स्पीड पोस्ट दारा
BY SPEED POST

COCHIN SPECIAL ECONOMIC ZONE AUTHORITY (CSEZA)
MINISTRY OF COMMERCE & INDUSTRY
GOVERNMENT OF INDIA
KAKKANAD, COCHIN – 682 037
Phone: 2413111, 2413234, Fax: 2413074
E-Mail: mail@csezauthority.in
Website:http://www.csezauthority.in

No.H-12/01/2019:CSEZA/1091 Dated: 20th February, 2019

To

The Secretary,
Kerala State Electricity Regulatory Commission,
KPFC Bhavanam,
C V Raman Pillai Road,
Vellayambalam,
Thiruvananthapuram – 695 010.

Subject: **Application for approval of additional Capital Expenditure for the financial year 2017-18 in respect of CSEZ Authority (CSEZA) – reg.**

Sir,

Please find enclosed the duly notarized petition for approval of additional Capital Expenditure for the financial year 2017-18 for installation of Roof Top Solar PV Plants, under the Kerala State Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2014 and under the KSERC (Conduct of Business) Regulations, 2010 with amendments thereof.

It is humbly requested to condone the delay in filing the petition.

Yours faithfully,

(K. C. Ramakrishnan)
Secretary, CSEZA

Encl: 1) Petition signed and notarized with five copies
2) Demand Draft No. 002399, dated 20.02.2019 for Rs. 10,000/-
3) Soft Copy is being sent by e-mail to KSERC.

DESPATCHED
21 FEB 2019

O/C

EL 413700957 IN

Application for Approval of Additional Capital Expenditure for the FY 2017-18

Form 1

BEFORE THE KERALA STATE ELECTRICITY REGULATORY COMMISSION

PETITION NO:

IN THE MATTER OF:

Application for approval of additional Capital Expenditure for the financial year 2017-18 for Installation Roof Top Solar PV plants , under the Kerala State Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2014 and under the KSERC (Conduct of Business) Regulations, 2010 with amendments thereof.

Name(s) and Full address (es) of the Petitioner(s) /Applicant(s)

Cochin Special Economic Zone Authority (CSEZA),
Ministry of Commerce & Industry,
Department of Commerce,
Government of India,
CSEZ Administration Building,
Kakkanad, Kochi – 682037

Name (s) and full address (es) of Respondent (s)

Applicant
For Chairperson
Cochin Special Economic Zone Authority

साजु के. सुरेन्द्रन आई.ई.एस.
SAJU K. SURENDRAN I.E.S.
उप विकास आयुक्त
Deputy Development Commissioner
कोचिन विशेष आर्थिक क्षेत्र
Cochin Special Economic Zone
भारत सरकार, वाणिज्य एवं उद्योग मंत्रालय
Govt. of India, Min. of Commerce & Industry
सेज प्रशासन बिल्डिंग / CSEZ Admn. Building
काक्कनाड, कोचिन-682037
Kakkanad, Cochin-682037

Form 2

BEFORE THE KERALA STATE ELECTRICITY REGULATORY COMMISSION

PETITION NO:

IN THE MATTER OF:

Application for approval o of additional capital Expenditure for the financial year 2017-18 for Installation Roof Top Solar PV plants, under the Kerala State Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2014 and under the KSERC (Conduct of Business) Regulations, 2010 with amendments thereof.

Name (s) and Full address (es) of the Petitioner(s) / name (s) and full address (es) of the respondent(s)

Cochin Special Economic Zone Authority (CSEZA),
Ministry of Commerce & Industry,
Department of Commerce,
Government of India,
CSEZ Administration Building,
Kakkanad, Kochi – 682037

Affidavit verifying the Application for approval o of additional capital Expenditure for the financial year 2017-18

.....

I, Saju K Surendran , S/o, Surendran, aged 38 years residing at Lakshmi Nivas, Kalluvathukkal P.O, Kollam-695578 , working as the Deputy Development Commissioner of Cochin Special Economic Zone under the Ministry of Commerce and Industry, Government of India, do solemnly affirm and state as follows:

1. I am the Deputy Development Commissioner of the Cochin Special Economic Zone, Kakkanad, Kochi – 682037 and the Petitioner in the above matter and I am duly authorized to make this affidavit on behalf of the CSEZ Authority.

2. The statements made in the accompanying petition are true to my knowledge and the statements made are based on information received from the official records which I believe to be true and correct.

Solemnly affirmed at Kakkanad on this day of 19th February , Two Thousand Nineteen that the contents of the above affidavit are true to my knowledge, no part of it is false and nothing material has been concealed there-from.

Saju K. Srendran
Deputy Development Commissioner
for Chairperson
Cochin Special Economic Zone Authority

साजु के. सुरेन्द्रन आई.ई.एस.
SAJU K. SURENDRAN I.E.S.
उप विकास आयुक्त
Deputy Development Commissioner
कोचिन विशेष आर्थिक क्षेत्र
Cochin Special Economic Zone
भारत सरकार वाणिज्य एवं उद्योग मंत्रालय
Govt. of India, Min. of Commerce & Industry
सेज प्रशासन / CSEZ Admn. Building

SPECIAL ADHESIVE
T.G. KALADHARAN
Ernakulam Dist. (Kerala)
Reg. No: 695
Expiry Date: 13-10-2023

Solemnly affirmed and signed before me.

T.G. KALADHARAN
ADVOCATE & NOTARY
TRANSAVENUE, MAVELIPURAM
KAKKANAD P.O., PIN-682030
MOB: +91 9446485490

20/02/2019

This application is filed before the Hon'ble Kerala State Electricity Regulatory Commission (KSERC) in accordance with the provisions of the Electricity Act, 2003 for the approval of additional capital Expenditure incurred by CSEZ Authority in 2017-18 towards installation of Roof Top solar PV plants in SDF Buildings.

Background

Cochin Special Economic Zone (CSEZ), is a Government owned Special Economic Zone is under the Ministry of Commerce and Industry, Department of Commerce, Government of India. The Zone, comprising an area of 105 acres, is located at Kakkanad. The Cochin Special Economic Zone Authority constituted under the SEZ Act, 2005 is the Developer of the Zone providing the infrastructure and other related services to the Zone.

The Zone has been set up with the objective of promoting exports and creating employment opportunities. Exporting industries are provided with infrastructure facilities like power, water, effluent treatment facility, communication etc. The power distribution network was revamped during the period 2003-05 by the Central Government to provide uninterrupted and quality power to the consumers in the Zone.

Government of Kerala granted Power distribution license to CSEZ vide *G.O.(Rt)No.118/02/PD* dated 20.6.2002. On obtaining NOC from the KSERC, vide their letter *No.KERC/CSEZ/2/71/2005* dated 1.1.2005, CSEZ started power distribution inside the Zone w.e.f. 1.5.2005.

Details of Petition

Cochin Special Economic Zone Authority(CSEZA) had submitted capital Expenditure plan as part of the MYT petition for the control period 2015-16 to 2017-18 and Honorable Commission had considered the same and conveyed their decision as per Order dated 18.7.2016 (petition N RP/1/2016) approving the capital expenditure.

Subsequently, as part of Government of India's target of achieving 40GW of roof top Solar Power towards clean power commitment, CSEZA was directed by Ministry of Commerce, Govt. of India to set up grid connected Roof Top Solar PV plants on the available roof area of buildings owned by CSEZA. Ministry of New and Renewable Energy (MNRE) had given a deadline of 31St March 2017 for completion of installation of Roof top Solar PV plants. M/s PEC Ltd, a public undertaking under ministry of Commerce is one of the Organizations recognized by MNRE for installation of Solar PV plants and has been approved by MNRE. Accordingly , CSEZA approached PEC ltd for conducting a feasibility study and for setting up of Solar PV plants on the Roof tops of Standard Design Factory(SDFs) buildings within CSEZA. PEC has submitted detailed project report for setting up of 636 kWp roof top Solar PV plants with a project cost of Rs 5,08,80,000/-. Copy of DPR is attached herewith for ready reference. CSEZA could not include the above capital expenditure in the MYT petition for 2015-16 to 2017-18 as the same came up subsequently only after Honorable commissions order dated 18.7.2016 conveying decision on capital expenditure proposals raised by CSEZA for MYT control period from 2015-16 to 2017-18.

के.सी. रामकृष्णन/K.C. RAMAKRISHNAN
सचिव/Secretary
कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority

Since as per directive from Ministry of Commerce, Govt. of India, the solar PV plants project had to be implemented on priority basis before 31.3.2017, CSEZA could not take prior approval of Honorable Commission at that time. It is also brought to the kind attention of Honorable Commission that as per KSERC (Terms and Conditions for determination of tariff) Regulations 2014, prior approval is required only for major capital investments exceeding Rs 10 Crore. CSEZA placed work order on M/s PEC Ltd on 18.10.2016 and the Solar PV plants was completed in July 2017. After trial running and rectification of defects, the same was commissioned and capitalized on 25th August 2017. CSEZA had earlier itself brought the attention of Honorable Commission the basis, need and urgency to install the solar plants, to the Honorable Commission vide letter No. H-12/2/2014:CSEZA/6471 dated 21.11.2016 and copy of the same along with the DPR is attached herewith for ready reference.

CSEZA had also explained the reasons for urgently installing Solar Plants during the hearing called by KSERC in connection with CSEZA's truing up petition for 2016-17 when Commission asked about the Expenditure incurred by CSEZA and recorded as Work in Progress, towards the above project. The work was fully completed and the project was capitalized on 25th August 2017 incurring a total cost of Rs 5,08, 80,000/-. A total of 512356 kWh was generated from date of Commissioning to 31.3.2018, from the 636 kWp Solar plants. By setting up the above solar plants, CSEZA could save 512356 Units in 2017-18 from the quantum of power which otherwise should have been procured from KSEB and thereby CSEZA could reduce Power Purchase cost to that extent. Also CSEZA could promote renewable energy generation to the tune of 512356 units during the year 2017-18.

In view of the above, it is humbly prayed that Honorable Commission may kindly approve and regularize the capital expenditure of Rs 5,08,8000/- incurred by CSEZA towards Installation of 636 kWp Roof Top Solar PV plants for the year 2017-18 and approve depreciation for the same while truing up of accounts for the year 2017-18.

Enclosue : 1. CSEZA letter No. H-12/2/2014:CSEZA/6471 dated 21.11.2016 addressed to KSERC.
2. Detailed Project Report.

के.सी. रामकृष्णन /K.C. RAMAKRISHNAN
सचिव/ Secretary
कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority
भारत सरकार, वाणिज्य एवं उद्योग मंत्रालय
Govt. of India, Min. of Commerce & Industry
सेज प्रशासन भवन /CSEZ Admn. Building
काक्कनाड, कोच्चिन-682037
Kakkanad, Cochin-682037

स्पीड पोस्ट दारा
BY SPEED POST

COCHIN SPECIAL ECONOMIC ZONE AUTHORITY (CSEZA)
MINISTRY OF COMMERCE & INDUSTRY
GOVERNMENT OF INDIA,
KAKKANAD, COCHIN - 682 037.
Phone: 2413111, 2413234, Fax: 2413074
E-Mail: mail@csezauthority.in
Website:http://www.csezauthority.in

CSEZ

Copy

No.H-12/2/2014:CSEZA / 6471 Dated: 21.11.2016

To
The Secretary,
Kerala State Electricity Regulatory Commission,
KPFC Bhavanam,
C V Raman Pillai Road,
Vellayambalam,
Thiruvananthapuram – 695 010.

Sir,

Subject: Request for additional Capital expenditure for the year 2016-17 by CSEZA for Installation Grid connected Roof Top Solar PV plants on the Standard Design Factory buildings (SDF) inside Cochin SEZ

.....

Please refer to the Hon'ble Commission's Order dated 18.07.2016 on Petition No.RP 1/2016, wherein the Commission has conveyed the in-principle approval for capital expenditure of a total amount of Rs.47.25 lakh for the year 2016-17. In the meantime, on the direction of Ministry of Commerce, CSEZA has awarded work for design, supply, installation, hooking up and commissioning of 636 kWp Grid Connected Roof Top Solar PV Plant Project for CSEZ to M/s.PEC Ltd. (A Govt. Of India Enterprises), New Delhi for a total amount of Rs.5,08,80,000/-. Out of this amount, an amount of Rs.2,54,40,000/- has already been released to M/s.PEC Ltd. as advance payment. As this capital expenditure was not proposed in the original ARR & ERC for the year 2016-17, the Hon'ble Commission is requested to kindly approve the additional capital expenditure plan of Rs.5,08,80,000/- for installation of Roof Top Solar PV Plants for the year 2016-17. Detailed note is enclosed for favourable consideration and for necessary approval.

Yours faithfully,

(K.C.Ramakrishnan)
Secretary-in-Charge, CSEZA

Encl.as above.

कोच्चिन विशेष आर्थिक क्षेत्र (सेज) कोच्ची-37 COCHIN SPECIAL ECONOMIC ZONE (CSEZ)

DESPATCHED ON 24/11/16

के.सी. रामकृष्णन/K.C. RAMAKRISHNAN
सचिव/Secretary
कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority
भारत सरकार, वाणिज्य एवं उद्योग मंत्रालय
Govt. of India, Min. of Commerce & Industry
सेज प्रशासन भवन/CSEZ Admin. Building
काक्कनाड, कोच्चिन-682037
Kakkanad, Cochin-682037

Capital Expenditure Plan - Additional Capital expenditure for the year 2016-17 by CSEZA for Installation Grid connected Roof Top Solar PV plants on the Standard Design Factory buildings (SDF) inside Cochin SEZ.

Introduction

Cochin Special Economic Zone Authority (CSEZA) had submitted Capital Expenditure Plan as part of MYT petition for the control period of 2015-16 to 2017-18 and Honorable Commission had considered the same and conveyed their decision as per Order dated 18.07.2016 (Petition No.RP 1/2016) approving certain capital expenditure.

Subsequent to this , as part of Government of India's target of achieving 40 GW of Roof top Solar Power towards clean power commitment, CSEZA was directed by Ministry of Commerce, Govt of India to set up grid connected Roof Top Solar PV Plants on the available roof area of buildings owned by CSEZA. Ministry of New and Renewable Energy (MNRE) has given a deadline of 31st March, 2017 for completion of installation of Roof top Solar PV plants. M/s.PEC Ltd., a Public Sector undertaking under Ministry of Commerce is one of the organizations recognized by MNRE for installation of Solar PV plants and has been approved by Ministry of Commerce. Accordingly, CSEZA approached M/s. PEC Ltd. for conducting a feasibility study for setting up solar PV Plants on the roof tops of Standard Design Factory (SDFs) buildings within CSEZA and they have submitted a Detailed Project Report on the installation of Solar PV Plants on roof top of SDF buildings inside Cochin SEZ, the salient details of which are given below:

a) Capacity of the Solar Power Plants proposed:
   - On the roof of SDF 43 - 168 kWp
   - On the roof of SDF 16 - 204 kWp
   - On the roof of SDF 17 - 264 kWp

   Total - **636 kWp**

b) Total cost projected for 636 kWP Solar PV plants - Rs 5,08,80,000/-

c) As per MNRE guidelines, no Government subsidy will be available for the project, instead MNRE will provide Achievement linked Incentives for the Solar PV plants installed on the roof tops of Government Buildings. The Achievement linked incentives available is Rs 18,750/kWP, totaling to Rs.1,19,25,000/- for 636 kWp capacity. This Incentive will be claimed from MNRE once the project is commissioned.

d) Net cost to be incurred by CSEZA after incentive for 636 kWp is Rs.3,89,55,000/- (Rs.61,250/kWp) which is well below the approved cost of Rs.75/- per kWp as per MNRE.

e) Warranty Period - Five years

f) Specifications and Quality - Meeting the quality and standards prescribed by MNRE. Refer attached DPR for detailed Specifications.

के.सी. रामकृष्णन /K.C. RAMAKRISHNAN
सचिव/Secretary
कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority
भारत सरकार, वाणिज्य एवं उद्योग मंत्रालय
Govt. of India, Min. of Commerce & Industry
सेज प्रशासन भवन/CSEZ Admn. Building
काक्कनाड, कोच्चिन-682037
Kakkanad, Cochin-682037

Accordingly, CSEZA has awarded the work to M/s.PEC Ltd. on 18.10.2016 for Design, Supply, Installation, Hooking Up, Testing and Commissioning of 636 kWP Solar PV Plants on the roof tops of three SDF buildings within CSEZA for the total cost of Rs.5,08,80,000/- with completion period of four months time from date of acceptance of Work Order (i.e. 18.10.2016). Copy of the Work Order and the Detailed Project Report (DPR) submitted by M/s. PEC Ltd. are attached herewith for reference and perusal.

Need, Justifications and Cost- Benefit Analysis:

CSEZA, being a Power Distribution licensee is bound by KSERC (Renewable Energy) Regulations. As per the existing KSERC (Renewable Energy) Regulations 2015, the RPO obligation for 2016-16 is 4.5 %of total energy distributed, which will be increased by 0.5 % every year till total obligation reaches 10 %. Out of this total RPO obligation, 10 % shall be Solar Obligation. KSERC has initiated revision of RPO regulations, 2015 and a draft is issued on 4.11.2016 for discussion and comments. As per this draft, the RPO for licensees has been proposed to be revised as below:

Year	Minimum Solar RPO % of total consumption	Minimum Non Solar RPO % of total consumption	Total RPO (%)
2016-17	2.75	8.75	11.50
2017-18	4.75	9.5	14.25
2018-19	6.75	10.25	17.00

As per this new proposed amendment, CSEZA will have a solar obligation of 4.75% of its total consumption for year 2017-18. Based on the actual consumption of 57.26 MU for 2015-16, CSEZA will have a solar obligation of 2.72 MU (4.75%) for the year 2017-18. Considering an average solar power generation of 4 kWh per day per kWp solar plant and considering useful 300 days of generation per year, in order to meet 2.72 MU solar obligation, capacity of Solar PV plants required would be 2226 kWp. Hence, based on the available roof top area, CSEZA intends to install 636 kWp Roof top plants, by which part of the solar Obligation could be met. Remaining Solar Obligations could be met by CSEZA by procuring RECs. As already explained, the solar obligation could be partly met by installing Solar PV plants. Additionally, CSEZA can utilize the solar energy generated, for consumption within CSEZA, thereby reducing power purchase quantum and power purchase cost to that extent.

636 kWP Solar Plant will generate 7,63,200 KWH per year (636*4*300). Based on the present Bulk Supply tariff applicable (Rs 5.30/kWH) , CSEZA could save about Rs.40.44 Lakh per year towards power purchase cost which otherwise would have to be procured from KSEBL.

के.सी. रामकृष्णन, I.R.S. / K.C. RAMAKRISHNAN
सचिव/ Secretary
कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority
भारत सरकार, वाणिज्य एवं उद्योग मंत्रालय
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काक्कनाड, कोच्चिन–682037
Kakkanad, Cochin-682037

Also ,if Solar power is not generated or not procured, In order to meet solar RPO, CSEZA should purchase RECs for the total Solar obligation of 2.72 MU for 2017-18 thus incurring additional expenditure of minimum Rs.95 lakh (2720 REC @ Rs 3500/REC) . Once the solar Plants are installed, REC requirement to meet solar RPO will be reduced. (2720000-763200)/1000)=1957 RECs costing Rs.68.50 Lakh only (1957* Rs.3500/-).

The above justifies the need and necessity for CSEZA proceeding with installation of solar PV plants. More over solar energy is clean and renewable energy.

Investment Plan:

CSEZA plans to meet this expenditure of Rs.5,08,80,000/- from CSEZA's own fund available under Power Distribution accounts.

Date of expected completion and capitalization: 31.03.2017.

Prayer:

CSEZA could not include this capital expenditure for installation of Roof Top Solar PV Plants in the ARR & ERC for 2015-16 to 2017-18 control period. Accordingly this capital expenditure was not approved by Honorable Commission while approving the capital expenditure vide Commission's Order dated 18.07.2016.

In view of the requirement to complete installation of Solar PV Plants by deadline of 31.03.2017 as directed by Ministry of Commerce, Govt of India, it is prayed that Honorable Commission may kindly approve the above additional capital expenditure plan of Rs.5,08,80,000/- for installation of Roof top Solar PV Plants for the year 2016-17. CSEZA shall include the same while revising the ARR & ERC/ truing up.

Enclosure : Detailed Project Report.

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के.सी. रामकृष्णन/K.C. RAMAKRISHNAN
सचिव/Secretary
कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority
भारत सरकार, वाणिज्य एवं उद्योग मंत्रालय
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काक्कनाड, कोच्चिन-682037
Kakkanad, Cochin-682037

By hand 5

कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin SpecialEconomic Zone Authority(CSEZA)
वाणिज्य एवं उद्योग मंत्रालय
Ministry of Commerce & Industry
भारत सरकार / GOVERNMENT OF INDIA
काक्कनाड /Kakkanad
कोच्चिन / Kochi - 682037

No.H-1/01/2016:CSEZA /5706

Dated 18th October 2016

To

M/s. PEC Limited,
(A Govt. Of India Enterprise)
"Hansalaya", 15,
Barakhamba Road,
New Delhi- 110001

Letter of Award of Work

Sub: Design, Supply, Installation, Hooking up, Testing, Commissioning of 636kWp Grid Connected Roof Top Solar PV plant Project for Cochin SEZ- Reg

Ref: Your e-mail dated 26.9.2016 attaching letter No. PEC/Solar/CSEZ/RP/SP/ 2016/99 dated 26.9.2016 & Detailed Project Report (DPR).

This has reference to your above referred offers, proposals and DPR submitted by you to Cochin SEZ and subsequent discussions and clarifications regarding the subject. Cochin SEZ Authority (CSEZA) hereby accept your offers and proposals and are pleased to award the work to PEC Limited for a total offered amount of Rs.5,08,80,000/- (Rupees five crore eight lakh eighty thousand only), inclusive of all taxes, as per details below:

S. No	Location/ building Roof	Capacity (kWp)
1	Standard Design factory(SDF) No. 43A	168
2	Standard Design factory(SDF) No. 16	204
3	Standard Design factory(SDF) No. 17	264

Scope of Work

The scope of work shall include but not limited to the following:

1. Survey and Design the Solar PV plants.
2. Supply all necessary materials and accessories required for completion, hooking up and commissioning and shall include:
   - Solar PV Modules
   - Inverters
   - PV Junction Boxes
   - Module mounting Structures
   - DC Cables
   - AC cables

Rcd original on behalf of PEC Ltd 18/10/16 S. Karthik

DESPATCHED 21/10/16

के सी रामकृष्णन / K.C. RAMAKRISHNAN
सचिव / Secretary
Fax /0484/2413074 Phone: 2413111 2413321 E mail : mail@csezauthority.in, Web : csezauthority.in

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- DC Earthing Kits
- Lightning Arrestors
- Hooking UP Materials and accessories
- Covered protection structures for inverters.
- All other items required for completion as covered in DPR.

3. Installation, testing, hooking up the solar power generated to existing power distribution system, and commissioning of the solar plants . All incidental expenses for completion of work shall be included in the scope of PEC Limited.
4. Obtaining necessary approval from statutory authorities like Electrical Inspectorate and liaisoning with State nodal agency where required shall be done by PEC Limited on behalf of CSEZ Authority.
5. PEC shall prepare and submit necessary documentation on behalf of CSEZA and obtain subsidy/ incentive from MNRE accordingly.
6. PEC shall submit all the necessary details, documents for forwarding to Kerala State Electricity Regulatory Commission (KSERC) in connection with the Project.
7. The scope shall be completion a turnkey basis and shall include all necessary items for satisfactory completion though specifically mentioned or not.

Specifications

1. Specifications of solar panels, inverters and all other items shall be meeting the approvals and quality requirements specified by MNRE.
2. The requirements stipulated in the DPR submitted by PEC shall be complied with.
3. Warranty conditions as stipulated in the DPR shall be strictly complied .
4. The items supplied shall be new and as per specifications only.

Payment terms

The payment will be made as follows:-

50% of the cost i.e., Rs.2,54,40,000/- (Rupees two crore fifty four lakh forty thousand only) towards the project (other than the MNRE subsidy part) will be released by us to PEC Limited along with the purchase order, 40% i.e., Rs.2,03,52000/- (Rupees two crore three lakh fifty two thousand only) shall be released against the supply of material and remaining 10% i.e. Rs. 50,88,000/- (Rupees fifty lakh eighty eight thousand only) shall be released against commissioning of the Solar PV Power Plant to the satisfaction of the Chairperson, CSEZA.

Compliance to statutory and Government Regulations

All relevant statutory and government regulations applicable to the project shall be strictly complied by PEC Ltd.

Completion of the project and release of achievement linked incentive available as per MNRE-

Shri. K.G. RAMAKRISHNAN
Secretary
Cochin Special Economic Zone Authority
Govt. of India, Min. of Commerce & Industry
CSEZ Admn. Building
Kakkanad, Cochin-682037

SPECIAL ECONOMIC ZONE AUTHORITY COCHIN-37

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The work shall be completed within a period of 4 months from date of acceptance of this work order. On completion of the project, it shall be the responsibility of PEC Limited to liaison with MNRE for speedy release of the achievement linked incentive of Rs.18750/kWp to Cochin Special Economic Zone Authority.

In case the above terms and conditions are acceptable, PEC Limited shall communicate the acceptance of the work order in writing within 7 days of issue of this work order and shall enter into an agreement with the Cochin Special Economic Zone Authority within 25 days of issue of this work order.

Yours faithfully,

(Dr. Safeena A.N.)
Development Commissioner
& Chairperson, CSEZA

के.सी. रामकृष्णन / K.C. RAMAKRISHNAN
सचिव / Secretary
कोचिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority
भारत सरकार, वाणिज्य एवं उद्योग मंत्रालय
Govt. of India, Min. of Commerce & Industry
सेज प्रशासन भवन / CSEZ Admn. Building
काक्कनाड, कोचिन-682037
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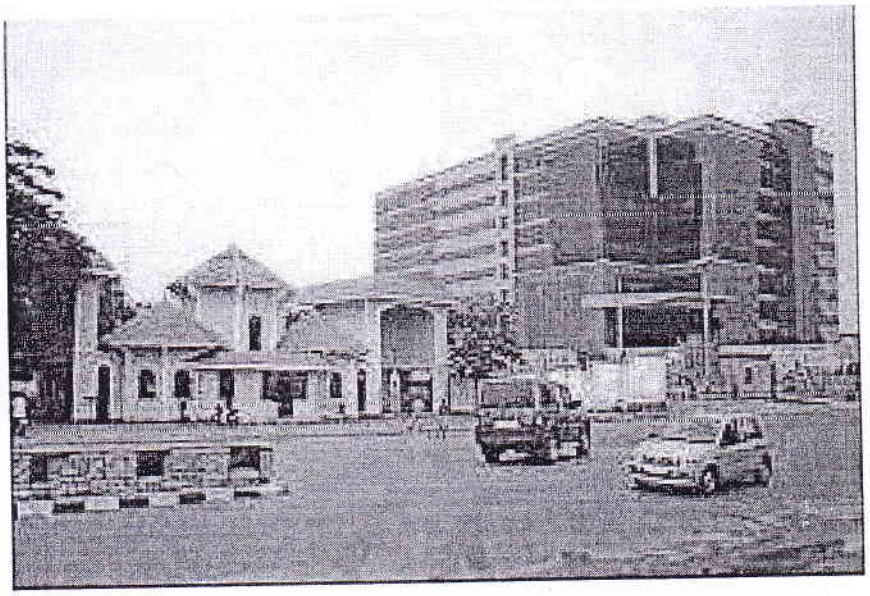
DETAILED PROJECT REPORT



Detailed Project Report

for

COCHIN SPECIAL ECONOMIC ZONE

Submitted by :

PEC Limited
'Hansalaya'
15 – Barakhamba Road
New Delhi – 110 001

CONTENTS

1. EXECUTIVE SUMMARY

Kakanad Cochin SEZ plays a crucial role in the country's socio-economic development..

The proposed Solar Photovoltaic Power Plant at Kakanad Cochin SEZ would utilize Shadow free area of vacant roof top/ground . The SPV power plant with a proposed capacity of 636 kWp would be set up. The Solar Photovoltaic Power project would be a demonstration plant to harness renewable energy and the data on generation would be utilized for analysis of the various aspects of operation.

2. OBJECTIVES AND BENEFITS

Solar PV Power Plants are proposed with an objective to attain following benefits:

1. Saving of precious fossil fuels.
2. Noiseless, pollution free and Eco-friendly power.
3. The Solar Photovoltaic Power Plants are highly reliable and easy to install & maintain.
4. It would set an example to others and give you a clean and green image of reducing carbon emission and saving the environment.
5. Free inexhaustible power
6. Conversion from sunlight to electricity is direct, so that bulky mechanical generator systems are unnecessary.
7. Photovoltaic technology is proven, reliable, has no moving parts and easy to install
8. Once installed, solar panels and solar cells don't require any maintenance.
9. It is economical.
10. Possible to expand the system in future
11. Greater independence from imported fossil fuels
12. Diversity of power sources
13. Power may be stored to provide uninterrupted power supply. For the essential loads like Lights, Fans and Computers can be directly connected to Solar Power Plant
14. Relief from the volatility of energy prices
15. All over the world, solar energy systems have reduced the need to build more carbon-spewing fossil-fueled power plants. They are critical weapons in the battle against global warming.

3. SITE DETAILS

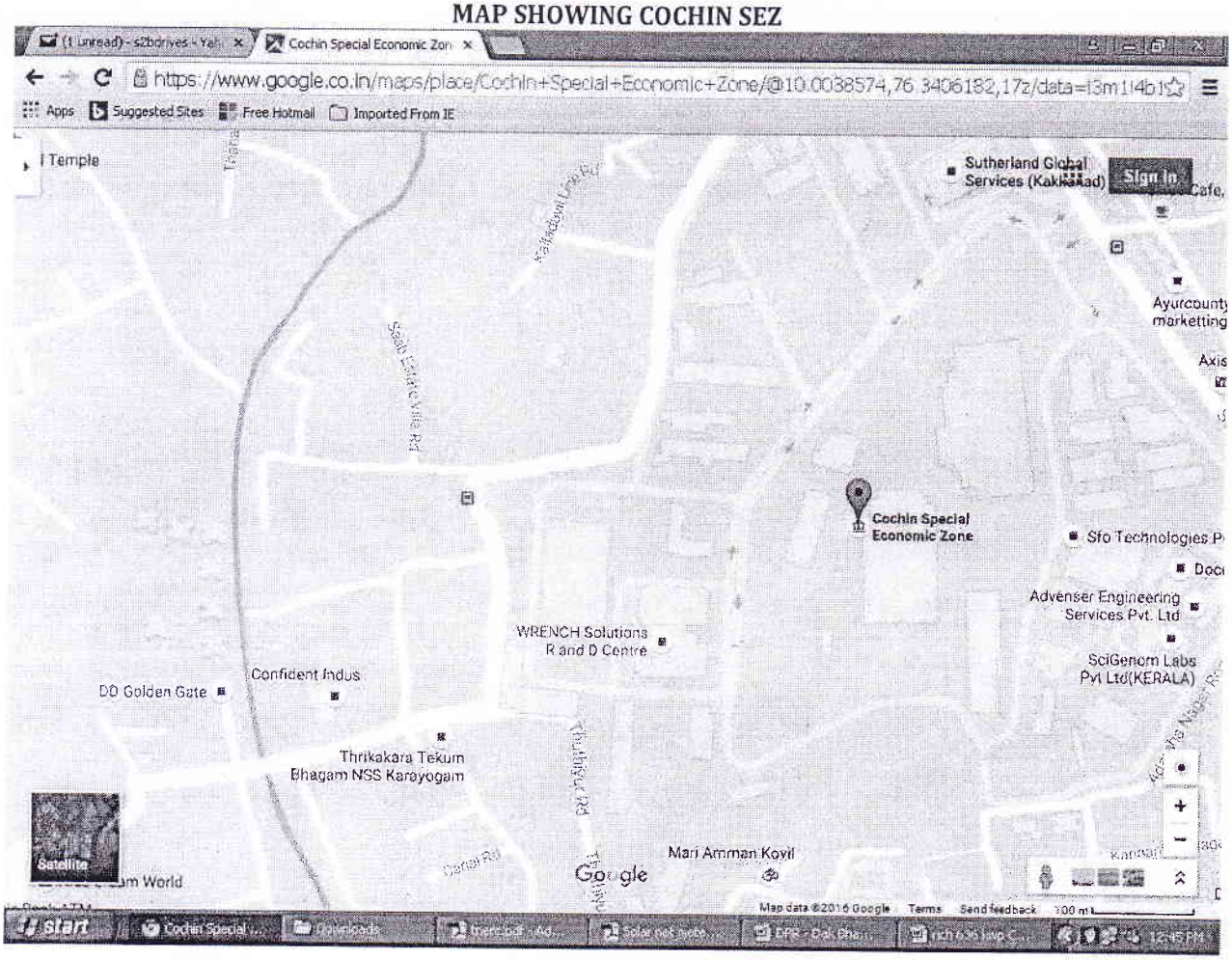
Site Name	Cochin Special Economic Zone
Location	Kakanad, Cochin
Capacity	636 kWp
Latitude	9.9312° N
Longitude	76.2673° E

4. DETAILS OF PROPOSED POWER PLANT

i. Proposed capacity of the SPV Power Plant (kWp): **636KW at Kakanad, Cochin**

SHADOW FREE ROOFTOP OF COCHIN SEZ

MAP SHOWING COCHIN SEZ



ii. Calculations and justification for the proposed capacity:

Maintenance and high fuel costs have been long-standing problems with diesel generators. Quite often the cost (of operating a generator) can be very much higher than expected because of the need for maintenance personnel and the difficulties encountered in obtaining fuel and spare parts."

Conventional diesel generators are not a real alternative solution, as they have other negative side effects:

- The high cost of operation a susceptibility to break down
- Maintenance servicing is poor and expensive
- Not environmentally friendly

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The Life of the DG set would be around 8 years and it involves additional charges for replacement of the parts and more maintenance is required. But when compare with Solar PV Power Plant, the life time of the Solar PV Power Plant has much more when compare to conventional DG set and Solar PV Plant requires very less maintenance.

Socio- Economic Justification of the Project:

The solar renewable power source is clear, greater independence from imported fossil fuels, a cleaner environment, diversity of power sources, relief from the volatility of energy prices and greater domestic economic development. All over the world, solar energy systems have reduced the need to build more carbon-spewing fossil-fueled power plants. They are critical weapons in the battle against global warming.

iii. Expected annual energy generation.

Mean Global Solar Radiant Exposure

CSEZ,Cochin

Month	Daily solar radiation-Horizontal
	Kwh/m²/d
January	5.68
February	6.24
March	6.66
April	6.12
May	5.49
June	4.04
July	4.25
August	4.72
September	5.36
October	4.85
November	4.92
December	5.22
Annual	5.37

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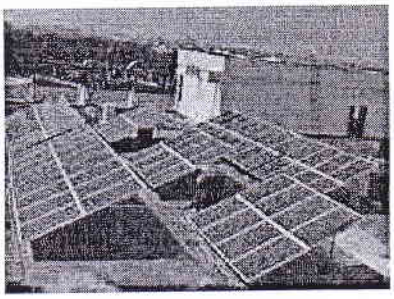
- The expected annual energy generation from a 636 kWp SPV Plant would be approx. 1230 MW.

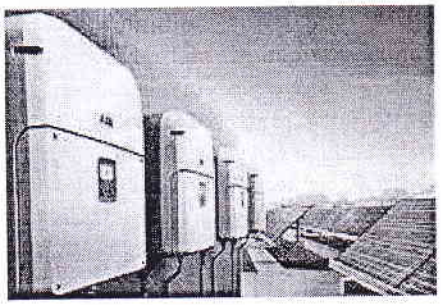
The SPV generation is calculated under STC conditions. The actual generation depends on the following conditions.

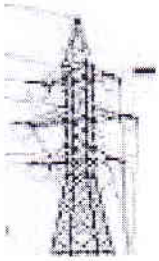
1. Solar Radiation
2. Temperature
3. Humidity
4. And other atmospheric conditions
5. System losses

5. TECHNOLOGY DESCRIPTION & SYSTEM DESIGN / SPECIFICATION

i. Line diagram of the complete System with details







ii. Details of training of manpower to be provided for successful operation of the plant.(Compliance to BIS/IEC Standards is mandatory)

Cochin SEZ will appoint one or two Technicians for regular checkup of the system. Training for this purpose will be provided.

NOTES:

- It is mandatory to provide technical performance specifications of each component of the power plant proposed to be installed under the project and for which the performance will be warranted
- All technical parameters and warranty requirements must meet or exceed the requirements mentioned in the guidelines issued by the Ministry.

Operation and Maintenance Arrangements

- Details of Operation and Maintenance Arrangements

  The operation of the plant is automatic as the Solar power plant will act as Grid tied system. Based on the solar radiation the load will be shared with the Grid supply to the connected loads. Hence the existing manpower, which is operating the present energy sources like, diesel generator set, shall be trained daily for operation & monitoring of solar power plants.

- Arrangements for Generation Data Collection through remote monitoring (applicable for SPV Power Plants having more than 10 kWp capacity)- **Yes**
- Is dedicated staff being trained for O & M of the plant - **Yes**
- No. of personnel to be trained in O&M- **One or Two Technicians**

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Project Duration and Implementation Schedule

The total project shall be implemented within 90 -120 days.

MONITORING MECHANISM

Details of Data Monitoring on Daily, Monthly and Annual energy generation (Data logging and compilation and sharing with MNRE)

- IPO will maintain a log book. The details of the parameters such as solar current contribution, solar radiation and ambient or panel temperature will be entered in the log book on a daily basis.
- The data logger will be installed and data through email/fax/courier will be sent to MNRE/designated agency by IPO.
- Remote Monitoring (for SPV power plants of 10 kWp and above) will be provided

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TECHNICAL DETAILS & SYSTEM SPECIFICATIONS

Bill of Material For Building No 43

Sl.N	Description	Qty	Unit
1	300Wp Solar Module Poly	560	Nos.
2	String Inverter 50KW String Inverter 33 KW String Inverter 12.5 KW	2 2 1	Nos.
3	PV Junction Box	5	Nos.
4	Module Mounting Structure	For 168KWp	sets
5	DC Cable 1C x 4Sq.mm	Required qty	Mtrs.
6	AC Cable 4 C of 25&35sqmm Cu cable for Inv to Ac D Box	Required qty	Mtrs.
7	AC Cable 4C of 200sqmm armour Alu cable	Required qty	Mtrs.
8	DC earthing kit	1	Set
9	Lightning Arrestor	1	Set

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Bill of Material For Building No 17

Sl.N	Description	Qty	Unit
1	300Wp Solar Module Poly	880	Nos.
2	String Inverter 50KW String Inverter 20 KW	5 1	Nos.
3	PV Junction Box	6	Nos.
4	Module Mounting Structure	For 264KWp	sets
5	DC Cable 1C x 4Sq.mm	Required qty	Mtrs.
6	AC Cable 4 C of 25&35sqmm Cu cable for Inv to Ac D Box	Required qty	Mtrs.
7	AC Cable 4C of 200sqmm armour Alu cable	Required qty	Mtrs.
8	DC earthing kit	1	Set
9	Lightning Arrestor	1	Set

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Bill of Material For Building No 16

Sl.N	Description	Qty	Unit
1	300Wp Solar Module Poly	680	Nos.
2	String Inverter 50KW String Inverter 33 KW	2 3	Nos.
3	PV Junction Box	5	Nos.
4	Module Mounting Structure	For 204KWp	sets
5	DC Cable 1C x 4Sq.mm	1000	Mtrs.
6	AC Cable 4 C of 25&35sqmm Cu cable for Inv to Ac D Box	Required qty	Mtrs.
7	AC Cable 4C of 200sqmm armour Alu cable		Mtrs.
8	DC earthing kit	1	Set
9	Lightning Arrestor	1	Set

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1. SOLAR PV MODULES

FEATURES:

- High efficiency multi-crystalline - 4 busbar cells
- Wide range of power with high Watt density
- Bypass diodes to avoid effect of partial shading
- Anodized Aluminum alloy frame and tempered glass for rugged protection in hostile environments
- Manufactured in a state-of-the-art, automated production facility.
- MNRE, IEC and CE Certified
- Tested and certified for UL standards
- Module Efficiency 14% to 16%
- PV modules used in solar power plants are warranted for output wattage, which will not be less than 90% at the end of 12 years and 80% at the end of 25 years.

2. SOLAR POWER CONDITIONING UNIT

Off Grid Solar PCU specification defines a high reliability single/three-phase, with integral MPPT charger controller true Bi-directional, digital signal processing (DSP), high frequency pulse width modulated (PWM) system, utilizing MOSFET/IGBTs, hereafter referred to as the "Solar PCU".

Solar PCU has ben designed to utilize renewable solar energy and providing high quality regulated and conditioned AC power to the Bank loads and charging of the connected battery.

Solar PCU shall mandatorily consist of the MPPT charger controller, Bi-directional Inverter and associated items. The PCU integrates within itself, all of the following systems:

i. PWM Inverter, capable of bi-directional power flow (DC to AC & vise-versa)
ii. MPPT based solar charge controller
iii. 32bit DSP controller for digital setting (no analogue set points will be accepted)
iv. Isolation transformer at output as inbuilt
v. Essential protection devices.
vi. Suitable breaker/isolator at Array, Battery and PCU along with inbuilt Schottky Diode protection at MPPT charger input to prevent the battery from draining into the PV panel.

Features:

Multiple 32 bit DSP controllers
High efficiency> 96% at STC
True Bi-directional Solar Inverter with 100% capacity for battery charging through Grid
PF correction while on mains / grid supply (Line interactive)
Active Harmonic filtering when load on mains
Higher Array Voltage capacity optionally available
Inbuilt charge controller
MPPT - Achieved through Incremental Conductance Algorithms
DC fan for low power consumption
Variable fan speed - increased reliability, lesser dust suction in side the cabinet
Inbuilt Isolation transformer for Galvanic isolation
Modular construction gives highest MTTR
128 x 64 Graphics display

Sytem Rating attached separately

System Operation Modes (Selectable and settable)

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a. On GRID Mode: When grid supply is absent, the Inverter works as Grid Tie system

REMOTE MONITORING- CONNECTIVITY FOR DATA & ALARM LOG FOR PCU:

Port for connectivity:
RS-232 serial port for local PC based monitoring.
RJ45: Ethernet based remote monitoring via TCP/IP.
USB port: for flushing the data logged into a pendrive, along with micro SD memory card slot to be provided for extended memory for storage.
Inverter has a feature where Remote Monitoring can be done through data card connectivity with 2G/3G/4G option OR Ethernet. (Note: The client has to provide Data Card (GSM SIM) or public IP/static IP for connecting the above)

DATA MONITORING

The plant parameters shall be measured by using Data Acquisition system to maintain the plant and to study the plant performance. The plant monitoring will also have,

PV array energy production: Digital Energy Meters to log the actual value of AC/DC Voltage, Current & Energy generated by the PV system will to be provided.
Solar Irradiance: An integrating Pyranometer (Class II or better) will be provided, with the sensor mounted in the plane of the array. Readout will be integrated with data logging, system.
A data logging system for monitoring is integrated with the PCU.

Following data and alarm logging function will be performed by the connectivity software.

STORED DATALOG

Store data log will be used to retrieve data from system memory for all parameters with date time logged at specified interval. It will be possible to export all stored data log logs in .csv format

STORED ALARM LOG

Store alarm log will be used to retrieve all alarm logs parameters from system memory along with date time logged whenever any fault occurs. It will be possible to export all stored alarm logs in .csv format

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Following minimum Groups will be displayed

Grid Group: To display Grid parameters.

1. R-Y-B Ø Voltage in Volts
2. R-Y-B Ø Currents in Amps
3. R-Y-B Ø Real Power in KW
4. R-Y-B Ø Apparent Power in KVA
5. R-Y-B Ø Power Factor
6. Grid Frequency in Hz

Inverter Group: To display Inverter parameters.

1. U-V-W Ø Voltage in Volts
2. U-V-W Ø Currents in Amps
3. U-V-W Ø Current in %
4. U-V-W Ø Power Factor
5. U-V-W Ø Real Power in KW
6. U-V-W Ø Apparent Power in KVA
7. U-V-V Ø Frequency in Hz
8. Heat sink Temperature in ^{0}C

Array Group: To display Array parameters.

1. Array Voltage in Volts
2. Array Current Currents in Amps
3. Array Power in KW
4. Solar Radiation in w/m2 (Optional)
5. Cell Temperature in ^{0}C (Optional)

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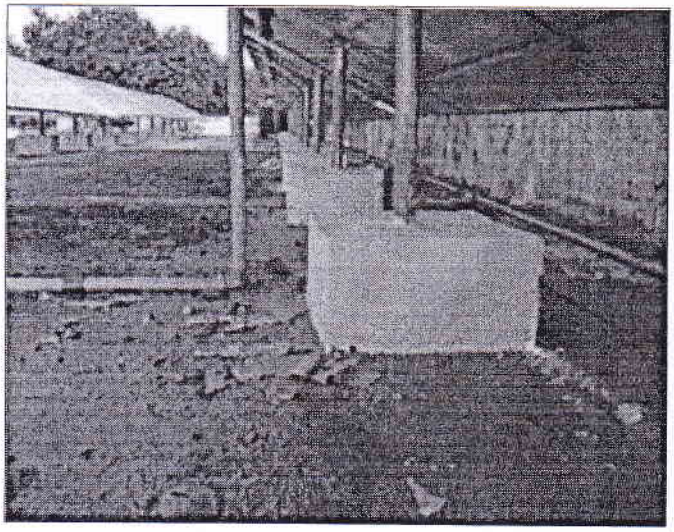
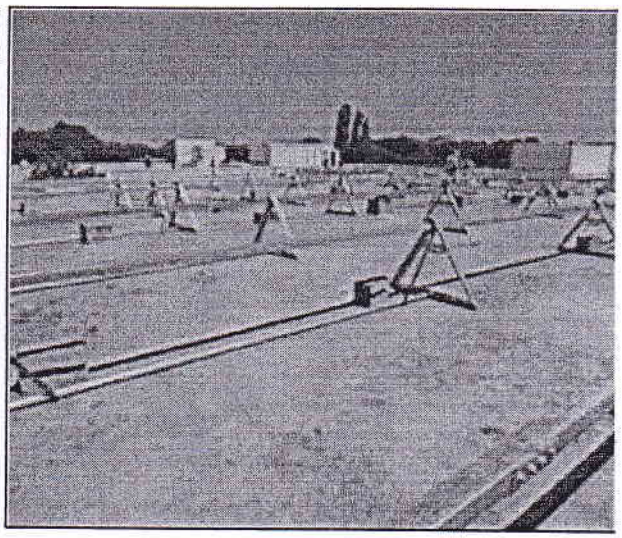
3. ARRAY MOUNTING STRUCTURE:





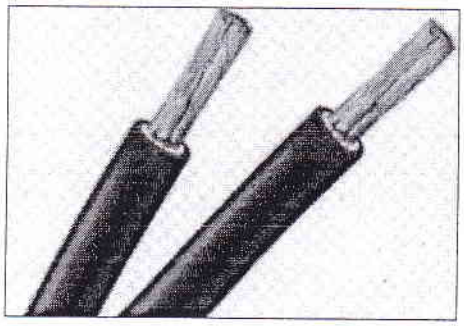
- Mounting array structure plays major role as it hold the module and provides stability and strength to Solar Modules installed. It will be of standard make, Galvanized (or Equivalent), SS Hardware with spring watchers; Roof top installation flexibility.

- The SPV panel array will be mounted facing south and tilted to an angle equal to the latitude where being used for optimum performance.

- The structure will be designed for simple mechanical and electrical installation. It will support Solar PV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly.

- The array structure will be so designed that it will occupy minimum space without sacrificing the output from SPV panels. At the same time it will withstand wind speed up to maximum 150 km/h.

4. SOLAR CABLES:



- Once a solar panel is exposed to sunlight, it will generate electricity. Care must be taken when selecting the size of the cable to be used.
- Cables are always double insulated and polarized. Cable or fuses should never be disconnected when under load. Cable from the solar PV modules should follow the shortest route to the array Junction boxes.
- All cables are clearly identifiable and connected appropriately, without any clutter to avoid confusion while servicing. This also ensures proper safety.
- All cables will be PVC insulated 1100 V grade conforming to IS
- Wiring size of PV array will be designed such that maximum voltage drop at full power from the PV modules to the inverter will be less than 2% (including diode voltage drop). The wiring for module interconnection will be with hard HDPE conduit running through cable trays.
- All cable/wires shall be marked with a good quality letter and number ferrules of proper sizes so that the cables can be identified easily.

i. DC Cables:

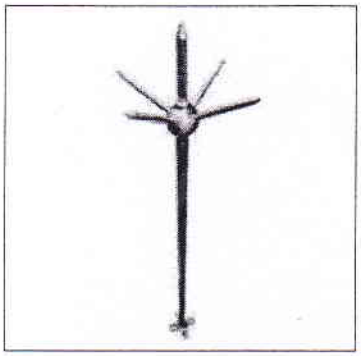
S.No	Particulars	Description of the Ca	Specification
1	Depending upon the inverter capacity the array will be arranged as per mentioned in drawing	Single Core 6 Sq.mm PVC Insulated Copper Conductor (Unsheathed) Industrial Cable, 1100V Grade	Max current carrying capacity depends upon connectivity •

ii. AC Cables:

Listed in Buildingwise BOM

Earthing Cables: 16 Sq.mm single cores copper (Green)

5. LIGHTENING ARRESTOR



The Solar PV Power plant will be provided with Lightning and over voltage protection both for the PV panels . The "Lightning Protection System" will be completed prior to start-up of Commissioning activities of the project. The main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components. The source of over voltage can be lightning or other atmospheric disturbance.

The SPV generator/Inverter will be provided with an appropriate protection system on their incoming side / consumer premises with the feature of "Islanding the SPV generator" when grid fails.

6. EARTHING SYSTEM

- Each Array structure of the Solar PV Yard will be grounded properly. The array structures will be connected to earth pits as per IS standards.
- The earthing for the power plant equipment is made as per the provisions of IS. Necessary provision will be made for bolting isolating joints of each earthing pit for periodic checking of earth resistance.
- All non-current carrying metal parts are earthed with separate and distinct earth continuity conductors to an efficient earth electrode.
- The complete earthing system will be mechanically & electrically connected to provide independent return to earth. All equipments shall have distinct earth connections.

7. SCOPE OF WORK

WORK IN THE SCOPE OF SYSTEM DEVELOPER

S.No	PARTICULARS
1.	Detailed Site survey and Comprehensive Layout Planning.
2.	Design, supply, construction, erection and commissioning of SPV Power system.
3.	Evaluation and due diligence of transportation and embarkation of SPV Power plant to the cl vicinity to central location.
4.	Installation and Commissioning of SPV Power system up to LT Panel
5.	Providing training to the personnel deputed by client.
6.	Provision of a standard Comprehensive warranty for five years from the date of supply.
7.	Maintenance during the warranty period.

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WORK IN THE SCOPE OF BENEFICIARY

S.No	PARTICULARS
1	Providing roof top which is completely shadow free
2	Provision of sufficient electrical lighting and water facility at the solar plant location during the installation & Commissioning.
3	Insurance cover against theft and damages of the plant shall be provided from the date of commissioning and handing over of the SPV Plant.
4	Internet facility with Static IP for monitoring the power generated by the SPV Plant.
5	Facility for Safe Storage of materials during the execution of project.
6	Approval by the Electrical Inspectorate before initiation of project.
7	Construction of roof/ strengthening / modifications / leveling of roof / land etc., if needed for the proper installation of SPV Plant.
8	Regular cleaning of SPV Modules after commissioning of the plant will be carried out to ensure optimum power output.

Return of investment calculations for 636 kwp Solar project @ CSEZ:

Debt ratio: 70: 30

Net investment Rs. 5,08,80000/-

MNRE subsidy Rs. 18.75/Wp: Rs 1,19,25,000/-

Net amount Rs. 3,89,55,000/-

Loan amount: 70% : Rs. 2,72,68,500/-

Working capital share: 30%: Rs. 1,16,86,500/-

Conclusion:

Thus the solar power project in the Cochin special economic zone can bring in lot of economical savings by bring in the return of investment in 4 to 5 years of time,Taking in The IT depreciation benefit into the account.
Over the period of 25 years into the life of solar power plant the levelised tariff of solar will be less than Rs 4/Kwh
Thus this investment is economically and socially beneficial

Net investment in lakhs		**389.55**	**271.55**	**211.73**	**165**	**116**	**64.8**	**8.8**
Tariff component		**year 1**	**year 2**	**year 3**	**year 4**	**year 5**	**year 6**	**year 7**
savings via power@Rs5.2/KwhRs lakhs		63.96	63.7	63.3	63.01	62.8	62.4	62
O&M expense	Rs lakhs	included	included	included	included	included	included	included
depreciation	Rs lakhs	93.5	23.4	4.7	2.4	0	0	0
interest on loan	Rs lakhs	32.72	22.8	17.8	13.86	9.7	5.4	0.74
interest on working capital @5.5% p.a	Rs lakhs	6.4	4.48	3.5	2.7	1.9	1	0.15
Return on equity	Rs lakhs	118	59.82	46.7	48.94	51.2	56	61
Total fixed cost	Rs lakhs	250.62	110.5	72.7	67.9	62.8	62.4	62
per unit tariff fixed charge	rs/kwh							
per unit O&M expenses	rs/kwh							
per unit depreciation	rs/kwh	7.6	1.9	0.38	0.2	0	0	0
per unit interest on loan	rs/kwh	2.66	1.83	1.55	1.12	0.8	0.53	0.26
per unit interest on working	rs/kwh	0.52	0.36	0.28	0.22	0.15	0.1	0.05
per unit ROE	rs/kwh	9.59	4.86	3.8	4	4.16	4.6	5
per unit rate component for outflw	rs/kwh	3.18	2.19	1.83	1.34	0.95	0.63	0.31
Levelised tariff								
discount factor	15.97%	0.84	0.74	0.66	0.55			
discount tariff factor	rs/kwh	2.34	1.55	1	0.85			
Levelised tariff	rs/kwh	3.28	2.29	1.66	1.4			

K.G. RAJAKRISHNAN
Secretary
कोचिन विशेष आर्थिक क्षेत्र प्राधिकरण
Cochin Special Economic Zone Authority
भारत सरकार वाणिज्य एवं उद्योग मंत्रालय
Govt. of India, Min. of Commerce & Industry
सेज प्रशासन भवन/CSEZ Admn. Building
काक्कनाड, कोच्चिन-682037
Kakkanad, Cochin-682037

MONTHS	Average production /day/KW	installation in KW	production/day i KW	production/day i MW
Jan	**5.68**	636	3612.48	3.61
Feb	**6.24**	636	3968.64	3.97
Mar	**6.66**	636	4235.76	4.24
Apr	**6.12**	636	3892.32	3.89
May	**5.49**	636	3491.64	3.49
Jun	**4.04**	636	2569.44	2.57
Jul	**4.25**	636	2703.00	2.70
Aug	**4.72**	636	3001.92	3.00
Sep	**5.36**	636	3408.96	3.41
Oct	**4.85**	636	3084.60	3.08
Nov	**4.92**	636	3129.12	3.13
Dec	**5.22**	636	3319.92	3.32
Average Production/DAY in KW				3368.33
Average Production/year in MW				1230
Approximate Cost/KWH				5.20
Approximate value /day in Rs				17515.32
Total Investment in Rs				3,89,55,000
Payback period in days				2224
Payback period in year				6.09

के.सी. रामकृष्णन/K.C. RAMAKRISHNAN
सचिव/Secretary
कोच्चिन विशेष आर्थिक क्षेत्र प्राधिकरण
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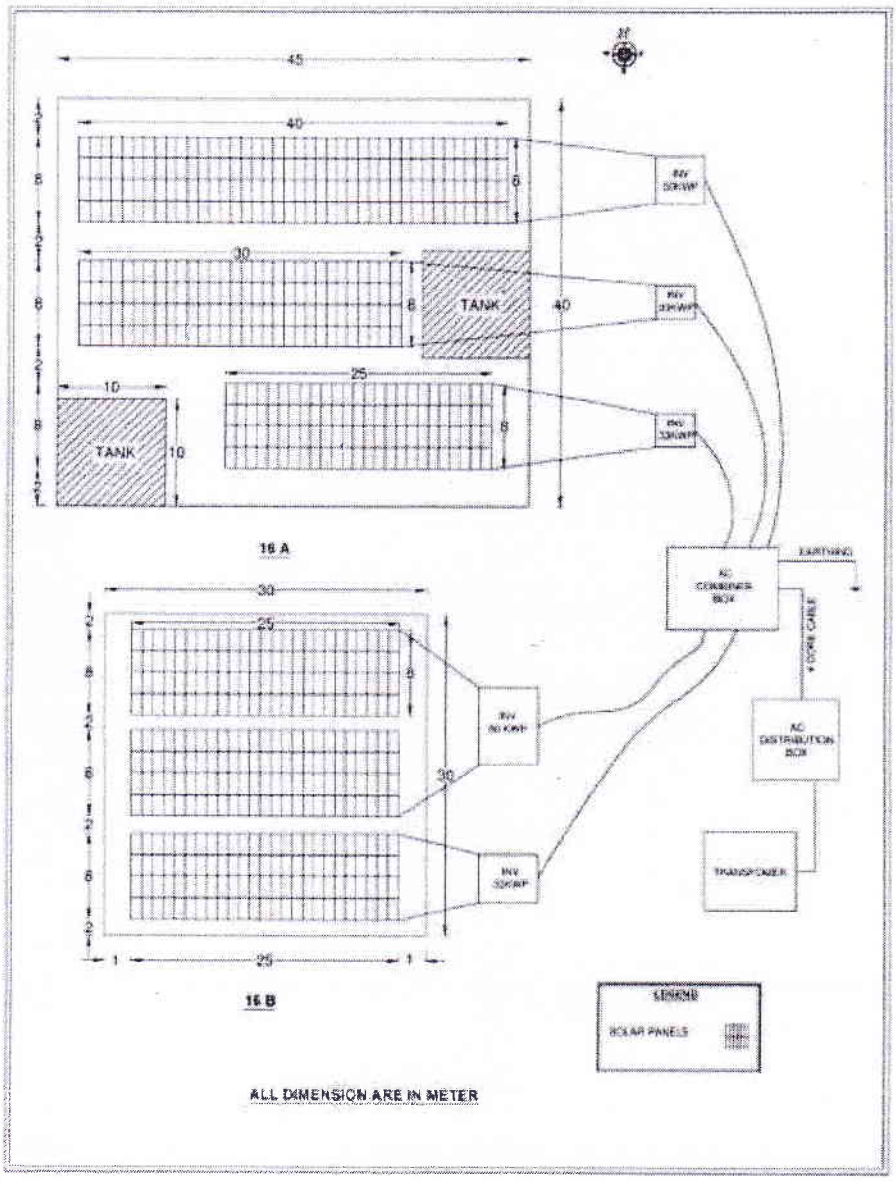

केवल आदाता खाते में A/C PAYEE ONLY

Kakkanad Branch, Kerala - 682037
IFS Code : CBIN0283724

3724
जारी करने वाली शाखा ISSUING BRANCH

अल्फा कोड क्र. ALPHA CODE NO. K A K K A N

PAYABLE AT PAR AT ALL LOCAL BRANCHES

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THE SECRETARY KSERC **********

मांगे जानेपर ON DEMAND PAY या उनके आदेशपर OR ORDER

रुपये RUPEES Ten Thousand only **********

********** अदा करें ₹ 10000.00

CBI KAKKANAD 2427415
मूल्य प्राप्त VALUE RECEIVED

अदाकर्ता शाखा Name of the Purchaser : CSEZ AUTHORITY FUND
DRAWEE BRANCH 3275 - SSB THIRUVANANDAPURAM

A 1 1 / 0 0 1 4 9
अ.क्र./SR. NO.

Prefix : DD

ह.न.क्र. S. S. Nos. प्राधिकृत हस्ताक्षरी AUTHORISED SIGNATORIES
Please sign above

"002399" 000016000": 16

के.सी. रामकृष्णन K.C. RAMAKRISHNAN
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