केन्द्रीय विद्युत विनियामक आयोग
CENTRAL ELECTRICITY REGULATORY COMMISSION

नई दिल्ली
NEW DELHI

याचिका संख्या./ Petition No. 341/GT/2019

कोरम/ Coram:

श्री पी. के. पुजारी, अध्यक्ष/ Shri P. K. Pujari, Chairperson
श्री आई. एस. झा, सदस्य/ Shri I.S. Jha, Member
श्री अरुण गोयल, सदस्य/ Shri Arun Goyal, Member
श्री प्रवस कुमार सिंह, सदस्य/ Shri Pravas Kumar Singh, Member

आदेश दिनांक/ Date of Order: 9th of May, 2022

In the matter of:
Petition under Sections 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-V of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 1999 along with "CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020" for determination of project specific levelised tariff for 92 MW floating solar Photo Voltaic Plants in two phases (first phase 22 MW and second phase 70 MW) at Rajiv Gandhi Combined Cycle Power Project (RGCCP), Kayamkulam, Kerala

And

In the matter of

NTPC Limited,
NTPC Bhawan,
Core-7, Scope Complex,
7, Institutional Area, Lodhi Road.
New Delhi-110 003

…….. Petitioner

Versus

Kerala State Electricity Board (KSEB) Limited,
Vydyuthi Bhavan, Pattom,

Thiruvananthapuram,
Kerala-695004

…….. Respondent

Parties Present:

Ms. Swapna Seshadri, Advocate, NTPC
Shri Anand K Ganesan Advocate, NTPC
Ms. Ritu Apurva, Advocate, NTPC
Shri Jai Dhanani, Advocate, NTPC
Shri P.V Dinesh, Advocate, KSEBL

आदेश / ORDER

Background

The Petitioner, NTPC Limited is a Government Company within the meaning of the Companies Act, 1956. Further, it is a 'Generating Company' as defined under Section 2(28) of the Electricity Act, 2003.

2. The Respondent, Kerala State Electricity Board Limited (KSEBL) is an integrated State public sector power utility company constituted by the State Government which is carrying out Generation, Transmission and Distribution functions.

3. A Memorandum of Understanding (MOU) was signed between the Petitioner and the Respondent on 11-05-2018 to explore the possibility of setting up renewable power generation projects more specifically land-based and floating solar plants subject to their feasibility.

4. Based on the MOU, the Petitioner had initiated the bidding process for selection of Engineering Procurement and Commissioning (EPC) Contracts for setting up 92 MW floating solar photo voltaic plants in two phases (first phase 22 MW and second phase 70 MW) at Rajiv Gandhi Combined Cycle Power Project (RGCCP), Kayamkulam, Kerala, (in short "Kayamkulam floating SPV Project") through two (02) separate International Competitive Bidding (ICB) based tenders. After conclusion of the tendering process as per the above including Reverse Auction among shortlisted agencies, the project has been awarded to M/S BHEL for 22 MW floating Solar Project and M/S Tata Power Solar Systems Limited for 70 MW floating Solar Project.

5. The Petitioner and the Respondent initialled a draft Power Purchase Agreement (PPA) agreeing to the terms and conditions set therein for the procurement of power from Kayamkulam floating SPV Project. According to Article 6 of the draft PPA, the tariff shall be computed based on the EPC cost discovered through competitive bidding. Further the tariff, payable by the Respondent, for the energy up to a maximum 28% CUF supplied at the delivery point from Kayamkulam floating SPV Project shall be at Rs.3.16 per kWh, subject to the approval of the Kerala State Electricity Regulatory Commission (KSERC).

6. Accordingly, the Respondent filed a petition before KSERC for approval of the draft PPA for Kayamkulam MW floating SPV Project. The KSERC, vide its Order dated 24-07-2019 in Petition No. OP 46/19, observed that as per the Clause (a) of Sub Section (1) of Section 79 of the Electricity Act, 2003 (in short "the Act"), the authority for determination of tariff of electricity generated from the said project installed by the Petitioner is vested with the Central Commission and granted provisional approval to the draft PPA subject to the modifications under Article 6.1 of the draft PPA as below :

> *"Article 6.1 The Tariff shall be computed by NTPC based on EPC Cost discovered through competitive bidding followed by Reverse Auction. The tariff for energy upto a maximum CUF of 28% supplied at the delivery point from any of the Module of "Kayamkulam Floating Solar PV Station" shall be payable by KSEBL '****at the tariff determined by CERC based on the petition filed by NTPC Ltd as per Section 62 of the Electricity Act, 2003 or at Rs. 3.16 per kWh, whichever is lower****.' If during any contact year, it is found that the Developer has not been able to supply energy corresponding to minimum CUF of 16% on account of reasons solely attributable to the Developer, the Developer shall pay penalty equal to 25% of the project tariff to KSEBL, for such shortfall in units. In case the availability is more than the maximum CUF of 28%, the Developer will be free to sell it to any other entity, provided, first right of refusal will vest with KSEBL. In case the KSEBL purchases the excess generation, it will do so at 75% (seventy-five percent) of the tariff.* ***The applicable tariff as above shall be subject to approval of the Kerala State Electricity Regulatory Commission (KSERC) and the Tariff so arrived will be the tariff inclusive of all taxes, levies and duties****."*

7. The relevant extract of the KSERC Order dated 24-07-2019 in Petition no. OP 46/19 is as under:

"21. ……..

(1) The tariff for the electricity generated from the 92 MW floating solar plant to be developed by NTPC limited at its RGCCPP at Kayamkulam shall be the lower of the 'tariff to be determined by CERC based on a petition filed by NTPC limited as per the provisions of electricity act 2003 for the mutually agreed tariff of ₹3.16/unit between the petitioner and respondent, whichever is lower.

(2) *The respondent NTPC limited shall immediately file a petition before the CERC for determination of tariff for the electricity generated from the 92 MW floating solar plant at its RGCCPP at Kayamkulam as per the provisions of Electricity act 2003, with all supporting details.*

(3) Provisionally approve the draft initiated PPA submitted before this commission for approval, with the modifications under Article 6.1 of the PPAs as detailed under paragraph 20 above.

(4) *Immediately after CERC determines the tariff for the electricity generated from the 92 MW Floating Solar Plant, KSEB Ltd shall file a separate petition before this commission for the final approval of the PPA to be signed with the respondent NTPC Ltd."*

8. Accordingly, the Petitioner filed the present petition before this Commission for determination of tariff for Kayamkulam floating SPV Project as directed by the KSERC and as per the provision incorporated in the final PPA signed by the parties on 28.08.2019.

9. Meanwhile, the Commission notified CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020" (hereinafter 'RE Tariff Regulations 2020').

10. The Petitioner has sought approval of the levelized tariff and claimed that the tariff calculated based on the parameters mentioned in RE Tariff Regulations 2020 is Rs.3.51/kWh for 22 MW and Rs.3.58/kWh for 70 MW. The weighted average tariff calculated for 92 MW is Rs.3.56/kWh.

11. While claiming that the tariff computation is based on the various relevant provisions of the RE Tariff Regulations 2020, the Petitioner has also sought approval for deviation from the norms or principles specified in the RE Tariff Regulations 2020, to take into account the module degradation of 0.7% per annum, higher Auxiliary Power Consumption (APC) of 0.75%, transmission loss of 1.25%, additional expenditure of Rs.50.77 Crore towards construction of 7 KM long motorable road to have access to waterbodies for 70 MW Phase-2 project.

12. The prayers of the Petitioner are as follows:

a) Determine and approve the levelised tariff for Kayamkulam 92 MW Floating SPV Project;

b) Grant interim order to facilitate billing at proposed tariff;

c) Issue any other order as deemed fit in such case.

13. Accordingly, the matter was called out for hearing on 25.11.2019, 17.07.2021 and 21.12.2021. During the course of the hearing, the learned counsel of the Petitioner submitted that though the scheduled commissioning date (SCD) for Phase-1 of 22MW was 23.02.2021 and that for Phase-2 of 70 MW was 23.08.2021, the project has not been commissioned till date (21.12.2021).

Submission of the Petitioner

14. The Petitioner has submitted as under:

a) The project is being setup on the basis of MoU signed between the Respondent and the Petitioner on 11-05-2018. After the signing of MOU, the Petitioner initiated the tendering process. After conclusion of tendering process as per the above including Reverse Auction among shortlisted agencies, the project has been awarded to M/S BHEL for 22 MW floating Solar Project (Rs.2,27,41,085.94 per MU) and M/S Tata Power Solar Systems Limited for 70 MW floating Solar Project (Rs.2,05,11,012.98 per MU)

b) The Petitioner is implementing the project in two stages i.e. 22 MW and 70 MW. However, a single PPA has been signed with KSEBL for the total capacity of 92 MW. Therefore, the weighted average tariff for the total capacity of 92 MW is being

submitted for approval along with tariff calculations for the individual stages of 22 MW and 70 MW.

c) No subsidy/incentive is received from the Central Government or the State Government by NTPC. The tariff claimed is based on awarded cost for the project development one for 22 MW and another for 70 MW aggregating to capacity of 92 MW. The tariff calculated based on the parameters mentioned in the aforesaid paragraph is Rs.3.51/kWh for 22 MW and Rs.3.58/kWh for 70 MW. The weighted average tariff calculated for 92 MW is ₹3.56/kWh. Details of the two tenders are presented in the table below:

Particulars	22 MW	70 MW
Type of Bidding	ICB	
Mode of Tendering	e-tendering; Single Stage Two Envelopes followed by Reverse Auction (RA)	
Date of Invitation for Bids	25-06-2018	15-10-2018
Date of Technical Bid Opening	31-08-2018	10-01-2019
Number of bidders participated	10	10
Date of Reverse Auction	29-10-2018	24-01-2019
Number of bidders shortlisted for the reverse auction	08	08
Name of the Successful bidder (L1 bidder after closure of reverse auction)	Bharat Heavy Electricals Limited	Tata Power Solar Systems Limited
L1 Price (per MU) after the closure of RA	Rs.22741085.94	Rs.20511012.98

d) The Scheduled Commercial operation date (SCOD) for the 22 MW floating SPV Power Project was 23.02.2021 i.e. 15 months from the date of issuance of Notification of Award (NOA) and that of 70 MW floating solar SPV Power Project was 23.08.21 i.e. 21 months from the date of issuance of notice of award (NOA). NOA date for both the projects was 24th Sep 2019.

e) Treatment of over-generation: The supply of solar power from the project will be at applicable tariff up to 28% CUF on Annual basis. The over generation or excess energy above 28% CUF shall be made available to KSEB Limited at 75% of the applicable tariff.

f) The project is one of the initial large sized floating solar projects and the ceiling tariff of Rs.3.16/kWh for the above project is comparable to the tariff discovered for Solar PV projects in competitive bidding conducted by various States at the time of EPC tendering conducted by the Petitioner.

Submission of Respondent

15. The Respondent in its reply have submitted as under:

a) The Petitioner has not provided the detailed estimate of Rs.57.14 lakh/MW in 70 MW project towards 7 KM motorable road.

b) The transmission loss considered by the Petitioner towards evacuation system is very high without any justification.

c) The tariff is only Rs.3.12 per unit for floating solar plant developed by the Petitioner at Ramagundam Super Thermal Project.

Rejoinder of the Petitioner

16. In response to the reply, the Petitioner submitted as under:

a) 7 KM long motorable road is required to be constructed to have access to the water bodies and floating solar panels of 70 MW Phase-2 of the Project and the same shall be executed through deposit works by Kerala Irrigation Department. The Assistant Executive Engineer, Irrigation Sub Division, Mavelikkara Kerala Irrigation Department has forwarded the cost estimate for Rs.50.77 Crore. Accordingly, the Petitioner has calculated the revised tariff for the instant project based on the expenditure estimate of ₹50.77 Crore which corresponds to Rs.72.53 lakh per MW for 70 MW floating solar project in the Capital Cost of the Project.

b) Transmission loss has been considered due to loss in power evacuation system consisting of Transformer loss (33 KV /220 KV), loss due to 33 KV cables.

c) With regard to the comparison of 92 MW Kayamkulam floating SPV project tariff with 100 MW Ramagundam Floating Solar PV project tariff, the Petitioner submitted that tariffs in both the projects are based on International Competitive Bidding (ICB) and concluded after Reverse Auction (RA) process. The scope of work in the above two projects is also not similar as mentioned hereunder:

(i) Kayamkulam floating Solar Project evacuation system envisages Outdoor yard (33/220 kV) for stepping up to 220 kV and final termination at 220 kV GIS at

Kayamkulam. In case of Ramagundam floating Solar project, the termination is at 33 kV Owner's Switchgear.

(ii) Kayamkulam floating solar project includes construction of 7 Km long motorable road to be constructed at an estimated cost of Rs.50.77 Crore.

Analysis and Decision

17. The Commission has examined copies of the bid documents, letter of award to successful bidders, the detailed project report outlining the technical and operational details along with the power purchase agreement signed by both the parties. The Commission has also taken into consideration the submission by the Petitioners and the Respondents along with oral submission made by the parties during the hearing process.

18. The Scheduled Commercial Operation Date (SCOD) for Phase-1 of 22MW was 23.02.2021 and that of for Phase-2 of 70 MW was 23.08.2021. However, during the hearing dated 21.12.2021, the Petitioner informed that the project has not been commissioned till date (21.12.2021).

19. In view of the fact that the SCOD of the project is envisaged during the control period (1.7.2020 to 31.3.2023) of the RE Tariff Regulations 2020, the Commission vide letter dated 16.07.2020 for technical validation granted liberty for filing amended tariff petition in accordance with the provisions of RE Tariff Regulations 2020. Accordingly, the Petitioner has filed this amended petition for determination of project specific levelised tariff for Kayamkulam Floating Solar PV Project as per RE Tariff Regulations 2020.

20. The Commission notes that the both parties have agreed that the tariff applicable for the Kayamkulam Floating Solar PV project shall be lower of Rs.3.16 per kWh or the tariff determined by this Commission. Further, the project has not been commissioned till the last hearing held on the subject matter on 21.12.2021. Accordingly, the Commission has decided to determine the interim tariff for the Kayamkulam Floating Solar PV project based on the relevant principles and methodology applicable for project specific tariff as specified in the RE Tariff Regulations 2020; the levelised generic tariff order (dated 31.03.2021 in Petition No 2/SM/2021) for FY 2021-22; and based on relevant information furnished by the Petitioner.

21. Regulation 7 of the RE Tariff Regulations 2020 provides general principles for determination of project specific tariff for generation of electricity from renewable energy station

including floating solar projects specifying that the financial and operational norms specified in the RE Tariff Regulations 2020, shall be considered as the ceiling norms except for capital cost.

*"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*."

22. Regulation 8 (2) of the RE Tariff Regulations 2020 specifies the formats and information which need to be accompanied with project specific tariff petition which reads as follows:

"*8. Petition and proceedings for determination of tariff*

……

(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 re-enactment 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."

23. Regulation 10 of the RE Tariff Regulations 2020 specifies parameters of tariff for the renewable energy project as single tariff consisting 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

24. Regulation 11 of the RE Tariff Regulations 2020 provides tariff design principles for determination of project specific tariff on levelized basis considering the year of commissioning of the project for the tariff period of the project with discount factor equivalent to post-tax weighted average cost of capital.

"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.*"

25. Accordingly, the Commission has determined the project specific levelised tariff for the Kayamkulam Floating Solar PV project considering the financial and operational norms as ceiling norms wherever required as specified in the RE Tariff Regulations 2020. Chapter 7 of the RE Tariff Regulations 2020 specify the technical and operational parameters for floating solar projects.

26. Further, financial parameters as estimated in the latest levelized generic tariff Order dated 31.03.2021 in Petition No. 2/SM/2021 for FY 2021-22 have been considered by the Commission wherever required.

27. The Commission has, in addition to the above-mentioned principles specified in the RE Tariff Regulations 2020, also made certain assumptions and taken into consideration the input values submitted by the Petitioners and the submissions made by the Respondent as elaborated in the subsequent sections of this Order.

A. Capital Cost

Petitioner's submission

28. The Petitioner has submitted that the project is being setup on the basis of the MOU signed between the Respondent and the Petitioner on 11-05-2018. After the signing of the MOU, the Petitioner had initiated the tendering process for implementation of floating solar PV projects in two phases i.e. 22 MW and 70 MW Floating Solar PV Project at NTPC-Rajiv Gandhi Combined Cycle Power Station (RGCCP), Kayamkulam, Kerala through two (02) separate International Competitive Bidding (ICB) tenders. After conclusion of the tendering process as per the above including Reverse Auction among shortlisted agencies, the project has been awarded to M/S BHEL for 22 MW floating Solar Project and to M/S Tata Power Solar Systems Limited for 70 MW floating Solar Project. with EPC discovered cost as Rs. 2,27,41,085.94 per MU for 22 MW Phase -1 and Rs. 2,05,11,012.98 per MU for 70 MW Phase-2. The Petitioner has

estimated EPC cost per MW based on discovered cost per MU and annual generation of 48.42 MUs for Phase-1 of 22 MW and 167.15 MUs for Phase-2. Thus, EPC Costs per MW proposed by the Petitioner are Rs.500.51 lakh per MW for Phase-1 of 22 MW and Rs.489.77 lakh per MW for Phase-2 of 70 MW.

29. The Petitioner has submitted the details of capital cost as follows:

Table-1: Capital cost as proposed by the Petitioner

Capital Cost of the Project		**Phase-1 (22MW)**	**Phase-2 (70MW)**
Preliminary Cost	₹Lakhs / MW	3	3
Land Cost- Leasehold	₹Lakhs/ MW	0	0
Land Cost- Freehold	₹Lakhs/MW	0	0
EPC Cost	₹Lakhs/MW	500.51	489.77
Infrastructure Cost	₹Lakhs/MW	0	72.53
Project Management (@0.50%)	₹Lakhs/ MW	2.52	2.83
Contingency (@0.50%)	₹Lakhs/ MW	2.53	2.84
Interest During Construction (IDC) Period	₹Lakhs/ MW	18.92	15.57
Capital Cost (Including IDC) per MW	₹Lakhs/ MW	527.48	586.54
Capital Cost for Project	**₹Lakhs**	**116,04.52**	**410,57.57**
Total Project Cost (92 MW)	**₹Lakhs**	**526,62.09**	

30. As shown in the table above, the Petitioner has considered the EPC cost as discovered through the bidding process while other parameters like Preliminary Cost, Infrastructure Cost, Project Management Cost and Contingency Cost on lumpsum basis. As regards the infrastructure cost of Rs.72.53 lakh per MW, the Petitioner has argued that the same is proposed as per the estimation received from Kerala Irrigation Department for construction of 7KM long motorable road to have access to the water bodies and floating solar panels for Phase-2 of 70 MW. A communication from the Kerala Irrigation department in this regard providing detailed estimation of the construction has also been submitted to support the estimate.

31. Subsequently, the Petitioner, in compliance with the Commission's directions, has submitted the relevant extracts from the minutes of the 477th Meeting Board of Directors held on 21st September, 2019 approving the investment proposal for Kayakulam floating Solar PV

Projects 92 MW (22MW and 70 MW) with estimated cost of Rs.518.76 Crore including Interest During construction (IDC).

Commission's Analysis and Decision

32. Regulation 12 of the RE Tariff Regulations 2020 specifies the definition of Capital Cost as follows:

> **" *12. Capital Cost***
>
> *Norms for capital cost, as specified in relevant chapters of these regulations, shall be inclusive of land cost, pre-development expenses, all capital work including plant & machinery, civil work, erection, commissioning, financing cost, interest during construction, and evacuation infrastructure up to inter-connection point."*

33. Regulation 46 of the RE Tariff Regulations 2020 specifies that the capital cost for the project specific tariff shall be determined considering the prevailing market trends. Regulation 46 is reproduced below for ready reference:

> *" **46. Capital cost***
>
> *The Commission shall determine only project specific capital cost considering the prevailing market trends."*

34. Upon examining the documents submitted in support of the capital cost, the Commission observes that the EPC cost provided by the Petitioner includes the cost associated with Module, Inverter, Transformer, ABT meter, SCADA, Installation erection, civil works, evacuation cost, and O& M cost of 3 years, along with the GST payable on all these services. As submitted by the Petitioner, the EPC cost is based on the competitive bidding followed by the reverse auction method and hence represents the prevailing market trends. Accordingly, the Commission approves the EPC cost discovered through bidding process as Rs.500.51 lakh per MW for Phase-1 of 22 MW and Rs.489.77 lakh per MW for Phase-2 of 70 MW of the RGCCP Kayamkulam Floating Solar Project.

35. The Preliminary Cost, Project Management Cost and Contingency Cost as submitted by the Petitioner is 1.5% of the project cost for both 22MW and 70 MW. The Commission finds this claim to be reasonable based on the analysis of the Commission on this aspect in the past when the Commission used to determine generic tariff for solar projects (last such exercise was done

by the Commission for the period 2016-17). Hence, the Commission approves the Preliminary Cost, Project Management cost and Contingency Cost as proposed by the Petitioner.

36. The Commission also observes that the cost proposed by the Petitioner for 7 KM motorable road for Phase-2 of 70MW is as per the detailed estimation received from the Kerala Irrigation Department to construct motorable Road and construction of bund for protecting the water body and hence approves the infrastructure cost of Rs.50.77 Crore for construction of 7KM long motorable road to have access to the water bodies and floating solar panels for Phase-2 of 70 MW.

37. The capital cost proposed by the Petitioner is Rs.116,04.52 lakh for 22 MW Phase-1 and Rs.41057.57 lakh for 70MW Phase-2, totalling Rs.526,62.09 lakh (Rs.526.62 Crore) for the entire 92 MW Kayamkulam floating Solar PV Projects. However, the capital costs approved by the Board of Directors of the Petitioner in its meeting dated 21.09.2019 based on the financial appraisal report for independent verification of financial viability of the Project are Rs.115.14 Crore for Phase-1 of 22 MW and Rs.403.62 Crore for Phase-2 of 70 MW. Thus, the total cost approved by the Board of Directors of the Petitioner is Rs.518.76 Crore for the combined Project of 92 MW Kayamkulam Floating Solar PV Projects. Since, the project is yet to be commissioned as informed by the Petitioner during the last hearing and the actual cost of the project is not yet known, the Commission approves that cost of the project as Rs.518.76 Crore for the purpose of determination of project specific tariff.

38. The cost towards Interest During construction (IDC) considered by the Petitioner is Rs.18.92 lakh per MW for 22MW and Rs.15.57 lakh per for 70 MW. The Petitioner has not provided any further details regarding the cost toward IDC. The Commission notes that the Capital Cost per MW consists of Preliminary cost, EPC cost, Infrastructure Cost, Project Management Cost, Contingency Cost and IDC cost, as per the submission of the Petitioner. In the preceding paras, the Commission has already approved the Capital Cost and other sub-components of the Capital Cost, except IDC. Accordingly, the IDC cost has been determined after subtracting the components such as EPC Cost, Preliminary Cost, Infrastructure Cost, Project Management Cost, Contingency Cost from the total approved Capital Cost for the project as approved by the Commission. Accordingly, the IDC for Phase-1 of 22 MW works out to be Rs.14.81 lakh/MW and that for Phase-2 of 70 MW as Rs.5.63 lakh per MW, as indicated in the table below:

Table-2: The Cost towards IDC approved by the Commission

Interest During Construction (IDC) (per MW)		**Phase-1 (22MW)**	**Phase-2 (70MW)**
Interest During Construction (IDC) / MW	₹Lakhs/ MW	14.81	5.63

39. Based on the above analysis, the Commission approves the Capital Cost of Rs.11,514 lakh for 22 MW and Rs.40,361.96 lakh for 72 MW of Kayamkulam floating Solar PV Projects as follows:

Table-3: Capital cost approved by the Commission

Capital Cost of the Project (per MW)		**Phase-1 (22MW)**	**Phase-2 (70MW)**
Preliminary Cost	₹Lakhs / MW	3	3
Land Cost- Leasehold	₹Lakhs / MW	0	0
Land Cost- Freehold	₹Lakhs / MW	0	0
EPC Cost	₹Lakhs / MW	500.51	489.77
Infrastructure Cost	₹Lakhs / MW	0	72.53
Project Management (@0.50%)	₹Lakhs / MW	2.52	2.83
Contingency (@0.50%)	₹Lakhs / MW	2.53	2.84
Interest During Construction (IDC)	₹Lakhs / MW	14.81	5.63
Project Cost (Including IDC) per MW	₹Lakhs / MW	523.36	576.60
Capital Cost for Project	**₹Lakhs**	**11,514.00**	**40,361.96**
Total Project Cost (92 MW)	**₹Lakhs**		**51,875.96**

B. Debt Equity Ratio

Petitioner's Submission

40. The Petitioner has considered normative Debt: Equity Ratio of 70: 30 for determination of the project specific tariff for 22 MW Phae-1 and 70 MW phase-2. However, in compliance with the direction of the Commission during the hearing, the Petitioner has submitted Board approval along with other supporting documents for equity component of the entire project of 92 MW and has claimed 20% equity component for the entire project of 92 MW.

Commission's Analysis and Decision

41. Regulation 13 of the RE Tariff Regulations 2020 specifies the debt equity ratio for project specific tariff as follows:

"*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;

....

(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."*

42. As per Regulation 13 of the RE Tariff Regulations 2020, wherever the equity deployed is less than 30% of the Capital cost, the actual equity is be considered for determination of project specific tariff. Upon review of Board approval for 20% equity component along with the financial viability report and the principle specified in Regulation 13 of the RE Tariff Regulations 2020, the Commission has decided to consider the Debt Equity ratio of 80:20 for Kayamkulam Floating Solar PV Projects, as follows:

Table-4: Debt Equity Amount approved by the Commission

Perticulars		As Proposed by the Petitioner		As considered by the Commission	
		Phase-1 (22MW)	**Phase-2 (70MW)**	**Phase-1 (22MW)**	**Phase-2 (70MW)**
Debt Component	(%)	70%	70%	80%	80%
Equity Component	(%)	30%	30%	20%	20%
Debt Component	Rs Lakh	8,123.17	28,740.30	9,211.20	32,289.57
Equity Component	Rs Lakh	3,481.36	12,317.27	2,302.80	8,072.39

C. Loan Tenure and Interest on Loan

Petitioner' Submission

43. The Petitioner has considered loan tenure of 15 years as per the RE Tariff Regulations 2020 for determination of project specific tariff. The Petitioner has claimed interest on loan capital as 9.38% after taking into consideration of the average State Bank of India MCLR (one-year tenor) prevalent during the six months period of 10.02.2020 to 10.07.2020 as 7.38%. The Petitioner has also submitted that no specific loan has been drawn for the project and the average State Bank of India MCLR (one-year tenor) prevalent during the six months period of 10.02.2020 to 10.07.2020 as 7.38% has been used to calculate interest on loan as 9.38% as per RE Tariff Regulations 2022.

Commission's Analysis and Decision

44. Regulation 14 of the RE Tariff Regulations 2020 specifies the loan tenure of 15 years and the rate of interest as equivalent to SBI MCLR (one-year tenor) prevalent during the last available six months plus 200 basis points, for the purpose of determination of project specific tariff for RE projects, which is reproduced as follows:

*" 14 **Loan Tenure and Interest on Loan***

*(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."

45. The Commission observes that the Petitioner has not taken any project specific loan and has considered average State Bank of India MCLR (one-year tenor) prevalent during the six months period of 10.02.2020 to 10.07.2020 as 7.38% when the Petition was filed.

46. The Commission notes that according to Clause (b) of Regulation 7 of RE Tariff Regulations 2020, the financial norms, except for capital cost, shall be ceiling norms for determining the project specific tariff. It would be pertinent to mention that the Commission while notifying the levelised generic tariff for renewable energy technologies for FY 2021-22 in its Order dated 31.03.2021 had considered the interest on loan as 9% [Average of six months for period of 10.07.2020 to 09.01.2021 SBI MCLR one-year tenor (7%) + 200 bps].

47. Accordingly, the Commission approves the Interest on Loan as 9% p.a.

D. Depreciation

Petitioner' Submission

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

Commission's Analysis and Decision

49. Regulation 15 of the RE Tariff Regulations 2020 specifies the principles for computation of depreciation as follows:

*"**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."

50. According to Clause (b) of Regulation 7 of the RE Tariff Regulations 2020, the financial norms, except for capital cost, shall be the ceiling norms for determining the project specific tariff. Accordingly, the salvage value of the asset is considered 10% and depreciation is allowed up to 90% of the capital cost. Further, the Commission has considered the depreciation at 4.67% for the first 15 years and 2% for the remaining period spread over the useful life of the project as proposed by the Petitioner.

Table-5: Depreciation approved by the Commission

Particulars	As proposed by the Petitioner	As Considered by the Commission
Useful Life	25 Years	25 Years
Debt	70%	80%
Repayment Period	15	15
Depreciation for 1st 15 Years	4.67%	4.67%
Depreciation for 16th year onward	2%	2%
Salvage Value as % of Capital Cost	10%	10%

E. Return on Equity

Petitioner' Submission

51. The Petitioner has claimed Return on Equity in terms of Regulation 16 of the RE Tariff Regulations 2020 as 14% grossed up at MAT rate for the first 20 years and Corporate Tax rate for remaining five years period of the project life. The Minimum Alternate Tax (MAT) rate and Corporate Tax rate considered by the Petitioner are 17.47% and 34.94%, respectively.

Commission's Analysis and Decision

52. Regulation 16 of the RE Tariff Regulations 2020 specifies Return on Equity as follows:

*"**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 Periods"

53. The Commission in its generic tariff order in Petition No 2/SM/2021 for renewable energy project to be commissioned in FY 2021-22 had considered the MAT rate of 17.47% and Corporate Tax rate of 34.94%.

54. The Commission observes that the submission of the Petitioner is according to the RE Tariff Regulations 2020. Accordingly, the Commission has considered Return on Equity (ROE) as 16.96% i.e. 14% / (1-17.47%) (after grossing up by MAT rate of 17.47%) for the first 20 years of the project and as 21.52 % i.e. 14% / (1- 34.94%) (after grossing up by Corporate Tax rate of 34.94%) for the remaining five years of the useful life of the project.

F. Interest on Working Capital

Petitioner' Submission

55. The Petitioner has claimed interest on working capital in terms of Regulation 17 of the RE Tariff Regulations 2020 as 10.88% after taking into consideration of the average State Bank of India MCLR (one-year tenor) prevalent during the six months period from 10.02.2020 to 10.07.2020 as 7.38%. Further, the Petitioner has computed the working capital requirement in accordance with the RE Tariff Regulations 2020 by considering Operational and Maintenance expenses for one-month, receivable equivalent to 45 days of tariff and maintenance spare equivalent to 15% of Operation and Maintenance expenses for determining the levelized tariff.

Commission's Analysis and Decision

56. Regulation 17 of the RE Tariff Regulations specifies the working capital requirements of the RE projects 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 & 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.".

57. It would be pertinent to mention that the Commission while notifying the levelised generic tariff for renewable energy technologies for FY 2021-22 in its Order dated 31.03.2021 had considered the interest on working capital as 10.5% (Avg. of six months SBI MCLR one-year tenor (7%) + 350 bps). Accordingly, the Commission has decided to consider 10.5% as interest on working capital for the purpose of tariff determination in the present petition.

G. Capacity Utilisation Factor (CUF)

Petitioner's Submission

58. The Petitioner has claimed the capacity utilisation factor (CUF) of 25.11% for the 22 MW phase-1 and 27.24 % for 70 MW phase-2 of Kayamkulam floating SPV Project. The Petitioner has submitted the quoted annual generation submitted by the successful contractor M/s BHEL for 22 MW Phase-1 as 48.42 MU and Ms/ Tata Power Solar System Ltd for 70 MW phase-2 as 167.5 MU of Kayamkulam Floating SPV Project during reverse auction based on reference global solar radiation at the project sites. This guaranteed annual generation under the reverse auction process has been considered for computation of CUF of the projects as 25.55% for 22 MW Phase-1 and as 27.24% for 70 MW Phase-2 by the Petitioner while calculating the levelized tariff.

59. It would be pertinent to mention that as per the power purchase agreement (PPA) signed between the Petitioner and the Respondent, the Petitioner is entitled to supply energy corresponding to minimum CUF of 16% and a maximum CUF of 28% from the said project in a

contract year to the Respondent. The Petitioner has submitted that the supply of solar power from the project would be at applicable tariff up to 28% CUF on annual basis. The over generation or excess energy above the CUF of 28% from the project shall be made available to the Respondent at 75% of the applicable tariff.

Commission's Analysis and Decision

60. Regulation 18 of the RE Tariff Regulations 2020, as defined below, specifies number of hours for calculation of CUF/PLF as 8766.

"The number of hours in a year for calculation of capacity utilization factor and plant load factor, as the case may be, shall be considered as 8766."

61. Regulation 47 of the RE Tariff Regulations 2020 specifies the norms for Capacity Utilization Factor (CUF) of units generated in a year in respect of the floating solar projects as follows:

"**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%:

Provided further that the minimum capacity utilization factor for solar thermal power projects shall be 23%:

Provided also that the minimum capacity utilisation factor for floating solar projects shall be 19%.

62. As per the above Regulations, the capacity utilisation factor shall be approved by the Commission with a condition of minimum capacity utilisation factor of 19% for floating solar projects. The Commission observes that the Petitioner has considered a CUF of 25.11% for Phase-1 of 22 MW project and CUF of 27.24% for Phase-2 of 70 MW after considering the solar radiation available on the respective sites. The Commission also notes that the Petitioner has signed PPA with the Respondent corresponding to minimum CUF of 16% and a maximum CUF of 28% in a contract year. Upon review of the CUF guaranteed by the successful bidders and provisions of the PPA, the Commission decides to consider the CUF of 25.11% for Phase-1 of 22 MW project and CUF of 27.24% for Phase-2 of 70 MW for the computation of project specific tariff.

H. Operation and Maintenance Expenses

Petitioner's Submission

63. The Petitioner has submitted that the O&M of the projects after its commissioning for first three years is included in the project cost and the same is included in the scope of EPC contractor. Therefore, Petitioner has considered O&M cost of the projects for initial three (03) years as NIL. Thereafter, the Petitioner has considered O&M cost at the rate of Rs.3.5 lakh/ MW/ Year considering the project location with escalation at the rate of 3.84% per annum as per Regulation19(2) of RE Tariff Regulations 2020.

Commission's Analysis and Decision

64. Regulation 19 of the RE Tariff Regulations 2020 specifies the norms of Operation and Maintenance Expenses (O&M expenses) in respect of RE projects as follows:

"*19. Operation and Maintenance Expenses*

(1) *Operation and Maintenance expenses shall be determined for the Tariff Period of the project based on normative O&M expenses specified in these regulations for the first year of the Control Period."*

(2) Normative O&M expenses allowed during first year of the Control Period i.e., financial year 2020-21 under these Regulations shall be escalated at the rate of 3.84% per annum over the Tariff Period."

65. Regulation 48 of the RE Tariff Regulations 2020 specifies the principle of determining the O & M expenses for floating solar projects as follows :

" *48. Operation and Maintenance expenses*

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

66. The Commission notes the submission by the Petitioner about not considering the cost of O&M for the first three years of the project as it has been included in the EPC cost discovered through competitive bidding process. The Commission observes that the O & M cost applicable after three years of the commissioning of the projects is below 1% of the EPC cost and in line with the prevailing market practice. Accordingly, the Commission has considered the O& M expenses of Rs.3.5 lakh/ MW/ Year for both phase-1 of 22MW and phase-2 of 70 MW projects

as proposed by the Petitioner. Further, as specified in the Regulations, the escalation rate of 3.84% per annum shall be applicable on O & M expenses and hence, the Commission has considered an escalation rate of 3.84% per annum on O & M expenses as proposed by the Petitioner.

I. Auxiliary Consumption

Petitioner's Submission

67. The Petitioner has considered Auxiliary Power Consumption (APC) of 0.75% as per Regulation 49 of RE Tariff Regulations, 2020.

Commission's Analysis and Decision

68. Regulation 49 of the RE Tariff Regulations specifies methodology to consider auxiliary consumption for floating solar projects as follows:

"*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%

69. As per the above Regulation the maximum 0.75% of auxiliary consumption has been allowed for floating solar projects. The Petitioner has not provided any further details regarding the auxiliary consumption. Accordingly, the Commission has decided to consider auxiliary consumption of 0.75% for both Phase-1 of 22MW and Phase-2 of 70 MW projects as proposed by the Petitioner.

J. Module Degradation

Petitioner's submission

70. The Petitioner has considered degradation factor of 0.7% per annum for Solar Module by citing reason that the same was included in the technical bid specification and is as per the normal industry practice.

Commission's Analysis and Decision

71. The Commission observes that the Petitioner has proposed Module degradation factor of 0.70%. However, as explained in the Statement of Reasons for the RE Tariff Regulations 2020, the quality and efficiency of Solar Module have increased over the period. Accordingly, the Commission has not considered the module degradation factor as proposed by the Petitioner while determining the project specific tariff in this case.

K. Transmission losses

Petitioner's submission

72. The Petitioner has considered loss of 1.25% on account of loss in power evacuation system consisting of Transformer loss (33 KV /220 KV), loss due to 33 KV cables and system availability loss for calculating energy sent out from the project for determination of tariff.

Commission's Analysis and Decision

73. The Commission observes that no specific details have been provided by the Petitioner for its claim of transmission loss of 1.25%. The Commission observes that as per the PPA, the metering shall be done at the interconnection point which is the interface point of Kayamkulam Floating Solar PV power plant with the STU/CTU transmission network at 220 KV level at the existing premises of RGCCP. The Detailed Project Report specifying the technical details for both the projects refers metering point for EPC contractor at 33 kV. As the Petitioner has not provided any details or justification for transmission loss, the Commission has decided not to consider transmission loss for the purpose of tariff determination in the present petition.

L. Discount Factor

Petitioner's Submission

74. The Petitioner has claimed discount factor of 9.63 % for the first 20 years of the project by considering the MAT rate and 8.47% for the remaining 5 years of the useful life of the project by considering the Corporate Tax rate.

Commission's Analysis and Decision

75. Regulation 10(2) of the RE Tariff Regulations 2020 specifies the methodology to calculate discount factor for the purpose of levelised tariff computation as under:

"10. Tariff Design

… …

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

76. The Commission has consistently followed the practise of single discount rate and applied it to year on year cost to arrive at the levelized tariff and is of the view that the methodology is adequate.

77. In accordance with Regulation 10 of the RE Tariff Regulations 2020, the discount factor considered for the purpose of determination of tariff in this case is equal to the post tax weighted average cost of capital on the basis of approved debt-equity ratio (80:20). Interest Rate considered for the loan component (i.e., 80% of capital cost) is 9%. For equity component (i.e., 20% of capital cost), the rate of Return on Equity (ROE) is considered at post-tax rate of 14%. Further, Corporate Tax rate has been considered as 34.94%. Accordingly, the discount factor derived by this method for this case is 7.48%.

Discount Factor = [{(9% x 0.80) x (1 – 34.94%)} + (14.0% x0.20)] = 7.48%

Parameters Approved by the Commission

78. The following table provides summary of various parameters approved by the Commission for determination of project specific tariff for both Phase-1 of 22MW and Phase-2 of 70 MW of Kayamkulam Floating Solar PV power project.

Table-6: Parameters approved by the Commission

Summary of Project Specific Parameters					As Proposed by the Petitioner		As Approved by the Commission	
Sl. No.	Head	Sub-Head(1)	Sub-Head(2)	Unit	Phase -1	Phase-2	Phase-1	Phase-2
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	22	70	22	70
			Capacity Utilisation Factor	%	25.11	27.24	25.11	27.24
			Auxiliary Consumption	%	0.75	0.75	0.75	0.75
			Degradation loss	%	0.70	0.70	0	0
			Transmission Loss	%	1.25	1.25	0	0
			Useful Life	Years	25	25	25	25
2	Project Cost	Capital Cost/ MW	Normative Capital Cost	Rs Lakhs/MW	527.48	586.54	523.36	576.60
			Capital Cost	Rs (Lakh)	11604.52	41057.57	11514.0	40362.0
			Net Capital Cost	Rs (Lakh)	11604.52	41057.57	11514.0	40362.0
3	Financial Assumption	Debt: Equity	Tariff Period	Years	25	25	25	25
			Debt	%	70	70	80	80
			Equity	%	30	30	20	20
			Total Debt Amount	%	8123.17	28740.30	9211.20	32289.6
			Total Equity Amount	Rs (Lakhs)	3481.36	12317.27	2302.80	8072.40
		Debt Component	Loan Amount	Rs (Lakhs)	8123.17	28740.30	9211.20	32289.6
			Moratorium Period	Years	0	0	0	0
			Repayment Period (Including Moratorium)	Years	15	15	15	15
			Interest Rate	%	9.38	9.38	9	9
		Equity Component	Equity Amount	Rs (Lakhs)	3481.36	12317.27	2302.80	8072.40
			Return on Equity for first 20 years	% p.a.	16.96	16.96	16.96	16.96
			Return on Equity 21st Year onward	% p.a.	21.52	21.52	21.52	21.52
		Depreciation	Discount Rate for first 20 Years	%	9.62	9.62	7.48	7.48
			Discount Rate for last 5 Years	%	8.47	8.47	7.48	7.48
			Depreciation Rate for 1st 15 years	%	4.67	4.67	4.67	4.67
			Depreciation Rate 16th year onwards	%	2	2	2	2
4	Operation & Maintenance	O&M expense per annum from 3rd year		Rs Lakhs/MW	3.5	3.5	3.5	3.5
		Escalation factor for O&M expense		%	3.84	3.84	3.84	3.84
5	Working Capital	O&M expense		Months	1	1	1	1
		Maintenance Spare as % of O&M expenses		%	15	15	15	15
		Receivables		Months	1.5	1.5	1.5	1.5
		Interest on Working Capital		% p.a.	10.88	10.88	10.5	10.5
6	Tariff	Levelised Tariff		Rs/ kWh	3.51	3.58	2.91	2.94

Tariff Approved by the Commission

79. Based on the parameters, assumptions and methodology outlined in earlier paragraphs, the levelized Tariff for Phase-1 of 22 MW works out to Rs.2.91 per kWh and that for Phase-2 of 70 MW works out to be Rs.2.94 per kWh. The detailed calculation is attached as Annexure. The Weighted average tariff calculated for 92 MW is Rs.2.94 per kWh.

Table-7: Tariff approved by the Commission

Weighted Average of 92 MW Floating SPV Project						
Sr. No.	**Name of Floating SPV Power Project**	**Net Life time Generation Per MW (MU)**	**Net Life time Generation from project (MU)**	**Capital Cost (Rs. lakh)**	**Capital Cost (Rs. lakh/ MW)**	**Payable Levelised Tariff (₹/kWh)**
1	22 MW Kayamkulam floating SPV Project	54.48	1198.52	11514.00	523.36	2.91
2	70 MW Kayamkulam floating SPV Project	59.10	4136.96	40362.00	576.60	2.94
3	**Weighted Average for 92 MW floating SPV Project**	**113.58**	**5335.49**	**51876.00**	**563.87**	**2.94***

* *Levelised Tariff computed is Rs 2.937 per kWh which has been rounded off to Rs 2.94 per kWh*.

80. Although the Petitioner is implementing the projects in two stages i.e. 22 MW and 70 MW, a single PPA has been signed with the Respondent for the total 92 MW capacity. Accordingly, the Commission determines the interim tariff for the electricity generated from the 92 MW Kayamkulam Floating Solar Plant of the Petitioner as Rs.2.94 per kWh. However, considering that the said project is yet to be commissioned, the Commission gives liberty to the Petitioner to approach the Commission with detailed break up of actual costs and other parameters, if required.

81. Annexure-1 and Annexure-1A given hereinafter form part of the order.

82. Accordingly, the Petition No. 341/GT/2019 is disposed of in terms of the above.

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
(Pravas Kumar Singh)	**(Arun Goyal)**	**(I.S. Jha)**	**(P.K. Pujari)**
MEMBER	**MEMBER**	**MEMBER**	**CHAIRPERSON**

Annexure-1

Determination of Tariff - Components for 22 MW Phase-1 Kayamkulam Floating Solar Project

Units Generation	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Installed Capacity (For Calculation of Tariff)	MW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation	MU	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Degradation Loss	MU	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Generation after Degradation loss	MU	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Transmission Loss	MU	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aux Consumption	MU	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Net Generation	MU	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18
Tariff Components (Fixed Charge)	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
O&M Expenses	₹Lakhs	0.00	0.00	0.00	3.50	3.63	3.77	3.92	4.07	4.23	4.39	4.56	4.73	4.91	5.10	5.30	5.50	5.71	5.93	6.16	6.40	6.64	6.90	7.16	7.44	7.72
Depreciation	₹Lakhs	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	24.44	10.44	10.44	10.44	10.44	10.44	10.44	10.44	10.44	10.44	10.44
Interest on term loan	₹Lakhs	36.58	34.38	32.18	29.98	27.78	25.58	23.38	21.18	18.98	16.79	14.59	12.39	10.19	7.99	5.79	3.59	1.39	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	₹Lakhs	1.05	1.02	0.99	1.09	1.07	1.05	1.02	1.00	0.97	0.95	0.93	0.91	0.88	0.86	0.84	0.63	0.61	0.60	0.61	0.62	0.69	0.70	0.71	0.72	0.73
Return on Equity	₹Lakhs	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.65
Tax on ROE	₹Lakhs	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	7.87	7.87	7.87	7.87	7.87
Total Fixed Cost	₹Lakhs	**79.83**	**77.60**	**75.37**	**76.77**	**74.68**	**72.60**	**70.52**	**68.45**	**66.38**	**64.32**	**62.27**	**60.22**	**58.18**	**56.15**	**54.12**	**37.92**	**35.91**	**34.88**	**34.97**	**35.21**	**40.30**	**40.56**	**40.84**	**41.12**	**41.42**
Per Unit Tariff Components	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
PU O&M Expenses	₹/kWh	0.00	0.00	0.00	0.16	0.17	0.17	0.18	0.19	0.19	0.20	0.21	0.22	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.32	0.33	0.34	0.35
PU Depreciation	₹/kWh	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
PU Interest on term loan	₹/kWh	1.67	1.57	1.47	1.37	1.27	1.17	1.07	0.97	0.87	0.77	0.67	0.57	0.47	0.37	0.26	0.16	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PU Interest on working Capital	₹/kWh	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
PU Return on Equity	₹/kWh	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
PU Tax on ROE	₹/kWh	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.36	0.36	0.36	0.36	0.36
PU Tariff Components	₹/kWh	**3.65**	**3.55**	**3.45**	**3.51**	**3.42**	**3.32**	**3.23**	**3.13**	**3.04**	**2.94**	**2.85**	**2.76**	**2.66**	**2.57**	**2.48**	**1.74**	**1.64**	**1.60**	**1.60**	**1.61**	**1.84**	**1.86**	**1.87**	**1.88**	**1.90**
Levelised Tariff	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Discount Factors		1.00	0.93	0.87	0.81	0.75	0.70	0.65	0.60	0.56	0.52	0.49	0.45	0.42	0.39	0.36	0.34	0.32	0.29	0.27	0.25	0.24	0.22	0.20	0.19	0.18
Discounted Tariff Component	₹/kWh	3.65	3.30	2.99	2.83	2.56	2.32	2.09	1.89	1.71	1.54	1.38	1.25	1.12	1.01	0.90	0.59	0.52	0.47	0.44	0.41	0.44	0.41	0.38	0.36	0.34
Levelised Tariff	₹/kWh	**2.91**																								

Annexure-1A

Determination of Tariff - Components for 70 Mw Phase-2 Kayamkulam Floating Solar Project

Units Generation	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Installed Capacity (For Calculation of Tariff)	MW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation	MU	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39
Degradation Loss	MU	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generation after Degradation loss	MU	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39
Transmission Loss	MU	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aux Consumption	MU	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Net Generation	MU	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37
Tariff Components (Fixed Charge)	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
O&M Expenses	₹Lakhs	0.00	0.00	0.00	3.50	3.63	3.77	3.92	4.07	4.23	4.39	4.56	4.73	4.91	5.10	5.30	5.50	5.71	5.93	6.16	6.40	6.64	6.90	7.16	7.44	7.72
Depreciation	₹Lakhs	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	26.93	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
Interest on term loan	₹Lakhs	40.30	37.88	35.46	33.03	30.61	28.19	25.76	23.34	20.92	18.49	16.07	13.65	11.22	8.80	6.38	3.95	1.53	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	₹Lakhs	1.15	1.12	1.09	1.19	1.16	1.14	1.11	1.08	1.06	1.03	1.01	0.98	0.95	0.93	0.91	0.68	0.65	0.64	0.65	0.66	0.74	0.75	0.76	0.77	0.78
Return on Equity	₹Lakhs	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14	16.14
Tax on ROE	₹Lakhs	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	8.67	8.67	8.67	8.67	8.67
Total Fixed Cost	₹Lakhs	**87.95**	**85.49**	**83.04**	**84.21**	**81.90**	**79.59**	**77.28**	**74.98**	**72.69**	**70.40**	**68.12**	**65.85**	**63.58**	**61.32**	**59.07**	**41.19**	**38.96**	**37.80**	**37.87**	**38.12**	**43.70**	**43.96**	**44.24**	**44.52**	**44.82**
Per Unit Tariff Components	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
PU O&M Expenses	₹/kWh	0.00	0.00	0.00	0.15	0.15	0.16	0.17	0.17	0.18	0.19	0.19	0.20	0.21	0.22	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.33
PU Depreciation	₹/kWh	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
PU Interest on term loan	₹/kWh	1.70	1.60	1.50	1.39	1.29	1.19	1.09	0.98	0.88	0.78	0.68	0.58	0.47	0.37	0.27	0.17	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PU Interest on working Capital	₹/kWh	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
PU Return on Equity	₹/kWh	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
PU Tax on ROE	₹/kWh	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.37	0.37	0.37	0.37	0.37
PU Tariff Components	₹/kWh	**3.71**	**3.61**	**3.50**	**3.55**	**3.46**	**3.36**	**3.26**	**3.16**	**3.07**	**2.97**	**2.87**	**2.78**	**2.68**	**2.59**	**2.49**	**1.74**	**1.64**	**1.59**	**1.60**	**1.61**	**1.84**	**1.85**	**1.87**	**1.88**	**1.89**
Levelised Tariff	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Discount Factors		1.00	0.93	0.87	0.81	0.75	0.70	0.65	0.60	0.56	0.52	0.49	0.45	0.42	0.39	0.36	0.34	0.32	0.29	0.27	0.25	0.24	0.22	0.20	0.19	0.18
Discounted Tariff Component	₹/kWh	3.71	3.36	3.03	2.86	2.59	2.34	2.11	1.91	1.72	1.55	1.40	1.26	1.13	1.01	0.91	0.59	0.52	0.47	0.44	0.41	0.44	0.41	0.38	0.36	0.33
Levelised Tariff	₹/kWh	**2.94**																								