Before the
MAHARASHTRA ELECTRICITY REGULATORY COMMISSION
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Case No. 86 of 2022

Petition of MSEDCL Seeking approval for Procurement of Flexible and Schedulable Power from Renewable Energy Sources with Energy Storage facility on Long Term Basis For 25 years from Renewable Sources and Approval of Tender Documents.

M/s Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) : Petitioner

Coram

Sanjay Kumar, Chairperson
Mukesh Khullar, Member

Appearance:

For the Petitioner : Ms. Kavita Gharat, CE (RE)

ORDER

Date: 21 July 2022

1. Prior to this Petition, Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) had approached Commission in the following cases seeking approval for procurement of flexible and schedulable power from Renewable Energy sources coupled with energy storage facility on long term basis for 25 years. In the said earlier cases, MSEDCL had also submitted bidding document for approval of the Commission:

   1.1. Case No. 167 of 2019 – MSEDCL had for the first time approached the Commission seeking approval for procurement of flexible and schedulable RE power coupled with energy storage facility. The Commission vide its Order dated 29 August 2019 in this matter stated that it might conceptually and in principle consider MSEDCL's proposal for

procuring flexible and schedulable RE power, however bid documents prepared by MSEDCL for this purpose required amendment. The Commission had compared MSEDCL's Bid document with similar Bid floated by Solar Energy Corporation of India (SECI) on 1 August 2019 and noted that there were many clauses in SECI's document which if adopted by MSEDCL could improve the MSEDCL's RfS document. In addition to that some of the discrepancies in MSEDCL bid document were also highlighted. Accordingly, the Commission directed MSEDCL to make necessary changes and approach afresh for approval of bid documents.

1.2. Case No. 18 of 2022 – As directed in the above Order, MSEDCL modified its bid documents and filed a fresh Petition on 24 December 2021 for approval of the Commission. After scrutinizing the said bid documents, the Commission vide its Order dated 11 March 2022 noted that certain conditions proposed by MSEDCL might restrict the competition in the bidding process and further there was no supporting analysis for proposed provisions and deviation in its bid document from the bid document floated by SECI. Hence, through that Order, the Commission returned the Petition to MSEDCL with direction to resubmit the same after making necessary changes in bid document, addressing the concerns raised and providing detailed analysis for the clauses proposed in the bid document. (Hereinafter referred as 'previous order')

2. Accordingly, in pursuance of the directions of the Commission in its Order dated 11 March 2022 in Case No.18 of 2022, Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) has filed the present Petition on 22 April 2022 seeking approval for modified bid documents for procurement of flexible and schedulable power from Renewable Energy sources coupled with energy storage facility on long term basis for 25 years.

3. **MSEDCL's main Prayers are as follows:**

a. To approve the Tender documents i.e. RfS and Draft PPA for such Power procurement.

b. To allow MSEDCL to float tender for procurement of 250 MW power with green-shoe option from flexible, schedulable power generators on long term basis from renewable energy sources along with energy storage system through competitive bidding process.

4. **MSEDCL in its Case has stated as follows:**

MSEDCL submitted following compliances in respect of Commission's Order dated 11 March 2022 in Case No. 18 of 2022 (Impugned Order):

4.1. Technology and period of SCOD:

4.1.1. The Commission in its previous Order had opined that to increase participation; procurement from hydro RE source need not be mandatory but could be kept optional. The Commission further ruled that if bidder offered hydro resource as one of the components of its bid, then period of SCOD could be 30 months and in all other cases period of SCOD should be 18 months. Considering the proposed dispensation of the Commission, MSEDCL has revised its tender documents.

4.2. Location of battery storage system:

4.2.1. The Commission in its previous Order while referring to Ministry of Power's notification dated 21 June 2021 had pointed out that energy storage systems are exempted from payment of transmission charges only in case of charging and not for export of electricity. Further, the Commission also pointed out that there was no exemption from transmission charges for energy supply from small/large hydro. Above factors might impact discovered price in competitive bidding process. This aspect was required to be studied by MSEDCL and appropriate changes with regard to location of the storage system needed to be incorporated in bid documents, if required.

4.2.2. MSEDCL has been calling the bids with regard to procurement of RE from stand-alone solar or stand-alone wind or from Hybrid soureces and has been mentioning that the energy will be procured at STU periphery. Thus, onus of delivering of power at STU periphery lies with the bidder and not MSEDCL. It is up-to the bidder to decide on the location of the storage depending on its tie-up or its planning.

4.2.3. The same principle has been adopted by MSEDCL in this tender also.

4.3. Minimum bid capacity:

4.3.1. The Commission had rejected MSEDCL's proposal of stipulating minimum bid capacity as 100 MW. The Commission had instead ruled that increasing minimum bid capacity from 50 MW to 100 MW would adversely impact participation of prospective bidders in the bidding process.

4.3.2. Accordingly, in compliance with this directive of the Commission, MSEDCL has revised the minimum bid capacity from 100 MW to 50 MW in the tender documents.

4.4. Peak & off- peak hours and commercial impact:

4.4.1. Nomenclature 'peak hours' and 'off-peak hours' are not related to peak hours and off-peak hours of the MSEDCL's load curve. These terminologies have been used in context with

availability of solar generation. 'Peak hours' are hours when minimum or no solar generation is available.

4.4.2. This flexible tender is not designed to suit the needs during its system peak load but it is designed to have flexibility in adjusting the system by optimizing the power purchase cost. The window of peak hours is kept broad excluding the solar generation hours.

4.4.3. The GoM's MSKVY scheme aims to provide day-time power supply to AG consumers which works out to about 8000-9000 MW. Also, the Commission has setup solar target of 13.5% by FY 2024-25. Hence, when such huge quantum of solar power is not available, MSEDCL will have to resort to the flexible generation which is intended under this tender.

4.4.4. From the past 2-3 years it is observed that there is frequent shortfall in coal. MSEDCL has to purchase power through the open market at much higher tariff, sometimes even at the tariff of Rs. 20/- per unit in some time blocks. Also, in some cases the power is not available even in open market. In some cases, MSEDCL has to resort to excessive generation from Koyna hydro station. In order to address such eventualities MSEDCL has preferred to float tender for purchase of flexible power which will serve dual purpose by way of fulfillment of RPO and providing flexibility in deciding the time frame on day ahead basis for scheduling of power based on power purchase cost optimization during zero solar generation period.

4.5. Green Shoe Option:

4.5.1. In the revised Tender, MSEDCL is considering the green shoe option by calling bids for 250+250 MW under green-shoe option. It explicitly mentioned in the bid document that bid capacity is 250 MW but if discovered tariff is found economical to MSEDCL then, additional 250 MW can also be contracted. Also, it would be voluntary for bidder to opt for green shoe option.

4.6. Including storage system in the bid:

4.6.1. The concept proposed in this tender is to embrace flexibility in deciding the power which can be scheduled from the storage systems on day ahead basis. Accordingly, the storage systems as envisaged under this bid will be charged from the solar plant during off peak hours. Alternatively, the storage systems can be charged from any other RE sources available in the market.

4.6.2. The ESS and pumped storage has to be brought in the grid in phase-wise manner so as that the effect of infirm nature of RE power can be mitigated. Considering MSEDCL's overall

demand, the capacity under the tender will not have adverse financial impact compared to the benefits offered. It is fact that, when any technology is matured and adopted on large scale it becomes economical, however in the initial phase the new technologies needs to be promoted so that the benefits can be reaped in future.

5. After perusal of the Petition submitted by MSEDCL, Office of the Commission vide email dated 1 June 2022 communicated set of data gaps to MSEDCL. Data gaps mainly focussed on power procurement options analysis, CUF considerations, Capacity ratings and Compliance of Impugned Order.

6. **MSEDCL vide its Reply dated 24 June 2022 submitted following details**:

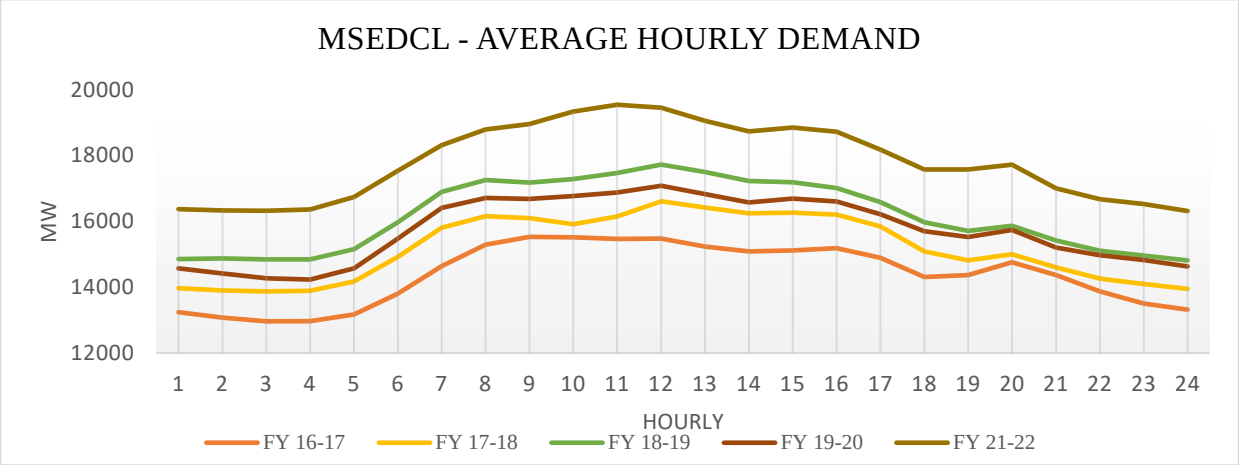
6.1. MSEDCL's Existing Contracted Capacity

6.1.1. **As on 31 May 2022, MSEDCL has contracted 26,462 MW of conventional power and 12,488 MW of Non-conventional power to meet the power demand of the consumers, details of the same are as below:**

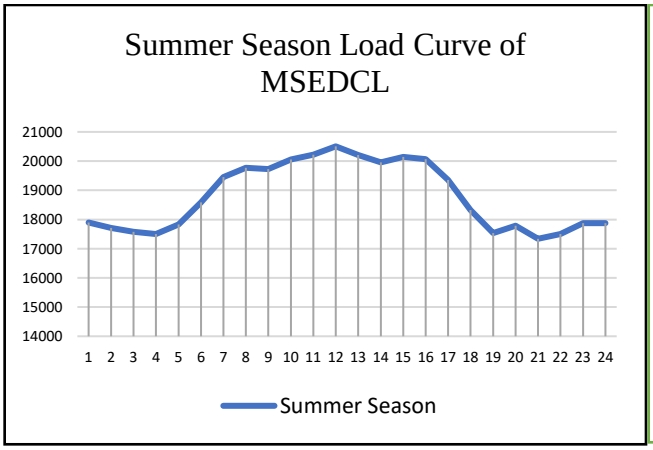
Particulars	MSPGCL	Central Sector	IPP	UMPP	Others	NC	Total
Contracted Capacity (MW)	13284	6180	5025	760	662	12488	38399

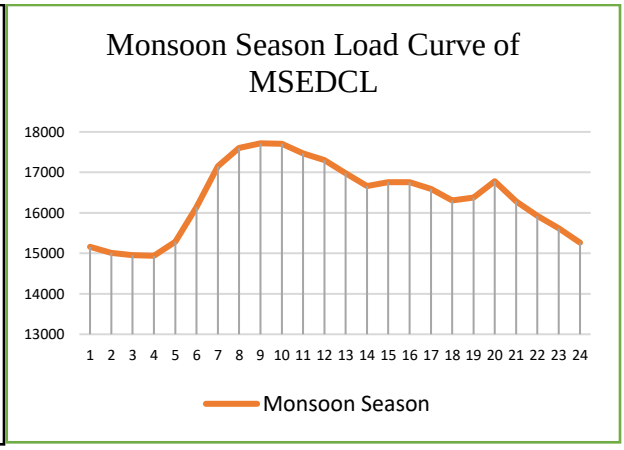
6.2. Load Curves of MSEDCL for last 5 years:

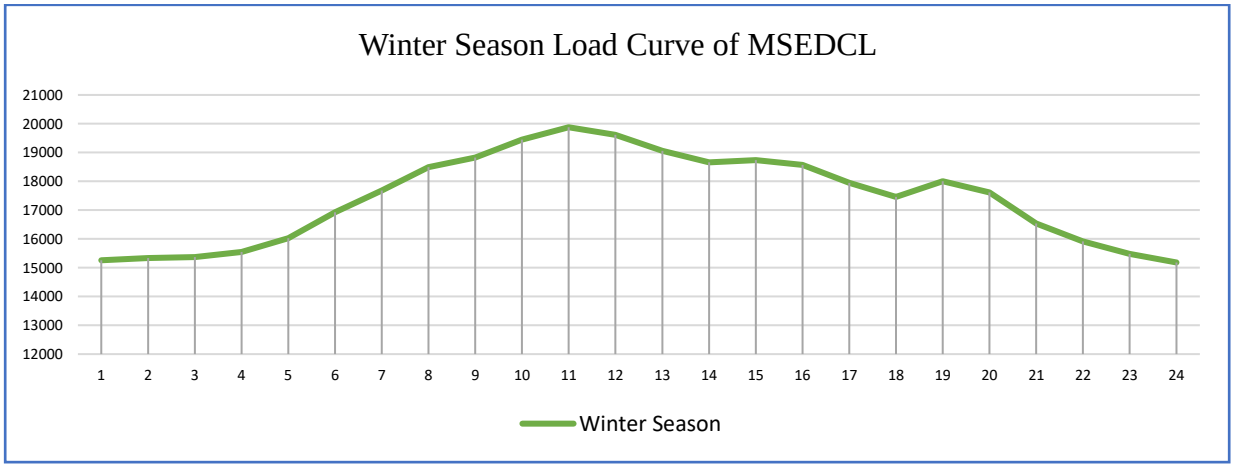
6.2.1. MSEDCL has analyzed the demand trend for last 5 years as shown below and observed that the demand pattern is almost similar in nature.



6.3. Seasonal Load Curves of MSEDCL for the last year:







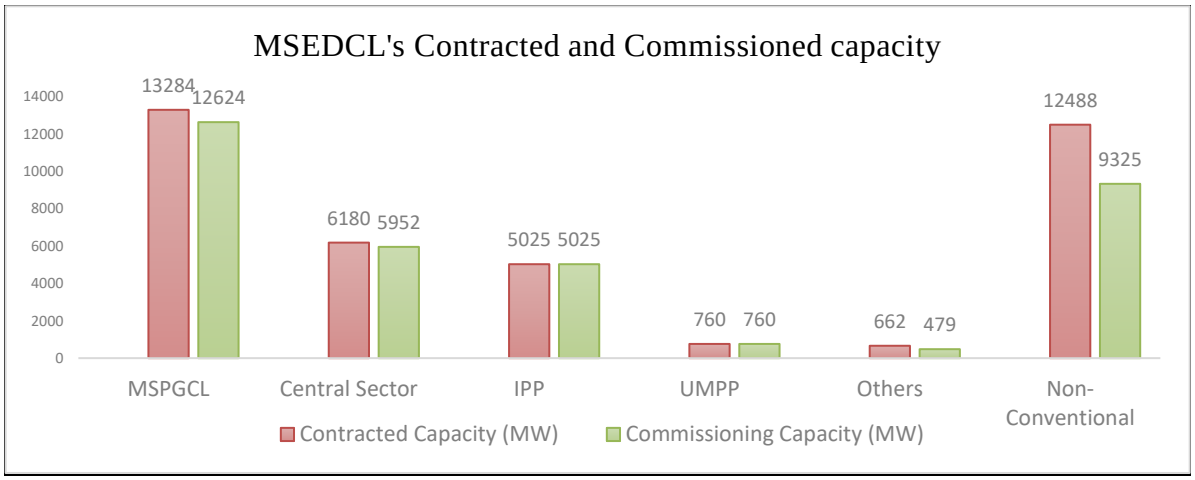
Seasonal Power requirement (21-22)	Summer (Hrs) & Monsoon (Hrs)	Winter (Hrs)
Morning Hours	04:30 to 09:30	05:00 to 10:00
Evening Hours	19:00 to 20:30	18:00 to 19:30

6.3.1. It is evident that peak hours are varying slightly with seasons.

6.4. Peak and off-Peak hours considerations:

6.4.1. This flexible tender is not designed to suit the needs during the MSEDCL system peak load conditions. The proposed tender is designed to have flexibility in adjusting the system by optimizing the power purchase cost. Hence, nomenclature of 'peak hours' and 'off-peak hours' will be revised as 'non-solar generation hours' and 'solar generation hours' in the proposed RfS.

6.5. Contracted and Commissioned capacity details and Power Purchase Optimization:



6.5.1. MSEDCL has total commissioned capacity from conventional sources as 24,840 MW. However, the availability from the conventional sources is not 100% but is around 72% on annual basis.

6.5.2. Further, although commissioned capacity of non-conventional sources is 9,325 MW, its availability varies based on seasons and is not available round the year as solar is mostly available during summer season, wind is most available during rainy season and bagasse is mostly available during winter season.

6.5.3. During summer season day-time peak is catered by base load thermal plants, koyna hydro and solar plus IEX. In the evening peak hours, solar generation is not available and IEX prices are generally high and koyna hydro is also having limitation for usages.

6.5.4. During winter and monsoon, since the demand is on the lower side as compared to summer, the costly thermal generators are kept under zero schedule. If these generators are scheduled to cater the demand during non-solar generation hours, then the power purchase cost will be more and hence it would be better that MSEDCL opts for proposed flexibility options in the system to procure the power in some time blocks of non-solar generation hours for optimizing the power purchase cost.

6.6. Green Shoe Option:

6.6.1. As mentioned in draft RfS, MSEDCL has decided to exercise the green shoe option to allocate additional capacity up to 250 MW to the successful bidder. In order to avail green shoe option, the successful bidder need to match L-1 tariff of the tender corresponding to the green shoe quantity.

6.6.2. The successful bidder shall submit his acceptance for availing the green shoe option within 07 days from the date of issuance of LoA.

6.6.3. The maximum demand of the MSEDCL is 24668 MW and the proposed tender capacity is 250 MW which is 1% of the maximum demand and the capacity of 500 MW (including green shoe option) is 2% of the maximum demand. Considering above, the proposed tender capacity is very small, and it is similar to a single unit/spare capacity of thermal generating station.

6.6.4. MSEDCL shall exercise green shoe option in case it is found that the rate discovered under e-reverse auction is attractive and beneficial to it.

6.6.5. From the past 2-3 years, it has been observed that there is frequent shortfall in coal. Therefore, to meet the power requirement MSEDCL has to purchase through the open market at much higher tariff. In some cases the power is not available even in open market.

6.6.6. Recently, MoP directed all the thermal generators to import at least 10% of their requirement of coal for blending. These situations will increase power purchase cost from the thermal generators. Also, in some cases MSEDCL has to restrict generation from Koyna hydro station. In order to address such eventualities MSEDCL has preferred to float tender for purchase of flexible power.

6.7. MSEDCL has considered the scenarios for peak hour power procurement for a typical day based on available bilateral sources/IEX etc. Summary of the analysis of net impact on power procurement expenses of MSEDCL is summarized below:

Year/Season		Summer	Monsoon	Winter	Total
FY 21-22	Total cost for procurement of power from IEX/ Thermal Station (Rs. Cr.)	4.58	2.56	3.24	10.38
	Total cost for procurement of power from Flexible Tender (Rs. Cr.)	1.182	1.18	1.18	3.542
FY 19-20	Total cost for procurement of power from IEX/ Thermal Station (Rs. Cr.)	0.83	2.55	2.69	6.07
	Total cost for procurement of power from Flexible Tender (Rs. Cr.)	1.194	1.19	1.19	3.574
FY 18-19	Total cost for procurement of power from IEX/ Thermal Station (Rs. Cr.)	1.40	2.77	3.02	7.19

Year/Season		Summer	Monsoon	Winter	Total
	Total cost for procurement of power from Flexible Tender (Rs. Cr.)	1.152	1.15	1.15	3.452
FY 17-18	Total cost for procurement of power from IEX/ Thermal Station (Rs. Cr.)	1.42	2.08	2.76	6.26
	Total cost for procurement of power from Flexible Tender (Rs. Cr.)	1.014	1.01	1.01	3.034
FY 16-17	Total cost for procurement of power from IEX/ Thermal Station (Rs. Cr.)	0.957	1.96	3.02	5.937
	Total cost for procurement of power from Flexible Tender (Rs. Cr.)	1.002	1.00	1.00	3.002

In above computation, MSEDCL has considered rate of flexible power equal to its APPC.

6.8. Power purchase cost will be comparatively less when flexibility to choose the time slots during non-solar generation is given to MSEDCL. Further, the demand characteristics are not always static and are expected to change in the future. Night- time Agriculture load is shifted to day-time, backing down/zero schedule of thermal station may increase. But, power procurement cost for procuring power on round the clock will be higher compared to procuring power from flexible tender in flexible hours.

6.9. Further, the proposed tender capacity is small, and it is similar to a single Unit/spare capacity of thermal generating station which may not affect the MSEDCL financially. But if MSEDCL ties up the flexibility at this stage for 25 years then there will be definite reduction in power purchase cost as the variable cost of tied up thermal generators is bound to increase due to coal shortages, mandatory requirement of imported coal blending and change in law matters whereas the storage tariff during the non-solar generation hours will be fixed for 25 years.

6.10. The proposed tender is going to be unique and first of its kind bidding in the country with the wide range of non-solar generation hours. MSEDCL is also for the first-time proposing procurement under this kind of bidding. Hence, it is very difficult to predict a price till the outcome of bid process. However, overall tariff is to be very competitive as compared to thermal tariffs. It is pertinent note that competitiveness of discovered tariff would be scrutinized at the time of tariff adoption by the commission.

6.11. Flexible projects will take at least 2 years for commissioning and considering the solar generation at that point of time, the flexibility offered by the projects under flexible tender may make it commercially viable. The Energy Storage System (ESS) has to brought in the

grid in phase wise manner so that the effect of infirm nature of RE power can be mitigated.

6.12. RE integration option:

6.12.1. Grid scale energy storage technologies is one of the options for large scale integration of RE generation sources. Such storages can complement with RE generation sources.

6.12.2. Storage Hydro plants/ Pumped storage plants can be highly useful for facilitating integration of highly variable RE power into the power system. Other new storage technologies such as grid scale battery energy storage systems are becoming attractive globally due to its rapidly reducing cost with the technological advancement.

6.12.3. Central Electricity Authority (CEA) in its report named "Report on Optimal Generation Capacity Mix for 2029-30" projected the installed capacity by end of 2029-30 as 8,17,254 MW comprising of PSP of 10,151 MW along with a Battery Energy Storage capacity of 27,000 MW/108,000 MWh. Hence, it is necessary now to encourage the new storage technologies to make it commercially viable.

6.13. Possibility of cost reduction in battery technologies:

6.13.1. Considering the overall MSEDCL's demand, the capacity under the proposed flexible tender will not have adverse financial impact compared to the benefits offered. It is a fact that, when any technology is matured and adopted on large scale it becomes economical, however in the initial phase the new technologies need to be promoted so that the benefits can be reaped in future.

6.13.2. The draft National Electricity Policy (NEP), 2021 has also mentioned that special efforts should be made for adoption of new technologies. Further, Prayas report of April 2020 regarding "Estimating the Cost of Grid-Scale Lithium-Ion Battery Storage in India" has concluded that PV-plus-storage bids could be Rs. 3.94/kWh ($0.056/kWh) by 2020, Rs. 3.32/kWh ($0.047/kWh) by 2025, and Rs. 2.83/kWh ($0.040/kWh) by 2030.

6.13.3. These values are close to the market-estimated prices, and they are already competitive with the marginal cost of coal units that are currently dispatched in several states in India. Additionally, these costs are inflation-proof; they are flat for the next 25 years, while coal prices may keep increasing each year. In the future, the cost difference between PV-plus-storage assets and thermal assets is likely to increase.

6.14. Capacity Rating clarification:

6.14.1. MSEDCL is proposing flexibility in terms of power and not in terms of energy. MSEDCL has specified the storage capacity in terms of MW.

6.14.2. For instance, if contracted capacity is 100 MW then the successful bidder has to install storage of 50 MW. For the said purpose the successful bidder will appropriately choose MWh capacity.

6.15. CUF Considerations:

6.15.1. MSEDCL is expecting that solar generation will be available during off peak period of the proposed project & hence 19 % CUF is considered.

7. **At the E-Hearing held on 28 June 2022:**

7.1. Representative of MSEDCL elaborated on proposed scheme of arrangement and revised modalities in draft bid document.

7.2. In Reply to Commission's queries, MSEDCL stated that CUF of 19% has been considered based on its earlier Solar Tenders. With regards to battery rating, MSEDCL categorically stated that its tender is in power terms and not energy. Hence, storage capacity is specified in MW (or kW) terms rather that MWh (or kWh) terms. Lastly MSEDCL stated that at this stage it is not possible to provide any tentative tariff for power from proposed project. Hence, cost economics have been worked out based on APPC.

Commission's Analysis and Rulings

8. The Commission has summarized background of this Petition in opening paragraph of this Order. MSEDCL has stated that it has complied with the observations of the Commission in impugned Order dated 11 March 2022 and revised its bid documents appropriately.

9. Before dealing with such revised submission, the Commission notes that proposed procurement of 500 MW (250 +250) will be an addition to already contracted surplus capacity as per approved MYT Order. Normally for any conventional power procurement, the demand supply (in MW terms) and the associated energy balance need to be extrapolated for the next tariff control period with reference to the demand projection and contracted power as per the MYT projections. However, as additional RE procurement is required for meeting increasing RPO targets stipulated in the Regulations, it needs to be contracted irrespective of existing surplus contracted capacity. Therefore, while contracting such additional RE capacity, MSEDCL needs to be cognisant of the additional power being contracted (even if the same is a very small quantum compared to its peak demand) and

efforts need to be taken to contract a RE Capacity which will replace existing contracted capacity having higher variable rate. If this is achieved, then contracting such additional RE capacity will reduce average power purchase cost of MSEDCL besides meeting its RPO targets. Contracting comparatively costly RE capacity will increase average power purchase cost of MSEDCL. This aspect needs to be considered by MSEDCL as an important benchmark while coming before the Commission for tariff adoption.

10. The Commission in its previous Order dated 11 March 2022 had highlighted following issues for MSEDCL to appropriately consider while approaching afresh with revised bid document for procurement of flexible and schedulable RE power coupled with energy storage system:

(a) Hydro resources shall not be made compulsory component but only be kept as one of the eligible resources;
(b) Period for SCoD be linked with RE technology being offered by the bidder;
(c) Decision on location of the battery storage system after considering applicable transmission charges;
(d) Not to increase Minimum bid capacity from 50 MW to 100 MW;
(e) Carrying out detailed study on identification of peak and off-peak hours;
(f) Commercial impact assessment of contracting RE power with Storage component;
(g) Tariff above which MSEDCL will have adverse financial implication on power purchase expenses.
(h) Considering Green shoe option for awarding the contract.

11. During the hearing, representative of MSEDCL submitted that it has referred to the SECI's tender for similar purpose and adopted certain stipulations in its bidding document. Further, MSEDCL has modified certain provisions so that the power from this proposed tender can meet its requirement.

12. The Commission notes that there is no standard bidding document for such type of bidding process and hence it needs to be evolved based on existing available documents for different technologies and SECI's bid document floated for similar purpose could act as a reference. Therefore, in earlier two orders, the Commission had directed MSEDCL to distil its requirement more objectively and consequent thereto make necessary changes in the Bid documents. The Commission notes that as per directives and observations of the Commission in the Impugned Order, MSEDCL has suitably modified the Tender document. The rationale submitted by MSEDCL and Commission's observations on such considerations are given below:

12.1. **Technology, Period for SCOD and Minimum bid capacity**:

12.1.1. The Commission in its previous Order had opined that inclusion of Hydro resource in eligible RE technologies could not be objected, however bidder should have option to propose any of the eligible technologies in its hybrid formulation. Making Hydro resource as mandatory component of the bid quantity would act as anti-competitive or create restrictions amongst the prospective bidders. Hence, it is necessary to make all RE source eligible for participation in this tender. With regards to SCOD the Commission suggested that if bidder offered Hydro resource as one of the components of its bid, then period of SCoD shall be 30 months and in all other cases period of SCoD shall be 18 months. The Commission also directed MSEDCL to correct its bidding document to make minimum bid capacity as 50 MW.

12.1.2. MSEDCL in the present Petition has submitted that it has carried out necessary amendments in Tender document.

12.1.3. The Commission has perused the Tender document and finds that above observations have been incorporated by MSEDCL. However, after closer scrutiny the Commission notes that providing different period of SCoD for Hydro and other RE sources in same bidding process creates inequality for prospective bidders. Bidder who is not opting for Hydro will have to quote tariff considering SCoD of 18 months. Hence, such bidder will be deprived from factoring price variation which may occur in 18^{th} to 30^{th} month. Whereas bidder who opts for Hydro resource will get 30 months for SCoD and hence the bidder in this case is in a better position to factor possible price variation in other RE technologies during such period which will be proposed along with Hydro. Further, when various study reports are indicating that cost of battery storage will be reducing in near future, depriving the prospective bidder from factoring the possible downward changes in battery cost which may occur in 18^{th} to 30^{th} month from PPA and then making it to compete with bidder who opts for Hydro and gets 30 months for SCoD is not appropriate. Hence to place all bidders in the equitable position, the Commission directs MSEDCL to consider period of SCoD as 30 months irrespective of RE /storage technology opted by the bidder. As MSEDCL is neutral to technology, it will not have any adverse impact except that irrespective of the technology opted the power would be available after 30 months instead of 18 months. Also, for the bidder who wishes to supply power earlier than 30 months, the provision in the bid document has such enabling provision.

12.2. **Location of battery storage system:**

12.2.1. The Commission in its previous Order had noted that as per Ministry of Power's notification dated 21 June 2021 for Energy Storage systems, inter-state transmission charges are exempted only for import (electricity used for pumping in Pumped Storage Plants and charging for Battery Storage) of Wind / Solar Renewable Energy. For Export

(supply of energy) of electricity from Energy Storage system, transmission charges are applicable in graded manner i.e. @25% during first 5 years from commissioning which will gradually increase to 100% in 12th year and thereafter 100% transmission charges will be applicable for rest of useful life. Further, no exemption of transmission charges is applicable for energy supply from small / large hydro. All these factors have impact on price to be discovered in competitive bidding process, and hence the Commission in impugned Order had directed MSEDCL to study the same and incorporate appropriate changes with regards to location of the battery storage system (transmission charges will be applicable when the battery storage is used for export of power to MSEDCL) in bid documents.

12.2.2. In response to above suggestions, MSEDCL in the present Petition has submitted that they have practice of calling bids for procurement of RE power with a condition that bidder has to quote the tariff for supply of energy at Maharashtra STU periphery. Hence, onus of delivering power at STU periphery by factoring all applicable charges for Inter State transmission lies with bidder. The same principle has been adopted by MSEDCL in this tender wherein the bidder has already been given clarity regarding the transmission charges so that bidder will factor it appropriately while submitting the bid.

12.2.3. The Commission notes that as bidder has to quote the tariff for supply of power at Maharashtra STU periphery, therefore incorporating inter-state transmission charges in tariff to be quoted is responsibility of the Bidder. Hence, Bidders will take appropriate decision as regards location of the battery storage system and bid accordingly. Therefore, the Commission accepts MSEDCL's submission in this regard.

12.3. **Identification of peak and off-peak hours:**

12.3.1. In the previous Order of the Commission had noted that MSEDCL as a Distribution Licensee is best placed to determine peak hours based on its demand supply position. But analysis based on which MSEDCL has decided such peak hours was not submitted with earlier Petition.

12.3.2. MSEDCL in the present Petition asserted that the word 'peak hours' and 'off-peak hours' are not related to peak hours and off-peak hours of the MSEDCL's load curve. These terminologies have been used in the context of availability of solar generation. MSEDCL clarified that this flexible tender is not designed to suit the needs during the MSEDCL system peak load conditions. Subsequently, in Reply to data gaps MSEDCL clarified that it intends to revise nomenclature of 'peak hours' and 'off-peak hours' as 'non-solar generation hours' and 'solar generation hours' in the proposed RfS document.

12.3.3. The Commission notes that RfS document has specified following windows of 'peak

hours' and 'off-peak hours':

Peak hours (non-solar generation hours)	Any 06 energy scheduling hours between (& including) 00:01 Hrs up to 10:00 Hrs and between (& including) 18.01 Hrs up to 24:00 Hrs of the same day
Off-peak hours (solar generation hours)	10.00 Hrs to 18.00 Hrs

From the above it is clear that MSEDCL has not linked the peak power requirement with its load curve, rather has chosen to match it with solar generation availability.

12.3.4. The Commission notes that above said approach of MSEDCL is consistent with its plan to implement MSKVY for providing daytime supply to Agriculture consumers and hence the proposed flexibility in asking bidder to supply power in any six hours of non-solar hours will help MSEDCL to manage its load during this period. At the same time, it is important to note that for providing such flexibility to MSEDCL, bidders have to configure their system in a such a way that in any 6 hours of non-solar period, it should be able to supply 100% of contracted quantum. This may lead to a possibility of the bidder over sizing the capacity and thus quoting slightly higher tariff for this bid. This is an important issue since any new power procurement needs to be done in the most economical manner and should generally reduce the cost of Power procurement. This aspect will be scrutinized after final discovery of tariff.

12.3.5. In view of the above observations, the Commission allows MSEDCL to rename the peak hours and off-peak hours as 'non-solar generation hours' and 'solar generation hours' in bid document.

12.4. **Power procurement optimization in surplus scenario and Commercial impact assessment of contracting RE power with Storage component:**

12.4.1. MSEDCL submitted that the maximum demand of the MSEDCL is 24668 MW and the proposed tender capacity is 250 MW which is 1% of the maximum demand and the capacity of 500 MW (including green shoe option) is 2% of the maximum demand. Hence considering such lower quantum in total demand, it may not have adverse impact on MSEDCL.

12.4.2. MSEDCL stated that it has contracted 24,840 MW from conventional sources, but their availability is around 72% on annual basis. Further, as against 9325 MW non-conventional capacity availability from renewable energy sources varies based on seasons.

12.4.3. MSEDCL has contended that during summer season, daytime peak is catered by base load thermal plants, koyna hydro and solar plus IEX. In the evening peak hours, solar generation is not available, IEX prices is high and koyna hydro will also be not available due to restriction on water usage. Under such circumstances RE flexibility power available during non-solar generation hours will be useful.

12.4.4. Similarly, MSEDCL has contended that during winter and monsoon season, since there is less demand as compared to summer the costly thermal generators are kept under zero schedule. If these generators are scheduled to cater the demand during non-solar generation hours then the power purchase cost will be more and hence it would be better that MSEDCL is given flexibility in the system to procure the power in some time blocks of non-solar generation hours for optimizing the power purchase cost.

12.4.5. MSEDCL has also submitted its computation for impact on power procurement for maximum demand day of each season (Summer, Monsoon, Winter) for the period of FY 2016-17 to FY 2021-22. MSEDCL in these computation has tried to compare power procurement cost if such power is procured from regular sources and if it is procured from RE flexible sources during non-solar generation hours. Summary of MSEDCL's analysis is tabulated at para 6.7 above. On scrutinizing the said computation, the Commission notes the following:

a. MSEDCL has considered tariff for power to be supplied during non-solar generation hours under RE flexible tender is at its Average Power Purchase Cost (APPC). The Commission notes and appreciates the consideration of APPC for comparison and commercial analysis of the Flexible power since this condition if achieved will reduce the power purchase cost to that extent. However, this will be true for only limited hours where existing variable cost is above APPC whereas during night hours, which is the period for consideration in this proposal, the variable cost is generally lower than APPC. Thus, the discovered tariff needs to be lower than APPC so that the overall power purchase cost can be optimized.

b. The Commission also notes that the storage component is a crucial part of this proposal and this component is likely to have an impact on the expected tariff. The Commission is of the opinion that these type of proposals need to be encouraged so as to promote upcoming technologies subjected to its observations at para 12.7.3 below.

c. Rs. 15.27 per unit is considered as Tariff for procurement of power from IEX during summer season of FY 2021-22. Such high tariff on IEX is exception and the Commission is of the opinion that such exceptional numbers should have been filtered out while undertaking impact analysis study. To that extent, the Commission does not agree with

this comparison.

d. In other seasonal analysis MSEDCL has used tariff of marginal generator on MoD during peak hour of that day. However, such tariff is used to compare impact of RE flexible power which is to be supplied at non-solar generation hours i.e. off peak hours as per load curve. Hence, this analysis and the comparison is also not correct.

e. MSEDCL has not considered the scenario of additional backing down of thermal generator due to scheduling of RE flexible power during non-solar generation hours.

In view of above observations, the Commission is of the opinion that indicative financial impact of procurement of RE flexible power submitted by MSEDCL in its Petition needs to be reassessed by them. However, the same can also be estimated more accurately when tariff of RE flexible power is discovered after successful completion of bidding process.

12.4.6. In the previous Order, the Commission had also directed MSEDCL to indicate the highest discovered tariff beyond which such discovered tariff will have adverse financial implications on its power purchase expenses. However, in the present Petition, MSEDCL stated that as this will be unique bid, it is difficult to predict tariff which will be discovered through bidding process. However, once discovered it will be scrutinized for financial implications. In this regard the Commission notes that although MSEDCL has not indicated such tariff, but for the purpose of computing financial implication it has considered tariff for non-solar generation hours as APPC. Any tariff above APPC will increase the power procurement cost of MSEDCL, which MSEDCL will have to keep in its consideration while seeking adoption of tariff. Further in its Petition MSEDCL has stated that cost optimization is one of the objectives of this bidding process. Hence, although the Commission agrees with MSEDCL that it cannot predict the tariff to be discovered in present bidding process due to its uniqueness, but to avoid any adverse financial implications, MSEDCL shall consider APPC as a benchmark tariff for non-solar generation hours. MSEDCL will have to submit detailed justification and possible financial impacts on the end consumers if at all it wishes to proceed with tariff above APPC.

12.5. **Green Shoe option:**

12.5.1. The Commission in the previous Order had suggested to MSEDCL to opt for green shoe option in bidding process. Accordingly, MSEDCL in its draft RfS document has submitted in present petition clearly mentioning that it will exercise the Green-Shoe Option to allocate additional capacity upto 250 MW to the successful bidder if discovered tariff is found economical to MSEDCL.

12.5.2. The Commission notes that as suggested in the previous Order, MSEDCL has incorporated green shoe option in its bidding process.

12.6. **CUF of the Project:**

12.6.1. MSEDCL in the bid document has proposed CUF of 19% for solar generation hours. MSEDCL stated that it is minimum CUF and bidders can provide higher CUF. Further said provisions has been taken from previous solar procurement tender.

12.6.2. In this regard the Commission notes MSEDCL's submission that 19% is minimum CUF and bidder may opt to provide higher CUF. Further the said 19% CUF is limited to 8 hours of solar generation hours. Whereas in remaining non-solar generation hours, successful bidder has to provide 100% capacity in any six hours indicated by MSEDCL on day ahead basis. On combining these two periods, resultant minimum CUF will be around 31% which is around the 35% CUF stipulated by SECI for similar project.

12.6.3. Considering above facts the Commission allows MSEDCL to stipulate 19% minimum CUF for non-solar generation hours.

12.7. **Possibility of cost reduction in battery storage and storage capacity ratings:**

12.7.1. MSEDCL has stated that when any technology is matured and adopted on large scale it becomes economical, however in the initial phase the new technologies needs to be promoted so that the benefits can be reaped in future. As per MSEDCL, considering its overall demand, the capacity under the proposed flexible tender will not have adverse financial impact compared to the benefits offered by it. MSEDCL has relied upon provisions of NEP which lays emphasis on the adoption of new technologies.

12.7.2. Regarding capacity rating, MSEDCL stated that it is proposing flexibility in terms of power and not in terms of energy.

12.7.3. The Commission notes the above submissions of MSEDCL. In the previous Order, the Commission had highlighted this issue as MSEDCL was proposing to enter into a contract for 25 years at present costs when various studies indicate that cost of storage may reduce drastically in coming years. MSEDCL itself has highlighted one of such study reports in its submission. However, MSEDCL has relied on the provisions of NEP relating to adoption of new technologies and suggested that higher cost in initial period need to be paid for promoting such technologies. In this regard the Commission is of the opinion that although new technologies need to be promoted, its financial impact needs to be weighed against benefit which can be accrued by adopting such technology. In the present petition, MSEDCL has tried to compute the impact but as observed in earlier paragraphs of this

order, the said computation needs to be reviewed. Therefore, at this point of time, no inference can be drawn related to cost benefit analysis. As stated above, while approaching the Commission for tariff adoption, MSEDCL should provide such cost benefit analysis.

13. In view of the above observations, the Commission directs MSEDCL to make necessary changes in its bid document and thereafter float tender for procurement of RE flexible power on 25 year long contract. Post discovery of tariff, MSEDCL shall quantify possible financial impact of procuring such power and then take decision about entering PPA. In case MSEDCL decides to go ahead, while submitting Petition for tariff adoption, MSEDCL should submit such detailed computation of financial implications and cost benefit analysis.

14. Hence, the following Order.

ORDER

1. **Case No. 86 of 2022 is partly allowed.**

2. **Maharashtra State Electricity Distribution Co. Ltd. to reframe draft RfS documents as per the observations noted in Para (12) and float the tender.**

3. **Post bidding process in case MSEDCL decides to file tariff adoption petition, said petition shall include detailed analysis of financial implications as stated in para 13 above.**

Sd/-	Sd/-
(Mukesh Khullar)	**(Sanjay Kumar)**
Member	**Chairperson**

(Abhijit Deshpande)
Secretary