नई दिल्ली
NEW DELHI

याचिका संख्या./ Petition No. 136/GT/2024

कोरम/ Coram:

Shri Jishnu Barua, Chairperson
Shri Ramesh Babu. V, Member
Shri Harish Dudani, Member

आदेश दिनांक/ Date of Order: 16th March, 2025

IN THE MATTER OF:

Petition under Section 79(1)(a), 62 and 64 of the Electricity Act, 2003 read with Regulations 7 and 8 of the Central Electricity Regulatory Commission (Terms And Conditions For Tariff Determination From Renewable Energy Sources) Regulations, 2020 for determination of project specific tariff in respect 1.7 MW Solar PV Power Plant with 1.4 MWh of battery energy storage system of Solar Energy Corporation of India Limited at Union Territory, Lakshadweep of for a period of 25 years from actual cod of the project in terms of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020.

AND IN THE MATTER OF:

Solar Energy Corporation of India Limited
6th Floor, Plate-B, NBCC Office Block Tower-2,
East Kidwai Nagar
New Delhi-110023

…Petitioner

Versus

Union Territory of Lakshadweep
Through the Secretary
Electricity Department
Kavaratti, Lakshadweep -682555 **……Respondent**

Parties Present: Shri M. G Ramachandran, Senior Advocate, SECI
Ms. Anushree Bardhan, Advocate, SECI
Ms. Surbhi Kapoor, Advocate, SECI
Ms. Srishti Khindaria, Advocate, SECI
Shri Aneesh Bajaj, Advocate, SECI
Ms. Shirsa Saraswati, Advocate, SECI
Shri Mohd. Irfan Khan, UT of Lakshadweep
Shri Dharwesh Khan M.P., UT of Lakshadweep
Shri Anver Husain K., UT of Lakshadweep

आदेश/ ORDER

1. The Petitioner, Solar Energy Corporation of India Limited (SECI), a Government of India enterprise, is a Generating Company within the scope of Section 2 (28) of the Electricity Act, 2003, and has set up a 1.7 MW Solar PV Plant with 1.4MWh Battery Energy Storage System (BESS) at Agatti and Kavaratti Island in Lakshadweep. SECI filed the present petition under Sections 79(1)(a), 62 and 64 of the Electricity Act, read with Regulations 7 and 8 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 (RE Tariff Regulation, 2020), for determination of project specific tariff for 1.7 MW Solar PV Plant with 1.4 MWh BESS in Lakshadweep for a duration of 25 years from the project's commercial operation date i.e. 23.12.2023.
2. The Respondent, Lakshadweep Electricity Department, undertakes the distribution of electricity in Lakshadweep.
3. SECI has made the following prayers:
    a) *To take on record the present Petition and determine the project specific tariff for 1.7 MW solar PV Power Project with 1.4 MWh Battery Energy Storage System of SECI at Union Territory of Lakshadweep in terms of Section 79 (1) (a) of the Electricity Act, 2003 and Regulation 7 and 8 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 as per the terms set out in the Petition.*
    b) *Permit SECI to recover the filing fee of the present Petition from the Respondent; and*
    c) *Pass any other or further order which this Hon'ble Commission may deem fit and proper in the facts and circumstances of this case.*

Submission by the Petitioner

4. SECI submitted as under:

(a) SECI and the Lakshadweep Electricity Department signed a Memorandum of Understanding (MoU) on 07.10.2018 to establish a framework for developing solar energy projects across the islands and to establish a total of 25.14 MW of solar power capacity with up to 75.71 MWh of Battery Energy Storage System (BESS).

(b) Following the MoU, on 09.10.2019, SECI and Lakshadweep Electricity Department executed a Power Purchase Agreement (PPA) to establish the Solar Power Projects of 25.14 MW cumulative contracted capacity with BESS capacity up to 75.71 MWh and sell such energy generated from these projects would entirely be to the Lakshadweep Electricity Department (LED) for a period of 25 years.

(c) Considering the location of the proposed projects being away from the mainland and endeavour being made for the first time in Lakshadweep, the power projects were being established in a phased manner by SECI. Of the cumulative capacity of 25.14 MW agreed between the parties, SECI proceeded with the development of a 1.7 MW ground-mounted solar PV Power Project with 1.4 MWh BESS at Agatti and Kavaratti as follows:

S. No.	**Island**	**Solar capacity (KW)**	**BESS Capacity (kWh)**
1.	Agatii	300	0
2.	Kavaratti	1400	1400
TOTAL		**1700**	**1400**

(d) In terms of the MOU and PPA, SECI initiated the process for the selection of Engineering, Procurement, and Construction Contractor (EPC) through e-tendering, followed by an e-reverse auction process for the development of the projects.

(e) On 24.09.2019, SECI issued a Notice Inviting Tender (NIT) to select a contractor for designing, engineering, supplying, constructing, erecting, testing, and commissioning a 1.95 MW ground-mounted solar PV power project with 2.15 MWh BESS, including 10 years of comprehensive Operation and Maintenance (O&M), at various islands of Lakshadweep. The tender document provides for the project to include the development of various individual (island-wise) sub-projects as a single package, which includes ground-based solar projects along with BESS.

(f) The tender provides for the project to include the development of various individual (island-wise) sub-projects as a single package, which includes ground-based solar

projects along with BESS. It also includes the dismantling and demolishing of the existing solar projects. The tender was floated for the deployment of solar power plants on four islands: Kavaratti (1.4 MW with 1.4 MW BESS), Agatti (0.3 MW without BESS), Bangaram (0.15 MW with 0.45 MWh BESS), and Thinnakara (0.1 MW with 0.3 MW BESS), Totaling 1.95 MW with 2.15 MW BESS.

(g) In response to the notice inviting tender, bids were submitted by four (4) interested parties, all meeting technical criteria. In an e-reverse auction carried out on 23.01.2020, M/s. SunSource Energy Private Limited emerged as the L1 bidder and was further invited to negotiate the price.

(h) On 09.07.2020, SECI awarded contracts to M/s. SunSource Energy Private Limited for the following: firstly, the design, engineering, supply, construction, erection, testing, and commissioning of a 1.95 MW Solar PV Power Plant with 2.15 MW BESS, valued at EPC cost of Rs. 21,78,36,350.78; and secondly, a 10-year comprehensive operation and maintenance contract for the same facilities, at a cost of Rs. 3,06,55,919.74.

(i) On 05.03.2021, the Administration of the Union Territory of Lakshadweep informed SECI that the Government of India had decided to privatize all distribution companies in Union Territories. Consequently, the Lakshadweep Administration aimed to fully privatize electricity generation, transmission, and distribution by September 2021. To avoid potential administrative challenges for new private players, activities were put on hold. Accordingly, the ongoing projects in Kavaratti and Agatti could be continued, while the projects in Bangaram and Thinnakara could be deferred for review as part of the privatization process. SECI was instructed to proceed only with the Kavaratti and Agatti projects at this stage.

(j) Subsequently, SECI negotiated with Sun Source Energy Pvt. Ltd. to reduce the order capacity to a 1.7 MW Solar PV Power Plant with 1.4 MWh BESS and focus solely on Kavaratti and Agatti.

(k) On 13.01.2022, SECI implemented Amendment-01 to both the Supply and Service Contract and the O&M Contract for the 1.7 MW Solar PV Power Plant with 1.4 MWh BESS. This amendment adjusted the project's total awarded capacity and set the contract prices to Rs.16,83,22,794.09 for supply and service and Rs.2,33,43,833.93 for O&M. Additionally, it established a 12-month timeline from the Notification of Award dated July 9, 2020, for the project's design, engineering, construction, and commissioning phases.

(l) The second wave of Covid-19, along with the monsoon season, delayed the movement of cargo ships, affecting the material delivery and execution of the project. On 17.08.2021, SECI extended the scheduled commissioning date to November 7, 2021.

(m) On 13.02.2022, Amendment-02 to Supply and Service Contract was proposed by SECI to Sun Source Energy Private Limited due to a revision in GST rates whereby the Contract Price was modified to Rs.17,43,20,644.07.

(n) On 06.09.2023 SunSource Energy Private Limited wrote to SECI reiterating the various issues faced by it during the execution of the Project and again sought for extension till 30th November 2023 and an increase in project cost amounting to Rs. 1,54,40,931 on account of alleged reasons of idling, spoilage of material at the site, increase in vendor prices, etc.

(o) On 16.11.2023, SECI wrote to SunSource Energy Private Limited stating that the COD for the 1.7 MW Solar PV Project with 1.4 MWh BESS has been revised to 31.12.2023.

(p) In the meantime, on 20.07.2023, the 300 KW Solar Power Project at Agatti was commissioned. In addition to the above, 600 KW out of 1400 KW solar power project was commissioned on 04.10.2023. Later, 800 KW out of 1400 KW solar power project at Kavaratti was commissioned on 03.11.2023. The balance battery storage system of 1400 KWh was commissioned on 23.12.2023.

(q) In terms of the letter dated 06.09.2023, SunSource Energy Private Limited sought an increase in project cost of Rs. 1,54,40,931 by which the aggregate contract price in respect of Supply and Service Contract (excluding O&M) for 1.7 MW Solar PV Power Plant with 1.4 MWh BESS comes to Rs. 18,37,63,725 as against Rs.17,43,20,644.07 proposed by SECI by way of Amendment no. 2 dated 13.02.2023. This increase in capital cost has not been agreed to by SECI.

(r) In view of this, the SECI filed the present petition for the tariff determination in terms of the contract price in respect of the Supply and Service Contract (excluding O&M) for 1.7 MW Solar PV Power Plant with 1.4 MWh BESS as Rs.17,43,20,644.07 as mentioned in Amendment no. 2 dated 13.02.2023, with the contingency of Sun Source Energy Private Limited pursuing its additional claim against SECI for increase in contract price (as per the letter dated 06.09.2023) and the same resulting in consideration of higher Capital cost and consequent increase in servicing of the Capital cost. SECI has requested the Commission to consider Rs. 94,43,081 (Rs. 18,37,63,725 minus Rs.17,43,20,644.07) as contingent additional capitalization and liability and granting liberty to SECI to approach the Commission for consideration and appropriate relief.

(s) Lakshadweep Electricity Department and SECI jointly filed a petition before the Joint Electricity Regulatory Commission (State Commission) under Sections 86(1)(b) and (e) of the Electricity Act 2003. However, the State Commission returned the petition, stating that it should be filed afresh once the tariff for these projects owned by SECI is determined by CERC.

(t) In the present Petition, SECI is seeking a determination of project-specific tariff in respect of the 1.7 MW solar PV Power Plant with 1.4 MWh of BESS under Regulation 7 of the CERC (RE Tariff) Regulations, 2020.

(u) As required in Regulation 8 (2) of the RE Tariff Regulations 2020, SECI has furnished the information in terms of Forms 1.1 and 2.1, along with consent from the beneficiaries. Financial and Operational norms are as per the RE Tariff Regulations 2020.

(v) The storage efficiency of the battery system at 80% and a degradation rate of 2% is considered, indicating the expected decline in the solar panels' efficiency over time.

(w) The levelized tariff, which is the average financial cost of generating electricity over the lifetime of the project, is calculated to be ₹8.89 per KWh.

(x) MNRE, Government of India, by order dated 22.07.2020, sanctioned Central Financial Assistance (CFA) of Rs.8,71,34,540, i.e., 40% of the EPC Cost of Rs.21,78,36,350 subject to terms and conditions mentioned therein.

(y) It is further requested a degradation factor of 0.7% be adopted for the entire life of the project in the project-specific tariff determination under 'Power to Relax' provided for in Regulation 78 of RE Tariff Regulations, 2020.

Hearing dated 11.07.2024

5. During the hearing on 11.07.2024, no one was present on behalf of the Respondent. Therefore, the Commission, after hearing the counsel for the Petitioner, directed to issue notice to the Respondent.

Submission by the Petitioner, SECI, dated 04.06.2024 and 05.07.2024

6. An affidavit was submitted on behalf of the Petitioner to place on record the additional document pursuant to the filing of the petition regarding the following:

(a) SECI granted an extension of the Scheduled Commissioning date till 28.12.2023 without levy of any Liquidated Damages /penalty for setting up a 1.7 MW Solar PV Power Plant with 1.4 MWh of Battery Energy Storage System for the generation and sale of electricity to Lakshadweep Electricity Department.

(b) SunSource Energy Private Limited (EPC contract awardee) accepted the amendments dated 13.01.2022 and 13.02.2023 to the Supply and Service contract dated 04.08.2020 granted by SECI.

Submission by the Respondent, Lakshadweep Electricity Department on 12.08.2024

7. The Respondent submitted that the Petitioner, SECI offered a tariff of Rs. 14.73/kWh without subsidy and Rs. 8.60/kWh with subsidy vide letter Dt. 04.03.2020 & 23.12.2022. SECI vide letter Dt. 10.01.2024 stated that due to an increase in the project cost & GST rate, the revised tariff is estimated at Rs. 8.82/kWh and requested the Respondent to pay SECI the monthly payments as per the initial intimated tariff of Rs. 8.60/kWh based on monthly Joint Meter Reading (JMR) and reconciliation against the paid amount will be done or settled once the tariff is finalized by this Commission. The Respondent prayed the Commission to approve the rate of Rs. 8.60/unit as agreed upon & communicated by SECI vide letter Dt. 04.03.2020 & 23.12.2022 and also confirmed vide subsequent communication dt. 10.01.2024. Further submitted that the burden of escalation of cost during project execution & impact of GST may not passed to the Lakshadweep Electricity Department.

Hearing dated 13.08.2024

8. During the hearing on 13.08.2024, the Commission directed the parties to submit detailed information on the project's capital cost and soft costs, with audited certificates wherever possible; the rationale behind the selection of battery size, including generation and load profiling; a note on the BESS, including battery chemistry, make/model, technical data, performance parameters, losses, and manufacturer data sheets; a detailed battery cost breakdown, methodology for determining replacement and replenishment costs, procedures for battery replacement, and whether the installation is included in the EPC or O&M contract must also be included. Additionally, the Commission also directed the Petitioner to submit an explanation for the low CUF of 17%, reasons for the delay in SCOD and its impact on the project costs (including IDC), any penalties within the contract, factors influencing tariff increases, and a detailed breakdown of the debt portion, including loan sanction, borrowing rates, and repayment schedules.
9. In response to the Commission's direction, the Petitioner provided the detailed information as outlined in the ROP on 12.09.2024.

Analysis and Decision

10. We have heard the learned counsels of the parties and have carefully perused the records.

11. The determination of project-specific tariffs is governed by Regulations 7 & 8 of the RE Tariff Regulations 2020. The relevant extracts of the Regulations are reproduced as under:

7. Project Specific tariff

a) Project specific tariff, on case to case basis, shall be determined by the Commission for the following types of renewable energy projects:

i. Solar PV power projects, floating solar projects and solar thermal power projects;

ii. Wind power projects (both on-shore and off-shore);

iii. Biomass gasifier based power projects and biogas based power projects – if a project developer opts for project specific tariff;

iv. Municipal solid waste based power projects and refuse derived fuel based power projects;

v. Renewable hybrid energy projects;

vi. Renewable energy with storage projects; and

vii. Any other project based on new renewable energy sources or technologies approved by MNRE.

b) Financial and operational norms specified in these regulations, except for capital cost shall be the ceiling norms while determining the project specific tariff.

8. Petition and proceedings for determination of tariff

(1) In case of renewable energy projects for which generic tariff has to be determined as per these regulations, the Commission shall determine such generic tariff at least one month before the commencement of year for each year of the Control Period:

Provided that for first year of Control Period i.e., from 1.7.2020 to 31.3.2021, the generic tariff shall be determined upon issuance of these regulations.

(2) A petition for determination of project specific tariff shall be accompanied by such fee as may be specified in the Central Electricity Regulatory Commission (Payment of Fees) Regulations, 2012 as amended from time to time or any subsequent reenactment thereof, and shall be accompanied by:

a) Information in forms 1.1, 1.2, 2.1, 2.2 and 2.3, as the case may be, as appended to these regulations;

b) Detailed project report outlining technical and operational details, site specific aspects, basis for capital cost, detailed break-up of capital cost and financing plan;

c) A statement of all applicable terms and conditions and anticipated expenditure for the period for which tariff is to be determined;

d) A statement containing details of calculation of any grant or subsidy or incentive received, due or assumed to be due, from the Central Government or State Government or both. This statement shall also include the proposed tariff calculated without such subsidy or incentive;

e) Consent from beneficiary for procurement of power from renewable energy project at tariff approved by the Commission, in the form of initialled Power Purchase Agreement or Memorandum of Understanding; and

f) Following documents in case of petition for determination of project specific tariff by renewable energy projects, where tariff from such renewable energy sources is generally determined through competitive bidding process in accordance with provisions of Section 63 of the Act:

i. Rationale for opting project specific tariff instead of competitive bidding; and

ii. Competitiveness of the proposed tariff vis-à-vis tariff discovered through competitive bidding/ tariff prevalent in the market.

g) Any other information directed by the Commission.

(3) The proceedings for determination of tariff shall be in accordance with the provisions of the Conduct of Business Regulations.

12. The technical and operational norms for Solar PV Projects are specified in Chapter 7 of the RE Tariff Regulations 2020. The relevant extracts are reproduced as under:

"Chapter 7: Parameters for solar PV power projects, solar thermal power projects and floating solar projects

46. Capital Cost

The Commission shall determine only project specific capital cost considering the prevailing market trends.

47. Capacity Utilisation Factor

The Commission shall only approve capacity utilisation factor for project specific tariff: Provided that the minimum capacity utilization factor for solar PV power projects shall be 21%:

……..

48. Operation and Maintenance expenses

The Commission shall determine only project specific O&M expenses considering the prevailing market trends.

49. Auxiliary Consumption

The Commission shall only approve auxiliary consumption for project specific tariff:

Provided that the maximum auxiliary consumption for solar PV power projects shall be 0.75%;

……"

Tariff Design

13. Regulations 9 & 10 of the RE Tariff Regulations, 2020 state as under:

9. Tariff Structure

The tariff for renewable energy sources shall consist of the following components:

(a) Return on equity;

(b) Interest on loan;

(c) Depreciation;

(d) Interest on working capital; and

(e) Operation and Maintenance expenses;

Provided that for renewable energy projects having fuel cost component, like biomass power projects with rankine cycle technology, biomass gasifier based power projects, biogas based power projects, non-fossil fuel based co-generation projects and refuse derived fuel based power projects, single part tariff with two components, fixed cost component and fuel cost component, shall be determined.

10. Tariff Design

(1) The generic tariff shall be determined, on levelized basis, considering the year of commissioning of the project, for the tariff period of the project:

Provided that for renewable energy projects having single part tariff with two components, fixed cost component shall be determined on levelized basis considering the year of commissioning of the project while fuel cost component shall be determined on year of operation basis in the Tariff Order to be issued by the Commission.

(2) For the purpose of levelized tariff computation, discount factor equivalent to post-tax weighted average cost of capital shall be considered.

(3) The above principles shall also apply for project specific tariff.

14. Accordingly, the Commission shall determine the project-specific tariff of the Petitioner's (SECI) project as a single-part tariff considering the year of commissioning of the project.

Debt-Equity Ratio

15. SECI submitted that in line with regulation 13, the Debt-Equity ratio has been taken at 70:30 for the purpose of computation of Tariff. The debt-equity ratio has been considered after deducting the amount of Central Financial Assistance received from the Government of India for a 1.7 MW Solar Plant with 1.4 MWh BESS for arriving at the amount of debt and equity.

16. Regulation 13 of the RE Tariff Regulations 2020 states as under:

"13. Debt Equity Ratio
(1) For determination of generic tariff and project specific tariff, the debt equity ratio shall be considered as 70:30:
Provided that, for project specific tariff, where the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan;
Provided further that for project specific tariff where equity actually deployed is less than 30% of the capital cost, the actual equity shall be considered for determination of tariff;
....
Provided also that debt equity ratio shall be considered after deducting the amount of grant or capital subsidy received for the project for arriving at the amount of debt and equity.

Explanation-The premium, if any, raised by the generating company, while issuing share capital and investment of internal resources created out of its free reserve, for the funding of the project, shall be reckoned as paid up capital for the purpose of computing return on equity, only if such premium amount and internal resources are actually utilised for meeting the capital expenditure of the renewable energy project.

(2) The project developer shall submit the resolution of the Board of the company or approval of the competent authority in other cases regarding infusion of funds from internal resources in support of the utilization made or proposed to be made to meet the capital expenditure of the renewable energy project."

17. The Commission notes that the Petitioner, in its submission with respect to ROP compliance, submitted that the entire project cost of Rs 17,53,25,192 is financed through equity, with no loan taken, resulting in a zero debt balance. Since the actual equity deployed exceeds 30% of the capital cost, in accordance with Regulation 13, the Commission considered a debt-equity ratio of 70:30, treating the equity in excess of 30% as a normative loan.

Return on Equity

18. SECI claimed Return on Equity in terms of Regulation 16(2) of the RE Tariff Regulations 2020 as 14% grossed up with the corporate tax rate. The rate of Income tax has been adopted as 25.168% {22% (corporate tax)* 1.10 (surcharge) * 1.04 (education Cess)}.

SECI submitted the Rate of Return as 18.71% for the first 10 years and 18.71% for the remaining tariff period (15 years).

19. Regulation 16 of the RE Tariff Regulations 2020 states as under:

16. Return on Equity

(1) The value base for equity shall be as determined under Regulation 13.

(2) The normative Return on Equity shall be 14%. The normative Return on Equity shall be grossed up by the latest available notified Minimum Alternate Tax (MAT) rate for the first 20 years of the Tariff Period and by the latest available notified Corporate Tax rate for the remaining Tariff Period.

20. The Commission notes that the project in the instant case was commissioned during FY 2023-2024. Agatti Solar plant of 300 KW was commissioned on 20.07.2023. The Kavaratti plant of 1400 KW was commissioned on 03.11.2023, and the BESS of 1400 KWh was commissioned on 23.12.2023.

21. For the FY 2023-2024, the MAT rate was 15%. and accordingly, the effective MAT rate (including a 12% surcharge and 4% Health and Education cess) works out to 17.472%. The corporate tax rate is considered as 34.94% (30% Income Tax rate + 12% surcharge +4% Health and Education cess. As per the RE Tariff Regulations, 2020, the Return on Equity Rate is computed as 16.96% for the first 20 years by grossing up the normative ROE of 14% by MAT rate (17.472%) and 21.52% for the remaining useful life after 20 years by grossing up ROE of 14% by corporate tax rate (34.94%). Accordingly, the same has been considered for the purpose of tariff determination.

Interest on Loan Capital

22. For the purpose of determination of tariff, SECI considered loan tenure of 15 years in terms of Regulation 14 of the RE Tariff Regulations 2020. The rate of interest for the Project has been computed in terms of Regulation 14 of the RE Tariff Regulations 2020 as 10.57%.

23. Regulation 14 of the RE Tariff Regulations 2020 states as under:-

"(1) Loan Tenure

For determination of generic tariff and project specific tariff, loan tenure of 15 years shall be considered.

(2) Interest on Loan

(a) The loans arrived at in the manner indicated in Regulation 13 shall be considered as gross normative loan for calculation for interest on loan. For project specific tariff, the normative loan outstanding as on 1st of April of every year shall be worked out by deducting the cumulative repayment up to 31st March of previous year from the gross normative loan.

(b) For the purpose of computation of tariff, normative interest rate of two hundred (200) basis points above the average State Bank of India Marginal Cost of Funds based Lending Rate (MCLR) (one-year tenor) prevalent during the last available six months shall be considered.

(c) Notwithstanding any moratorium period availed by project developer, the repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the annual depreciation allowed."

24. The Commission observes that the Petitioner did not submit any actual loan documentation. So, in terms of Regulation 14 of the RE Tariff Regulations, 2020, the Interest on Loan shall be allowed at an interest rate equivalent to the normative interest rate of two hundred (200) basis points above the average State Bank of India Marginal Cost of Funds based Lending Rate (MCLR) (one year tenor) prevalent during the last available six months.

25. The monthly data of MCLR for the last available six months (prior to the COD of the project) from the State Bank of India and the average MCLR is shown in the following table:

Effective Date	**One Year Tenor MCLR Rates**
15.06.2023 to 14.07.2023	8.55%
15.07.2023 to 14.09.2023	8.55%
15.09.2023 to 14.10.2023	8.55%
15.10.2023 to 14.11.2023	8.55%
15.11.2023 to 14.12.2023	8.55%
15.12.2023 to 23.12.2023	8.65%

Avg. for last Available 6 months	**8.57%**

26. Accordingly, the Commission has allowed the interest rate for the loan component as 10.57%. [Avg. of the past six months SBI MCLR one-year tenor (8.57%) + 200 bps].

Depreciation

27. SECI has claimed the depreciation as 4.67% for the first 15 years of the project life and the remaining depreciation of 2% spread over the useful life of the project. The salvage value of the asset has been considered as 10%.

28. Regulation 15 of the RE Tariff Regulations 2020 states as under:

> ***"15. Depreciation***
> *(1) The value base for the purpose of depreciation shall be the capital cost of the project admitted by the Commission. The salvage value of the project shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the capital cost of the project:*
>
> *Provided that, no depreciation shall be allowed to the extent of grant or capital subsidy received for the project.*
>
> *(2) Depreciation rate of 4.67% per annum shall be considered for the first 15 years and remaining depreciation shall be evenly spread during remaining Useful Life of the project.*
>
> *(3) Depreciation shall be computed from the first year of commercial operation:*
> *Provided that, for determination of project specific tariff, in case of commercial operation of the project for part of the year, depreciation shall be computed on pro rata basis."*

29. In terms of the above Regulation, the Commission approves the depreciation at 4.67% for the first 15 years, and the remaining depreciation spreads over the useful life of the project. The salvage value of the asset is considered as 10% and depreciation is allowed up to 90% of the capital cost.

Interest on Working Capital

30. SECI claimed the interest on working capital considering the last available six months average State Bank of India (SBI) MCLR (1 Year Tenor) of 8.57% plus 350 basis points, i.e.12.07%

31. Regulation 17 of the RE Tariff Regulations 2020 states as under:

> ***"17. Interest on Working Capital***

(1) The Working Capital requirement in respect of wind power projects, small hydro projects, solar PV power projects, floating solar projects, solar thermal power projects, and renewable energy with storage projects shall be computed in accordance with the following:

a) Operation and Maintenance expenses for one month;

b) Receivables equivalent to 45 days of tariff for sale of electricity calculated on normative Capacity Utilisation Factor or Plant Load Factor, as the case may be; and

c) Maintenance spares equivalent to 15% of Operation and Maintenance expenses.

……..

(4) Interest on Working Capital shall be at interest rate equivalent to the normative interest rate of three hundred and fifty (350) basis points above the average State Bank of India Marginal Cost of Funds based Lending Rate (MCLR) (one-year tenor) prevalent during the last available six months.

32. The Commission observes that the Petitioner has not submitted any actual interest on working capital documentation. The Commission has considered the interest on working capital in terms of Regulation 17 of the RE Tariff Regulations 2020. The interest rate has been computed as the average of the State Bank of India MCLR (One Year Tenor) prevalent during the last available six months (prior to the COD of the project) plus 350 basis points. Therefore, the Commission has considered the interest on working capital as 12.07% [Avg. of past six months SBI MCLR one-year tenor (8.57%) + 350 bps].

Discount Factor

33. SECI has considered the discount factor as 9.74% equivalent to the post-tax weighted average cost of capital {(10.57% x 0.70) x (1 – 25.168%)} + (14.0% x0.30)] for the computation for levellised tariff.

34. Regulation 10 (2) of the RE Tariff Regulations 2020 provides as under:

"10 Tariff Design

(2) For the purpose of levelized tariff computation, discount factor equivalent to post-tax weighted average cost of capital shall be considered."

35. The Commission notes that the discount factor considered for this exercise is equal to the post-tax weighted average cost of capital on the basis of the normative debt: equity ratio (70:30) specified in the Regulations. Considering the normative debt-equity ratio and the weighted average of the post-tax rates for debt and equity components, the discount factor is calculated. The Interest Rate considered for the loan component (i.e.70 %) of capital cost is 10.57 %. For the equity component (i.e., 30 %), the rate of Return on Equity

(ROE) is considered at a post-tax rate of 14 %. The corporate tax rate is considered as 34.94% (30% Income Tax rate + 12% surcharge +4% Health and Education cess. The discount factor derived as per Regulation 10(2) works out to 9.01% [(10.57 % x 0.70 x (1 – 34.94%)) + (14.0% x 0.30)]. Accordingly, the Commission allows the discount factor of 9.01% in the instant case.

Capital Cost of the Project

36. SECI submitted that the awarded contract for the commissioning of 1.95 MW of Solar PV Power plant with 2.15 MW BESS was Rs 21,78,36,350.78 with ten (10) years comprehensive Plant Operation and Maintenance contract of Rs 3,06,55,919.74. Subsequently, the contract was modified for the 1.7 MW Solar PV Power Plant with 1.4 MWh BESS. The amended contract price, as per SECI, in respect of the Supply and Service Contract (excluding O&M) for 1.7 MW Solar PV Power Plant with 1.4 MWh BESS is Rs.17,43,20,644.07 and in respect of the O&M Contract entered into with M/s. Sunsource Energy Private Limited (successful bidder under EPC contract) is Rs. 2,33,43,833.93. SECI also highlighted a contingency related to M/s SunSource Energy Private Limited's claim for an increase in the contract price, which may lead to a higher capital cost and increased servicing expenses. SECI submitted that the amount of Rs. 94,43,081 (the difference between Rs. 18,37,63,725 and Rs. 17,43,20,644.07) be recognized as contingent additional capitalization and liability, with the option to approach the Commission for further relief.
37. The project is funded under the MNRE's Central Financial Assistance (CFA) scheme. Initially, for a 1.95 MW Solar PV plant with 2.15 MWh BESS, the EPC cost was Rs. 21,78,36,350, with CFA sanctioned at 40% of EPC as Rs. 8,71,34,540. However, with the revised capacity of 1.7 MW with 1.4 MWh BESS and a revised cost of Rs. 17,43,20,644.07, a reduced CFA of Rs. 6,97,28,257.63 was sanctioned by the MNRE.
38. The breakdown of the EPC cost as submitted by the Petitioner, SECI is as under:

Sl. No.	**PACKAGE**	**PRICE (in INR)**
1	Supply of Solar Part (1.7 MW)	8,19,75,966.23
2	Supply of BESS Part (1.4 MWh)	6,69,96,723.65
3	Freight and Insurance	41,13,713.10
4	Design, engineering, installation, erection, testing, Commissioning	47,25,557.09
5	Civil and Allied Works	54,34,353.27
6	Site Clearance and preparation	1,10,74,330.73

7	**Total EPC Price {1+2+3+4+5+6}**	**17,43,20,644.07**

39. The breakdown of the Capital cost as submitted by SECI is as under:

Sl. No.	**Description**	**Price (in INR)**
1.	EPC Cost of the project {inclusive of land cost, pre-development expenses, all capital work including plant & machinery, civil work, erection, commissioning, evacuation infrastructure up to inter-connection point}	17,43,20,644.07
2.	Other Costs and expenses, including financing cost, interest during construction (IDC)	10,04,548
3.	Total Cost of the Project	17,53,25,192.07
4.	Cost Per MW	10,31,32,465.92

40. *Regulation 73 of the Renewable Tariff Regulations, 2020 provides as under:*

"Chapter 12: Parameters for renewable energy with storage project

73. Capital Cost

The Commission shall determine only project specific capital cost for renewable energy with storage project considering the prevailing market trends"

41. The Commission notes that initially, SECI floated the tender and placed a Letter of Award (LOA) for 1.95MW Solar PV with 2.15 MWh BESS on 09.07.2020 as requested by the Lakshadweep Electricity Department (the Respondent) for the development of ground-mounted solar plants with storage in four islands namely, Karavatti, Agatti, Bangaram & Thinnakara. The Project implementation could not start by November 2020 due to the Covid-19 impact, getting entry permits, and restrictions in air and water connectivity. Subsequently, in light of the decision to proceed with privatisation of the power department in the Union Territory of Lakshadweep, the Respondent asked to put a hold on all the project activities. After follow up by the Central Ministry, the resumption of work was allowed for the projects at Agatti and Karavatti islands only and withholding the activities at Bangaram and Thinnakara. After this, the capacity of the awarded project was reduced and the amended LOA was issued on 13.02.2023 with reduced cost on a pro-rata basis and on account of revision in GST rates. The Commission observes that the EPC Contractor Namely, M/s Sunsource Energy Pvt. Ltd. was selected by the Petitioner by following the competitive bidding process through the Single Stage- Two Envelope Bidding Process as provided in its submission. The price of

the EPC contract was discovered through an e-reverse auction concluded on 23.01.2020 among qualified three bidders, namely, M/s Sunsource Energy Pvt Ltd., M/s Bharat Electronics and M/s Kosol Energie Pvt Ltd. The implementation of the project was delayed in view of the Covid restrictions and holding of project activities by the Respondent in light of the decision of the Central Government to privatise the distribution utilities in the Union Territories. SECI extended the scheduled commissioning of the project till 31.12.2023.

42. The Commission notes that the Petitioner has also submitted the Audited Account statement dt.22.02.2024 certifying the cost of 1.7 MW Solar PV with 1.4 MWhr of BESS in Karavatti and Agatti islands as Rs 17,53,25,192 after examining the books of account and other relevant records of the Petitioner for the period from 04.08.2020 to 22.02.2024. The Petitioner has also submitted the board approval. Accordingly, the Commission approves the Capital Cost of the Project as follows:

Sl.No	Description	As Claimed by the Petitioner (Rs. Lakh)	As approved by the Commission (Rs. Lakh)
1.	Supply of Solar Part (1.7 MW)	819.75	819.75
2.	Supply of BESS Part (1.4 MWh)	669.97	669.97
3.	Freight and Insurance	41.14	41.14
4.	Design, engineering, installation, erection, testing, Commissioning	47.26	47.26
5.	Civil and Allied Works	54.34	54.34
6.	Site Clearance and preparation	110.74	110.74
	Total EPC Price {1+2+3+4+5+6}	**17.43**	**17.43**
7.	Overhead (Including financing cost, IDC, etc.)	10.04	10.04
8.	**Total Project Cost without Subsidy**	**1753.25**	**1753.25**
9.	MNRE subsidy 40% of EPC Cost	697.28	697.28
10.	**Net Project Cost with Subsidy**	**1055.97**	**1055.97**

43. The Commission notes that the MNRE has sanctioned Central Finance Assistance (CFA) of Rs 8,71,34,540, i.e., 40% of the EPC Cost of Rs.21,78,36,350 discovered with awarded tender of 1.9 MW of solar PV plant with 2.15 MWh BESS. Subsequently, due to the

reduction in the project capacity to 1.7 MW of Solar PV plant with 1.4 MWh BESS, the modified cost of the EPC contracts agreed between the parties is Rs. 17,43,20,644.07. As per the CERC RE Tariff Regulations 2020, any grant or subsidy by the Central or State Government shall be considered for computation of Tariff, and the debt-equity ratio shall be considered after deducting the amount of grant or capital cost received for the project. Accordingly, the Commission has deducted the CFA grant receivable to the Petitioner to arrive at the Net Project Cost of Rs. 10,55,96,934.44.

44. The Commission also notes the submission on the issue of an increase in the project cost. The Petitioner has sought liberty to approach the Commission for consideration and appropriate relief for Rs. 94,43,081 as contingent additional capitalisation and liability. In response to the specific queries by the Commission on detailed reasoning along with explanations for the delay in the scheduled commercial operation date (SCOD), the Petitioner has submitted a detailed note highlighting difficulties in the execution of the projects due to the suspension of the work by the Respondent for around 312 days at different stages which led to the logistical hindrance in air and ship availability, hampering the movement of manpower and material. The Petitioner has submitted that the reduction in project capacity, cost, and stoppage of work at the project site could not be attributed to the contractor's defaults, and hence, the Scheduled Date of Commissioning for the project was extended till 31.12.2023 without levy of any liquidated damage. However, as submitted by the Petitioner, the terms and conditions of the amended contracts were accepted by the EPC contractor. Hence, the Commission is of the view that the Petitioner may not be required to approach the Commission for the same.

Battery Replacement Cost

45. In response to the specific query on the methodology for arriving at the battery replacement cost, the Petitioner has submitted that a detailed note on the replacement cost for the battery as the Petitioner has submitted that the current contract comprises O&M of the SPV Plant with BESS for a period of 10 years. At the end of this O&M period, a minimum Battery capacity of 80 % of the initial capacity is to be maintained. Subsequent replacement /augmentation of the BESS capacity is in the scope of the Petitioner. Accordingly, Battery replacement has been considered in the 11th and 21st years of the plant life. Based on the availability of the battery system make and model,

battery replacement is envisaged to be carried out through battery pack replacement or the entire rack replacement. This would be installed through a separate EPC Contract. The installation and commissioning of the new battery are not included as part of the EPC or O&M contract. The Petitioner further submitted battery replacement costs after the 11th year and after the 22nd year as per the following methodology:

S.No.	Battery replacement	Description
1	After 11th Year	50% of (initial battery cost + Service Cost bifurcated at 50% + Preliminary and Pre-Operative Expenses including IDC and Contingency at 5.5% of (initial battery cost + Service Cost bifurcated at 50%)
2	After 22nd Year	BESS shall be replenished for 3 years at the additional cost of 10% of (initial battery cost + Service Cost bifurcated at 50% + Preliminary and Pre-Operative Expenses including IDC and Contingency at 5.5% of (initial battery cost +Service Cost bifurcated at 50%)

46. Accordingly, the Petitioner has considered the Battery replacement cost in the 12th year as Rs. 420.26 Lakh and the Battery Replenishment Cost in the 22nd year as Rs. 84.05 Lakh.

47. The Commission notes that the initial battery cost specified in the tender is Rs. 669.97 Lakh. The detailed break-up of the battery cost provided by the Petitioner as per the tender document is as follows:

Sr. No	Particulars (as specified in the Tender Documents)	Base Cost (Rs.)	% of GST applied	GST Amount (Rs.)	Total Cost (Rs.)
1	**Supply of Battery**	3,67,33,819.53	12%	44,08,058.34	4,11,41,877.87
2	**Battery Management System (BMS)**	1,61,61,386.45	12%	19,39,366.37	1,81,00,752.82
3	**Supply of Bi-directional Inverter (PCS)**	32,10,538.65	12%	3,85,264.64	35,95,803.29
4	**Supply of Step-up Transformer**	12,81,922.22	12%	1,53,830.67	14,35,752.89
5	**Supply of MS Switchgear/RMU**	6,87,972.57	12%	82,556.71	7,70,529.28

6	**Manufacture & Supply of Balance of System (BoS) including all Equipments, Materials, Spares, Accessories, Grounding, Lighting, Lighening, Safety &Fire Fighting System etc. excluding BESS part supply above and any other supplies**	17,42,863.84	12%	2,09,143.66	19,52,007.50
	Total	**5,98,18,503.26**		**71,78,220.39**	**6,69,96,723.65**

48. As shown in the table above, the Battery cost includes the Battery Management System (BMS), bi-directional inverter (PCS), step-up transformer, switchgear, Balance of System (BoS), etc, excluding the supply of battery pack. While battery life could be 10 years, the useful life of the associated system of BESS is much more than 10 years. Further, the Service Costs considered by the Petitioner include site clearance and site preparation, civil and allied works, etc., which may not be required during the replacement of the BESS system. Further, no rationale has been provided by the Petitioner for contingency and IDC expenses of 5.5% of the Project cost at the time of replacement of BESS. Further, in the initial project cost, the Petitioner has claimed the overhead expenses, including contingency and IDC cost, as 0.567% of the Capital Cost. Accordingly, the Commission is not considering the methodology proposed by the Petitioner for the replacement of battery cost.

49. According to current projections, the cost of Battery Energy Storage Systems (BESS) is expected to significantly decrease in the future, with estimates suggesting a potential drop of 40-50% by 2030, primarily driven by advancements in battery technology, increased manufacturing efficiency, and economies of scale as the industry matures; larger cell sizes and higher energy density containers are also key factors in this cost reduction trend. In view of this, the Commission believes that a potential drop of the BESS system by 50% of the initial cost of BESS specified in the Tender document would be a reasonable assumption to estimate the battery replacement cost at the end of the 12^{th} year. Further, considering the advancement of battery technology, the Commission is of the view that the replaced BESS at the end of the 12^{th} year would have a useful life of more than 10 years, and hence, there is no need to consider the 2^{nd} battery replacement as proposed by

the Petitioner. Accordingly, the Battery replacement cost considered by the Commission at the end of the 12th year is Rs. 334.98 Lakh for tariff determination of the Project.

Capacity Utilisation Factor (CUF)

50. SECI has submitted that for 1.7 MW Solar Plant with 1.4 MWh BESS, CUF of 17 % has been adopted for the purpose of tariff computation due to lower GHI in Kavaratti (5-8% less than top radiation zones), no DC overloading to reduce breakdown risk, 5-6% energy loss from battery round-trip efficiency, and potential grid unavailability due to the small island grid with a total connected load of 2 MW.

51. Regulation 47 of the RE Tariff Regulations 2020 states as under:

"47. Capacity Utilisation Factor

The Commission shall only approve capacity utilisation factor for project specific tariff:

Provided that the minimum capacity utilization factor for solar PV power projects shall be 21%:

……"

52. The Commission notes that Regulation 36.1 of the JERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2019 provides as under:

State/UT	***CUF (%)***
Puducherry	*18%*
Dadra & Nagar Haveli	*18%*
Lakshadweep	***17%***
Andaman & Nicobar Islands	*17%*
Daman	*18%*
Diu	*18%*
Chandigarh	*17%*
Goa	*18%*

Provided that the Commission may deviate from the norm in case of project specific tariff determination in accordance with Regulations 9."

53. It is also noted that the project CUF is in line with the norms specified for the Solar PV Projects for Lakshadweep by the JERC (Goa & UTs), and the Commission is inclined to accept this as a special case given the project-specific conditions in the instant case, in deviation of the norm specified in the RE Tariff Regulations, 2020.

Auxiliary Consumption

54. SECI has submitted that it has adopted the Auxiliary consumption of 0.75 % for the purpose of tariff computation.

55. Regulation 49 of the RE Tariff Regulations 2020 states as under:

> ***"49. Auxiliary Consumption***
> *The Commission shall only approve auxiliary consumption for project specific tariff:*
> *Provided that the maximum auxiliary consumption for solar PV power projects shall be 0.75%;*
> *Provided further that the maximum auxiliary consumption for solar thermal power projects shall be 10%;*
> *Provided also that the maximum auxiliary consumption for floating solar projects shall be 0.75%.*

56. The Commission has considered the auxiliary consumption to be 0.75% in accordance with the above Regulation.

Module Degradation Factor

57. The Petitioner has submitted that Module degradation is an acceptable technological phenomenon in the Photo-voltaic insolation concept and requested that a degradation factor of 0.7% be adopted for the entire life of the project in the project-specific tariff determination in the exercise of 'Power to Relax' provided for in Regulation 78 of Renewable Tariff Regulations.

58. The Commission notes that the RE Tariff Regulations 2020 do not provide any norms for the module degradation factor. After going through the documents furnished by the Petitioner as part of the tender specification and with due regard to the special circumstances of the project located in the Lakshadweep islands, the Commission considers it necessary to allow deviation and approve the module degradation fact of 0.7% while determining the tariff for the project.

Storage Efficiency

59. SECI has considered the storage efficiency of 80% in line with the RE Tariff Regulations, 2020.

60. Regulation 74 of the RE Tariff Regulations 2020 states as under:

> *"74. Storage Efficiency*
> *(1) The Commission shall approve the storage efficiency only for project specific tariff:*
> *Provided that the minimum efficiency for storage based on technology of solid state*

batteries shall be 80%:

.....

(2) Efficiency of storage component of renewable energy with storage project shall be measured as ratio of output energy received from storage and input energy supplied to the storage component of such project, on annual basis."

61. The Commission approves the storage efficiency of 80% in accordance with the above Regulation. No specific norms for the degradation of battery efficiency are provided in the Tariff Regulations. The Commission sought data regarding the battery chemistry, battery model, and technical data sheets from the battery manufacturer. It has been submitted that battery technology of Lithium Iron Phosphate with a DC installed capacity of 1971.2 kWh has been commissioned AC round trip efficiency of 80%. Accordingly, the Commission allows the degradation of 2% of the Battery system as proposed by the Petitioner while determining the tariff for the Project.

Operation and Maintenance Expenses

62. SECI submitted that in terms of Regulation 75 and based on the O & M contract for ten (10) years for Rs.2,33,43,833.93 (with M/s SunSource Energy Private Limited) and other establishment charges during the period of Operation and Maintenance, O&M cost of Rs. 19.5 lakh per MW per annum has been adopted. In line with Regulation 19 of the Renewable Tariff Regulations, an escalation of 3.84% has been adopted for the purpose of tariff computation.

63. Regulation 75 of the RE Tariff Regulations 2020 states as under:

"Chapter 12: Parameters for renewable energy with storage project

…….

75. Operation and Maintenance expenses

The Commission shall determine only project specific O&M expenses considering the prevailing market trends."

64. Upon reviewing the O&M expenses claimed by SECI, the Commission notes that the Petitioner stated that the aggregate contract price for the O&M contract had been considered as Rs. 2,33,43,833.93 for the project as discovered in the tendering process for the first ten years. Thereafter an escalation of 3.84% has been considered.

65. The Commission observes that since the O&M cost considered by the Petitioner is discovered through the competitive bidding process, the same is approved by the

Commission while determining the tariff for the first ten years. From the 11th year onwards, an escalation rate of 3.84%, as specified in the Regulations, would be considered for the remaining life of the project.

66. A summary of the parameters approved by the Commission is as under:

S.No.	DETAILS	As submitted by the Petitioner	As approved by the Commission
1	Capacity (In MW)	1.7	1.7
2	Capital Cost without Subsidy (Rs. Lakhs)	1,753.25	1,753.25
3	Capital Cost with Subsidy/Grant (Rs. Lakh)	1056	1056
4	Debt (%)	70%	70%
5	Equity (%)	30%	30%
6	Loan Tenure (in Years)	15	15
7	Interest on Loan % (MCLR +200 Basis Points Points)	10.57%	10.57%
8	Depreciation:		
	Salvage Value (%)	10%	10%
	Depreciation Rate for First 15 Years (% Per Annum)	4.67%	4.67%
	Depreciation Rate for Remaining Useful Life of Project (% Per Annum)	2.00%	2.00%
9	Return on Equity (ROE):		
	ROE for the First 20 Years of the Tariff Period	18.71%	16.96%
	ROE for the Remaining Tariff Period	18.71%	21.52%
10	Income Tax	25.17%	34.94%
11	O&M Expenses (Rs. Lakh)	829.33	829.33
12	Escalation Rate (%)	3.84%	3.84%
13	Interest on Working Capital % (MCLR +350 Basis Points)	12.07%	12.07%
14	CUF (%)	17%	17%
16	Auxiliary Power Consumption (%)	0.75%	0.75%
17	Weighted Average Cost of Capital % (Discount Rate)	9.74%	9.01%
18	Storage Efficiency (%)	80%	80%
19	Degradation (%)	2%	2%

67. The Commission notes that the Petitioner has communicated an initial tariff of Rs. 8.60 per kWh to the Respondent, and the Respondent has been making the monthly payments at an agreed tariff of Rs. 8.60 per kWh. The Respondent, in its submission, has prayed to approve the tariff of Rs 8.60 per kWh. However, based on the approval of the aforesaid

parameters for the 1.7 MW Solar Project with 1.4 MWh BESS, the tariff for the project life of the project is determined as Rs. 8.39 per kWh as at Annexure-I.

68. The Commission observes that the tariff approved by the Commission is significantly higher than the prices being discovered in the country. However, considering the remoteness of the project site, inaccessibility and hardship of the islands, challenges with logistics and the size of the individual project, limitation of land etc., the Commission is of the view that the said project should not be compared with the price of large-scale ground-mounted solar projects in the mainland. It is expected that the said solar power project with a Battery Energy Storage System (BESS) would reduce/minimize the use of diesel generating sets for the generation of electricity and thereby would lead to the protection of the environment by avoiding the use of fossil fuel.

69. Accordingly, the Commission approves the levelized tariff of Rs. 8.39/kWh as against the Petitioner's claim of Rs. 8.89/kWh with actual CFA received. SECI is hereby directed to raise bills for the energy generated from the project on the basis of the tariff approved as above and also to reconcile the paid amount as on date with the respondent in the subsequent bills.

70. The Petition No. 136/GT/2024 is disposed of in terms of the above.

Sd/-	Sd/-	Sd/-
Shri Harish Dudani	**Shri Ramesh Babu. V**	**Jishnu Barua**
Member	**Member**	**Chairperson**

Annexure-1

Form-1.1

Assumption for Solar PV Power Projects and BESS (1.7MW Solar PV with 1.4MWh BESS)

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Parameters
1	**Power Generation**				
		Capacity			
			Installed Power Generation Capacity	MW	1.7
			Capacity Utilization Factor	%	0.17
			Deration factor	%	0.7%
			Auxilary Consumption	%	0.0075
			Cost of Auxiliary Consumption	Rs./Kwh	0
			Useful Life	Years	25
2	**Project Cost**		**Capital cost**	Rs Cr.	17.53
			Capital subsidy		6.97
		Initial Project cost	Net capital Cost	Rs Cr.	10.56
3	**BESS Replacement Cost**			Year	
			BESS Replacement Cost (Rs. in Lakhs)	11	335
			BESS Replenishment Cost (Rs. in Lakhs)	22	0
4	**Financial Assumptions**				
			Tariff Period	Years	25
		Debt: Equity			
			Debt	%	0.7
			Equity	%	0.3
			Total Debt Amount	Rs Lacs	736.37
			Total Equity Amout	Rs Lacs	315.59
		Debt Component			
		Domestic	Loan Amount	Rs Lacs	736.37
			Moratorium Period	years	0
			Repayment Period	years	15
			Interest Rate	%	10.57%
			Weighted average Cost of Debt		10.57%
		Equity Component			
			Equity amount	Rs Lacs	315.59
			Taxation on ROE		0
			Return on Equity for first 20 years	% p.a	16.96%
			RoE Period	Year	20
			Return on Equity 21th year onwards	% p.a	21.52%
			Discount Rate		9.01%
5	**Financial Assumptions**				
		Fiscal Assumptions			
			Income Tax	%	34.94%
			MAT Rate		
		Depreciation			
			Depreciation for Tariff		0
			Depreciation Rate for first 15 years	%	4.67%
			Depreciation Rate 16th year onwards	%	2.00%
			Years for 4.67% rate		15
			Book Depreciation for IRR		0
6	**Working Capital**				
		For Fixed Charges			
		O&M Charges		Months	1
		Maintenance Spare	(% of O&M exepenses)	%	15%
		Receivables for Debtors		Months	1.5
		For Variable Charges			
		Interest On Working Capital		%	12.07%
7	**Operation & Maintenance**				
		Power plant plus BESS		Rs. Lacs	Actual
		Total O & M Expenses Escalation		%	3.84%

Determination of Tariff for Lakshadweep Solar Power Project

			1	2	3	4	5	6	7	8	9	10	11	12	13
Discount Factor		1	0.917	0.841	0.772	0.708	0.650	0.596	0.547	0.501	0.460	0.422	0.387	0.355	0.326

Units Generation	**Unit**	**Year--->**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Installed Capacity	MW		1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Gross/Net Generation	MU		2.41	2.39	2.38	2.36	2.35	2.33	2.32	2.30	2.29	2.27	2.26	2.22	2.21

Fixed Cost	**Unit**	**Year--->**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
O&M Expenses	Rs Lakh		18.38	19.34	20.35	21.41	22.53	23.70	24.93	26.22	27.58	29.00	30.12	31.27	32.47
Auxiliary Consumption Charge	Rs Lakh		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Usage/Reservoir Charges	Rs Lakh		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Cost on replacement of BESS	Rs Lakh		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.00	39.35
Depreciation	Rs Lakh		66.02	66.02	66.02	66.02	66.02	66.02	66.02	66.02	66.02	66.02	66.02	48.20	48.20
Interest on term loan	Rs Lakh		75.22	70.03	64.84	59.65	54.47	49.28	44.09	38.90	33.72	28.53	23.34	18.16	12.97
Interest on working Capital	Rs Lakh		3.57	3.58	3.59	3.60	3.61	3.62	3.64	3.66	3.68	3.70	3.71	3.70	3.71
Return on Equity	Rs Lakh		53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53
Total Fixed Cost	**Rs Lakh**		**216.71**	**212.50**	**208.33**	**204.22**	**200.16**	**196.16**	**192.21**	**188.34**	**184.52**	**180.78**	**176.72**	**195.85**	**190.23**

Levellised COG

Per Unit Cost of Generatio	**Unit**	**Levellis**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
O&M Expenses	Rs/kWh	**1.23**	0.76	0.81	0.86	0.91	0.96	1.02	1.08	1.14	1.20	1.27	1.33	1.41	1.47
Auxiliary Consumption Charge	Rs/kWh	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Usage/Reservoir Charges	Rs/kWh	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Cost on replacement of BESS	Rs/kWh	**0.46**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.84	1.78
Depreciation	Rs/kWh	**2.51**	2.74	2.76	2.77	2.79	2.81	2.83	2.85	2.87	2.88	2.90	2.92	2.17	2.18
Interest on term loan	Rs/kWh	**1.64**	3.12	2.92	2.73	2.52	2.32	2.11	1.90	1.69	1.47	1.25	1.03	0.82	0.59
Interest on working Capital	Rs/kWh	**0.16**	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17
Return on Equity	Rs/kWh	**2.39**	2.22	2.24	2.25	2.26	2.28	2.29	2.31	2.32	2.34	2.35	2.37	2.41	2.42
Total COG	**Rs/kWh**	**8.39**	**8.99**	**8.87**	**8.76**	**8.64**	**8.52**	**8.40**	**8.29**	**8.17**	**8.06**	**7.95**	**7.82**	**8.81**	**8.61**

Discount Factor			0.917	0.841	0.772	0.708	0.650	0.596	0.547	0.501	0.460	0.422	0.387	0.355	0.326

Levellised Tariff	**8.39**	**Rs/Unit**

Determination of Tariff for Lakshadweep Solar Power Project														
			14	15	16	17	18	19	20	21	22	23	24	25
Discount Factor		1	0.299	0.274	0.251	0.231	0.212	0.194	0.178	0.163	0.150	0.137	0.126	0.116
Units Generation	**Unit**	**Year--->**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Installed Capacity	MW		1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Gross/Net Generation	MU		2.20	2.18	2.17	2.15	2.14	2.13	2.11	2.10	2.09	2.07	2.06	2.05
Fixed Cost	**Unit**	**Year--->**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
O&M Expenses	Rs Lakh		33.72	35.01	36.36	37.75	39.20	40.71	42.27	43.90	45.58	47.33	49.15	51.04
Auxiliary Consumption Charge	Rs Lakh		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Usage/Reservoir Charges	Rs Lakh		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Cost on replacement of BESS	Rs Lakh		37.70	36.04	34.39	32.74	31.09	29.44	27.78	26.13	24.48	22.83	21.18	20.35
Depreciation	Rs Lakh		48.20	48.20	32.92	32.92	32.92	32.92	32.92	32.92	32.92	32.92	32.92	32.92
Interest on term loan	Rs Lakh		7.78	2.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		3.73	3.75	3.77	3.79	3.81	3.84	3.87	3.89	3.93	3.96	3.99	4.03
Return on Equity	Rs Lakh		53.53	53.53	53.53	53.53	53.53	53.53	53.53	67.91	67.91	67.91	67.91	67.91
Total Fixed Cost	**Rs Lakh**		**184.66**	**179.13**	**160.98**	**160.74**	**160.56**	**160.44**	**160.38**	**174.76**	**174.82**	**174.95**	**175.15**	**176.25**
Levellised COG														
Per Unit Cost of Generatio	**Unit**	**Levellis**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
O&M Expenses	Rs/kWh	**1.23**	1.54	1.61	1.68	1.75	1.83	1.91	2.00	2.09	2.18	2.28	2.39	2.49
Auxiliary Consumption Charge	Rs/kWh	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Usage/Reservoir Charges	Rs/kWh	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Cost on replacement of BESS	Rs/kWh	**0.46**	1.72	1.65	1.59	1.52	1.45	1.38	1.32	1.24	1.17	1.10	1.03	0.99
Depreciation	Rs/kWh	**2.51**	2.20	2.21	1.52	1.53	1.54	1.55	1.56	1.57	1.58	1.59	1.60	1.61
Interest on term loan	Rs/kWh	**1.64**	0.35	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs/kWh	**0.16**	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.20
Return on Equity	Rs/kWh	**2.39**	2.44	2.45	2.47	2.49	2.50	2.52	2.53	3.23	3.26	3.28	3.30	3.32
Total COG	**Rs/kWh**	**8.39**	**8.41**	**8.21**	**7.43**	**7.46**	**7.50**	**7.55**	**7.59**	**8.32**	**8.38**	**8.44**	**8.50**	**8.61**
Discount Factor			0.299	0.274	0.251	0.231	0.212	0.194	0.178	0.163	0.150	0.137	0.126	0.116
Levellised Tariff	**8.39**	**Rs/Unit**												

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