NAGALAND ELECTRICITY REGULATORY COMMISSION

TARIFF ORDER

20MW Solar Power Project at Jalukie, Under Peren District Nagaland.

Dated: 27th August, 2020.

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LIST OF CONTENTS

ABBREVIATIONS

Abbreviation	Description
ARR	Aggregate Revenue Requirement
CERC	Central Electricity Regulatory Commission
Cr	Crores
DE	Debt Equity
FY	Financial Year
KV	Kilo volt
KVA	Kilo volt Amps
KW	Kilo Watt
kWh	kilo Watt hour
MU	Million Units
MW	Mega Watt
NERC	Nagaland Electricity Regulatory Commission
NTP	National Tariff Policy
O&M	Operation & Maintenance
PLF	Plant Load Factor
PLR	Prime Lending Rate
R&M	Repairs and Maintenance
RoR	Rate of Return
Rs.	Rupees
S/s	Sub Station
SBI	State Bank of India
SERC	State Electricity Regulatory Commission
YoY	Year on Year

Before the
Nagaland Electricity Regulatory Commission
Kohima, Nagaland

Case No. : 02/2020-21

In the matter of

Determination of Generation Tariff on the Petition filed by M/s. Halo Energie Pvt. Ltd, Hyderabad.
-Petitioner.

Present

Er. IMLIKUMZUK AO
Chairman-cum-Member,
NERC, Kohima.

ORDER
(Passed on 27th August, 2020)

1. The Nagaland State Power Policy, 2018 under clause 4(A)(xvi) states "the Government of Nagaland realizes the importance of new & renewable sources of energy and shall endeavour to get the maximum benefit out of the new & renewable sources of energy which are clean and eco-friendly".

2. M/s. Halo Energie Private Limited, Hyderabad (herein after referred to Project Developer/Petitioner) proposes to set up 20 MW Solar Power Project at Jalukie area under Peren District, Nagaland. The Project Developer has projected the total Project cost as Rs. 84.00 Crore, Debt Equity Ratio as 70:30, CUF @ 19.20% and proposed levellised tariff @ Rs.4.20/kWh.

3. The Project Developer filed Petition before the Commission for determination of Generation Tariff for the said Solar Power Project on 29th June, 2020.

4. The Commission, upon following the procedures and in exercise of the powers vested under Section 62(1)&(3) and Section 64 3(a) of the Electricity Act, 2003 and Regulation 10 of Nagaland Electricity Regulatory Commission (Terms and Conditions for Determination of Generation Tariff for Renewable Energy) Regulations, 2011 (herein after referred to as RE Regulations) and other enabling provisions in this behalf, has approved the Generation Tariff **@ Rs.4.14/kWh** for the said Solar Power Project with the following Terms & Conditions:

a. The Tariff shall be further reduced based on any subsidy/incentive etc received by the Developer from Central or State Government for the said solar power project.

b. The Tariff shall be reviewed based on the submission of capital expenditure actually incurred up to the date of commercial operation duly audited and certified by the statutory auditors.

c. Any escalation in the tariff shall not be allowed beyond the approved rate unless on account of uncontrollable factor.

d. The Execution and Commissioning of the project is completed within 14 (fourteen) months from the date of signing of Tariff Annexure to the signed PPA.

5. Power Evacuation (grid connectivity):

The evacuation of power from the said Solar Power Plant shall be through 66kv line by upgradation of existing 33kv substation to 66kv substation at Jalukie.

6. Communication and Data Transfer System:

The Project Developer shall establish necessary Communication & Data Transfer System and co-ordinate with the State Load Dispatch Centre for:

(1) Forecasting & Scheduling as per the CERC applicable norms.
(2) Exchange of data of quantity of electricity transmitted through the Grid.
(3) Real time Grid Operation and Dispatch of electricity in accordance with IEGC and State Grid Code.

7. Grid Code:

The Project Developer shall ensure compliance of the Indian Electricity Grid Code (IEGC), 2010 and NERC (Grid Code) Regulations, 2012 as amended from time to time.

Sd/-
Er. IMLIKUMZUK AO
Chairman-cum-Member,
NERC, Kohima.

Place: Kohima, Nagaland.
Date: 27th August, 2020.

1. INTRODUCTION

1.1. Nagaland Electricity Regulatory Commission

In exercise of the powers conferred by the Electricity Act, 2003, the State Government of Nagaland constituted an Electricity Regulatory Commission to be known as "Nagaland Electricity Regulatory Commission" for the State of Nagaland, as notified on 21st February, 2008.

The Commission is a one-member body designated to function as an autonomous authority responsible for Regulation of the Power Sector in the State of Nagaland. The powers and the functions of the Commission are as prescribed in the Electricity Act, 2003. The head office of the Commission is presently located at Kohima, Nagaland.

The Nagaland Electricity Regulatory Commission started to function with effect from 4th March, 2008 with the objectives and purposes for which the Commission has been established.

1.1.1. In accordance with the provisions of the Act, the Nagaland Commission discharges the following functions:

a) Determine the tariff for generation, supply, transmission and wheeling of electricity, wholesale, bulk or retail, as the case may be, within the State: Provided that where open access has been permitted to a category of consumers under Section 42, the State Commission shall determine only the wheeling charges and surcharge thereon, if any, for the said category of consumers;

b) Regulate electricity purchase and procurement process of distribution licensees including the price at which electricity shall be procured from the generating companies or licensees or from other sources through agreements for purchase of power for distribution and supply within the State.

c) Facilitate intra-State transmission and wheeling of electricity.

d) Issue licenses to person(s) seeking to act as transmission licensees, distribution licensees and electricity traders with respect to their operations within the State.

e) Promote co-generation and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee;

f) Adjudicate upon the disputes between the licensees and generating companies; and to refer any dispute for arbitration.

g) Levy fee for the purposes of this Act.

h) Specify State Grid Code consistent with the Grid Code specified under Clause (h) of sub-section (1) of Section 79;

i) Specify or enforce standards with respect to quality, continuity and reliability of service by licensees;

j) Fix the trading margin in the intra-State trading of electricity, if considered, necessary.

k) Discharge such other functions as may be assigned to it under the Act.

1.1.2. Further, the Commission also advises the State Government on all or any of the following matters namely:

a) Promotion of competition, efficiency and economy in activities of the electricity industry.

b) Promotion of investment in electricity industry.

c) Reorganization and restructuring of electricity industry in the State.

d) Matters concerning generation, transmission, distribution and trading of electricity or any other matter referred to the State Commission by that Government.

1.1.3. The State Commission ensures transparency while exercising its powers and discharging its functions.

1.1.4. In discharge of its functions, the State Commission is guided by the National Tariff Policy (NTP) has brought out by GOI in compliance to Section 3 of the Act. The objectives of the NTP are to:

a) Ensure availability of electricity to consumers at reasonable and competitive rates.

b) Ensure financial viability of the sector and attract investments.

c) Promote transparency, consistency and predictability in regulatory approaches across jurisdictions and minimize perceptions of regulatory risks.

d) Promote competition, efficiency in operations and improvement in quality of supply.

1.2. Tariff Petition

M/s Halo Energie Private Limited, Hyderabad proposes to set up 20 MW Solar Power Project at Jalukie area under Peren District, Nagaland and filed Petition before the Commission for determination of its Generation Tariff on 29th June, 2020.

1.3. Admission of the Petition and Publication:

The Commission observed that the petition filed by the Petitioner was lacking vital information as specified in Commission's RE Regulations. Therefore, the Petitioner was asked to submit the required information and clarification through letter/e-mail. The Tariff Petition was then admitted on 11th August, 2020 to avoid delay in processing of tariff.

The Commission directed the petitioner to publish the Public Notice giving the summary of the petition in the abridged form and manner as approved in accordance with section 64 of the Electricity Act, 2003 to ensure public participation. Through the public notice, the stakeholders/public were invited to file their objections and suggestions, if any, on the said petition latest by 15th August, 2020. The petitioner published the public notice in the following local newspaper:

Sl. No.	Name of the Newspaper	Language	Date of Publication
1.	Eastern Mirror	English	01st August, 2020
2.	The Morung Express	English	01st August, 2020
3.	Nagaland Post	English	02nd August, 2020

2. SUMMARY OF TARIFF PETITION

2.1. Project Cost & Annual Fixed Charges

The proposed project cost of the 20 MW Solar Power Plant at Jalukie, Peren District, Nagaland along with Annual Fixed Charges (AFC) & levellised Tariff are as shown in Table below.

Table 2.1: Project cost & AFC projected by petitioner

Sl. No	Assumption Head	Sub-Head (1)	Sub-Head (2)	Unit	Parameter Values
			Installed Power Generation		
			Capacity	MW	20
1	Power Generation	Capacity	Capacity Utilization Factor	%	16.09%
			Commercial Operation Date	mm/yyyy	Aug-21
			Useful Life	Years	25
				Rs. lakh	
			Per MW Cost	Rs. lakh	420
2	Project Cost	Capital Cost / MW	Total Capital Cost	Rs. lakh	8400
			Capital Subsidy, if any	Rs. lakh	NA
			Net Capital Cost	Rs. lakh	8400
			Tariff Period	Years	25
			Debt	%	70
		Debt Equity	Equity	%	30
			Total Debt Amount	Rs. lakh	5880
			Total Equity Amount	Rs. lakh	2520
			Loan Amount	Rs. lakh	5880
			Moratorium Period	Years	0
		Debt Component	Repayment Period (incld		
			Moratorium)	Years	10
			Interest Rate	%	11.00%
3	Financial Assumptions		Equity amount	Rs. lakh	2520.00
			Discount Rate	%	13.65%
		Depreciation	Depreciation Rate (I.Tax)		
				%	15.00%
				%	
	Operation & Maintenance	Normative O&M Expenses			1%

Sl. No	Assumption Head	Sub-Head (1)	Sub-Head (2)	Unit	Parameter Values
4					
		O&M Expenses per annum		Rs. Lakh	84.00
		Escalation factor for O&M			
		Expenses		%	5.72%

2.2 Prayers of petitioner

The petitioner has prayed in its petition for the following:

To admit and approve the Petition for the 20 MW Solar Power Plant at Jalukie, Peren District, Nagaland.

To approve the tariff submitted by petitioner.

Condone any inadvertent delay/omissions/errors/rounding off differences/shortcoming and Petitioner may please be permitted to add/change/modify/alter the petition.

Permit petitioner to file additional data/information as may be necessary.

Pass such orders as the Commission may deem fit and proper, keeping in view the facts and circumstances of the case.

3. PUBLIC HEARING

3.1. Public Response to the Petition

On admitting the Petition for determination of levellised tariff for the proposed 20 MW Solar Power Plant, the Commission directed the petitioner to make copies of the petition available to the general public, post the petition on their website and also publish the same in newspapers in abridged form and invite comments/objections from the stakeholders/Public.

Through the public notice, the stakeholders/public were invited to file their objections and suggestions, if any, on the petition latest by 15thAugust, 2020.

No objection/suggestion was received by the Commission on the petition till the last date of submission.

3.2 Public Hearing

The Commission could not hold the Public Hearing on the proposed tariff petition due to various restrictions on public movement/gathering by the State Government in view of COVID-19 Pandemic. As such a Public Notice to this effect was published on 12th August, 2020 in following local Newspaper inviting views/comments on the tariff petition in writing, if any, to be submitted latest by 20th August, 2020.

Sl. No.	Name of the Newspaper	Language	Date of Publication
1.	Nagaland Post	English	12th August, 2020
2.	Eastern Mirror	English	12th August, 2020
3.	The Morung Express	English	12th August, 2020
4.	Nagaland Page	English	12th August, 2020

No objection/suggestion was received by the Commission on the petition till the last date of submission.

4. IMPLEMENTATION AND PROJECT COST

4.1. Overview of the Project

Location and Accessibility:

Proposed site location is situated at latitude: 25°39'40"N and longitude 77°43’20.418”E near a town called Jalukie, in Peren District, State – Nagaland.

The available land area is 120 acres (approx.) to implement 20 MW power plant. The distance from substation to site is nearly 2 kms. The site has a decent irradiation level of 4.57 kWh/m^2/day. A minimum of 19.2% of (AC) PLF is expected.

The site is a little remote, but has connectivity through intra-state and interstate road, railway and airways. Distance from site till approach road is 3.5 km. The nearest airport (Dimapur) is roughly 45km from the town of Jalukie. The proposed land site has boundary by North with Mathew’s/D.K. Zeliang’s Plantation/Boundary nallah, boundary by South with Veterinary Departments land, boundary by East with Veterinary Departments land, and boundary by West with Shri. Hupen’s Land.

4.2 Summary of Grid Connectivity (Power evacuation):

The Project Developer submitted that, 66 KV switchyard has been envisaged for evacuation of power through step-up transformer for the proposed solar plant. The switchyard will be in adjacent to Central Control Building. The switchyard will be interconnected with the 66 KV grid sub-station by means of overhead conductor.

The Power Department vide letter No.CEL/TB/NERC/T-017/06 dated 26th August, 2020 submitted its view and comments as under:

1. The 5MVA, 33/11 kv Sub-station at Jalukie is connected to the grid through a single circuit 66kv Transmission Line from 66kv Sub-station at Ganeshnagar. However, the 66kv Transmission Line is presently charged and operated at 33kv with 33kv sending end equipments at Ganeshnagar and the receiving end equipments at Jalukie at 33kv voltage level. As such, evacuation of power from the proposed Solar Power Plant at 66kv level would not be possible at this stage and also due to the fact that the Department do not have any plan to upgrade the system to 66kv level in the near future.
2. Alternatively, the firm may explore evacuation at 33kv level by installing a 40 MVA, 66/33 kv Transformer with Protective Switchgear at Jalukie Sub-station at their cost.

Commission’s Analysis:

The Grid Connectivity at 66 KV level will be more reliable than 33 KV (line interruption is more frequent) as the Solar Power Project requires grid supply as backup power for generation and evacuation of power. Therefore, DoP shall provide continuous grid supply as per signed PPA.

Commission observes that the existing 66KV transmission line from Ganeshnagar to Jalukie can be directly charged and operated at 66KV in Jalukie by upgrading the existing 33/11KV substation, Jalukie to 66/33 KV substation. This will provide grid connectivity to the proposed solar power project at 66KV as required.

As per the Present arrangement, it is seen that the power supply to Jalukie and Peren is fed at 33KV through 66KV line from 10 MVA, 66/33KV substation at Ganeshnagar.

Therefore, the DoP shall re-examine the capacity of 66/33 KV transformer required for up-gradation of existing 33/11KV substation at Jalukie as this Sub-station will also be feeding Peren at 33 KV level.

4.3 Capital Cost – Petitioner submission:

The petitioner has proposed total capital cost of Rs. 84 crores for the 20 MW SPV Plant. The summary of the capital cost submitted by the petitioner is provided below:

Sl. No	Particulars	INR Lakh
1	PV Modules	4065.60
2	Land Lease (Per MW per Year)	4.20
3	Civil & General Works	1008.00
4	Mounting Structures	714.00
5	Power Conditioning Unit	672.00
6	Evacuation cost up-to interconnection point (Cables & Transformers)	1092.00
7	Pre-operative & preliminary expenses including IDC & Contingency	844.20
	Total Capital Cost	**8400.00**

PV Modules: Tier-I Company Solar PV Mono-Crystalline Modules with 25-year performance guarantee and 10 year product warranty. This consists of using a mixture of 345Wp - 350Wp modules. These TEIR I modules will have any efficiency above 18% under STC and will have a depreciation of only 0.5% per year

Land Lease: Government fixed rate for 5 acres (1MW requires 5 acres) per year.

Civil & General Works: RCC Foundations to the designed depth with 50MT/MW TMT bars, construction of Inverter & Control Rooms, Watch Towers, and Compound wall. Cutting and filling the areas according to contour (Area grading and clearing of jungle) and laying of water pipelines for cleaning purpose.

Mounting Structures: Hot dipped Galvanised MMS above the ground level of 25 MT per/MW such as rafters purlins etc

Power Conditioning Unit: Tier-I Company Inverters with smart controller, HT, LT breakers, power transformers, AC & DC cables from SCB SCADA and weather monitoring system with online UPS

Evacuation cost up to interconnection point (Cables & Transformers): Transmission line (66kv) up to the Government substation along with RCC 9.5M poles. This also includes Bay extension (ABT meters, breakers, 6 pole structure along with CT, PT set up) at government substation. Auxiliary transformer, switchyard breaker, CT, PT setup at the plant evacuation point .

Pre-operative & preliminary expenses including IDC & Contingency: SPV formation, debt syndication, processing fee and other permission/approvals. Transportation of all equipment, custom clearances, procurement of skilled & unskilled manpower, travel expenses, lodging and boarding of engineers, etc.

Commission's Analysis:

The project cost of 20 MW Solar Power Plant submitted by the petitioner is 84 Crores. The per MW capital cost comes to Rs. 4.20 Crores. The CERC in its order dated 23rd March, 2016 in the matter of determination of Benchmark Capital Cost Norm for Solar PV power projects and Solar Thermal power projects applicable during FY 2016-17 has provided as follows:

Sl. No.	Particulars	Capital Cost norm proposed for FY 2016-17 (Rs. Lakhs/MW), for Solar PV projects	% of Total Cost
1	PV Modules	328.39	61.96%
2	Land Cost	25	4.70%
3	Civil and General Works	35	6.60%
4	Mounting Structures	35	6.60%
5	Power Conditioning Unit	35	6.60%
6	Evacuation Cost up to Inter-connection Point (Cables and Transformers)	44	8.30%
7	Preliminary and Pre-Operative Expenses including IDC and Contingency	27.63	5.21%
	Total Capital Cost	**530.02**	**100.00%**

The capital cost per MW for the FY 2016-17 as approved by CERC is Rs.530.02 Lakhs/MW. JERC (Goa & its UTs) in its order dated 02nd September, 2019 for the FY 2019-20 has issued Generic Tariff Order for Solar PV projects. The JERC (Goa & its UTs) has approved capital cost of Rs. 5 Crore/MW. Further, the cost of Solar PV power project across the country is currently in the range of 4-5 Crores/MW depending up on the geographical & topographical conditions.

In view of the above, the proposed Project Cost of Rs. 4.20 Crores/MW i.e. 84 Crores for 20 MW is considered justified & and the same is approved.

4.4 Means of Finance – Petitioner submission:

The total estimated project cost is INR 84 Crores. The project cost is expected to be funded by Equity and Long-Term Debt. The means of Finance are summarized in the Table below.

Particulars	%	INR Lakh
Debt	70	5880
Equity	30	2520
Total Project Cost		**8400**

Commission's Analysis:

Debt Equity Ratio:

Provisions w.r.t the Debt Equity ratio for calculation for interest on loan & return on equity as given in the Nagaland Electricity Regulatory Commission (Terms and Conditions for Determination of Generation Tariff for Renewable Energy) Regulations, 2011 has been considered. The Regulations provides as follows:

(i) For Suo-motu determination of generic tariff, the debt equity ratio shall be 70:30.
(ii) For project specific tariff, the following provisions shall apply:
If the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan.
Provided that where equity actually deployed is less than 30% of the capital cost, the actual equity shall be considered for determination of tariff.

Provided further that the equity invested in foreign currency shall be denominated/ designated in Indian rupees on the date of each investment.

Provided further that the equity invested in foreign currency shall be designated in Indian rupees on the date of each investment.

In view of the above, the Debt & Equity has been considered in the ratio of 70:30 for the purpose calculating Interest on loan & Return on Equity. The Debt & Equity approved is as below:

Total Capital Cost (Rs. Lakhs)	Debt - 70%	Equity - 30%
8400	5880	2520

5. ANNUAL FIXED CHARGES:

The NERC Regulations provides for the components of AFC and various parameters. The provisions of the Regulations are produced below:

"The tariff for renewable energy technologies shall be single-part tariff consisting of the following fixed cost components:

a) Operation and maintenance expenses.
b) Depreciation.
c) Interest on loan capital.
d) Interest on working capital.
e) Return on equity; "

Each of the above components are analyzed and discussed in the subsequent sections.

5.1 Operation & Maintenance Expenses:

The petitioner has submitted O&M expenses at the rate of Rs. 4.20 Lakhs/MW. Thus for 20 MW, the submitted O&M expenses for the 1st year of the plant life is 84 lakhs. The O&M expenses for the 1st year has been escalated @ 5.72% year over year to project the O&M expenses over the plant life. The proposed O&M Expenses of 4.20 Lakhs/MW is reasonable considering the geographical conditions of the state of the Nagaland.

However, w.r.t the yearly escalation of O&M expenses, Regulation 19(2) of Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 provides that the O&M expenses as determined for the 1st year shall be escalated at the rate of 3.84% per annum for the tariff period.

Accordingly, escalation rate of 3.84% per annum has been considered on the base O&M expenses (1st year) of Rs. 4.20 Lakhs/MW to determine the O&M expenses for subsequent years over the life of the project.

5.2 Depreciation

Regulation 18 of Nagaland Electricity Regulatory Commission (Terms and Conditions for Determination of Generation Tariff for Renewable Energy) Regulations, 2011 provides as follows:

(1) For the purpose of tariff, the depreciation shall be computed in the following manner.

I. The value base for the purpose of depreciation shall be the Capital Cost of the asset admitted by the Commission.

II. The salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset.

III. Annual Depreciation shall be based on 'Differential Depreciation Approach' using 'Straight Line Method'. Over two distinct periods comprising loan tenure and period beyond loan tenure over useful life. The depreciation rate for the first 10 years of the Tariff Period shall be 7% per annum and the remaining depreciation shall be spread over the remaining useful life of the project from 11th year onwards.

IV. Depreciation shall be chargeable from the first year of commercial operation.

Provided that in case of commercial operation of the asset for part of the year, depreciation shall be charged on pro rata basis.

(2) Capital subsidy received by the generator shall not be reduced from the capital cost for depreciation purposes. However, the generator will have to carry out any renovation or replacement or additional capitalization.

Further, Regulations 15 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 *provides as follows.*

"(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.

(3) 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."

The above regulation is applicable for all projects commissioned after 01.07.2020. Therefore, the parameters as defined in the above Regulations have been considered for the purpose of arriving at the allowable depreciation.

Accordingly, depreciation for the first 15 years have been calculated at the rate of 4.67% and remaining depreciation has been evenly spread during balance 10 years of the useful Life of the project.

5.3 Interest on Loan Capital

The interest on loan has been considered on the Debt as calculated in the above 4.4 above. The petitioner has submitted the rate of interest as 13% p.a. and tenure of loan as 10 years.

Regulations 14(1) of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 20 20 provides for the normative tenure. The provision is reproduced below:

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

Accordingly, tenure of the loan has been considered as 15 years.

Further, Regulations 14(2)(b) of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 provides for the rate to be considered for interest on loan. The provisions are reproduced below:

"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."

The average State Bank of India MCLR (One Year Tenor) was 7.13%, accordingly interest on loan has been considered at 9.13% i.e. 7.13% +2%.

5.4 Interest on Working Capital

Regulation 20 of Nagaland Electricity Regulatory Commission (Terms and Conditions for Determination of Generation Tariff for Renewable Energy) Regulations, 2011 provides as follows:

The Working Capital requirement in respect of wind energy projects, small hydro power , solar PV and Solar thermal power projects shall be computed as under:

a. Operation & Maintenance expenses for one month.
b. Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative Capacity Utilisation Factor (CUF).
c. Maintenance spare @ 15% of operation and maintenance expenses.

Further, Regulation 17(1) of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 provides for the computation of the working capital requirement. The regulation is produced below:

"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."

The revised norms as per above CERC Regulation has been considered for computing the working capital requirement.

Regulations 17(4) of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 provides for the rate to be considered for interest on working capital. The provisions are reproduced below:

"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."

The above provision of CERC Regulations has been considered for calculation of interest on working capital. The average State Bank of India MCLR (One Year Tenor) was 7.13%, accordingly interest on working capital has been considered at 10.63% i.e. 7.13% +3.5%.

5.5 Return on Equity

Regulations 16 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 provides for the Return on Equity. The provisions are reproduced below:

"(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."

In accordance with the Regulations 16(1) value base of equity has been considered as determined in para 4.4 above. Latest notified Minimum Alternative Tax (MAT) is 17.16% & latest notified Corporate Tax rate is 25.17%. As per Regulation 16(2), the normative Return on Equity has been grossed up by MAT rate for the first 20 years of the tariff period & by Corporate Tax rate for the remaining 5 years of the tariff period to arrive at the effective Return on Equity.

Accordingly, the effective Return on Equity for the first 20 years of the tariff period has been considered at 16.40% & the remaining 5 years has been considered at 17.52%.

6. CALCULATION OF CUF/PLF:

Regulations 18 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 20 20 provides as follows:

"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."

Further, Regulations 47 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 20 20 provides for the CUF. The provisions are reproduced below:
"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%"

Further, Regulation 49 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 20 20 provides for the Auxiliary consumption. The provisions are reproduced below:

"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%"

The petitioner had submitted CUF of 19.20% but there was mismatch between CUF & the saleable energy figures. Subsequently, the petitioner revised the CUF at 16.09%. Further, the petitioner has not provided any details of auxiliary consumption considered for arriving at the net saleable energy.

In view of the topographical & geographical condition of the state, the CUF has been considered at 17% in line with the approved CUF in the earlier Solar PV Tariff Order issued by the Commission. Further, the auxiliary consumption has been considered at 0.25%.

7. USEFUL LIFE OF THE PROJECT:

Regulations 2(hh)(vi) of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 20 20 provides for the useful life of the generating stations. The provision is reproduced below:

"*Useful Life' in relation to project, including dedicated evacuation system, from the date of commercial operation of such project, shall mean the following: -*

(vi) Solar PV power project/ floating solar project/

Solar thermal power project …… 25 years"

In view of the above, useful life of the plant for determination of Tariff has been considered as 25 years.

8. TARIFF DESIGN:

Regulations 10 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020 provides for the tariff on levellised basis for the Tariff period. The provisions are reproduced below:

"(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."

The discount factor for levellised tariff computation has been considered at weighted average cost of capital.

The weightage of Debt Equity ratio has been taken in the ratio of 70:30. Interest rate & rate of Return on Equity has been applied on Debt & Equity respectively for arriving at the weighted average cost of capital. Further, average rate of tax applicable over the life of the project has been considered for arriving at the post-tax weighted average cost of capital.

Accordingly, the discount factor of 10.18% has been considered for determining the levellised tariff.

9. ANNUAL FIXED CHARGES & TARIFF:

Based on the parameters approved above, the Annual Fixed Charges (AFC) & levellised Tariff for the Solar PV project is determined. The details of Tariff components & levellised Tariff for the project life of 25 year is provided in theTables below

Generation &Tariff Components

Generation Parameter	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
Installed Capacity	MW	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Net Generation	MU	29.73	29.58	29.43	29.29	29.14	28.99	28.85	28.70	28.56	28.42	28.28	28.14	27.99	27.85
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
O&M Expenses	Rs. Lakh	84	87	91	94	98	101	105	109	114	118	122	127	132	137
Depreciation	Rs. Lakh	392	392	392	392	392	392	392	392	392	392	392	392	392	392
Interest on term loan	Rs. Lakh	519	483	447	411	376	340	304	268	233	197	161	125	89	54
Interest on Working															
Capital	Rs. Lakh	21	20	20	20	19	19	19	18	18	18	18	17	17	17
Return on Equity	Rs. Lakh	413	413	413	413	413	413	413	413	413	413	413	413	413	413
Total Fixed Cost	Rs. Lakh	1429	1396	1363	1331	1298	1266	1233	1201	1170	1138	1106	1075	1044	1013

Generation Parameter	Unit	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Installed Capacity	MW	20	20	20	20	20	20	20	20	20	20	20
Net Generation	MU	27.72	27.58	27.44	27.30	27.16	27.03	26.89	26.76	26.63	26.49	26.36
Tariff Components												
(Fixed Charge)	Unit	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	Rs. Lakh	142	148	154	159	166	172	178	185	192	200	208
Depreciation	Rs. Lakh	392	168	168	168	168	168	168	168	168	168	168
Interest on term loan	Rs. Lakh	17.89	0	0	0	0	0	0	0	0	0	0
Interest on Working Capital	Rs. Lakh	16	13	14	14	14	14	15	15	15	16	16
Return on Equity	Rs. Lakh	413	413	413	413	413	413	442	442	442	442	442
Total Fixed Cost	Rs. Lakh	982	743	748	755	761	768	803	810	818	825	833

Per Unit Tariff Components

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
PU O&M Expenses	Rs / kWh	0.283	0.29	0.308	0.32	0.335	0.35	0.365	0.38	0.4	0.41	0.433	0.452	0.472	0.492
PU Depreciation	Rs / kWh	1.319	1.33	1.332	1.34	1.345	1.35	1.359	1.37	1.37	1.38	1.386	1.393	1.4	1.407
PU Interest on term loan															
	Rs / kWh	1.74	1.63	1.52	1.40	1.29	1.17	1.05	0.93	0.81	0.69	0.57	0.45	0	0
PU Interest on working capital															
	Rs / kWh	0.07	0.07	0.068	0.07	0.067	0.07	0.065	0.06	0.06	0.06	0.062	0.061	0.061	0.06
PU Return on Equity	Rs / kWh	1.39	1.40	1.40	1.41	1.42	1.43	1.43	1.44	1.45	1.45	1.46	1.47	1.48	1.48
PU Tariff Components	Rs / kWh	4.81	4.72	4.63	4.54	4.45	4.37	4.28	4.19	4.09	4.00	3.91	3.82	3.73	3.64

Per Unit Tariff Components	Unit	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	Rs / kWh	0.51	0.54	0.56	0.58	0.61	0.64	0.66	0.69	0.72	0.75	0.79
PU Depreciation	Rs / kWh	1.41	0.61	0.61	0.62	0.62	0.62	0.62	0.63	0.63	0.63	0.64
PU Interest on term loan	Rs / kWh	0	0	0	0	0	0	0	0	0	0	0
PU Interest on working capital												
	Rs / kWh	0.06	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
PU Return on Equity	Rs / kWh	1.49	1.50	1.51	1.51	1.52	1.53	1.64	1.65	1.66	1.67	1.68
PU Tariff Components	Rs / kWh	3.54	2.69	2.73	2.76	2.80	2.84	2.99	3.03	3.07	3.11	3.16

Calculation of Levellised Tariff

Levellised 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
Discount Factors		1.00	0.90	0.81	0.72	0.65	0.58	0.53	0.47	0.42	0.38	0.34	0.31	0.28	0.25
Discounted Tariff															
Components	Rs / kWh	4.81	4.24	3.74	3.29	2.90	2.55	2.25	1.97	1.74	1.52	1.34	1.17	1.03	0.90

Levellised Tariff	Unit	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Discount Factors		0.22	0.20	0.18	0.16	0.14	0.13	0.12	0.10	0.09	0.08	0.08
Discounted Tariff												
Components	Rs / kWh	0.79	0.54	0.49	0.45	0.41	0.37	0.35	0.32	0.29	0.26	0.24
Levellised Tariff	Rs / kWh	4.14										

The Commission hereby approve the levellised Tariff for the 20 MW Solar Power Plant at Jalukie, under Peren District at Rs. 4.14/kWh for 25 years .

10. SUMMARY OF TARIFF FOR 20 MW SOLAR POWER PROJECT AT JALUKIE, PEREN

A. Approved Capital Cost:

Sl. No	Particulars	INR Lakhs
1	PV Modules	4065.60
2	Land Lease (Per MW per Year)	4.20
3	Civil & General Works	1008.00
4	Mounting Structures	714.00
5	Power Conditioning Unit	672.00
6	Evacuation cost up-to interconnection point (Cables & Transformers)	1092.00
7	Pre-operative & preliminary expenses including IDC & Contingency	844.20
	Total Capital Cost	**8400.00**

B. Approved Levellised Tariff for 25 years:

Sl. No	Particulars	Units	Parameters
1	**2**	**3**	**4**
1.	Capital Cost	Rs./Lakhs	8400
2.	Subsidy	Rs./Lakhs	-
3.	Net Capital Cost	Rs./Lakhs	8400
4.	Project Life	Years	25
5.	Return on equity (Grossed up with income tax)	%	14
6.	Interest on Loan	%	9.13
7.	Interest on working capital	%	10.63
8.	Depreciation	%	4.67
9.	Generation/Annum	MUs	29.73
10.	Discounting factor	%	10.18
11.	**Levellised Tariff**	**Rs./kWh**	**4.14**

11. DIRECTIVES

Directive 1. Actual Capital Expenditure:

The petitioner is directed to submit the actual capital expenditure incurred up to the date of commercial operation of the generating station duly certified by the statutory auditors for review of this tariff order based on the actual Capital Cost along with all supporting papers & documents.

Directive 2. Loan Agreements:

The petitioner has projected interest rate on loan @ 13% p.a. for 10 years but has not provided any loan agreements/communication from any bank/financial institution in this regard. Hence, the petitioner is directed to submit the agreement between the parties at the earliest.

Directive 3. Fixed Asset Register:

The Commission directs the petitioner to maintain Fixed Asset Register at their end and submit to the Commission as and when asked.

Directive 4.

Penalty for non-compliance of the directives of the Commission shall be dealt with as per Section 142 of the Indian Electricity Act, 2003.

Sd/-
W. Y. YANTHAN
Secretary,
Nagaland Electricity Regulatory
Commission (NERC), Kohima.