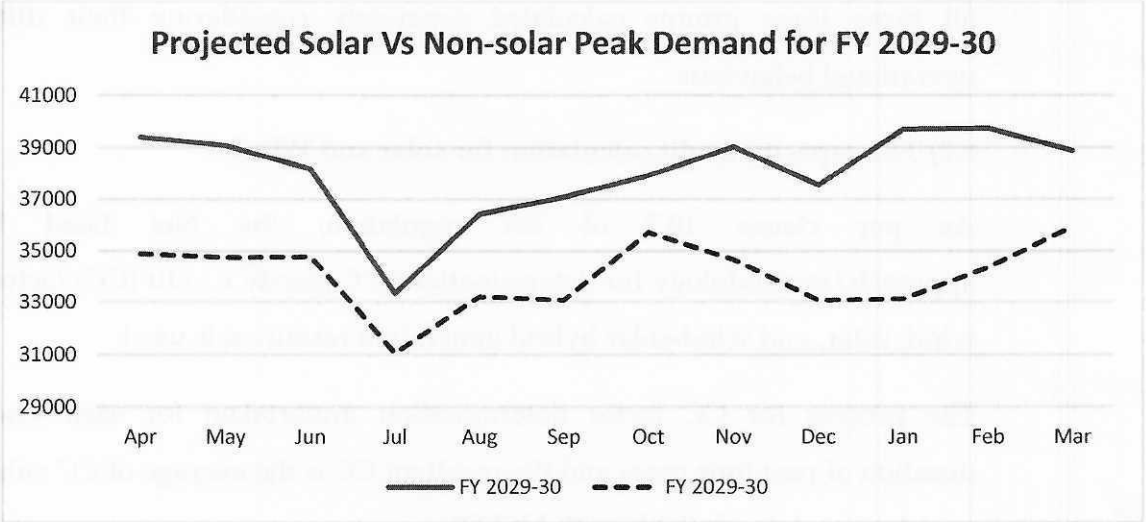
The plots for peak demand solar hrs and peak demand non-solar hrs are as below: -






**2) Capacity Credit Calculations: -**

(The Capacity credits calculated by MSLDC for thermal generation resources attached in **Annex-1**)

**2.1) The capacity credit calculation for thermal, Nuclear, Gas plants: -**

As per available Discussion paper on Methodology for CC generation resources by Ministry of Power, CEA, Conventional Sources such as coal, gas, and nuclear are reliable and dispatchable sources of power and can be made available during the high demand period. As such the capacity credit of these sources can be estimated as

**Capacity Credit of Conventional Sources (Coal, Gas, Nuclear) = Installed Capacity *(1- Auxiliary Power) *Availability**

Accordingly, the capacity credit for conventional based generating sources calculated by MSLDC based on the DC of each thermal plant available for last 3 years i.e 2021-2023, the plant is considered as not available during planned and forced outages for CC calculation. Further 3 groups are prepared for thermal plants i.e. MSPGCL, IPP, Mumbai embedded generators and CC for all these three groups calculated separately considering their different operational behaviour.

**2.2) The capacity credit calculation for solar and Wind: -**

As per clause 10.2 of RA regulation, the Net Load based approach/methodology for determination of Capacity Credit (CC) factors for wind, solar, and wind-solar hybrid generation resources is used

The process for CC factor determination undertaken for each year for duration of past four years and the resultant CC is the average of CC values of past 4 years data available with MSLDC.

*The resultant CC factors for Solar and Wind generating resources is enclosed in* ***Annex -2***

CC factors are calculated for wind and solar resources separately for solar hrs and non-solar hrs.

Further CC factors for RE calculated separately for monsoon period due to high penetration of wind during this period. Monsoon months considered for calculation are June to sept. The solar hrs considered for calculation as 06:00 hrs to 18:00 hrs and non-solar hrs considered as 18:00 hrs to 06:00 hrs. of next day

**2.3) The capacity credit calculation for Hydro plant: -**

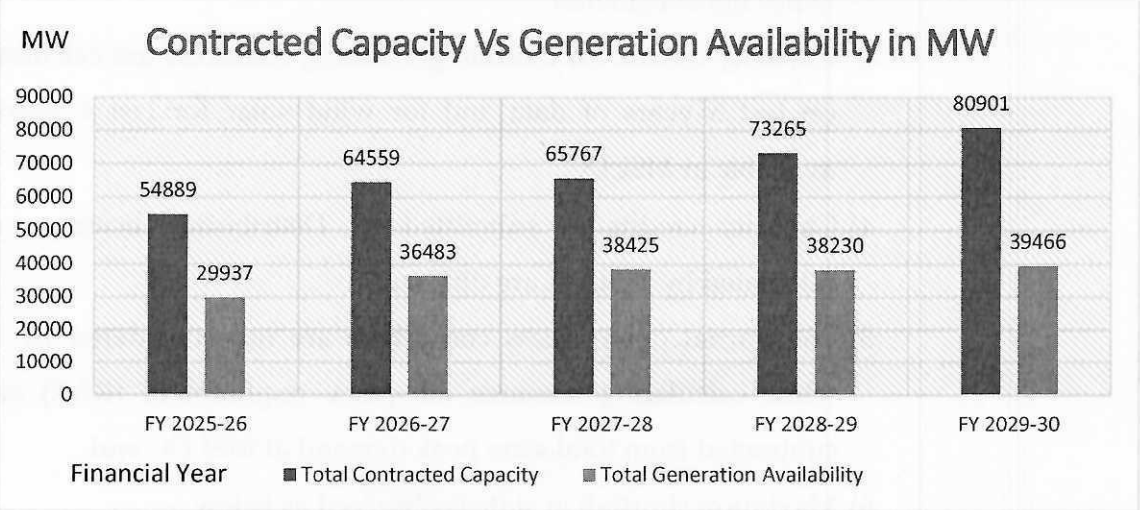
In Maharashtra major koyna generating plants, tata hydro generating plants availability is considered while calculation of Capacity credits for hydro plants.

*The Capacity credits of all generating resourced is attached in Annex-1*

**3)The aggregated Generation Resources Availability for state: -**

The all-distribution licensees except the Indian railways had submitted their contracted resources to the MSLDC for FY2026 to 2030

3.1) The state level contracted capacity is calculated by summation of all the contracted capacities submitted by all distribution licenses separately for each financial year. The year wise contracted capacity addition is as below:




3.2) The generation availability for each resource is calculated by multiplying the fuel wise contracted capacities by corresponding Capacity credit calculated in 2.1, 2.2,2.3 as above

3.3) Further total generation resources available for state is calculated by addition of all generation availability of each resource

**4) MSLDC's Submissions on shortfall in state: -**

*The consolidated RA study including Shortfall/surplus for the state is attached in Annex-3 for FY 2025-2030 ( 5 excel sheets in soft form),*

**Note:-**

1) Indian Railways Discom has not submitted the MT-DRAP and ST-DRAP plan to MSLDC, hence it's contracted capacities for medium term and long term are not considered in generation availabilty, however the demand is considered as per hourly demand data submitted by IR to MSLDC.
2) Other Deemed discoms in Maharashtra have contracted capacities are majorly through, MTOA, STOA and PX hence not included in total state contracted capacities. Further load of these discoms is approx. upto 100MW which is negligible compare to total state demand and hence not considered.
3) Capacity credits for thermal generating resources are calculated based on last 3 years of data and for wind solar for last 4 years of data available at MSLDC.
4) Capacity credits as submitted by Distribution licensees and that calculated by MSLDC are different.
5) The Partial open access consumers are not considered by MSEDCL while calculating resource adequacy requirement (RAR) and hence subtracted from total state peak demand at MSLDC end.
6) Maximum shortfall in state is observed as below: -

| Sr.No. | Financial Year | Months in which Max. short fall observed | Approx. Max Quantum of shortfall# in MW | Remark if any |
|---|---|---|---|---|
| 1 | 2025-26 | May-25 | 3149 | During non- solar hrs only |
| 2 | 2026-27 | March-27 | 1464 | During non- solar hrs only |
| 3 | 2027-28 | March-28 | 2800 | During non- solar hrs only |
| 4 | 2028-29 | March-29 | 2926 | During non- solar hrs only |
| 5 | 2029-30 | March-30 | 709 | During non- solar hrs only |

*# The shortfall is subject to change as per contracted capacity addition proposed by Discoms.*

7) The STOA/PX resources are not considered in generation availability of state.
8) The short fall is observed only during non-solar hrs.

Submitted for your further needful please.

**Encl:- Annex 1 to 3 as above in soft form**

**(Shashank Jewalikar),**
**Executive Director,**
**MSLDC, Airoli**

**Annexure -1** The Capacity credits calculated by MSLDC for thermal generation resources

| Name of Utility | Name of Unit | Capacity Credit (CC) | GroupCC | Remark |
|---|---|---|---|---|
| MSEDCL | Bhusawal U3 | 0.626941 | 0.64 | MSPGCL group |
| | Bhusawal U4 | 0.7890404 | | |
| | Bhusawal U5 | 0.7845649 | | |
| | Chandrapur U3 | 0.552153 | | |
| | Chandrapur U4 | 0.5146357 | | |
| | Chandrapur U5 | 0.5258819 | | |
| | Chandrapur U6 | 0.6186988 | | |
| | Chandrapur U7 | 0.4624071 | | |
| | Chandrapur U8 | 0.8054185 | | |
| | Chandrapur U9 | 0.8028731 | | |
| | Khaperkheda U1 | 0.5318482 | | |
| | Khaperkheda U2 | 0.5402973 | | |
| | Khaperkheda U3 | 0.7689754 | | |
| | Khaperkheda U4 | 0.7098638 | | |
| | Khaperkheda U5 | 0.8211738 | | |
| | Koradi U6 | 0.7474248 | | |
| | Koradi U7 | 0.1228572 | | |
| | Koradi U8 | 0.6778892 | | |
| | Koradi U9 | 0.6205855 | | |
| | Koradi U10 | 0.6231246 | | |
| | Nashik U3 | 0.3388776 | | |
| | Nashik U4 | 0.6515058 | | |
| | Nashik U5 | 0.6224394 | | |
| | Paras U3 | 0.7460902 | | |
| | Paras U4 | 0.7594765 | | |
| | Parli U6 | 0.7974973 | | |
| | Parli U7 | 0.8157304 | | |
| | Parli U8 | 0.7043429 | | |
| | APML U1 | 0.8616544 | 0.81 | IPP group |
| | APML U2 | 0.8222278 | | |
| | APML U3 | 0.860136 | | |
| | APML U4 | 0.8402856 | | |
| | APML U5 | 0.8585895 | | |
| | RIPL U1 | 0.8730501 | | |
| | RIPL U2 | 0.8281938 | | |
| | RIPL U3 | 0.7537822 | | |
| | RIPL U4 | 0.8350578 | | |
| | RIPL U5 | 0.848193 | | |

| | | | | |
|---|---|---|---|---|
| | JSWEL U1 | 0.5397134 | | |
| Merchant Generators | IEPL | 0.2786199 | | Merchant Generator |
| | JSW U234 | 0.8270001 | | |
| | SWPGL U1234 | 0.4622048 | | |
| | MSPGCL HYDRO | | | |
| MSEDCL | Bhira | 0.3406302 | 0.9 | Only koyna hydro generation availabity is considered for CC calculation |
| | Ghatghar U1 | 0.1708657 | | |
| | Ghatghar U2 | 0.4259693 | | |
| | Dodson | 0.0714328 | | |
| | KDPH | 0.7900545 | | |
| | Koyna | 0.9038188 | | |
| | Tillari | 0.2928168 | | |
| | Vaitarna | 0.2945712 | | |
| | | | | |
| | MSPGCL GAS | | | |
| | Uran STG 2 | 0.3325924 | | |
| | Uran WHRP | 0.2446071 | | |
| | | | | |
| TPCL | TPCL THERMAL & GAS | | | |
| | TPCL U5 | 0.8928039 | 0.921965256 | Mumbai embedded thermal generator group |
| | TPCL U7 APM | 0.5368912 | | |
| | TPCL U7 NAPM | 0.4107068 | | |
| | TPCL U8 | 0.9511266 | | |
| | | | | |
| | TPCL HYDRO | 0.990142 | | |
| | | | | |
| AEML | AEML THERMAL | | | |
| | ADTPS U1 | 0.9002022 | 0.9 | Mumbai embedded thermal generator group |
| | ADTPS U2 | 0.9351314 | | |

**Annex-2 The resultant CC factors for Solar and Wind generating resources (in soft form)**

**Annex-3 The consolidated RA study including Shortfall/surplus for the state for FY 2025-2030 ( 5 sheets in excel soft form)**