Before the
MAHARASHTRA ELECTRICITY REGULATORY COMMISSION
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Case No. 98 of 2024

Petition for seeking approval for bidding documents for procurement of 1,000 MW (up to 2000MW under green shoe option) energy storage capacity for 40 years from ISTS/InSTS connected pumped Hydro Storage Plant/s through competitive bidding.

Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL)… Petitioner

Coram
Sanjay Kumar, Chairperson
Anand M. Limaye, Member
Surendra J. Biyani, Member

For the Petitioner : Ms. Deepa Chawan (Adv)
Mr. Lokesh Chandra (Rep)

ORDER

Date: 12 July, 2024

1. Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL), has filed the present Petition being Case No.98 of 2024 on 13 June 2024 under Regulation 21 and 22 of the MERC (Multi Year Tariff) Regulations, 2019 with following objectives:

   a. Approval for initiation of Competitive Bidding process for procurement of 1000 MW Pumped Hydro Storage Power.

b. Approval for bidding documents for Procurement of 1,000 MW energy storage capacity (for 8 hours discharge with maximum 5 hours continuous discharge) for 40 years from ISTS/InSTS connected pumped hydro storage plant/s through competitive bidding.

2. **MSEDCL's main prayers are as under:**

"

a) To admit the Petition as per the provisions of Part C : Power Procurement of the Maharashtra Electricity Regulatory Commission (Multi Year Tariff) Regulations, 2015.

b) To accord approval for initiation of competitive bidding process for procurement of 1000 MW Pumped Hydro Storage Power.

c) To accord approval for bidding documents for Procurement of 1,000 Mw energy storage capacity (for 8 hours discharge with maximum 5 hours continuous discharge) for 40 years from ISTS/InSTS connected pumped hydro storage plant/s through competitive bidding.

…."

3. **MSEDCL in its Petition has stated as follows:**

3.1. Renewable Energy (RE) installation like solar and wind generate power as per the availability of natural resources which are variable in nature and therefore may not match the demand pattern. Due to mismatch in demand and supply, the grid may face problem of stability, flexibility, reliability and security. In order to meet such challenges, Energy Storage Systems (ESS) are essential.

3.2. By bundling ESS with solar or wind power installation schedulable power can be made available to the grid. Pumped Storage Projects (PSPs) are the most matured and reliable Mega Watt (MW) Level ESS. PSP systems are comparatively more environmental friendly, in the sense that it does not pose any disposal problem at the end of service life. Considering the life cycle cost, it is cheaper than other alternative ESS.

3.3. PSP systems provides following crucial ancillary services:

a. It helps to manage reactive power requirement of the grid and thereby supports the voltage management of the system.

b. Acts as a spinning reserve for fast ramp up /ramp down in case of generation failure.

c. Useful in black start in case of system blackout.

d. frequency response ancillary services and faster start-up & shutdown

3.4. **Central Electricity Authority – MSEDCL's Peak Demand Projection**:

3.4.1 As per 20th EPS (Electric Power Survey) data published by the Central Electricity Authority (CEA) in November 2022, the peak demand projections of MSEDCL are as below:

FY	Peak Demand in MW	FY	Peak Demand in MW
2022-23	26,558	2023-24	27,732
2024-25	29,115	2025-26	30,582
2026-27	32,271	2027-28	33,897
2028-29	35,573	2029-30	37,601
2030-31	38,781	2031-32	39,884

3.4.2 For FY 2022-23, the peak demand of MSEDCL is projected as 26,558 MW. The actual peak demand recorded on 14 April 2022 stands at 25,144 MW. As per CEA, MSEDCL's demand is expected to gradually increase up to 39,884 MW till FY 2031-32.

3.5. **Resource Adequacy Planning:**

3.5.1 Guidelines For Resource Adequacy Planning Framework For India (RA Guidelines):

a) On 28 June 2023, the GoI has issued guidelines for Resource Adequacy Planning Framework for India with key objectives to ensure that adequate generation capacities are available, round-the-clock, to reliably serve demand under various scenarios.

b) As per the Guidelines, to meet Distribution Licensee's 'Resource Adequacy Requirement' (RAR), the share of long-term contracts is suggested to be in the range of 75-80% of total supply side RAR, medium-term contracts in the range of 10-20% and rest can be met through short–term contracts.

3.5.2 The Commission's Draft Regulation for Framework for Resource Adequacy (Draft RA Framework Regulations):

a) In terms of the Draft Framework, resource adequacy is defined as a mechanism to ensure that there is an adequate supply of generation or demand responsive resources to serve expected peak demand reliably. In this context, reliability is measured through instances / probability of system peak exceeding the installed generation capacity which is effectively available. Adherence to such a framework would ensure a reliable and efficient operation of the power system across all timeframes.

b) The Draft RA Framework Regulations entails the planning of generation and transmission resources for reliably meeting the projected demand in compliance with specified reliability standards for serving the load with an optimum generation mix.

3.6. **Renewable Purchase Obligations (RPO):**

3.6.1 MoP Notification dated 22 July 2022

MoP vide its Notification dated 22 July 2022 specified the following RPO Trajectory till FY 2029-30:

Year	Wind RPO	HPO	Other RPO	Total RPO
2022-23	0.81%	0.35%	23.44%	24.61%
2023-24	1.60%	0.66%	24.81%	27.08%
2024-25	2.46%	1.08%	26.37%	29.91%
2025-26	3.36%	1.48%	28.17%	33.01%
2026-27	4.29%	1.80%	29.86%	35.95%
2027-28	5.23%	2.15%	31.43%	38.81%
2028-29	6.16%	2.51%	32.69%	41.36%
2029-30	6.94%	2.82%	33.57%	43.33%

MoP has also specified the Energy Storage Obligation (ESO).

3.6.2 MoP Notification dated 20 October 2023

The GoI in consultation with the Bureau of Energy Efficiency, specified the following minimum share of consumption of non-fossil sources (renewable energy) by designated consumers:

Year	Wind renewable energy	Hydro renewable energy	Distributed renewable energy	Other renewable energy	Total renewable energy
2024-25	0.67%	0.38%	1.50%	27.35%	29.91%
2025-26	1.45%	1.22%	2.10%	28.24%	33.01%
2026-27	1.97%	1.34%	2.70%	29.94%	35.95%
2027-28	2.45%	1.42%	3.30%	31.64%	38.81%
2028-29	2.95%	1.42%	3.90%	33.10%	41.36%
2029-30	3.48%	1.33%	4.50%	34.02%	43.33%

3.6.3 The Commission in its notification dated 23 February 2024 issued MERC (Renewable Purchase Obligation, its Compliance and Implementation of Renewable Energy Certificate Framework) (First Amendment) Regulations, 2024 has aligned the RPO targets with MoP dated 20 October 2023.

3.7. **Current Position of MSEDCL'S Power Supply**

3.7.1 In order to meet the demand, MSEDCL has tied-up capacities of total 43,517 MW under various long term power purchase agreements. Details of the same are as below:

(as on 30 April 2024)

Generator name	Type	Installed Capacity (MW)	Contracted Capacity (MW)
Bhusawal Unit – 3	Thermal	210	210
Bhusawal Unit - 4 & 5	Thermal	100	1000
Bhusawal Unit – 6	Thermal	660	660
Chandrapur Unit - 3 to 7	Thermal	192	1920
Khaperkheda Unit - 1 to 4	Thermal	840	840
Khaperkheda Unit – 5	Thermal	500	500
Koradi Unit – 6	Thermal	210	210
Nasik Unit - 3 to 5	Thermal	630	630
Parali Unit - 6 & 7	Thermal	500	500
Paras Unit - 3 & 4	Thermal	500	500
Uran GTPS	Gas	672	672
Koradi Unit - 8 to 10	Thermal	198	1980
Chandrapur Unit – 8&9	Thermal	100	1000
Parali Unit -8	Thermal	250	250
KSTPS I & II	Thermal	210	610
KSTPS-III	Thermal	500	108
VSTP-I	Thermal	126	410
VSTP-II	Thermal	100	319
VSTP-III	Thermal	100	258
VSTP-IV	Thermal	100	270
VSTPS-V	Thermal	500	149
Kawas	Gas	656	204
Gandhar	Gas	657	200
SSTPS- I	Thermal	198	510
SSTPS- II	Thermal	100	258
MSTPS-I	Thermal	100	370
MSTPS-II	Thermal	132	500
KHTPS-II	Thermal	150	148
Solapur STPS	Thermal	132	616
Gadarwara – I	Thermal	160	50
Gadarwara – II	Thermal	160	111
Lara Stage – I	Thermal	160	231
Lara Stage – II	Thermal	160	228
Khargone	Thermal	132	50
JSW U1, Jaigad	Thermal	300	300
CGPL, Mundra	Thermal	760	760
RattanIndia Power Ltd. 450 MW	Thermal	450	450
RattanIndia Power Ltd. 750 MW	Thermal	750	750
APML, Tiroda 1320 MW	Thermal	1320	1320
APML, Tiroda 1200 MW	Thermal	1200	1200

Generator name	Type	Installed Capacity (MW)	Contracted Capacity (MW)
APML, Tiroda 125 MW	Thermal	125	125
APML, Tiroda 440 MW	Thermal	440	440
EMCO, Warora	Thermal	200	200
Sai Wardh Power Generation Ltd.	Thermal	240	240
KAPP	Nuclear	440	152
TAPP 1&2	Nuclear	320	160
TAPP 3&4	Nuclear	1080	393
KAPP 3&4	Nuclear	1400	378
SSP	Hydro	1450	391
Pench	Hydro	160	54
Dodson II	Hydro	34	34
Subhansari Hydro	Hydro	2000	183
Hydro (including Ghatghar)	Hydro	2412	2412
Renewable - Non-Solar			8379
Renewable – Solar			8724
Total			**43517**

3.7.2 Apart from above, MSEDCL has also consented for procurement of power from various sources as under:

Consent given for	MW
Thermal	1280
Solar	3000
Hybrid (33% wind and 66% solar)	2580
Hydro	1137
Total	**7997**

3.7.3 It is pertinent to note that even though MSEDCL has contracted around 21,258 MW of thermal capacity, but the actual annual availability of these thermal stations during the last 4 years has been much below the contracted capacity, which is indicated in the below table:

Actual annual availability of Thermal Stations

Generators name	Contracted Capacity (MW)	2020-21 (MW)	2021-22 (MW)	2022-23 (MW)	2023-24 (MW)
Bhusawal Unit 03	210	204	139	120	130
Bhusawal Unit 04 & 05	1000	920	780	760	809
Khaperkheda Unit 1 to 4	840	630	512	538	549
Khaperkheda Unit 05	500	370	415	425	418
Nashik TPS	630	586	529	416	507

Generators name	Contracted Capacity (MW)	2020-21 (MW)	2021-22 (MW)	2022-23 (MW)	2023-24 (MW)
Chandrapur Unit 03 to 07	1920	1229	1018	998	1098
Paras Unit 03 and 04	500	410	375	360	414
Parli Unit 06 and 07	500	475	385	375	445
Koradi Unit 06	210	160*	147	149	159
GTPS Uran	672	235	235	188	242
Parli Unit 08	250	235	198	138	185
Chandrapur Unit 08,09	1000	850	750	820	858
Koradi Unit 08,09,10	1980	1267	1247	1267	1352
KSTPS	610	500	537	549	563
KSTPS III	108	103	103	91	109
VSTP I	410	346	347	336	368
VSTP II	319	255	260	282	303
VSTP III	258	238	220	222	258
VSTP IV	270	225	239	260	247
VSTP V	149	135	126	136	137
Kawas	201	166	69	182	202
Gandhar	200	186	98	164	192
KhSTPS-II	148	105	119	128	141
SIPAT TPS 2	258	235	241	231	246
SIPAT TPS 1	510	480	383	418	440
Mauda I	370	342	320	296	357
Mauda II	500	472	425	463	428
NTPC Solapur	616	577	537	450	581
Lara	231	182	191	195	203
Gadarwara	50	43	39	35	47
Khargone	50	33	39	41	44
JSW	300	231	99	207	244
CGPL	760	600	137	486	522
APML 125 MW	125	121	103	103	103
APML 1320 MW	1320	1069	1135	1175	1232
APML 1200 MW	1200	1164	1104	1176	1185
APML 440 MW	440	422	317	290	292
GMR	200	182	162	174	177
RPL 450 MW	450	437	383	365	387
RPL 750 MW	750	728	638	608	644
SWPGL	240	238	194	192	227
TOTAL	**21255**	**12402**	**15295**	**15809**	**17044**

*- Koradi Unit-7 is decommissioned on 03 August 2021

3.7.4 From the above table, it may be observed that most of the MSPGCL's stations were operating at an annual availability varying from 52% to 75%. Maximum thermal

availability of MSPGCL till date was of 8335 MW (made available on 4 April 2024) out of contracted 10,872 MW thermal capacity. Clearly, MSPGCL is not meeting the annual availability. MSEDCL in various meetings highlighted the availability issue and made correspondence. In the last three years, there was deficit in supply as against the contracted quantum. Hence, MSEDCL has catered its demand by additional procurement of power from power exchanges/ short term power purchase at prevailing high rates. It may also be noted that the annual fixed charges (AFC) were disallowed to MSPGCL due to less availability from their generating stations are as mentioned below:

Sr. No.	Financial Year	Approved AFC for Normative availability Rs. Crs.	AFC paid as per actual availability Rs. Crs.	AFC disallowed Rs. Crs.
1	FY 2020-21	9156	8026	1130
2	FY 2021-22	8984	7359	1625
3	FY 2022-23	8629	7050	1579
4	FY 2023-24	9171.01	8109.18	1061.83

3.7.5 Out of the 9,540 MW of coal based commissioned plants, MSPGCL has only on few occasions exceeded the availability of 8,400 MW and for most of the time availability from MSPGCL's coal-based plants is found to be in the range of 5,500 MW to 7,500 MW. This has resulted in a deficit of power for MSEDCL from MSPGCL's total contracted thermal capacity.

3.7.6 The PLF for the last four (4) years of the contracting generating stations of MSPGCL are as below:

PLF of tied-up MSPGCL Generation Stations

Unit	2020-21	2021-22	2022-23	2023-24
Bhusawal Unit 03	12%	29%	39%	55%
Bhusawal Unit 04 & 05	54%	64%	71%	74%
Khaperkheda Unit 01 to 04	67%	50%	59%	63%
Khaperkheda Unit 05	70%	79%	79%	81%
Nashik TPS	15%	41%	47%	51%
Chandrapur Unit 03 to 07	54%	50%	48%	52%
Paras Unit 03 and 04	77%	58%	70%	82%
Parli Unit 06 and 07	33%	40%	62%	62%
Koradi Unit 06 & 07	13%	46%	71%	75%
GTPS Uran	34%	35%	26%	32%
Parli Unit 08	45%	49%	49%	57%
Chandrapur Unit 08,09	81%	73%	76%	82%
Koradi Unit 08,09,10	46%	62%	63%	67%

From the above Table, it is evident that the PLF of most of the MSPGCL's Generating Stations has been very low leading to abnormal shortage of power supplied to MSEDCL, compared to the contracted capacities. The lower availability is on account of following:

a. Lack of availability of sufficient coal;

b. Poor coal quality;

c. Inability to achieve performance parameters due to vintage units;

d. Non-availability of part of contracted power from MSPGCL, due to trappings/forced shutdowns of their stations.

3.7.7 Although MSEDCL is being compensated by MSPGCL for the lower availability declared by its generating stations in the form of reduction in fixed cost, MSEDCL is still constrained to arrange the additional power that MSPGCL generating stations are unable to provide as per their contracted capacity, from other sources like power exchange at much higher prevailing rate. Details of exchange/bilateral purchase are depicted in table below:

FY	Exchange Purchase			Bilateral Purchase (Tender)			Total Purchase		
	Mus	Amt (Crs.)	Rate (Rs./kWh)	Mus	Amt (Crs.)	Rate (Rs./kWh)	Mus	Amt (Crs.)	Rate (Rs./kWh)
2020-21	4084.93	1176.16	2.88	0.00	0.00	0.00	4084.93	1176.16	2.88
2021-22	3627.03	1631.97	4.50	0.00	0.00	0.00	3627.03	1631.97	4.50
2022-23	3516.47	1869.99	5.32	253.79	188.82	7.44	3770.26	2058.81	5.46
2023-24	5184.62	2870.19	5.54	734.04	570.58	7.77	5918.65	3440.77	5.81

3.7.8 Since last four years, due to non-availability of administered pricing mechanism (APM) & non-administered pricing mechanism (N-APM) gas and high rate of RLNG gas, MSEDCL has not been able to schedule power from NTPC Kawas and Gandhar stations as per requirements (i.e. 404 MW). Also, due to lower supply of APM gas to GTPS Uran, MSEDCL is receiving only 200 MW of power against the contracted capacity of 672 MW from GTPS Uran. Thus, MSEDCL is deprived of around 876 MW (404 MW + 472 MW) from its contracted sources due to non- availability of APM and N-APM gas.

3.7.9 The availability of APM gas for ensuing years is also very uncertain and MSEDCL is not expecting any respite in terms of availability of APM and N-APM gas or any reduction in the prevailing rates of RLNG gas in the near future. Therefore, it is expected that MSEDCL may be deprived of this quantum of power from gas based power stations in the near term period.

3.7.10 The demand of MSEDCL in daytime is catered by conventional as well as renewable energy sources. However, during the evening peak and night hours, the availability of solar power is 'Nil'. Thus, the demand at evening/night is majorly catered by thermal power plants. Further, availability of power from renewable energy sources is unpredictable due to atmospheric conditions and seasonal variations. Owing to this, MSEDCL cannot rely upon the renewable contracted capacity to meet the demand in peak hours/night hours. Under such unavoidable deficit circumstances, MSEDCL is forced to procure power from power exchanges which cost around Rs. 8 per unit to Rs. 10 per unit during peak hours/ months to cater to the increasing demand.

3.7.11 Since availability of power from renewable energy sources is unpredictable, sufficient resources with firm power needs to be contracted by MSEDCL to cater the demand as projected vide the 20th EPS during peak hours, night hours and during peak seasons.

3.8. Latest Resource Adequacy Study Report of the CEA

3.8.1 MSEDCL has prepared a 'Resource Adequacy and Capacity Addition Plan'. Further, as per the latest resource adequacy study report by the CEA for MSEDCL, the peak demand and energy projections are as under:

Year	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Energy Projection (MUs)	160629	167746	175261	183949	192180	200590	210874	216301	221229	230034	239511
Peak Demand Projection (MW)	23676	24963	27621	30892	34298	35596	37163	38726	39000	40414	41956

3.8.2 The capacity projected by CEA considering 'Loss of Load Probability' and 'Expected Energy Not Served' is as under:

	Year	Coal	Gas	Nuclear	Bagasse + Biomass	Hydro	Wind	Solar	Hybrid (wind + Solar)	STOA/ OA	Storage (4 Hours) + PSP	Total
CEA	2033-34	27562	1076	1186	3439	3949	15905	30285	0	1457	2668	87528

The present contracted and consented capacity of MSEDCL is as below:

	Coal	Gas	Nuclear	Bagasse + Biomass	Hydro	Wind	Solar	Hybrid (wind + Solar)	FDRE	Storage (4 Hours) + PSP	Total
MSEDCL	20814	1077	1191	2828	3391	3451	21319	2880	1468	250	36423

3.8.3 Thus, capacity addition required by MSEDCL by FY 2033-34 is worked out as below:

	Coal	Gas	Nuclear	Bagasse + Biomass	Hydro	Wind	Solar	Hybrid (wind + Solar)	FDRE	Storage (4 Hours) + PSP	Total
MSEDCL	6748	0	0	611	558	12454	8966	0		2418	31755

3.8.4 In light of the requirements to boost resource adequacy and ensure stable power to its consumer, MSEDCL needs to add 2418 MW Storage based power to its energy procurement basket. Out of above requirement, 1000 MW (up to 2000 MW under Green Shoe option) Pumped Hydro Energy Storage System has been planned for procured through the competitive bidding route.

3.8.5 To meet out the demand during morning and evening peak hours, MSEDCL purchases power from Market. Thus, MSEDCL may explore the option of power from Pumped Storage Hydro plant so as to pump power during the day hours where there is availability of sufficient solar generation and utilise generation during morning and evening peak hours. Thus, MSEDCL may need to explore the option of additional tie up of Hydro Capacity for meeting the future demand and HPO targets.

3.8.6 As per MSEDCL's assessment by FY 2029-2030, there may be gap of availability @1000 MW of solar day power and non-Solar Power. To cater this gap, it is obligatory to purchase 1000MW of power in Non-Solar hours. It will be easier for MSEDCL to charge Pump Hydro Plant during Solar hours at low rates and utilize it in peak hours.

3.8.7 Standard Bidding Document for Procurement of Power through Pumped Hydro Storage based Power Plant is not available. Hence, MSEDCL has designed this biding document for Procurement of 1,000 MW energy storage capacity (for 8 hours discharge with maximum 5 hours continuous discharge) for 40 years from ISTS/InSTS connected pumped hydro storage plant/s through competitive bidding.

3.8.8 The procurement of Hydro based Storage power is an innovative approach it will be easier for MSEDCL to charge Pump Hydro Plant during Solar hours at low rates and utilize it in peak hours when cheap power is not available.

4. On 13 June 2024, MSEDCL filed Interlocutory Application No.29 of 2024 in Case No.98 of 2024 for urgent listing of the matter. At the e-hearing held on 25 June 2024, the Representative of the Petitioner elaborated on scheme of arrangement in proposed power procurement. He asserted that the proposed procurement is based on CEA's Resource adequacy study. Based on submission, the Commission sought clarification on proposed modalities of the scheme and directed MSEDCL to file its written submission.

5. **MSEDCL in its Submission dated 19 June 2024 stated as below:**

5.1. MSEDCL is amending its Petition to amend the Energy Storage Capacity of 2000 MW (up to 3000 MW under Green Shoe option).

5.2. Previously, MSEDCL has considered 1000 MW (up to 2000 MW under green shoe option) to comply with MERC RPO (First Amendment) Regulations 2024. However, as per said Regulations, MSEDCL's shortfall is 2418 MW.

5.3. In view of such shortfall in achieving ESO, MSEDCL proposed to procure an additional 1000 MW of power i.e. total 2000 MW (up to 3000 MW under green shoe option) from Pump Hydro Storage Project.

6. **MSEDCL in its Additional Submission dated 30 June 2024 stated as below:**

6.1. Justification for not approaching the Commission before initiating bidding process:

6.1.1 The bidding process was initiated with the floating of Request for Selection (RfS) on 9 March 2024 for procurement of 1000 MW power from Pumped Hydro Storage Plants.

6.1.2 The same was done to avoid loss of time that MSEDCL would have faced in view of the then forthcoming Model Code of Conduct that came in to effect from 16 March 2024. The release of document prior to the implementation of the Model Code helped MSEDCL in concurrently running the processes in the interim and complete other activities related to the process involving conduct of pre-bid meetings and response to queries of bidders and making consequent changes in the tender documents.

6.1.3 The bid submission date was proposed to be kept only after the approval of tender documents by the Commission and also incorporate any directions/ suggestions of the Commission, if any prior to bid due date.

6.2. Submission of CEA Report on Resource Adequacy Study of MSEDCL:

CEA has shared the data in presentation form only. MSEDCL has requested CEA to share Report, and will submit the same to the Commission on being made available by CEA.

6.3. Addressing Transmission bottlenecks:

6.3.1 In case of inter-state thermal as well as solar project, the developer has to connect the power plant to CTU grid and the delivery point is STU periphery. The developer also has an option to set up a dedicated transmission system from the plant till CTU/STU grid. In case of intra-state projects, the power plant will be connected to STU grid directly.

6.3.2 MSEDCL is working in close co-ordination with MSETCL to transmission network development, which is aligned with the requirements of MSEDCL. MSEDCL has communicated to MSETCL its future demand requirements from inter-state power stations. MSETCL has been requested to prioritize development of enhanced transmission adequacy plan including the following:

a. Initiating projects to increase the ATC of the interstate transmission network, to accommodate projected procurement from interstate sources

b. Designing the transmission network with scalability to accommodate future increases in generation capacity and demand.

6.3.3 MSETCL vide its letter dated 12 September 2023 and during the meeting date 16 November 2023 has informed that by 2026-27 cumulative ATC availability will increase from 9,700 MW to 22,500 MW.

6.3.4 Further, MSEDCL vide letter dated 18 June 2024, in view of Generation Resource Adequacy notified by CEA, has requested STU to prioritize the development of an enhanced transmission adequacy plan to strengthen Inter-State Transmission Corridor to accommodate projected inter-state sources.

7. At the E-hearing held on 2 July 2024, an Advocate appearing on behalf of MSEDCL presented rationale of the proposed procurement. She provided point wise reply to quires raised by the Commission in its Daily Order dated 25 June 2024.

Commission's Analysis and Rulings:

8. The Commission notes that MSEDCL has filed this Petition under Regulation 21 of the MERC MYT Regulations 2019. However, MSEDCL at prayer (a) has requested admission of this Petition under provisions of MYT Regulation 2015, which has already been repealed. In the opinion of the Commission, this might be a typographical mistake and hence proceeding with present Petition as per provisions of the prevailing Regulations i.e. MYT Regulations 2019.

9. MSEDCL has filed this Petition seeking approval for initiating bidding process and associated bidding documents for procurement of 1000 MW Energy Storage Capacity (for 8 Hours discharge with maximum 5 hours continuous discharge) for 40 years from ISTS/InSTS connected PSP plants through competitive bidding. In subsequent submission, MSEDCL has increased such capacity to be procured to 2000 MW (up to 3000 MW under green shoe option).

10. During the hearing dated 25 June 2024, the Commission learned that although this Petition has been filed for seeking approval for initiating Energy Storage Capacity procurement and associated bidding documents, MSEDCL has already floated the tender and issued corrigendum/clarifications based on pre-bid meetings. Justifying its actions of floating tender before approval of the Commission, MSEDCL submitted that the same was done to avoid loss of time in view of the then forthcoming Model Code of Conduct for Lok Sabha Election. The release of document prior to the implementation of the Model Code helped MSEDCL in concurrently running the processes in the interim and complete other

activities related to the process involving conduct of pre-bid meetings and response to queries of bidders and making consequent changes in the tender documents. MSEDCL further stated that bid submission date is proposed to be kept only after approval of tender documents by the Commission. In this regard, the Commission notes that Regulation 21.1 of MYT Regulations, 2019 mandates prior approval of the Commission for long term/medium term power purchase. MSEDCL floated the RfS on 9 March 2024 and filed the present Petition on 13 June 2024 i.e. after a lapse of 3 Months. Even if MSEDCL's justification of floating tender before Model Code of Conduct is accepted, then also there is no justification for filing this Petition after 3 months, Model Code of Conduct did not stop MSEDCL from filing the petitions before the Commission. The Commission expressed its displeasure on such administrative lapses. Henceforth, MSEDCL is directed to be vigilant on timelines and stipulations in Policy/Guidelines/Regulations made under the Electricity Act, 2003.

11. Based on submissions on record, the Commission frames following issues for its consideration:

a. Regulatory mandate for procurement of Energy Storage Capacities.

b. Assessment of the quantum of energy Storage component.

c. Major stipulations in Request for Selection (RfS) and Energy Storage Facility Agreement (ESFA)

d. Considerations for attenuating Transmission Constraints;

12. **Issue A: Regulatory mandate for procurement of Energy Storage Capacities.**

12.1 MSEDCL submitted that it intend to utilize the day time solar energy for pumping mode in PSP operation. Charged up capacity will be utilized for evening peak and early morning loads. As RE power is utilized for pumping of energy, it will be considered for meeting its RPO targets.

12.2 MSEDCL referred to the RPO Trajectory approved by MoP vide its Notifications dated 22 July 2022 and 20 October 2023. Further, reference is made to the Commission's MERC (Renewable Purchase Obligation, its Compliance and Implementation of Renewable Energy Certificate Framework) (First Amendment) Regulations, 2024 (RPO Amendment Regulations).

12.3 The Commission notes that its RPO Amendment Regulations specify RPO targets till 2029-30. In said Regulations, the Commission has introduced new RPO categories, viz., Wind RPO, Hydro Power Obligation (HPO), Distributed RPO and Other RPO along with Energy Storage Obligation.

12.4 As per RPO Amendment Regulations, HPO shall be met only by energy produced from

all Hydro Projects (including Pumped Storage Projects (PSPs) and Small Hydro Projects (SHPs)) commissioned after 31 March 2024.

12.5 The targets for HPO and other technologies have been specified in Regulations 7.5 (A) of the RPO Amendment Regulations, which reads as below:

"

7.5(A) Every Obligated Entity shall procure electricity generated from eligible RE sources to the extent of the percentages, out of its total procurement of electricity from all sources in a year, set out in the following Table:—

Year	***Quantum of purchase (in %) from Renewable Energy sources (in terms of energy equivalent in kWh)***				
	Wind RPO	***HPO***	***Distributed RPO***	***Other RPO***	***Total RPO***
	(a)	*(b)*	*(c)*	*(d)*	*(e)*
2024-25	*0.67%*	*0.38%*	*1.50%*	*27.35%*	*29.91%*
2025-26	*1.45%*	*1.22%*	*2.10%*	*28.24%*	*33.01%*
2026-27	*1.97%*	*1.34%*	*2.70%*	*29.94%*	*35.95%*
2027-28	*2.45%*	*1.42%*	*3.30%*	*31.64%*	*38.81%*
2028-29	*2.95%*	*1.42%*	*3.90%*	*33.10%*	*41.36%*
2029-30	*3.48%*	*1.33%*	*4.50%*	*34.02%*	*43.33%*

Provided that any shortfall in achievement of stipulated Wind RPO in a particular year may be met with HPO which is in excess for that year and vice-versa. The balance excess energy consumption under Wind RPO or HPO component in that year, may be considered as part of the Other RPO component.

….."

12.6 Further, trajectory of ESO have been specified in Regulation 7.7 of RPO Amendment Regulations, which reads as below:

"

7.7 Energy Storage Obligation

(a) The Energy Storage Obligation shall be calculated in energy terms as a percentage of total consumption of electricity and shall be treated as fulfilled only when at least 85% of the total energy stored in the Energy Storage System (ESS), on an annual basis, is procured from renewable energy sources.

(b) The following percentage of total energy consumed shall be solar/wind energy along with/through storage:

Year	*Storage (on Energy basis)*
2024-25	*1.5%*
2025-26	*2.0%*
2026-27	*2.5%*
2027-28	*3.0%*
2028-29	*3.5%*
2029-30	*4.0%*

…."

12.7 Considering above regulatory mandate, MSEDCL is required to procure energy storage services. Hence, the proposed procurement of energy storage services in terms of PSP is justified.

13. **Issue B: Assessment of the quantum of energy Storage component.**

13.1. Before dealing with this issue, the Commission would like to highlight that it has notified MERC (Framework for Resource Adequacy) Regulations 2024 on 20 June 2024. As per these Regulations, the Long Term/Medium Term- Resource Adequacy Plan and Short Term-Resource Adequacy Plan for the first control period coinciding with fifth control period FY 2025-26 to FY 2029-30 are to be submitted during Current Year (i.e., First Year of FY 2024-25) for Ensuing Years (FY 2025-26 to FY 2029-30) and subsequently, Annual Rolling Plans are be submitted in each year for the Ensuing Years for any revisions/modifications due to market developments or otherwise. Considering the time required for preparedness of various steps outlined under these RA Regulations, as also, in view of the fact that Central Electricity Authority (CEA) has not yet notified/approved National level RA plan with specification of reliability indices for Planning Reserve Margin (PRM), Loss of Load Probability (LOLP), Normalised Energy Not Served (NENS) for National/State level, it is envisaged that there could be some delays in development of RA Plans by the Utilities/stakeholders at state level. Recognizing this fact, the Commission vide notification dated 3 July 2024 has notified timeline for undertaking various activities which include filing of Resource Adequacy Plan by Distribution

Licensees by 30 September 2024 and the Commission to approve the same by 31 October 2024.

13.2. In view of above timelines, Resource Adequacy Plan as per MERC Regulations would be available only by 31 October 2024. As MSEDCL has already initiated bidding process in March 2024 based on Resource Adequacy Study conducted by the CEA, for time being the Commission is proceeding with present Petition. Any changes based on detailed Resource Adequacy Plan as per MERC Regulations will be dealt with at the time of approving said plan.

Demand Projections:

13.3. For demand projections, MSEDCL has relied upon the Resource adequacy Study presentation made by CEA. Apart from the Study report, MSEDCL also furnished peak demand projections made by CEA in its 20th EPS.

13.4. The Commission notes that CEA's Resource adequacy Study presentation has made projections till FY 2033-34. Whereas 20th EPS has projections up to FY 2031-32. Projections made in both documents are as below:

Peak Demand Projections (MW)

Year	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
20th EPS	27732	29115	30582	32271	33897	35573	37601	38781	39884	NA	
CEA's Resource adequacy Study presentation	23676	24963	27621	30892	34298	35596	37163	38726	39000	40414	41956

13.5. Further, in FY 2023-24, actual incident peak demand pattern of MSEDCL is as below:

Sr. No.	Max. Demand in MW	Date	Time
1.	24326	18 April 2023	16.00 Hrs.
2.	24047	24 May 2023	15.00 Hrs.
3.	24232	21 June 2023	16.00 Hrs.
4.	20817	04 July 2023	12.00 Hrs.
5.	23912	31 August 2023	16.00 Hrs.
6.	23993	02 September 2023	12.00 Hrs.
7.	24175	19 October 2023	12.00 Hrs.
8.	24441	09 November 2023	11.00 Hrs.
9.	24318	27 December 2023	11.00 Hrs.
10.	25310	29 January 2024	11.00 Hrs.
11.	25410	07 February 2024	11.00 Hrs.
12.	24807	12 March 2024	12.00 Hrs.

(Source-SLDC)

From above, it is evident that for FY 2023-24 incident peak demand of MSEDCL is higher than CEA's Resource adequacy Study but far less than projections in 20th EPS. However,

CEA's Resource Adequacy Study for subsequent 3 years considered year-on-year growth of 11 to 12%. Trend is presented below:

Year	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
20th EPS	5%	5%	6%	5%	5%	6%	3%	3%	NA	
CEA's Resource adequacy Study presentation	5%	11%	12%	11%	4%	4%	4%	1%	4%	4%

In the opinion of the Commission, such higher growth rate may not be materialised especially when larger adoption of solar rooftop and green energy open access will have negative impact on Discom's demand. Therefore, the Commission has directed MSEDCL to submit CEA's detailed Report so as to understand assumptions behind such higher growth rate. However, MSEDCL has submitted that such Report is yet to be received from CEA, hence, the Commission could not goes into such details.

13.6. Notwithstanding above observations, as projections of CEA's Resource Adequacy Study is lower than 20th EPS, the Commission is considering the same for further analysis.

Generation availability assessment:

13.7. MSEDCL submitted that it has contracted around 21,258 MW of thermal capacity. MSEDCL highlighted that out of the 9,540 MW of coal based commissioned plants, MSPGCL has only on few occasions exceeded the availability of 8,400 MW and for most of the time availability from MSPGCL's coal-based plants is found to be in the range of 5,500 MW to 7,500 MW. Further, due to unavailability of APM and N-APM Gas, MSEDCL is deprived of ~876 MW (404 MW from NTPC Kawas & Gandhar + 472 MW Uran). In absence of contracted power, MSEDCL has to rely upon power purchase through exchanges/bilateral procurement.

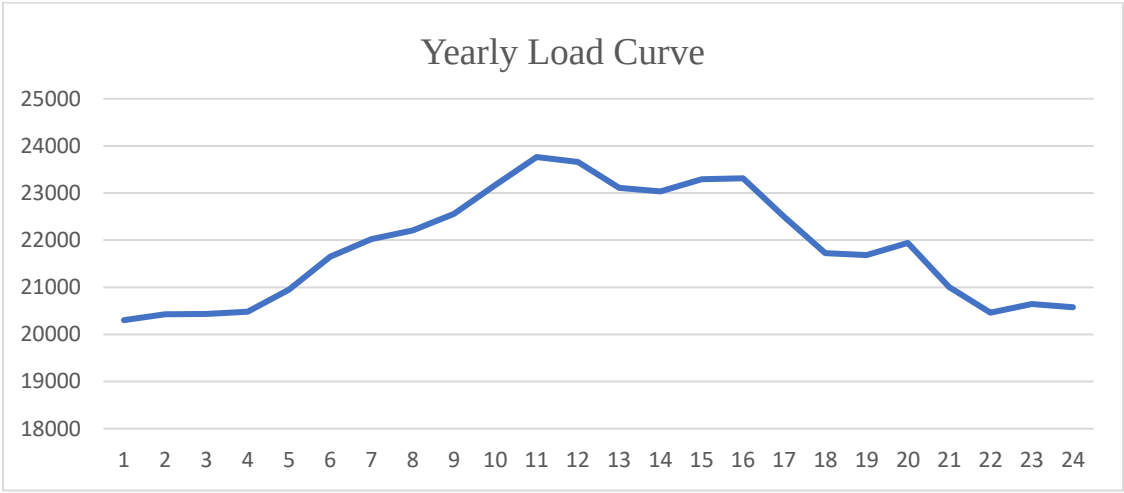
13.8. The Commission notes that due to lower generation availability of MSPGCL's stations, MSEDCL has to resort to short term bilateral or exchange based power procurement. To supplement the arguments, MSEDCL has furnished the availability data for contracted thermal generation. The Commission noted that it has recorded similar finding of lower availability of MSPGCL's stations in its MTR Ordered dated 31 March 2023 in Case No.227 of 2022 (Mid-Term Review of MSPGCL):

Station/Unit	Target Availability	FY 2019-20	FY 2020-21	FY 2021-22
		Actual Availability	Actual Availability	Actual Availability
	%	%	%	%
Bhusawal	80.00%	96.54%	97.11%	64.69%
Chandrapur	80.00%	61.76%	65.64%	53.51%
Khaperkheda	85.00%	73.38%	75.79%	61.00%
Koradi	72.00%	67.32%	76.73%	72.52%
Nashik	80.00%	81.14%	95.02%	84.43%
Uran	44.92%	44.92%	34.39%	35.33%

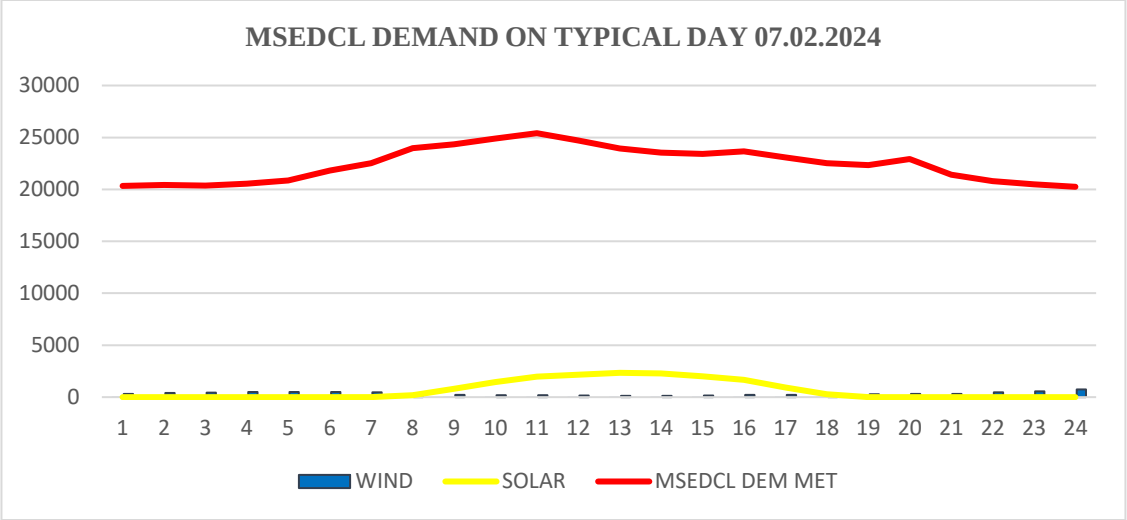
Paras Units 3&4	85.00%	81.87%	82.96%	75.00%
Parli Units 6&7	85.00%	78.59%	97.17%	77.58%
Khaperkheda Unit 5	85.00%	81.87%	74.08%	82.85%
Bhusawal Units 4&5	85.00%	83.72%	92.51%	77.81%
Koradi Units 8-10	85.00%	53.76%	65.78%	63.00%
Chandrapur Units 8&9	85.00%	82.09%	84.26%	74.80%
Parli Unit 8	85.00%	67.48%	97.06%	80.32%

From above it is evident that MSPGCL's certain units are having issues of sustained lower availability. Hence, MSEDCL's argument is accepted.

13.9. MSEDCL submitted that Solar power will be utilized for pumping mode in PSP. MSEDCL intends to utilize the energy storage facility on a 'On-Demand' basis, suited to its requirements during the peak and off-peak hours. The Commission notes that yearly load curve of MSEDCL's system is as below:



Solar generation is available between 08:00 Hrs to 18:00 Hrs. Once Solar generation is gone, demand falls on conventional thermal units. Thermal units have their own limitations and required considerable ramp up time. Further, Wind is more unpredictable and may increase variability in gird operations. For this purpose PSP is the effective solution. MSEDCL's demand and Wind -Solar generation pattern for a high peak demand day (i.e. 7 February 2024) is as below:



13.10. In view of CEA Resource adequacy Study, MSEDCL has worked out capacity to be contracted as below by FY 2033-34 as below:

	Coal	Gas	Nuclear	Bagasse + Biomass	Hydro	Wind	Solar	Hybrid (wind + Solar)	FDRE	Storage (4 Hours) + PSP	Total
MSEDCL	6748	0	0	611	558	12454	8966	0		2418	31755

13.11. The Commission notes that as against total storage requirement of 2418 MW, MSEDCL in present Petition has proposed procurement of 2000 MW (up to 3000 MW under Green shoe option). Definitely additional procurement will spill-over the targets set by CEA. But considering gestation period, geological issues and environmental clearances, it is difficult to predict the project timeline. Hence, the Commission allows MSEDCL to go ahead with proposed long term power procurement of PSP capacity of 2000 MW (up to 3000 MW under Green shoe option).

14. **Issue C: Major stipulations in Request for Selection (RfS) and Energy Storage Facility Agreement (ESFA)**

14.1 The Commission notes that MSEDCL will make arrangement for the power required for charging the ESS Pumped Hydro Storage project at Delivery point up to the declared Cycle Loss; and MSEDCL shall utilize the energy storage facility, on a 'On Demand' basis, suited to its requirements during the peak and off- peak hours to meets its power requirement. The deviation charges for charging and discharging shall be borne by the developer, if any, will be dealt as per applicable regulation.

14.2 Other Important features of the Bidding Documents are summarised below:

14.2.1 Project Size:

a. Minimum project size is proposed as 100 MW capacity at single location.

b. Green Shoe Option: If MSEDCL receives cumulative bid capacity of more than 1,000 MW from Technically Qualified Bidders, then it has the option to decide eligible award capacity of up to 2,000 MW.

14.2.2 Round Trip Loss/Conversion Loss (CL) and annual availability:

a. Round Trip Loss, also known as conversion loss (CL), refers to the efficiency of the energy conversion process in a Pumped Storage Hydroelectric System. It is calculated as the percentage of the energy input to the system that is lost during the storage and retrieval of energy. Specifically, it is determined by comparing the energy output of the system during the generation phase to the energy input during the pumping phase. The CL of the energy storage projects selected through present procurement exercise, shall not be more than 25%. CL shall remain same during the term of the contract. The minimum annual availability of the project shall be 95%.

14.2.3 Bidding Components:

a. Selection of bidders shall be through a competitive bidding process, based on the lowest quoted Total Storage Cost discovered (expressed in INR/MW/annum) during E-Reverse Auction.

b. Bidder shall quote the combination of the following:

Component A: Annual Fixed Charges (AFC) (expressed in INR/MW/annum) and

Component B: Cycle Loss (CL) (expressed in %)

c. The selection of Bidder/s shall be based on Total Storage Cost discovered through E-Reverse Auction process as per this Tender.

Total Storage Cost = Component A+ (Component A x Component B)

14.2.4 Commissiong of PSP:

a. As per RfS and ESFA stipulations, the Date of Commissioning of PSP shall be 36 months for at least 50% capacity and full COD in 48 months from the Effective date of ESFA.

b. The minimum capacity for acceptance of first part commissioning is 50MW and subsequent part(s) shall be 50MW. However, SCOD will not get altered due to part-commissioning. Irrespective of dates of part commissioning, ESFA will remain in force for a period of (40) years from the date of full commissioning of the project.

14.2.5 Performance Criteria:

a. Round Trip AC-AC Efficiency:

The PSP shall demonstrate a minimum roundtrip efficiency of 75% for each charging discharging cycle.

Efficiency (%) = (G_{out}/ G_{in}) x 100

Where G_{in} and G_{out} are the total cumulative incoming and outgoing energy measured during one complete charge-discharge cycle.

14.3 The Commission noted the above features of bidding document prepared by MSEDCL. As there is no reference bidding document notified by the Central Government under Section 63 of the EA 2003 for procurement of Pump Storage Capacity through competitive bidding process, the Commission has evaluated these documents independently and found that proposed provisions are appropriate and also consistent with bidding documents for other technologies. Accordingly, the Commission approves RfS and ESFA documents proposed by MSEDCL in present matter.

15. **Issue D: Considerations for attenuating Transmission Constraints**

15.1. MSEDCL submitted that it is working in close co-ordination with MSETCL for transmission network development, which is aligned with the requirements of MSEDCL. MSEDCL has communicated MSETCL its future demand requirements from inter-state power stations.

15.2. MSEDCL highlighted that MSETCL vide its letter dated 12 September 2023 and during the meeting dated 16 November 2023 has informed that by FY 2026-27 cumulative ATC availability will increase from 9,700 MW to 22,500 MW.

15.3. The Commission notes that transmission constraint is one of the crucial issue. Recently the Commission vide its Order dated 27 December 2023 in Case No.56 of 2023 and Case No.92 of 2023 has allowed termination of Solar PPAs on account of non-availability of ATC margin and non-issuance of un-conditional NOC for operationalization of Long Term Access (LTA).

15.4. The Commission further notes that the issue of transmission constraint in bringing power from outside Maharashtra is being highlighted at various fora including State Advisory Committee setup by this Commission and judicial proceedings before this Commission.

15.5. The transmission system considerations are important in present case as location of project can be within Maharashtra periphery or outside the Maharashtra. PSP will be operational during evening peak hours and early morning, when the load is about to pick up. During said period transmission corridor availability in crucial, if projects are located outside Maharashtra. Hence, meticulous planning and co-ordination with STU is required. In order to do so MSEDCL is directed to reassess the transmission corridor availability issue in consultation with STU. Accordingly, MSEDCL in consultation with STU shall chalk out the timeline for the same and may be submitted at the time of adoption of tariff.

16. Hence, the following Order:

ORDER

1. **The Petition in Case No. 98 of 2024 is allowed.**

2. **The Commission accords its approval for initiating process for procurement of 2000 MW (up to 3000 MW under Green Shoe option) Pumped Storage Capacities on long term basis through competitive bidding.**

3. **Request for Selection (RfS) and Energy Storage Facility Agreement (ESFA) for Pumped Hydro Storage Capacity are approved.**

Sd/-	Sd/-	Sd/-
(Surendra J. Biyani)	**(Anand M. Limaye)**	**(Sanjay Kumar)**
Member	**Member**	**Chairperson**

(Dr. Rajendra G. Ambekar)
Secretary