ZERO CARBON SOLAR

87-Block B1 MM Alam Road, Gulberg III, Lahore
M +923 111 111 926
W zerocarbon.com.pk

To
The Registrar,
National Electric Power Regulatory Authority,
NEPRA Tower, Ataturk Ave, G-5, Islamabad, Islamabad Capital Territory

**Subject: Application for the Grant of Distributed Generation License for 1.82 MW Solar Power Plant at Bulleh Shah Packaging (Private) Limited, Kot Krishan Radha Road, Kasur.**

I, Zain Ul Abideen being duly authorized representative of Zero Carbon Power Private Limited by virtue of board of resolution dated 2nd September, 2021 hereby apply to the National Electric Power Regulatory Authority for the grant of distributed Generation License of Zero Carbon's On-Grid Power Plant under compliance of section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

I certify that the documents in support attached with this application are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority Licensing Application and Modification Procedure Regulations, 1999, and undertake to abide by the terms and provisions of the above said regulations.

I further undertake and confirm that the information provided in the attached documents in support is true and correct to the best of my knowledge and belief. A bank draft in the sum of Rupees 304,890/- (Three hundred and four thousand, eight hundred and ninety rupees) being the non-refundable license application fee calculated in accordance with the schedule II of the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, is also attached with this application.

Dated: 03rd September, 2021

Signature

Zero Carbon (Private) Limited

Zain Ul Abideen

Head of Business

Zero Carbon Power (Pvt) Ltd

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## RESOLUTION OF THE BOARD OF DIRECTORS OF ZERO CARBON POWER (PRIVATE) LIMITED

A meeting of the Board of Directors of **M/s. Zero Carbon Power (Pvt.) Limited** (the **Company**) was held on 63 E1 Gulberg III, Hali Road , Lahore t its office, at 10.00 am to discuss the procurement of a Generation License by the Company from the **National Electric Power Regulatory Authority (NEPRA)**. The Meeting was attended by all the directors of the Company and the following resolutions were unanimously passed:-

1. **RESOLVED THAT** the Company would file an application, for obtaining generation License for setting up a 1.82 MW solar power generation project, to NEPRA.

2. **RESOLVED THAT** in respect of submitting an application for the Generation License (including any modification thereto) to NEPRA, **Mr. Zain Ul Abideen, Head of Business** would be authorized to do the following acts for and on behalf of the Company:

i) To review, execute, submit and deliver the generation License application (including any modification thereto) for the To represent the company in all generation License along with all related documents required by NEPRA for the grant of the Generation License including any contract, affidavits, statements, documents, powers of attorney, letters, forms, applications, deeds, guarantees, undertakings, approvals, memoranda, amendments, communications, notices, certificates, requests, statements and any other required document/instrument of any nature;

ii) negotiations, representations, presentations, hearings, conferences, and/or meetings of any nature whatsoever with any entity (including but not limited to NEPRA, any private parties, companies, partnerships, individuals, governmental and/or semi-governmental authorities and agencies, ministers, boards, departments, regulatory authorities and/or any other entity of any nature whatsoever);

iii) To sign and execute the necessary documentations, pay the necessary fee, appear before the NEPRA as needed, and do all acts necessary for completion and processing of the generation license application (including any modification thereto) and procuring the generation license;

Zero Carbon Power (Private) Limited

ZERO CARBON SOLAR

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iv) To appoint or nominate any one or more officers of the Company or any other person or persons, singly or jointly, in his discretion to communicate with, make presentations to and attend the NEPRA hearings;

v) To delegate all or any of these powers to any other officials of the Company as deemed appropriate by him;

vi) To do all such acts, matters and things as may be necessary for carrying out the aforesaid purposes and giving full effect to the Resolutions contained herein.

**IT WAS FURTHER RESOLVED THAT** the Company, through its Board of Directors, would validate and ratify all the actions taken by the duly authorized Business Head, Mr. Zain Ul Abideen, under the authority granted herein.

**CERTIFIED TO BE A TRUE COPY OF THE RESOLUTION OF THE BOARD OF DIRECTORS OF THE COMPANY PASSED IN ITS MEETING DATED Sep 2nd, 2021**

**Director**

**Mian Amer Mahmood**

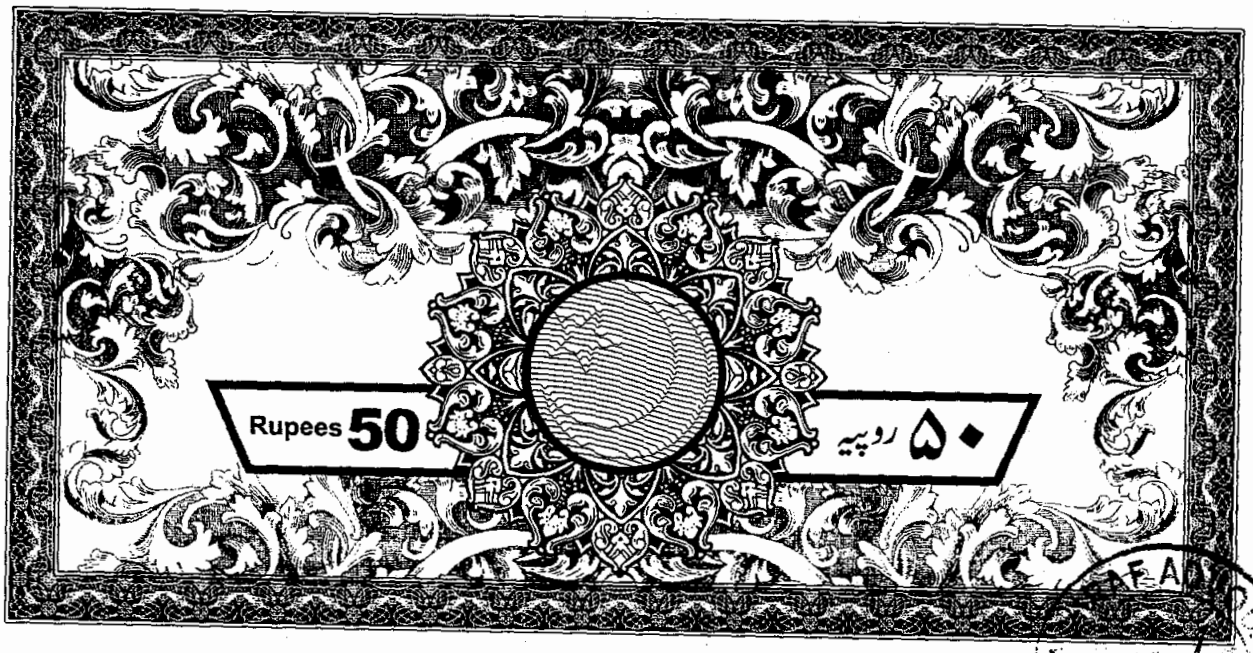
Dated:

**Director**

**Bilal Afzal**

Dated:

Zero Carbon Power (Private) Limited

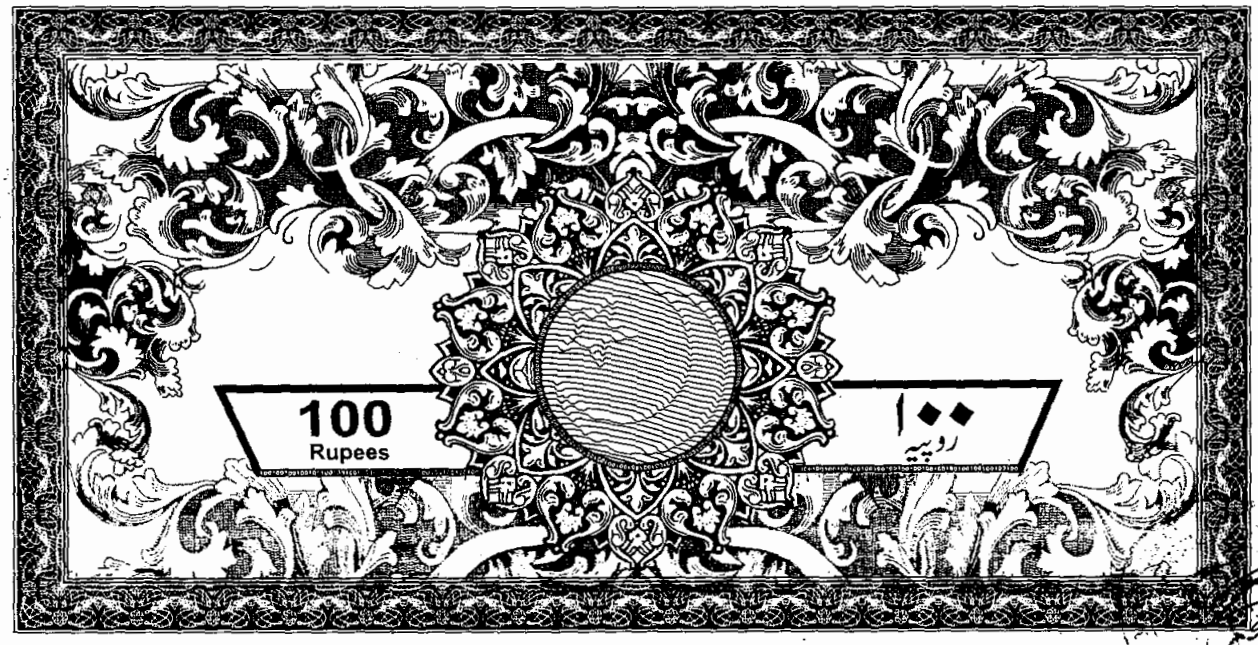



# AFFIDAVIT

I, Mr. Zain Ul Abideen, is hereby authorized representative of Zero Carbon Power Private Limited, state that all the information shared and documents provided are correct, authentic and accurate required for the application of NEPRA Generation License for the installation of Solar Powered 1.82MW Capacity Power Generation Plant for Electricity Production on Bulleh Shah Packaging (Private) Limited.

For and on behalf of **Zero Carbon Power (Private) Limited**

**Zain Ul Abideen**
Head of Business
**Zero Carbon Power (Private) Limited**
CNIC: 42301-2789467-7




# AFFIDAVIT

It is to state that M/S Zero Carbon Power (Private) Limited, incorporated under section – 16 of the companies Act, 2017 (XIX of 2017) having Corporate Universal Identification No. 0157971, dated September 16,2020 has previously been granted following license under the Act:

| Generation License # | Generation Facility | Installed capacity | Issuance Date | Expiry Date |
|---|---|---|---|---|
| No. SGC/154/2021 | Packages Convertor Limited, Walton Road, Gulshan Colony in the Province of Punjab | 3.12 $MW_p$ | 05th May 2021 | 30th December 2046 |

Furthermore, copy of NEPRA License attached for reference and record.

For and on behalf of **Zero Carbon Power (Pvt.) Ltd.**

Zero Carbon (Private) Limited

**Zain Ul Abideen**
Head of Business
**Zero Carbon Power (Pvt.) Ltd.**
CNIC: 42301-2789467-7

A081581

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

SECP

COMPANY REGISTRATION OFFICE
LAHORE

## CERTIFICATE OF INCORPORATION

[Under section 16 of the Companies Act, 2017 (XIX of 2017)]

Corporate Universal Identification No. 0157971

I hereby certify that ZERO CARBON POWER (PRIVATE) LIMITED is this day incorporated under the Companies Act, 2017 (XIX of 2017) and that the company is limited by shares.

Given under my hand at Lahore this Sixteenth day of September, Two Thousand and Twenty.

Incorporation fee Rs. 2010500/- only

(Syed Zargham Haider)
Joint Registrar

No. ARL/INC 6235

Dated: 16-9-2020

CERTIFIED TO BE TRUE COPY

ADDITIONAL REGISTRAR OF COMPANIES
REGISTRATION OFFICE
LAHORE

# THE COMPANIES ACT, 2017 (XIX of 2017)

(COMPANY LIMITED BY SHARES)

# MEMORANDUM

# OF

# ASSOCIATION

# OF


# Zero Carbon Power (Private) Limited

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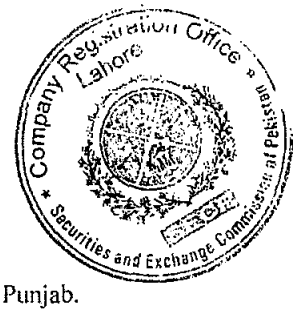
# THE COMPANIES ACT, 2017 (XIX of 2017)

## (COMPANY LIMITED BY SHARES)

## MEMORANDUM OF ASSOCIATION

## OF




1. The name of the company is Zero Carbon Power (Private) Limited.

2. The registered office of the Company will be situated in the Province of Punjab.

3. (i) The principal line of business of the company shall be to generate and sell electricity. To carry on all or any ancillary businesses relating to generation, production, sale, storage, supply and distribution of electricity. To provide such services as are associated with or required for the said business activities and completion/installation of projects of generation and sale of electricity. To perform all other acts which are necessary or incidental to the business of electricity generation, installation, storage, transmission, distribution, supply and sale subject to permission of concerned authorities. To establish, construct, install, equip, operate, use, manage and maintain electricity generation power plants of all types and capacities subject to permission of the relevant authorities.

(ii) Except for the businesses mentioned in sub-clause (iii) hereunder, the company may engage in all the lawful businesses and shall be authorized to take all necessary steps and actions in connection therewith and ancillary thereto.

(iii) Notwithstanding anything contained in the foregoing sub-clauses of this clause nothing contained herein shall be construed as empowering the Company to undertake or indulge, directly or indirectly in the business of a Banking Company, Non-banking Finance Company (Mutual Fund, Leasing, Investment Company, Investment Advisor, Real Estate Investment Trust management company, Housing Finance Company, Venture Capital Company, Discounting Services, Microfinance or Microcredit business), Insurance Business, *Modaraba* management company, Stock Brokerage business, forex, managing agency, business of providing the services of security guards or any other business restricted under any law for the time being in force or as may be specified by the Commission.


(iv) It is hereby undertaken that the company shall not:

(a) engage in any of the business mentioned in sub-clause (iii) above or any unlawful operation;

(b) launch multi-level marketing (MLM), Pyramid and Ponzi Schemes, or other related activities/businesses or any lottery business;

(c) engage in any of the permissible business unless the requisite approval, permission, consent or licence is obtained from competent authority as may be required under any law for the time being in force.

4. The liability of the members is limited.

5. The authorized capital of the company is Rs: 500,000,000/- (Rupees Five Hundred Million only) divided into 50,000,000 (Fifty Million only) ordinary shares of Rs.10/- (Rupees Ten only) each.

We, the several persons whose names and addresses are subscribed below, are desirous of being formed into a company, in pursuance of this memorandum of association, and we respectively agree to take the number of shares in the capital of the company as set opposite our respective names:

| Name and surname (present & former) in full (in Block Letters) | NIC No. (in case of foreigner, Passport No) | Father's/ Husband's Name in full | Nationality (ies) with any former Nationality | Occupation | Usual residential address in full or the registered/ principal office address for a subscriber other than natural person | Number of shares taken by each subscriber (in figures and words) | Signatures |
|---|---|---|---|---|---|---|---|
| Mian Amer Mahmood | 35202-1967706-3 | Mian Zahoor-ul-Haq | Pakistan | Business | 36-E, Model Town, Lahore | 750,000/-<br><br>(Seven Hundred Fifty Thousand Only) | |
| Bilal Afzal | 35202-8489452-5 | Sohail Afzal | Pakistan | Engineer | 28-C, Model Town, Lahore | 250,000/-<br><br>(Two Hundred Fifty Thousand Only) | |
| Zero Carbon (Private) Limited Through Its Authorized Representative /Nominee Director<br>Mian Amer Mahmood | Company Registration # 0131610<br><br>CNIC # 35202-1967706-3 | Mian Zahoor-Ul-Haq | Pakistan | Holding Company | 63-E/1, Gulberg III, Lahore | 9,000,000/-<br><br>(Nine Million Only) | |
| | | Total number of shares taken (Ten Million Only) | | | | 10,000,000/- | |

Dated the 8th day of September, 2020

CERTIFIED TO BE TRUE COPY

12/8/21

ADDITIONAL JOINT REGISTRAR OF COMPANIES
COMPANY REGISTRATION OFFICE
LAHORE

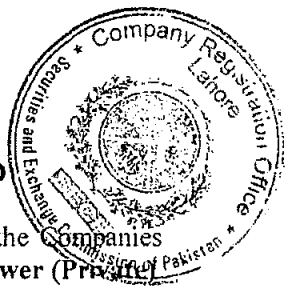
**THE COMPANIES ACT, 2017 (XIX of 2017)**

(Private Company Limited by Shares)

**ARTICLES OF ASSOCIATION**

**OF**

**ZERO CARBON POWER (PRIVATE) LIMITED**




1. The Regulations contained in Table 'A' to the First Schedule to the Companies Act, 2017 (the "Act") shall be the regulations of **Zero Carbon Power (Private) Limited** (the "Company") so far as these are applicable to a private company.

**PRIVATE COMPANY**

2. The Company is a "Private Company" within the meaning of Section 2(1)(49) of the Act and accordingly:

(1) No invitation shall be made to the public to subscribe for the shares or debentures of the Company.

(2) The number of the members of the Company (exclusive of persons in the employment of the Company), shall be limited to fifty, provided that for the purpose of this provision, where two or more persons hold one or more shares in the company jointly, they shall be treated as single member; and

(3) The right to transfer shares of the Company is restricted in the manner and to the extent herein appearing.

**TRANSFER OF SHARES**

3. A member desirous to transfer any of his shares shall first offer such shares for sale or gift to the existing members and in case of their refusal to accept the offer, such shares may be transferred to any other person, as proposed by the transferor member, with the approval of the Board of Directors.

**DIRECTORS**

4. The number of directors shall not be less than two or a higher number as fixed under the provisions of the Act. The following persons shall be the first directors of the Company and shall hold the office upto the date of First Annual General Meeting:

1. **Mian Amer Mahmood (Nominee of Zero Carbon (Private) Ltd.)**
2. **Bilal Afzal**

We, the several persons whose names and addresses are subscribed below, are desirous of being formed into a company, in pursuance of this memorandum of association, and we respectively agree to take the number of shares in the capital of the company as set opposite our respective names:

| Name and surname (present & former) in full (in Block Letters) | NIC No. (in case of foreigner, Passport No) | Father's / Husband's Name in full | Nationality (ies) with any former Nationality | Occupation | Usual residential address in full or the registered/ principal office address for a subscriber other than natural person | Number of shares taken by each subscriber (in figures and words) | Signatures |
|---|---|---|---|---|---|---|---|
| Mian Amer Mahmood | 35202-1967706-3 | Mian Zahoor-ul-Haq | Pakistan | Business | 36-E, Model Town, Lahore | 750,000/- (Seven Hundred Fifty Thousand Only) | |
| Bilal Afzal | 35202-8489452-5 | Sohail Afzal | Pakistan | Engineer | 28-C, Model Town, Lahore | 250,000/- (Two Hundred Fifty Thousand Only) | |
| Zero Carbon (Private) Limited Through Its Authorized Representative /Nominee Director<br>Mian Amer Mahmood | Company Registration # 0131610<br>CNIC # 35202-1967706-3 | Mian Zahoor-Ul-Haq | Pakistan | Holding Company | 63-E/1, Gulberg III, Lahore | 9,000,000/- (Nine Million Only) | |
| | | Total number of shares taken (Ten Million Only) | | | | 10,000,000/- | |

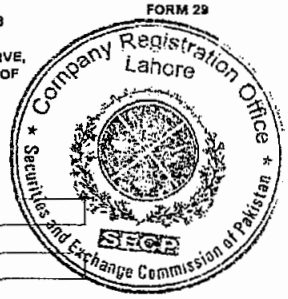
CERTIFIED TO BE TRUE COPY

ADDITIONAL JOINT REGISTRAR OF COMPANIES
COMPANY REGISTRATION OFFICE
LAHORE

Dated the 8th day of September, 2020

THE COMPANIES ACT, 2017
THE COMPANIES (GENERAL PROVISIONS AND FORMS) REGULATIONS, 2018
[Section 197 and Regulations 4 and 20]
PARTICULARS OF DIRECTORS AND OFFICERS, INCLUDING THE CHIEF EXECUTIVE, SECRETARY, CHIEF FINANCIAL OFFICER, AUDITORS AND LEGAL ADVISER OR OF ANY CHANGE THEREIN

FORM 29




PART-I

1.1 CUIN (Incorporation Number) 0157971

1.2 Name of Company ZERO CARBON POWER (PRIVATE) LIMITED

**1.3 Fee Payment Details**

1.3.1 Challan Number E-2020-279352 1.3.2 Amount 1200.0

PART-II

**2. Particulars*:**

2.1. New Appointment/Election

| Present Name in Full (a) | NIC No. or Passport No. in case of Foreign National (b) | Father / Husband Name (c) | Usual Residential Address (d) | Designation (e) | Nationality** (f) | Business Occupation*** (if any) (g) | Date of Present Appointment or Change (h) | Mode of Appointement / change / any other remarks (i) | Nature of directorship (nominee/independent/additional/other) (j) |
|---|---|---|---|---|---|---|---|---|---|
| Sabir Hussain | 3520237112227 | Sadaqat Hussain | 34-A Hussain Town Lahore | Secretary | Pakistan | | 23/10/2020 | Appointed | |
| Moazzam Salim | 3520202498873 | Muhammad Salim | 364-XX, DHA, Lahore | Legal Adviser | Pakistan | | 23/10/2020 | Appointed | |
| Qadeer And Co Chartered Accountants | | | 32-A Lawrence Road, Lahore | Auditor | Pakistan | | 23/10/2020 | Appointed | |

2.2 Ceasing of Office/Retirement/Resignation

| Present Name in Full (a) | NIC No. or Passport No. in case of Foreign National (b) | Father / Husband Name (c) | Usual Residential Address (d) | Designation (e) | Nationality** (f) | Business Occupation*** (if any) (g) | Date of Present Appointment or Change (h) | Mode of Appointement / change / any other remarks (i) | Nature of directorship (nominee/independent/additional/other) (j) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

2.3 Any other change in particulars relating to columns (a) to (g) above

| Present Name in Full (a) | NIC No. or Passport No. in case of Foreign National (b) | Father / Husband Name (c) | Usual Residential Address (d) | Designation (e) | Nationality** (f) | Business Occupation*** (if any) (g) | Date of Present Appointment or Change (h) | Mode of Appointement / change / any other remarks (i) | Nature of directorship (nominee/independent/additional/other) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

* In the case of a firm, the full name, address and above mentioned particulars of each partner, and the date on which each became a partner.
** In case the nationality is not the nationality of origin, provide the nationality of origin as well.
*** Also provide particulars of other directorships or offices held, if any.".
**** In case of resignation of a director, the resignation letter and in case of removal of a director, member's resolution be attached

PART-III

**PART-III**

**3.1 Declaration:**

I do hereby solemnly, and sincerely declare that the information provided in the form is

(i) true and correct to the best of my knowledge, in consonance with the record as maintained by the Company and nothing has been concealed and

(ii) hereby reported after complying with and fulfilling all requirements under the relevant provisions of law, rules, regulations, directives, circulars and notifications whichever is applicable.

| | | |
|---|---|---|
| 3.2 Name of Authorized Officer with designation/ Authorized Intermediary | Bilal Afzal | Director |
| 3.3 Signature | Electronically signed by Bilal Afzal | |
| 3.4 Registration No of Authorized Intermediary, if applicable | | |
| 3.5 Date (DD/MM/YYYY) | 04/12/2020 | |

Company Registration Office Lahore
Securities and Exchange Commission of Pakistan
SECP

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10/6/21

ADDITIONAL JOINT REGISTRAR OF COMPANIES
COMPANY REGISTRATION OFFICE
LAHORE.

Inc . Form - II

COMPANIES (INCORPORATION) REGULATIONS, 2017
[See Section 16 of the Act and Regulation 6]

APPLICATION FOR COMPANY INCORPORATION

PART- I

| | | |
|---|---|---|
| 1.1 Name of the Company | ZERO CARBON POWER (PRIVATE) LIMITED | |
| 1.2 Fee Payment Details | 1.2.1 Challan No | E-2020-156743 |
| | 1.2.2. Challan Amount (Rs.) | 600.0 |

Company Registration Office Lahore
Securities and Exchange Commission of Pakistan
SECP

PART- II

Section - A - Company Information

| | | | | | |
|---|---|---|---|---|---|
| 2.1 Correspondence Address* | | | | | |
| City | | District | | Province | |
| Telephone Number | | | Email Address | | |
| Mobile Number | | | | | |

* Information regarding Correspondence address is to be provided only if company does not have a place at its registered office at the time of incorporation of the company

| | | | | | |
|---|---|---|---|---|---|
| 2.2 Registered office Address, if any | 63, E/1, Gulberg III, Lahore, Gulberg Town, LAHORE, Punjab | | | | |
| City | Gulberg Town | District | LAHORE | Province | Punjab |
| Telephone Number | 35870192 | | Website (if any) | | |
| Mobile Number | 03334334774 | | Email Address | corporate.compliance@pgc.edu.pk | |

| | |
|---|---|
| 2.3 Principal line of business (Brief object as per clause 3(i) of the Memorandum may be mentioned) | --POWER GENERATION - ALLIED (OTHER) |

Section - B - Capital Structure

| | Class / Kind | Face Value | No of Shares | Total Amount |
|---|---|---|---|---|
| 2.4 Authorised Capital | Ordinary Share | 10 | 50000000 | 500000000 |
| 2.5 Paid Up Capital | Ordinary Share | 10 | 10000000 | 100000000 |

Section - C - Special Business Information*

(Applicable in case of Banking Company, Non-banking Finance Company, Insurance company, Modaraba management company, Stock Brokerage business, forex, real estate business, managing agency, business of providing the services of security guards and any other business restricted under any other law or as may be notified by the commission)

| | |
|---|---|
| 2.6 Nature of business in case of specialized business requiring licence / permission / approval (please specify and also attach NOC / approval of the relevant authority) | N/A |

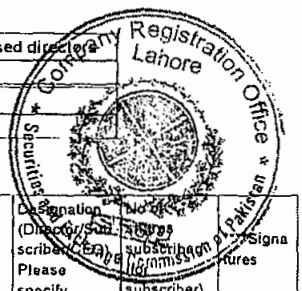
*(Additional documents will be required by the registrar)*

Section - D - Company subscribers, directors, chief executive officer and in case of sinlge member company, nominee

2.7 State Number of directors fixed by subscribers:

*[Please note that as per law a company must have minimum director as follows:]*

| Kind of company | Minimum number of directors required by law | No. of proposed directors |
|---|---|---|
| Singla Member Company | 01 | |
| Private Limited Company | 02 | 2 |
| Public Limited Company | 03 | |




2.8 Details of subscribers, directors and chief executive officer *

| Name | Father/Husband Name | NIC/Passport No/NICOP | **Incorporation/Registration No | Nationality | ***Occupation | Residential/Registered office address | NTN | Designation (Director/Subscriber/CEO) Please specify | No. of shares subscribed (for subscriber) | ****Signatures |
|---|---|---|---|---|---|---|---|---|---|---|
| Mian Amer Mahmood | S/O Mian Zahoor Ul Haq | 3520219677063 | | Pakistan | Business | 36-E Model Town Lahore Punjab Pakistan 54000 | 0155902 8 | Director And Subscriber | 750000 | Electronically signed by Mian Amer Mahmood |
| Bilal Afzal | S/O Sohail Afzal | 3520284894525 | | Pakistan | Engineer | 28-C Model Town Lahore Punjab Pakistan 54000 | 4183726 6 | Director And Subscriber | 250000 | Electronically signed by Bilal Afzal |
| Mian Amer Mahmood | S/O Mian Zahoor Ul Haq | 3520219677063 | | Pakistan | Business | 36-E Model Town Lahore punjab Pakistan 54000 | 0155902 8 | Chief Executive | | |
| Zero Carbon (Private) Limited through Mian Amer Mahmood | S/O Mian Zahoor Ul Haq | 3520219677063 | 0131610 | Pakistan | Engineer | 36-E Model Town Lahore Punjab Pakistan 54000 | 0155902 8 | Subscriber (Company) | 9000000 | Electronically signed by Zero Carbon (Private) |

*Add details as applicable
** Applicable on subscribers other than natural persons
***Please also mention names of other companies where directorship is held.
**** Signature of subscribers and consent to act as director or chief executive as the case may be. In case of online submission, the document will be signed electronically

2.9 Details of Nominee (only in case of single member company- Nominee shall not be a person other rhan relatives of the member- namely, a spouse, father, mother, brother, sister and son or daughter)

| | |
|---|---|
| Name of Nominee | |
| NIC of Nominee | |
| Residential address of Nominee | |
| Telephone number of Nominee | |
| Email address of Nominee | |
| Relationship of Nominee with subscriber | |
| Signature of nominee | |

Section - E - If the company intends to adopt tables contained in First Schedule to the Companies Act, 2017 (XIX of 2017) as its articles of association

☐ Table A- Part I (Articles of association of company limited by shares)

☐ Table A- Part II (Articles of association of single member company limited by shares)

Section - F - The company limited by shares in case it has not adopted articles contained in First Schedule to the Act company limited by guarantee and unlimited company shall attach the articles of association.

**PART- III**

Company Registration Office Lahore — Securities and Exchange Commission of Pakistan

Declaration under section 16

| | |
|---|---|
| 3.1 Declarant's Name | Mr Bilal Afzal |
| 3.2 Declarant Profession / Designation | ☐ Authorized Intermediary<br>☑ a person named in the articles as Director of the proposed company |
| 3.3 Declaration | I do hearby solemnly and sincerely declare that:<br>a) I have been authorized as declarant by the subscribers;<br>b) all the requirements of the Companies Act, 2017, and the regulations made there under in respect of matters precedent to the registration of the said Company and incidental thereto have been compiled with<br>c) I make this solemn declaration conscientiously believing the same to be true. |
| 3.4 Declarant Signature | |
| 3.5 Registration No of authorized intermediary, if applicable | |
| 3.6 Date(dd/mm/yyyy) | 10/09/2020 |

CERTIFIED TO BE TRUE COPY

10/9/21

ADDITIONAL JOINT REGISTRAR OF COMPANIES
COMPANY REGISTRATION OFFICE
LAHORE.

ENCLOSURES

(i) Original paid bank challan evidencing payment of fee;
(ii) Memorandum of Association;
(iii) Articles of Association, where applicable;
(iv) Copies of valid CNIC/NICOP of the subscribers/directors/chief executive officer or copy of Passport in case of a foreigner;
(v) Copy of valid CNIC/NICOP of Nominee only in case of single member company or copy of Passport in case of a foreigner;
(vi) Copy of valid CNIC of witness in case of physical filing;
(vii) NOC/Letter of Intent/ License (if any) of the relevant regulatory authority in case of specialized business;
(viii) Authority letter for filing of documents for the proposed company on behalf of the subscribers as per requirement of clause (vi) of sub-regulation (2) of regulation 5.
(ix) Copy of valid CNIC/Passport of person duly authorized by the Board of directors of a body corporate which is a subscriber. Further, along with copy of Board resolution along with and attendance sheet duly authorizing the representative. In case of a subscriber which is a limited liability partnership, copy of valid NIC/ Passport of designated partner empowered to act as such, along with copy of instrument empowering him;
(x) In case the subscriber is a foreign company or a foreign body corporate, the profile of the company, detail of its directors, their nationality and country of origin, certified copy of its charter, statute or memorandum and articles etc.
(xi) In case of foreign subscriber/ officer, an undertaking on stamp paper of requisite value duly signed , notarized and witnessed to the effect that in case name of subscriber/officer is not security cleared by MoI, the subscriber/officer and the company, shall take immediate steps for replacement and shall transfer shares if any, held by the subscriber.

ZERO CARBON SOLAR

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**ANNEXURE C** – TAXPAYER REGISTRATION CERTIFICATION

FBR
PAKISTAN

Government of Pakistan
**Federal Board of Revenue**
Inland Revenue Services

# TAXPAYER REGISTRATION CERTIFICATE

(Under Section 181C of the Income Tax Ordinance 2001)

| | |
|---|---|
| **Registration No.** | 8378127 |
| **Date of Registration** | 16-Sep-2020 |
| **Type of Person** | Company |
| **Inc. No.** | 0157971 |
| **Inc. Date** | 16-Sep-2020 |
| **Name** | ZERO CARBON POWER (PRIVATE) LIMITED |
| **Address** | 63 E/1 Gulberg III Pakistan |
| **Tax Office** | CTO, LAHORE |
| **Activity Type** | Business |

8378127

This is a computer generated certificate and, hence, no signatures are required.

Displaying of Taxpayer Registration Certificate is mandatory as provided under section 181C of Income Tax Ordinance 2001.

This is not a valid evidence of being a 'filer' for the purposes of clauses (23A) and (35C) of sections 2 and 181A of the Income Tax Ordinance 2001.

[redacted]

Date of Print 18-Sep-2020

ZERO CARBON SOLAR

# **ANNEXURE D** – ACCOUNT MAINTENANCE LETTER

# ZERO CARBON POWER (PRIVATE) LIMITED

## EQUITY CERTIFICATE

This is certifies that ***Zero Carbon Power (Pvt) Ltd*** has following equity as on 30th June 2021.

| | |
|---|---|
| ***Authorized Share Capital*** | |
| 50,000,000 Ordinary Shares of Rs. 10 each | 500,000,000 |
| ***Issued Subscribed and Paid Up Capital*** | |
| 10,000,000 shares of Rs. 10 each | 100,000,000 |
| Retained Earnings | (2,866,352) |
| Total Equity | 97,133,648 |

Chief Executive Officer

Company Seal

AUGUST 26,2021

ZERO CARBON POWER (PRIVATE) LIMITED
ZERO CARBON POWER (PRIVATE) LIMITED
63 E/1
GULBERG III LAHORE
PK

Dear Customer,

**Balance Certificate**

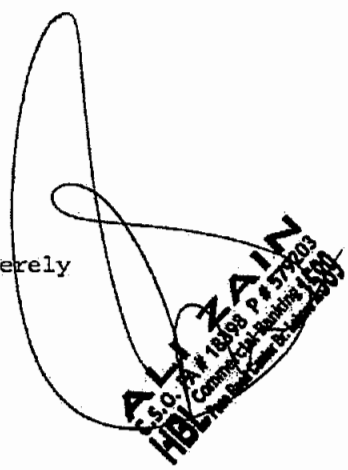
We hereby certify that the following account is being maintained at PECO ROAD CENTRE Branch.

**Account type** : **HBL FreedomAccount**
**Account number** : **15897919051803**

We further certify that the balance in the subject account at close of business on AUGUST 25,2021 stood at CREDIT PKR *******25,774,760.00 ( Rupees Twenty Five Million Seven Hundred Seventy Four Thousand Seven Hundred Sixty Only. )

Yours Sincerely

**MANAGER**



ZERO CARBON SOLAR

# FINANCIAL STATEMENTS

**ZERO CARBON POWER (PRIVATE) LIMITED**

# Financial Statements

FOR THE YEAR ENDED JUNE 30, 2021

# ZERO CARBON POWER (PRIVATE) LIMITED
## STATEMENT OF FINANCIAL POSITION
## AS AT 30 JUNE 2021

| | Note | 30 June 2021 (Rupees) |
|---|---|---|
| **EQUITY AND LIABILITIES** | | |
| **Share capital and reserves** | | |
| Share Deposit Money | 6 | 100,000,000 |
| Unappropriated profits/(Loss) | | (2,866,352) |
| **Total equity** | | **97,133,648** |
| **LONG TERM LIABILITIES** | | |
| SBP Term Finance Under Category III | 7 | 130,416,000 |
| **CURRENT LIABILITIES** | | |
| Trade and other payables | 8 | 492,062 |
| **TOTAL EQUITY AND LIABILITIES** | | **228,041,710** |
| **ASSETS** | | |
| **NON-CURRENT ASSETS** | | |
| Property and equipment | | - |
| Long Term Security Deposit | | 25,000,000 |
| **CURRENT ASSETS** | | |
| Loans and Advances | 9 | 189,167,921 |
| Cash and bank balances | 10 | 13,873,789 |
| **Total Current Assets** | | **203,041,710** |
| **TOTAL ASSETS** | | **228,041,710** |

The annexed notes from 1 to 12 form an integral part of these financial statements.

**Chief Executive** **Director**

# ZERO CARBON POWER (PRIVATE) LIMITED
## STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME
### FOR THE YEAR ENDED JUNE 30, 2021

| | Note | 30 June 2021 (Rupees) |
|---|---|---|
| Revenue | | - |
| Less: Cost of Sale | | - |
| **Gross profit** | | - |
| Administrative and general expenses | 11 | (2,300,467) |
| Financial Charges | 12 | (565,885) |
| | | - |
| **Profit / (Loss) before taxation** | | (2,866,352) |
| Taxation | | - |
| **Profit / (Loss) for the year** | | (2,866,352) |
| **Total comprehensive Profit / (loss) for the period** | | (2,866,352) |

The annexed notes from 1 to 12 form an integral part of these financial statements.

**Chief Executive** **Director**

# ZERO CARBON POWER (PRIVATE) LIMITED
## STATEMENT OF CASH FLOWS
## FOR THE YEAR ENDED JUNE 30, 2021

| | Note | 30 June 2021 (Rupees) |
|---|---|---|
| **CASH FLOWS FROM OPERATING ACTIVITIES** | | |
| Profit / (loss) before taxation | | **(2,866,352)** |
| **Non-cash adjustments** | | |
| - Depreciation | | - |
| **Operating loss before working capital changes** | | **(2,866,352)** |
| **Decrease / (Increase) in working capital** | | |
| Short Term Security | | **(189,167,921)** |
| Trade and other payables | | **492,062** |
| **Net cash flows from operating activities** | | **(191,542,211)** |
| **CASH FLOWS FROM INVESTING ACTIVITIES** | | |
| Property and equipment purchased | | - |
| **Net cash used in investing activities** | | - |
| **CASH FLOWS FROM FINANCING ACTIVITIES** | | |
| Long Term Security Deposit | | (25,000,000) |
| SBP Term Finance Under Category III | | 130,416,000 |
| Share capital issued | | 100,000,000 |
| **Net cash generated from financing activities** | | **205,416,000** |
| **Net increase / (decrease) in cash and cash equivalents** | | **13,873,789** |
| **Cash and cash equivalents at beginning of the period** | | - |
| **Cash and cash equivalents at end of the period** | **10** | **13,873,789** |

0

Chief Executive

Director

# ZERO CARBON POWER (PRIVATE) LIMITED
## STATEMENT OF CHANGES IN EQUITY
### FOR THE YEAR ENDED JUNE 30, 2021

| | Share Deposit Money | Share capital | Unappropriated profits | Total |
|---|---|---|---|---|
| | (Rupees) | (Rupees) | (Rupees) | (Rupees) |
| Share deposit money | 100,000,000 | | - | 100,000,000 |
| Transferred | | - | | |
| Loss for the period | - | - | (2,866,352) | (2,866,352) |
| Other comprehensive income / (Loss) | - | - | - | - |
| Total comprehensive loss for the period | - | - | (2,866,352) | (2,866,352) |
| **Balance as at 30 June 2021** | 100,000,000 | - | (2,866,352) | 97,133,648 |

Chief Executive

Director

# ZERO CARBON POWER (PRIVATE) LIMITED
## NOTES TO THE FINANCIAL STATEMENTS
## FOR THE YEAR ENDED JUNE 30, 2021

### 1 STATUS AND NATURE OF BUSINESS

Zero Carbon Power (Private) Limited ('the Company') was incorporated on 16 September 2020 in Pakistan as a Private Limited Company under the Companies Act, 2017. Registered office of the Company is situated at 63-E-1 Gulberg III, Lahore. The principal objects of the Company is to generate and sell electricity. To carry on all or any anicillary business relating to generation, production, sale, storage, supply and distribution of electricity.

### 2 STATEMENT OF COMPLIANCE

These financial statements have been prepared in accordance with the accounting and reporting standards as applicable in Pakistan. The accounting and reporting standards applicable in Pakistan comprise of:

- International Financial Reporting Standard for Small and Medium-sized Entities (IFRS for SMEs) issued by the International Accounting Standards Board (IASB) as notified under the Companies Act, 2017; and
- Provisions of and directives issued under the Companies Act, 2017.

Where provisions of and directives issued under the Companies Act, 2017 differ from the IFRS for SMEs, the provisions of and directives issued under the Companies Act, 2017 have been followed.

### 3 BASIS OF PREPARATION

#### 3.1 Basis of measurement

These financial statements have been prepared under the historical cost convention.

#### 3.2 Presentation currency

These financial statements are presented in Pak Rupee which is the Company's functional currency. Figures have been rounded off to nearest rupee unless otherwise stated.

### 4 SIGNIFICANT ACCOUNTING JUDGMENTS, ESTIMATES AND ASSUMPTIONS

The preparation of financial statements in conformity with the International Financial Reporting Standard for Small and Medium-sized Entities issued by the International Accounting Standard Board as notified under the Companies Act, 2017 requires management to make judgments, estimates and assumptions that affect the application of policies and reported amounts of assets and liabilities, income and expenses. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances, the results of which form the basis of making the judgments about carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates.

### 5 SIGNIFICANT ACCOUNTING POLICIES

#### 5.1 Cash and cash equivalents

Cash and cash equivalents are carried in the statement of financial position at cost. For the purpose of cash flow statement, cash and cash equivalents comprise cash in hand, demand deposits, other short term highly liquid investments that are readily convertible to known amounts of cash and which are subject to an insignificant risk of change in value and finances under mark up arrangements.

| | | 30 June 2021<br>(Rupees) |
|---|---|---|
| 6 | **SHARE CAPITAL** | |
| | **Authorized share capital** | |
| | 50,000,000 ordinary shares of Rs.10 each | 500,000,000 |
| | **Issued, subscribed and paid-up capital** | |
| | 10,000,000 ordinary shares of Rs. 10 each fully paid in cash | - |
| | **Share Deposit Money** | |
| | Share deposit money | 100,000,000 |
| 7 | **LONG TERM LOAN** | |
| | SBP Term Finance Category III | |
| | | 130,416,000 |
| | | 130,416,000 |
| 8 | **TRADE AND OTHER PAYABLES** | |
| | Trade payables | 2,000 |
| | Markup payable | 482,361 |
| | Income tax withheld at source | 1,701 |
| | | 486,062 |
| 9 | **ADVANCES** | |
| | Advance against Expenses | |
| | Others | |
| | - To Suppliers | 189,167,921 |
| | | 189,167,921 |
| 10 | **CASH AND BANK BALANCES** | |
| | Cash in hand | - |
| | Cash at bank | |
| | Current account | 13,873,789 |
| | | 13,873,789 |
| 11 | **ADMINISTRATIVE AND GENERAL EXPENSES** | |
| | Advertisement | 92,692 |
| | Fee and subscription | 2,207,775 |
| | | 2,300,467 |
| 12 | **FINANCIAL CHARGES** | |
| | Markup on Term Finance | 482,361 |
| | Bank Charges | 83,524 |
| | | 565,885 |

Chief Executive

Director

# ZERO CARBON (PRIVATE) LIMITED

## Financial Statements

FOR THE YEAR ENDED JUNE 30, 2020

## Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs as applicable in Pakistan will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISAs as applicable in Pakistan, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the Board of Directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

## Report on Other Legal and Regulatory Requirements

Based on our audit, we further report that in our opinion:

a) Proper books of account have been kept by the Company as required by the Companies Act, 2017 (XIX of 2017);
b) the Statement of Financial Position as at June 30, 2020, the statement of Profit or Loss and Other Comprehensive Income, the Statement of Changes in Equity, the Statement of Cash Flows for the year then ended, and Notes to the Financial Statements thereon have been drawn up in conformity with the Companies Act, 2017 (XIX of 2017) and are in agreement with the books of account and returns;

# ZERO CARBON (PRIVATE) LIMITED
## STATEMENT OF FINANCIAL POSITION
## AS AT 30 JUNE 2020

| | Note | 2020 | 2019 |
|---|---|---|---|
| | | (Rupees) | (Rupees) |
| **EQUITY AND LIABILITIES** | | | |
| **Authorized capital** | | | |
| 10,000,000 (2019:10,000,000) ordinary shares of Rs. 10/-each | | 100,000,000 | 100,000,000 |
| Issued, subscribed and paid-up capital | 4 | 25,000,000 | 25,000,000 |
| **Revenue Reserve** | | | |
| Unappropriated profit / (Loss) | | 18,069,102 | (2,488,156) |
| | | 43,069,102 | 22,511,844 |
| **CURRENT LIABILITIES** | | | |
| Trade and other payables | 5 | 100,220,461 | 34,807,015 |
| Short term borrowing | 6 | 43,107,756 | - |
| Provision for taxation | | 6,918,618 | - |
| | | 150,246,835 | 34,807,015 |
| **CONTINGENCIES AND COMMITMENTS** | 7 | - | - |
| **TOTAL EQUITY AND LIABILITIES** | | 193,315,937 | 57,318,859 |
| **ASSETS** | | | |
| **NON-CURRENT ASSETS** | | | |
| Property, plant and equipment | 8 | 1,894,067 | 176,950 |
| Long term deposit | | 1,000,000 | - |
| | | 2,894,067 | 176,950 |
| **CURRENT ASSETS** | | | |
| Stock in trade | 9 | 138,041,405 | 47,268,676 |
| Trade debts | 10 | 5,300,853 | - |
| Loans and advances | 11 | 6,155,668 | 8,125,000 |
| Deposits, prepayments and other receivables | 12 | 9,809,873 | 650,000 |
| Cash and bank balances | 13 | 31,114,071 | 1,098,233 |
| **Total Current Assets** | | 190,421,870 | 57,141,909 |
| **TOTAL ASSETS** | | 193,315,937 | 57,318,859 |

The annexed notes from 1 to 24 form an integral part of these financial statements

**Chief Executive**

**Director**

# ZERO CARBON (PRIVATE) LIMITED
## STATEMENT OF CHANGES IN EQUITY
## FOR THE YEAR ENDED JUNE 30, 2020

| | Share capital (Rupees) | Unappropriated profits/(Loss) (Rupees) | Total (Rupees) |
|---|---|---|---|
| Share capital issued | 25,000,000 | - | 25,000,000 |
| Loss for the period | - | (2,488,156) | (2,488,156) |
| Other comprehensive income | - | - | - |
| Total comprehensive loss for the period | - | (2,488,156) | (2,488,156) |
| **Balance as at 30 June 2019** | 25,000,000 | (2,488,156) | 22,511,844 |
| Profit for the year | - | 20,557,258 | 20,557,258 |
| Other comprehensive income | - | - | - |
| Total comprehensive Income for the year | - | 20,557,258 | 20,557,258 |
| **Balance as at 30 June 2020** | 25,000,000 | 18,069,102 | 43,069,102 |

The annexed notes from 1 to 24 form an integral part of these financial statements

Chief Executive

Director

ZERO CARBON (PRIVATE) LIMITED
NOTES TO THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED JUNE 30, 2020

## 1 THE COMPANY AND ITS OPERATIONS

Zero Carbon (Private) Limited ('the Company') was incorporated on 19 March 2019 in Pakistan as a Private Limited Company under the Companies Act, 2017. The Company is engaged in the business of power generation, solar technology, alternate energy solutions and allied services.

Its registered office is situated at situated at 63-E-1 Gulberg III, Lahore.

1.1 The novel coronavirus (COVID-19) emerged and since then, the condition has continued to deteriorate. On January 30, 2020, The International Health Regulations Emergency Committee of the World Health Organisation declared the outbreak "Public Health Emergency of International Concern". Many countries including Pakistan have enacted protection measures against COVID-19, with a significant impact on economic activities in these countries. The evolution of COVID-19 as well as its impact on the global and the local economy is hard to predict at this stage. As of the release date of these financial statements, there has been no specifically material quantifiable impact of COVID-19 on the Company's financial condition or results of operations.

## 2 BASIS OF PREPARATION

### 2.1 STATEMENT OF COMPLIANCE

These financial statements have been prepared in accordance with the accounting and reporting standards as applicable in Pakistan. The accounting and reporting standards applicable in Pakistan comprise of:
International Financial Reporting Standard for Small and Medium-sized Entities (IFRS for SMEs) issued by the International Accounting Standards Board (IASB) as notified under the Companies Act, 2017; and
Provisions of and directives issued under the Companies Act, 2017.
Where provisions of and directives issued under the Companies Act, 2017 differ from the IFRS for SMEs, the provisions of and directives issued under the Companies Act, 2017 have been followed.

### 2.2 BASIS OF MEASUREMENT

These accounts have been prepared under the "historical cost" convention.

### 2.3 FUNCTIONAL AND PRESENTATION CURRENCY

These financial statements are presented in Pakistan Rupee (Rs. / Rupees) which is the Company's functional currency. Amounts presented in the financial statements have been rounded off to the nearest of Rs. / Rupees, unless otherwise stated.

### 2.4 Judgment, estimates and assumptions

The preparation of financial statements in conformity with IASs as applicable in Pakistan requires management to make judgments, estimates and assumptions that affect the application of policies and reported amounts of assets, liabilities, income and expenses. The estimates and related assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances the results of which form the basis of making the judgments about the carrying values of assets and liabilities that are not readily apparent from other sources, actual results may differ from the estimates. The estimates and related assumptions are reviewed on an ongoing basis. Accounting estimates are revised in the period in which such revisions are made and in any future periods affected.

Significant management estimates in these financial statements relate to the useful life of property, plant and equipment, provisions for doubtful receivables, slow moving inventory and taxation. However, the management believes that the change in outcome of estimates would not have a material effect on the amounts disclosed in the financial statements.

Judgment made by management in the application of approved standards as applicable in Pakistan that have significant effect on the financial statements and estimates with a risk of material adjustment in subsequent year are as follows;

#### 2.4.1 Depreciation method, rates and useful lives of property, plant and equipment

The management of the Company reassesses useful lives, depreciation method and rates for each item of property, plant and equipment annually by considering expected pattern of economic benefits that the Company expects to derive from that item.

**Judgments and estimates:**
The allowance for doubtful debts of the Company is based on the ageing analysis and management's continuous evaluation of the recoverability of the outstanding receivables. In assessing the ultimate realization of these receivables, management considers, among other factors, the creditworthiness and the past collection history of each customer.

3.5 **Provisions**

A provision is recognized in the balance sheet when the Company has a legal or constructive obligation as a result of past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of obligation.

The amount recognized as a provision is the best estimate of the consideration required to settle the present obligation at the end of the reporting period, taking into account the risks and uncertainties surrounding the obligation.

Where the effect of the time value of money is material, the amount expected to be required to settle the obligation is recognized at present value using a pre-tax discount rate. The unwinding of the discount is recognized as finance cost in the statement of profit or loss.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, the receivable is recognized as an asset if it is virtually certain that reimbursement will be received and the amount of the receivable can be measured reliably.

As the actual outflows can differ from estimates made for provisions due to changes in laws, regulations, public expectations, technology, prices and conditions, and can take place many years in the future, the carrying amounts of provisions are reviewed at each reporting date and adjusted to take account of such changes. Any adjustments to the amount of previously recognized provision is recognized in the statement of profit or loss unless the provision was originally recognized as part of cost of an asset.

3.6 **Taxation**

**Current taxation:**
Provision for taxation is based on taxable income at the current rate of taxation after taking into account tax credit and tax rebates realizable, if any under the provisions of Income Tax Ordinance, 2001.

**Deferred taxation:**
Deferred tax is accounted for using the balance sheet liability method in respect of all taxable temporary differences arising from differences between the carrying amount of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit. Deferred tax assets are recognized to the extent that it is probable that taxable profits will be available against which the deductible temporary differences, unused tax losses and tax credits can be utilized.

Deferred tax is calculated at the rates that are expected to apply to the period when the differences reverse, based on tax rates that have been enacted.

3.7 **Borrowing costs**

Borrowing costs relating to the acquisition, construction or production of a qualifying asset are recognised as part of the cost of that asset. All other borrowing costs are recognised as an expense in the period in which these are incurred.

3.8 **Cash and cash equivalents**

Cash and cash equivalent comprise cash in hand, cash at banks on current, saving and deposit accounts and other short term highly liquid instruments that are readily convertible into known amounts of cash and which are subject to an insignificant risk of change in value.

3.9 **Stock in trade**

These are valued at lower of cost and net realizable value (NRV).

Cost is determined on the following basis:

| | |
|---|---|
| Raw Material and Other Material | Annual weighted average except items in transit which are valued at cost accumulated up to the balance sheet date |
| Finished goods and Work in process | Material as stated above plus proportionate production overheads. |

Net realizable value of finished goods represents estimated selling prices in the ordinary course of business less incidental selling expenses.

| | | NOTE | 2020 (Rupees) | 2019 (Rupees) |
|---|---|---|---|---|
| 4 | ISSUED, SUBSCRIBED AND PAID-UP CAPITAL | | | |
| | Issued, subscribed and paid up capital comprises of: | | | |
| | Ordinary share capital | 4.1 | 25,000,000 | 25,000,000 |

4.1 The breakup of ordinary share capital is as follows:

| 2020 Number | 2019 Number | | | |
|---|---|---|---|---|
| 2,500,000 | 2,500,000 | Ordinary shares of Rs. 10 each paid in cash | 25,000,000 | 25,000,000 |
| | | | 25,000,000 | 25,000,000 |

| | | | |
|---|---|---|---|
| 5 | TRADE AND OTHER PAYABLES | | |
| | **Trade payables:** | | |
| | Advances from customers | | |
| | - Related Party | 70,942,278 | 33,575,657 |
| | - Third parties | 27,304,421 | 1,000,000 |
| | **Other payables:** | | |
| | Accrued expenses | 580,247 | 99,798 |
| | Income tax withheld at source | 123,563 | 131,524 |
| | Sales tax withheld at source | 34,356 | 36 |
| | Sales Tax Payable | 1,235,596 | - |
| | | 100,220,461 | 34,807,015 |
| 6 | SHORT TERM BORROWINGS | | |
| | Short term borrowing | 6.1 43,107,756 | - |
| | | 43,107,756 | - |

6.1 Short term borrowing of PKR 100 Million is in the form of Finance Against Trust Receipts. The limits are available with Habib Bank Limited and The Bank of Punjab with the price ranging from 3 Month Kibor Plus 1.00% to 3 Month Kibor Plus 2.50%. These facilities are secured against charge over present and future current and fixed assets of the Company, personal guarantee of Cheif Executive Officer and cross corporate guarantee of Educational Excellence Limited (An Associated Company).

7 CONTINGENCIES AND COMMITMENTS

There were no contingencies and commitments as at the reporting date.

8 PROPERTY, PLANT AND EQIUPMENT

| Particulars | Cost | | | Rate % | Depreciation | | | WDV as at 30-06-2020 |
|---|---|---|---|---|---|---|---|---|
| | As at 01-07-2019 | Additions during the year | As at 30-06-2020 | | As at 01-07-2019 | For the Year | As at 30-06-2020 | |
| Computer equipment | 190,000 | 1,799,801 | 1,989,801 | 30 | 13,050 | 318,266 | 331,316 | 1,658,485 |
| Tools & equipments | - | 245,825 | 245,825 | 10 | - | 10,243 | 10,243 | 235,582 |
| Total 2020 | 190,000 | 2,045,626 | 2,235,626 | | 13,050 | 328,509 | 341,559 | 1,894,067 |
| Total 2019 | - | 190,000 | 190,000 | | - | 13,050 | 13,050 | 176,950 |

8.1 Depreciation for the year has been allocated as under:

| | 2020 (Rupees) | 2019 (Rupees) |
|---|---|---|
| Cost of sales | 262,807 | 13,050 |
| Administration | 65,702 | - |
| | 328,509 | 13,050 |

| | | | |
|---|---|---|---|
| 9 | STOCK IN TRADE | | |
| | Work in process | 80,211,226 | 40,800 |
| | Raw material | 14,497,165 | - |
| | Stock in transit | 43,333,014 | 47,227,876 |
| | | 138,041,405 | 47,268,676 |

| | NOTE | 2020 (Rupees) | 2019 (Rupees) |
|---|---|---|---|
| **15.2 Cost of Sales - Trading** | | | |
| Finished Goods - Opening Stock | | - | - |
| Add : Purchases during the year | | 172,941,783 | - |
| | | 172,941,783 | - |
| Less : Finished Goods Closing stock | | - | - |
| | | 172,941,783 | - |
| **16 ADMINISTRATIVE EXPENSES** | | | |
| Salaries, wages & other benefits | | 2,078,662 | 1,582,009 |
| Fee and subscription | | 315,000 | 455,405 |
| Advertisement expense | | 172,000 | - |
| Communication and postage Charges | | 104,170 | - |
| Insurance expense | | 142,605 | - |
| Carriage | | 116,257 | - |
| Rent and Hire Charges | | 52,000 | 51,500 |
| Travelling & conveyance | | 7,792 | 60,308 |
| Repair & maintenance | | 69,917 | 38,210 |
| Utilities & power | | 40,095 | 22,000 |
| Legal and professional | | 39,500 | 51,325 |
| Printing and stationary | | 59,321 | 16,745 |
| Software expense | | - | 142,372 |
| Vehicle running Expense | | 13,744 | - |
| Entertainment | | 77,530 | - |
| Miscellaneous expenses | | 26,370 | - |
| Auditors' remuneration | | 50,000 | 50,000 |
| Depreciation | | 65,702 | 13,050 |
| | | 3,430,665 | 2,482,924 |
| **17 FINANCE COST** | | | |
| Bank charges | | 106,606 | 5,232 |
| | | 106,606 | 5,232 |
| **18 OTHER INCOME** | | | |
| Exchange gain | | 448,906 | - |
| Insurance claims | | 2,819 | - |
| | | 451,725 | - |
| **19 Taxation** | | | |
| Current taxation: | | - | - |
| For the year | | 6,918,618 | - |
| | | 6,918,618 | - |

**20 TRANSACTIONS WITH RELATED PARTIES**

Related parties comprise of directors, key management personnel, associated companies and entities with common directors. Transaction amount due to / from related parties are shown under receivables and payables respectively, where applicable. The transactions with related parties are carried out at commercial terms and conditions except for compensation to key management personnel which are on employment terms. Detail of transactions during the year is as follows:

| **Transactions during the year** | 2020 (Rupees) | 2019 (Rupees) |
|---|---|---|
| **Receivable** | - | - |
| **Key Management Personnel** | | |
| Sale of Solar Project to Educational Excellence Limited | 114,641,600 | - |
| Share capital issued | - | 25,000,000 |

# PPA Agreement & Proposal with Annexures

# POWER PURCHASE AGREEMENT

**ZERO CARBON POWER (PRIVATE) LIMITED**
(Seller)

**AND**

**BULLEH SHAH PACKAGING (PRIVATE) LIMITED** (Purchaser)

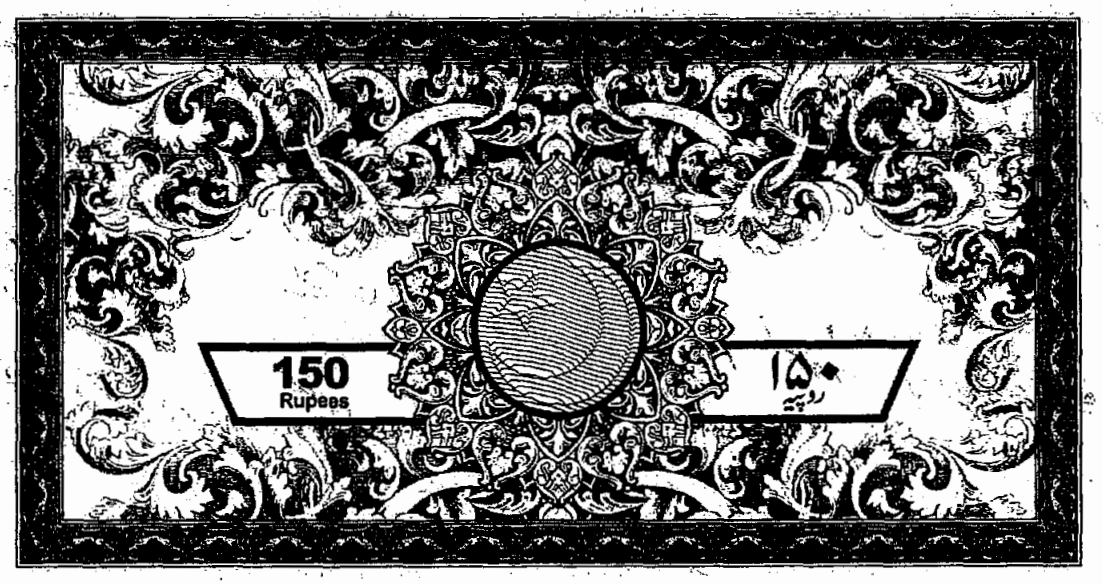
**POWER PURCHASE AGREEMENT**

**FOR**

**ELECTRICITY PRODUCED FROM**
**SOLAR POWERED 1.82 MW CAPACITY POWER GENERATION PLANT**

Zero Carbon Power (Private) Limited

433349




## POWER PURCHASE AGREEMENT

This Power Purchase Agreement (hereinafter "**this Agreement**") is made at Lahore on the 11th day of August 2021 (hereinafter "**the Effective Date**") by and between:

**Zero Carbon Power (Private) Limited**, a company incorporated and existing under the laws of Pakistan, having its registered office at 63, Block E/1, Hali Road, Gulberg III, Lahore (hereinafter "**the Seller**", which expression shall, wherever the context so permits, means and includes its successors-in-interest and permitted assigns)

**AND**

**Bulleh Shah Packaging (Private) Limited** a company incorporated and existing under the laws of Pakistan and having its registered office located at 4th Floor, the Forum, Suite no. 416-422, G-20, Block 9, Khayaban-e- Jami, Clifton, Karachi 75600, Pakistan hereinafter "**the Purchaser**", which expression shall, wherever the context so permits, means and includes its successors-in-interest and permitted assigns).

(The Purchaser and the Seller shall, where the context so permits, hereinafter be collectively referred to as the "**Parties**" and each individually as a "**Party**").

**WHEREAS:**

**A.** The Purchaser is in the business of the manufacture and marketing of a large number of domestic and consumer products at Kasur (the "**Factory**") and requires energy for its operation. The Factory is connected to the distribution and transmission system maintained and operated by the Lahore Electric Supply Company Limited.

**B.** The Seller is in the business of developing clean energy solutions for corporate customers on a build, own, operate and transfer basis.

**C.** The Purchaser intends to engage the Seller for the designing, engineering, construction, installation, operation and maintenance of the Project at the Project Site for the purposes of generating solar power to meet the electricity

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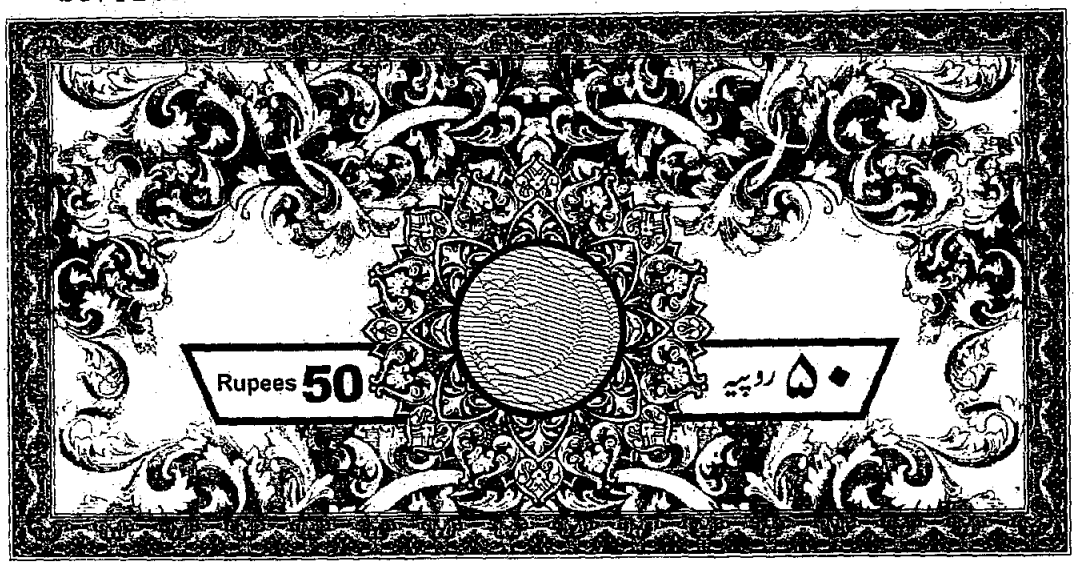


requirements of the Purchaser at the Factory, and the Seller is desirous of selling the electricity so generated to the Purchaser

D. The Parties have agreed to execute this Agreement whereby the Seller shall sell and the Purchaser shall purchase all of the Net Delivered Energy or the Net Energy (as applicable) in accordance with the terms and conditions of this Agreement. The Net Delivered Energy shall be delivered to the Purchaser at the Interconnection Point pursuant to the terms and conditions contained herein.

**NOW THEREFORE**, in view of the foregoing and in consideration of the mutual benefits to be derived and the representations and warranties, promises, covenants, undertaking and agreements contained herein and other good and valuable consideration, the sufficiency of which is hereby acknowledged and intending to be legally bound, the Parties hereby agree as follows:

## 1 DEFINITIONS AND INTERPRETATION

### 1.1. DEFINITIONS

Capitalized terms used in this Agreement, including the recitals hereto, without other definition, shall have the meanings specified hereunder, unless the context requires otherwise.

**"Agreement"** means this Power Purchase Agreement and includes all Annexures attached hereto and any addendum executed in the prescribed manner;

**"Agreement Year"** means any twelve (12) month period during the term of this Agreement that commences on the Commercial Operations Date and concludes a day prior to the subsequent anniversary of the Commercial Operations Date, and thereafter starts on an anniversary of the Commercial Operations Date and concludes a day prior to the subsequent anniversary of the Commercial Operations Date.

**"Approval"** means any/all authorizations, licenses, approvals, registrations, permits, waivers, privileges, acknowledgements, agreements, no objection certificates or concessions required to be obtained by the Seller under the applicable Law in order to legally implement the Project.

**"Ancillary Products and Services"** means products and services provided by the Seller outside the scope of the Project, which products/services maybe provided by the Seller on conditions mutually agreed upon by the Parties.

**"Annual Committed Consumption"** means the 2,546,000kWh Energy guaranteed to be consumed by the Purchaser for the first Agreement Year, which will be adjustable with five percent (5%) negative tolerance and later calculated with discounting for one percent (1%) degradation for each subsequent Agreement Year, as given in Annexure F to this Agreement (provided such Energy is delivered at the Interconnection Point).

**"Annual Guaranteed Generation"** means the annual minimum generation of 2,546,000 kWh Energy guaranteed to be generated by the Seller from the Project for the first Agreement Year which will be adjustable with five percent (5%) negative tolerance and later calculated with discounting for one percent (1%) degradation for each subsequent Agreement Year as given in Annexure F to this Agreement.

**"Asset Value"** means the Initial Project Cost, and thereafter the depreciated value calculated annually on the day after the first Agreement Year using the straight-line method;

**"Bank Guarantee"** means the bank guarantee procured by the Purchaser in favor of the Seller from a mutually agreed upon financial institution/bank that shall secure the payment obligations of the Purchaser under the Agreement and which shall substantially be in the form prescribed in **Annexure C** attached hereto;.

**"Business Day"** means any day other than a Saturday, Sunday or a statutory holiday, on which the scheduled banks remain open for business in Pakistan.

**"Buyout Price"** means the buyout price of the Project, as mentioned in Annexure E attached hereto;

**"Change in Law"** means and include the following events:

(i) adoption/amendment/effect/modification of any applicable Law; or

(ii) change in interpretation of applicable Law by a Relevant Authority; or

(iii) change in any Approvals available or obtained for the Project, or imposition of additional conditions in respect thereof, resulting in change in cost or revenues;

**"Commercial Operations Date"** means the date of Commissioning of the entire Project, whereupon it will commence delivering Energy to the Interconnection Point; provided that any delay in the Commercial Operations Date beyond the Scheduled COD shall only be with the prior written consent of the Purchaser and subject to any liquidated damages payable by the Seller to the Purchaser in accordance with this Agreement (unless such delay is on account of any act of the Purchaser or due to any Force Majeure Event).

**"Commission or Commissioning"** means:

(i) fulfillment/completion of:

(a) connection of the entire Project to the Interconnection Point using Seller Power Evacuation Infrastructure and commencement of delivery by the Project of Energy to the Interconnection Point provided that the Purchaser has given timely access to the Seller to such Interconnection Point provided, however, that in case the connection of the entire Project is not achieved on account of any act of the Purchaser, then the Purchaser shall accept partial Commissioning (on terms mutually agreed upon between

Carbon Power (Private) L

the Parties) by way of connection of part of the Project to the Interconnection Point with the remainder of the Commissioning also subject to terms mutually agreed upon between the Parties;

(b) successful completion of all the commissioning tests as duly notified by the Seller and countersigned in written approval by Purchaser;

(c) all necessary safety related aspects for commissioning the Project having been taken care of by the Seller as per Standard Industry Practices; and

(d) receipt of any/all applicable Approvals (including, without limitation, the Generation License) needed by the Seller in respect of the Project under the Law and submission of copies thereof to the Purchaser; and

(ii) the delivery of the Commissioning Certificate to the Purchaser by the Seller and countersignature of approval on the same by the Purchaser.

**"Commissioning Certificate"** shall mean the certificate issued by the Seller certifying the commissioning of the Project along with the applicable and necessary Approvals.

**"Contract Life"** means fifteen (15) years from the Commercial Operations Date till Termination, Project Buyout or expiry of this Agreement, whichever is earlier

**"Daytime Tariff"** means the tariff rate which is agreed by the Parties to be PKR 26.5 per kWh if the Net Delivered Energy was instead procured/produced from the DISCO.

**"DISCO"** means the Lahore Electric Supply Company or any other distribution company that is supplying electricity to the Purchaser.

**"Electricity Unit"** means the unit of electrical energy expressed in kWh to be generated and available to the Purchaser from the Project as measured by the Metering Equipment;

**"Energy"** means the solar powered electrical energy expressed in kWh generated by the Project.

**"Equipment"** means the solar powered electricity generation facility having an installed capacity of **1.82** MW comprising arrays of solar photo-voltaic modules located at the Project Site, including but not limited to the Seller's interconnection and transmission facilities, Metering Equipment etc. but excluding the Purchaser's interconnection and transmission Facilities;

**"Finance Agreements"** mean the agreements under which the Lenders shall grant financing for the Project to the Seller and include loan agreements, security documents, notes, indentures, security agreements, letters of credit and other documents, as may be amended, modified, or replaced from time to time;

**"Force Majeure Event"** means any event or circumstance or combination of events and circumstances (including the effects thereof) that is beyond the reasonable control of a Party and that materially and adversely affects the performance by such affected Party of its obligations under this Agreement, including but not limited to acts of God whether mentioned herein or not, sabotage, insurrection, terrorism, riots, hostilities, war (whether declared or not), political unrest, governmental acts, Relevant Authorities acts, change in law, radioactive contamination, strikes or lockouts, fire, lightning, earthquake, flood, storm, cyclone, typhoon, tornado, disease, pandemic, epidemic or plague,

explosion, vandalism, malicious damage, etc. which makes that Party's performance of its obligations under this Agreement impossible;

**"Generation License"** means the license issued to the Seller by NEPRA for generation and supply of Electricity Units/Energy through the Project;

**"Governmental Authority"** means any government authority, statutory authority, government department, agency, commission, board, tribunal or court or other law, rule or regulation making entity having or purporting to have jurisdiction on behalf of the Islamic Republic of Pakistan or any state or other subdivision thereof or any municipality, district or other subdivision thereof.

**"Interconnection Point"** means the physical point or points where the Project is connected to the Purchaser's system at which point the Purchaser shall receive the Net Delivered Energy and such Interconnection Point shall be decided mutually by both the Parties prior to the Commercial Operations Date;

**"Law"** means any statute, law, rule, regulation, ordinance, by-law, administrative requirement, guideline, directive, policy or any similar form of decision or determination, or any interpretation or adjudication having the force of law or other restriction of any Governmental Authority, as applicable and as enacted or promulgated and whether in effect in Pakistan as of the Effective Date or at any time thereafter.

**"Lenders"** means the financial institutions/banks listed in a certificate furnished to the Purchaser by the Seller that they are parties to the Finance Agreements, executed under the SBP RE Scheme or under any other such arrangement to secure finances for the Project by the Seller, together with their respective successors-in-interest and assigns;

**"Metering Equipment"** means all metering equipment including backup metering equipment, associated equipment and devices owned by the Purchaser for the measurement of the Net Energy and the Net Delivered Energy by the Project;

**"Net Delivered Energy"** means the net Energy expressed in Electricity Units generated by the Project on and from the Commercial Operations Date and delivered at the Interconnection Point, (as measured by the Metering Equipment) at the requisite Voltage of Delivery for the purpose of consumption by the Purchaser, subject to the respective tolerances allowed in the Annual Guaranteed Generation and Annual Committed Consumption;

**"Net Energy"** means the Energy expressed in Electricity Units which the Project is capable of generating under clause 4.4.3 and which shall be used as a substitute to Net Delivered Energy for billing purposes during the existence of any factors listed in sub-clauses 4.4.3.1 to 4.4.3.4 (inclusive);

**"NEPRA"** means the National Electric Power Regulatory Authority established under the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997 (XL of 1997), and includes any successor or substitute regulatory agency with authority and jurisdiction over the electricity sector in Pakistan;

Zero Carbon Power (Private) Limited

**"Performance Undertaking"** means an undertaking by Seller for performance of the Seller's obligations under this Agreement up to the Commercial Operations Date and which shall substantially be in the form prescribed in Annexure D attached hereto.

**"PKR"** means Pakistani Rupees.

**"Project"** means the Equipment to be designed, engineered, constructed, installed, possessed, operated and maintained by the Seller during the Term, whether completed or at any stage in its construction, including without limitation or regard to level of development, engineering and design documents, all energy-producing equipment and auxiliary equipment, data-communication and recording equipment and systems, the monitoring system, the inverter system, all spare parts stored at the Project Site and all other equipment or facilities necessary for delivery of electric power to the Purchaser at the Interconnection Point, which is described in Annexure A attached hereto;

**"Project Buyout"** has the meaning ascribed to it in Clause 4.5 hereof.

**"Project Site"** means the area which the Purchaser is lawfully entitled to use in the manner mentioned in the Agreement, duly designated as the Project Site with rights/entitlements/permissions accorded to the Seller in the manner prescribed herein for the installation of the Project as described in detail in Annexure B attached hereto;

**"Relevant Authority"** means the department, authority, instrumentality, agency, entity or other person or body of Pakistan from which an Approval is to be obtained and any authority or body or person having jurisdiction under the applicable Laws with respect to the Seller or the Purchaser and includes NEPRA;

**"Reference Conversion Rate"** means a conversion rate of US$ 1: PKR 177.5

**"SBP RE Scheme"** means State Bank of Pakistan's Financing Scheme for Renewable Energy, dated July 26, 2019;

**"Scheduled COD"** means twelve (12) months from Effective Date.

**"Standard Industry Practice"** means the practices, methods, techniques and standards, as they may be modified from time to time, which are generally followed in the international photovoltaic solar industry; including those expected from a reasonably skilled, prudent and experience person engaged in providing in performing obligations similar to those of the Seller hereunder, its subcontractors, their employees and other third-party agents of the Seller.

**"Tariff Rate"** means a rate of PKR 10.2 exclusive of all taxes but inclusive of Insurance payable by the Purchaser to the Seller for each Electricity Unit produced / delivered by the Seller to the Purchaser after the Commercial Operations Date in accordance with the terms of this Agreement.

**"US$"** means United States Dollars.

**"Voltage of Delivery"** means the voltage at which the electrical energy generated by the Solar Project is required to be delivered at the at the 3 phase (LT) Interconnection Point.

**"Works"** means designing, engineering, transportation, site management, custody and care of material and construction, assembling, installation, testing, Commissioning and handing over (if applicable) of the Project by the Seller to the Purchaser as fully set out in this Agreement and other related activities (including services) in furtherance thereof.

Carbon Power (Private) Limited

1.2. **INTERPRETATION**

(a) In this Agreement, unless there is something in the subject that is inconsistent with such interpretation or unless it is otherwise expressly provided:

i. words denoting one gender shall include all other genders and words denoting the singular includes the plural and vice versa;

ii. words denoting person(s) shall include corporation(s) and vice versa; and including their respective legal heirs, personal representatives, successors in title or permitted assignees, as the case may be;

iii. words not defined herein shall have the same meaning as are ascribed to them, firstly in the power generation industry and secondly in the recognized dictionaries;

iv. reference to a Party are references to a party to this Agreement, including that Party's respective successors in title, legal heirs, legal representatives and permitted assigns;

v. the headings are inserted for convenience only and shall not affect the construction/interpretation of this Agreement; and

vi. Any reference to a law, rule, regulation, notification or any section thereof will be deemed to include reference to any modification, amendment or re-enactment thereof for the time being in force and all instruments, orders, regulations, by-laws, permissions and directions at any time made thereunder.

(b) The Annexures to this Agreement shall have effect and be construed as an integral part of this Agreement, but in the event of any conflict or discrepancy between any of the provisions of this Agreement and the Annexures, the provisions of this Agreement shall take precedence.

## 2 WARRANTIES, EFFECTIVE DATE AND TERM

2.1. **The Purchaser warrants:**

2.1.1. and binds itself to purchase the Net Delivered Energy or Net Energy (whichever is applicable) in accordance with the terms and conditions of this Agreement;

2.1.2. that the Bank Guarantee arranged by the Purchaser shall remain intact and valid throughout the Term;

2.1.3. that it shall be bound to provide the Project Site in the manner mentioned in and subject to the terms of this Agreement. The Seller and its authorized representatives/employees shall be provided unhindered, uninterrupted and unconditional access to the Project Site after the Effective Date;

2.1.4. that it shall pay all invoices generated by the Seller under the terms of the Agreement;

2.1.5. that it shall provide a safe work environment to the Seller's personnel and shall remain fully responsible for the security of the Equipment;

2.1.6. that it understands that the Seller shall enter into Finance Agreements with the Lenders under the SBP RE Policy and that the Project shall be financed under the terms of such agreements. In case of an established default under the Finance Agreements, the Lenders shall have the same rights/entitlements relating to the Project as the Seller has; and

2.1.7. that all consents, permissions, filings, exemptions, authorizations, etc. required or necessary for the Purchaser to obtain in respect of the Project have been duly obtained and are in full force and effect. The Purchaser shall, where practicable, assist the Seller in acquiring the Generation License from NEPRA and execution of the Finance Agreements only to the extent of providing any necessary documentation and information.

2.2. **The Seller warrants:**

2.2.1. that the Seller shall, after the Effective Date and the signing of the Agreement between the Parties:

(a) apply for and procure the Generation License from NEPRA and any other approvals from the Relevant Authorities;

(b) execute binding Finance Agreements with the Lenders; and

(c) provide the Purchaser with data and design of the Project

2.2.2. and binds itself to exclusively deliver the Net Delivered Energy or the Net Energy (whichever is applicable) in accordance with the terms and conditions of this Agreement.

2.2.3. the Performance Undertaking shall remain valid and in force till the time it is duly discharged in accordance with the terms of the Undertaking;

2.2.4. it shall not have any right/title pertaining to the Project Site except the right to its use for setting up, operating and maintaining the Project that will be set up.;

2.2.5. it has the financial capacity and standing to perform all its obligations under this Agreement;

2.2.6. the Project shall be operational for the Contract Life, provided that the obligations of the Seller hereunder are restricted to the Termination, Project Buyout or expiry of this Agreement, whichever is earlier;

2.2.7. the Project shall be fit for the intended purpose of generating electricity for the duration of the Contract Life;

2.2.8. the Project, including all civil works, components and parts thereof shall be of high quality and free from any defects;

2.2.9. the Project, including all components and parts thereof shall, on the Commercial Operations Date, be new and unused;

2.2.10. it is not in violation of any applicable Law which would materially affect the performance of any of its obligations under this Agreement;

2.2.11. it has all requisite experience, expertise, resources, permits, capacity and skills for undertaking and performing its obligations under this Agreement;

2.2.12. it has not relied upon, and has satisfied itself as to the accuracy of, any information provided by the Purchaser or its consultants or any third parties with respect to roof testing;

2.2.13. it owns or has valid and enforceable right to use, as the case may be, and valid and enforceable right to license, all intellectual property rights: (i) necessary to perform the Works; and (ii) embodied in the Works and the processes employed by the Seller for the execution of the Works;

2.2.14. the Project and related equipment and their installation, commissioning, operation and maintenance in accordance this Agreement, and the use thereof by the Purchaser in accordance with the terms and conditions of this Agreement, will not infringe (whether directly, contributorily, by inducement or otherwise), misappropriate or violate any intellectual property right of any third-party, or violate the laws, regulations or orders of any governmental or judicial authority;

2.2.15. its performance and completion of any Works, and its operation and maintenance services will be of a professional quality, be provided by an adequate number of qualified individuals with suitable training, education, experience and skill in performing such kind of services, conform to the Standard Industry Practice, and that its performance of such services shall conform to the specifications and descriptions agreed between the Parties from time to time over the Term of this Agreement.

2.2.16. the Project and its components have all the relevant certification; and

2.2.17. it shall have read and understood the terms and conditions of the property documents for the Project Site and has satisfied itself that the Project Site is suitable for the Works.

2.3. **Effective Date:**

2.3.1. This Agreement shall become effective on the Effective Date, being the date of signing of this Agreement.

2.4. **Term:**

2.4.1. Unless terminated earlier in accordance with its provisions thereof, this Agreement shall commence from the Effective Date and expire upon the completion of fifteen (15) Years therefrom the Commercial Operations Date (the **"Term"**) or till the Termination, Project Buyout or expiry of this Agreement, whichever is earlier

2.5. The Parties hereby agree that throughout the Term, the Seller shall be the legal and beneficial owner of the Project (excluding the Project Site) at all times and the Equipment shall remain in the possession of the Seller as its property. The Purchaser warrants that in case of termination of this Agreement for any reason and if the Purchaser has not exercised its option of the Project Buyout or if the Purchaser has opted not to take over the Project after completion of the Term,

the Seller shall be entitled to remove the Equipment without any hindrance from the Purchaser subject to the terms of this Agreement.

2.6. The Purchaser warrants that it shall not act in a manner which would hinder, restrict, impair or diminish the Seller's ability to generate, sell and deliver the Net Delivered Energy or Net Energy in accordance with this Agreement. The Purchaser further warrants that it shall not take any action affecting the Equipment or the Project in any manner without the Seller's prior written consent.

## 3 SALE OF THE NET DELIVERED ENERGY/NET ENERGY, BILLING AND PAYMENTS

3.1. Subject to the terms of this Agreement, the Seller shall sell and the Purchaser shall purchase and accept the Net Delivered Energy or the Net Energy whichever is applicable at the Tariff Rate.

3.2. Subject to the provisions regarding Force Majeure for each Agreement Year, the Seller guarantees an Annual Guaranteed Generation which is detailed in Annexure F attached hereto.

3.3. If the Seller is unable to fulfill the Annual Guaranteed Generation for a given Agreement Year for reasons other than a Force Majeure Event or any act of the Purchaser, the Seller shall compensate the Purchaser by way of liquidated damages for its loss of savings for the Agreement Year calculated as below:

*Alternate Energy Compensation = (Daytime Tariff - Tariff Rate) * (Annual Guaranteed Generation – Net Delivered Energy/Net Energy in the Agreement Year)*

Such liquidated damages as mentioned above shall be calculated by the Purchaser at the end of each Agreement Year and shall be communicated to the Seller. The amount of liquidated damages so calculated shall be due and payable by the Seller to the Purchaser within thirty (30) days of receipt of the Purchaser's aforementioned communication.

3.4. In the event of (i) the Seller's failure or inability to fulfill its obligations under Clause 3.2 continues for an Agreement Year (the **"Shortfall Period"**) and the Seller does not top up such shortfall in the Annual Guaranteed Generation in the next Agreement Year following the Shortfall Period or (ii) if the Net Delivered Energy in for two(2) consecutive Agreement Years is less than eighty percent (80%) of the Annual Guaranteed Generation, the same shall be considered an incurable Seller's Event of Default and the Purchaser shall have the rights and remedies as are available to it in the case of an incurable Seller's Event of Default. Such rights and remedies shall be in addition and without prejudice to the Purchaser's right to claim liquidated damages from the Seller in accordance with Clause 3.3 hereof.

3.5. For each Agreement Year, the Purchaser guarantees an Annual Committed Consumption which is detailed in Annexure F attached hereto.

3.6. If the Purchaser is unable to fulfill the Annual Committed Consumption for a given Agreement Year for reasons other than a Force Majeure Event or any act of the Seller, the Purchaser shall compensate the Seller by way of liquidated damages for its loss of revenue for the Agreement year calculated as below:

*Alternate Energy Compensation = (Tariff Rate) * (Annual Committed Consumption – Net Delivered Energy/ Net Energy in the Agreement Year)*

3.7. The Parties have agreed that the Purchaser shall purchase the Electricity Units at the Tariff Rate. The Parties understand that on the Effective Date there is no withholding tax, however, the general sales tax is applicable.

3.8. The Seller shall not, without the prior written consent of the Purchaser, sell or deliver the Energy generated at the Project to any person other than the Purchaser.

3.9. All payments made by the Purchaser shall be made without deduction of any taxes/levies/charges. If the Purchaser is required, under any applicable law, to deduct any withholding tax. on the payments to the Seller, the Purchaser shall provide respective withholding tax challans as applicable under the Law.

3.10. The Tariff Rate and the Initial Project Cost shall be adjusted to take account of (i) any increase in the cost resulting from a Change in Law, (ii) SBP RE Policy rate or (iii) devaluation of Pak Rupee beyond the Reference Conversion Rate (till the time of the Commercial Operations Date or one (1) year from the Effective Date, whichever is earlier.

3.11. **BILLING**

3.11.1. On or after the first (1st) Business Day of each calendar month following the Commercial Operations Date, the Seller shall submit to the Purchaser an invoice, complete in all respects, stated in PKR, for the following:

3.11.1.1. The payments for the Net Delivered Energy and/or the Net Energy due in respect of the previous month (or part-month) and specifying for the relevant month:

3.11.1.1.1. the billing duration;

3.11.1.1.2. the Tariff Rate;

3.11.1.1.3. the Net Energy calculated subject to clause 4.4.3

3.11.1.1.4. the Net Delivered Energy (reading);

3.11.2. The invoice may also mention/include any arrears, the late payment surcharge, any applicable tax, payment for any Ancillary Products and Services or any other item mutually agreed by the Parties to be charged by the Seller due in respect of the previous month.

3.11.3. Either Party may require clarification or substantiation of any amount included in an invoice by delivering notice of such requirement to the other Party. The Party receiving such request shall provide the requested clarification and substantiation of such invoice or statement within five (5) Business Days of its receipt of such request.

3.12. **PAYMENTS**

3.12.1. The Purchaser shall pay the Seller the amount shown on an invoice less deductions for any disputed amount on or before the due date which will be the fifteenth (15th) of every month subject to submission under sub-clause 3.11.1. In case the due date of payment is not a Business Day, then the Purchaser shall pay the Seller on the next Business Day. The method of

Carbon Power (Private) Limited

payment may be by cheque and/or direct transfer by the Purchaser to the Seller's designated bank account.

3.12.2. Late payments by the Purchaser of any amounts due and payable under this Agreement shall bear a late payment surcharge of 2% per annum (prorated to the actual number of days for late payment), provided that such undisputed bill shall have been accompanied by all documentation required and verified by the Purchaser.

3.12.3. The Purchaser's obligation to pay any amounts under this Agreement shall remain in full force and effect and shall not be affected by the provisions of the Bank Guarantee.

3.13. **PAYMENT DISPUTES**

3.13.1 At any time within fifteen (15) Business Days of generation of an invoice, the Purchaser may serve notice on the Seller that the amount of such invoice (or part thereof) is in dispute. Such notice shall specify the invoice concerned and the amount in dispute, providing reasons as complete and detailed as reasonably possible.

3.13.2 The Parties shall resolve such payment disputes through good faith negotiations within fifteen (15) days from the service of the notice.

3.13.3 Upon resolution of the dispute, any amounts disputed and not paid but determined to be owed to the Seller or any amounts paid and determined not to be owed to the Seller, shall be paid or paid back within seven (7) Business Days after such resolution.

## 4 PROJECT AND EQUIPMENT

4.1. The Parties hereby agree that the Seller shall design, procure, install, construct, operate and maintain the Project on the Project Site with an installed capacity of **1.82 Megawatts (MW)** with an expected annual degradation of one percent (1%) at the Seller's own cost and expense in accordance with the applicable Laws, Standard Industry Practices and the terms and conditions of this Agreement as well as the Purchaser's health, safety and quality guidelines. The technical details and specifications of the Equipment are provided in Annexure A attached hereto.

4.2. The Net Energy shall be calculated under clause 4.4.3. The Net Delivered Energy shall be measured at the Interconnection Point identified in Annexure A attached hereto.

4.3. **Project Installation:**

4.3.1. The Project construction and installation of the Equipment shall be completed within a period of twelve (12) months from the Effective Date; provided that in case of any Force Majeure Event the said construction/installation period may be extended accordingly with mutual consent of the Parties.

4.4. **Metering Equipment:**

4.4.1. The Seller shall install Metering Equipment of 0.1 accuracy class to measure the Net Delivered Energy for each month, or part thereof, of the Term.

4.4.2. The Metering Equipment shall be jointly sealed, wherever possible, by both the Parties and the seal shall not be broken unless in the presence of the designated representatives of both Parties. The Parties will jointly have the Metering Equipment calibrated, wherever possible. Seller shall submit calibration certificate of the billing meters once in a year issued by a third party which will be mutually agreed by both Parties.

4.4.3. The readings on the Metering Equipment shall be considered final, provided that in the following cases the Net Energy (as a substitute to Net Delivered Energy for billing purposes) shall be calculated according to the last preceding week rolling average or the Annual Guaranteed Generation whichever is higher:

4.4.3.1. Grid unavailability and instability; or

4.4.3.2. Power production limiting due to lower load requirement at the Purchaser's end; or

4.4.3.3. Changes in shading profile (prior approval) leading to loss in power production; or

4.4.3.4. Shifting of the Equipment due to construction/Relocation.

4.4.4. During the Term of this Agreement, the Metering Equipment may be tested and calibrated at the request of either Party.

4.5. **Project Buyout:**

4.5.1. The Purchaser may purchase the Project at the Buyout Price at any point of time during the Contract Life; provided that in the event that the Purchaser purchases the Project before the end of the sixth ($6^{th}$) Agreement Year, the Purchaser shall pay the Seller an early purchase premium of twenty percent (20%) over and above the calculation of the Asset Value done in accordance with Clause 4.5.2 hereof.

4.5.2. The Parties agree that the Asset Value will be calculated on the straight-line depreciation method based on the Term of the Project.

4.5.3. The Purchaser must serve a prior written notice of ninety (90) days to the Seller of its intent to make an offer of the Project Buyout.

4.5.4. After completion of the Term under the provisions of this Agreement, the Seller shall transfer the ownership of the Project to the Purchaser for a total sale consideration of PKR 1/-.

4.6. **Project Extension:**

4.6.1. In the event that the Purchaser requires any extension in the Project's generation capacity, the Parties shall execute a new agreement on the terms and conditions mutually agreed between the Parties.

4.7. **Relocation of the Project:**

4.7.1. The Party who requires relocation of the Project to a new Project Site shall be liable to pay for the relocation expenses.

Carbon Power (Private) Ltd.

4.7.2. In case any term of this Agreement is affected due to the relocation of the Project, such term(s) shall be renegotiated in good faith.

4.8 **Synchronization, Commissioning & Commercial Operations**

4.8.1 Subject to the Purchaser fulfilling its obligations under this Agreement (including, without limitation, providing the Seller access to the Project Site and the Interconnection Point), the Seller shall Commission the Project and commence the supply of Energy from the Project to the Purchaser on or before the Scheduled COD.

4.8.2 The Seller shall provide the Purchaser with preliminary and final written notice of synchronization simultaneously with issuance of such notices to any other Relevant Authority as may be applicable in this case.

4.8.3 The Seller shall provide the Purchaser at least ten (10) days' prior written notice of the date on which it intends to Commission the Project. Following successful Commissioning of the Project, the Seller shall forthwith issue to the Purchaser a Commissioning Certificate which must be acknowledged by the Purchaser in writing, and, if the Commissioning has occurred to the Purchaser's satisfaction, be countersigned in approval by the Purchaser. The Commissioning of the Project shall occur on the date that the Purchaser countersigns the approval of the Commissioning Certificate or the date that the Seller has notified to the Purchaser under this sub-clause 4.8.3 (whichever is later).

4.9. **Consequences of Delay in Commissioning the Project**

4.9.1 In the event of the Seller's failure or inability to fulfill its obligations under Clause 4.8 hereinabove for any reason other than due to act(s), omission(s) or negligence on the part of the Purchaser or a Force Majeure Event, the Seller shall be liable to indemnify the Purchaser by way of liquidated damages calculated as per the formula:

*(Daytime Tariff-Tariff Rate) * Annual Guaranteed Generation (prorated for a period commencing from the Scheduled COD and ending on the Commercial Operations Date or the date of termination of this Agreement notified by the Purchaser to the Seller in accordance with Clause 12.5(i) hereof, whichever is earlier).*

Such liquidated damages in respect of a month or part thereof shall be calculated by the Purchaser and paid by the Seller to the Purchaser by the fifteenth (15th) day of the Commercial Operation Date or, at the option of the Purchaser, adjustable against the next monthly bill.

4.9.2 In the event of the Seller's failure or inability to fulfill its obligations under Clause 4.8 hereinabove, the same shall be considered Seller's Event of Default. Any cure period given by the Purchaser to the Seller to cure this Seller's Event of Default under Clause 12.4 hereof and any termination rights exercised by the Purchaser in consequence of such Seller's Event of Default shall be without prejudice to the Purchaser's right to claim liquidated damages from the Seller in accordance with Clause 4.9.1 hereof.

## 5 REPAIR AND MAINTENANCE

5.1. During the Term, the Seller will operate and perform all routine and emergency repairs to, and maintenance of, the Equipment at its cost and expense, except for any repairs or maintenance resulting from the Purchaser's negligence, willful misconduct or breach of this Agreement. The Seller shall ensure that, throughout the Term of this Agreement, the identities of those of its employees and its subcontractor(s)' employees that are involved in the operations, repairs and maintenance of the Project are at all times notified to and documented with the Purchaser; provided that such employees shall at all times wear appropriate identification tags and adhere to all safety & security related requirements at the Project, the Factory and the Purchaser's premises. If any of the employees of the Seller or its subcontractor(s) are replaced with others for any reason, the replacement(s) shall be duly and promptly notified to the Purchaser's security staff. Provided further, that the Seller hereby undertakes to indemnify and hold harmless the Purchaser and its employees, staff, agents, officials, representatives against any claim, losses or damages that may arise as a result of the Seller's failure or inability to fulfil its obligations under this Clause 5.1.

5.2. The Seller shall not be responsible for any loss, damage, cost or expense arising out of or resulting from improper operation or maintenance of the Equipment by the Purchaser, anyone other than the Seller and/or any third party directly or indirectly hired or involved with the Seller (provided that such third party was hired by the Purchaser without the Seller's consent).

5.3. If the Equipment requires repairs for which the Purchaser is directly responsible, the Purchaser shall pay the Seller all diagnosing and correcting costs at the Seller's standard billable rates.

5.4. In case of preventive or corrective maintenance, any loss in Energy production will not be considered while calculating the Annual Guaranteed Generation.

5.5. If the Seller incurs incremental costs to maintain the Equipment due to conditions created by the Purchaser at the Project Site or due to the inaccuracy of any information provided by the Purchaser prior to the handing over the Project Site to the Seller, the Purchaser will pay for such incremental costs.

## 6 BANK GUARANTEE

6.1. The Purchaser shall, within 30 days from the date of issuance of Generation License from NEPRA provide an irrevocable, unconditional and without recourse bank guarantee for the Contract Life (but subject to Clause 2.2.6 hereof) to the Seller from the agreed upon bank for an amount of PKR 24,227,273 (Pakistani Rupees Twenty Four Million Two Hundred & twenty seven thousand two hundred & seventy three rupees only) as security against any default of payment obligations the Purchaser. Such bank guarantee shall have a validity of one (1) year and the Purchaser shall procure its renewal prior to its expiry date.

6.2. The Seller shall have the right to make a demand/call on the Bank Guarantee in case of a Purchaser's Event of Default in connection with non-payment of an invoice as set out in Clause 12.1(ii) hereof (with regard to any applicable cure periods that may be provided by the Seller to the Purchaser).

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## 7 PROJECT SITE, AMENITIES AND ACCESS RIGHTS

7.1. The Purchaser hereby grants to the Seller and its authorized representatives/employees unhindered, uninterrupted access to the Project Site, for the Term, for the purposes of designing, installing, inspecting, operating, maintaining, repairing and removing the Equipment, and any other purpose under or arising out of this Agreement.

7.2. The Purchaser warrants and agrees to provide, at its own cost, the following on the Project Site:

7.2.1. reasonable vehicular access, parking and adequate equipment off-loading arrangements;

7.2.2. pedestrian access across the Project Site;

7.2.3. access and liberty to locate transmission lines and communication cables across the Project Site;

7.2.4. security for stored items during construction and installation;

7.2.5. drinking water, drainage and electrical connections on the Project Site to be used during installation, operations and maintenance of the Equipment.

## 8 INSURANCE

8.1. The Seller shall take out and maintain comprehensive insurance of the Equipment as appearing in Annexure G during the Term of this Agreement (the "**Insurance**").

8.2. The cost of such Insurance shall be a part of the Tariff Rate and the Seller shall not charge the Purchaser any additional fee on account of Insurance.

8.3. The Seller shall provide a copy of the Insurance policy to the Purchaser.

## 9 INITIAL PROJECT COST OF THE PROJECT

9.1. The Purchaser understands and agrees that the initial setup cost of the Project is PKR. 164,100,000/- [Pakistani Rupees One Sixty-Four Million & one hundred thousand Only] exclusive of all applicable taxes ("**the Initial Project Cost**") and in accordance to clause 3.10.

9.2. The Buyout Price shall be determined on the basis of the Initial Project Cost and the Asset Value in the manner as is provided in Annexure D attached hereto.

## 10 MUTUAL REPRESENTATIONS AND WARRANTIES

10.1. Each Party hereby represents, warrants and undertakes to the other Party that:

10.1.1. such Party has the full power authority and approvals to enter into, execute and deliver this Agreement and to perform the obligations hereby contemplated thereunder;

10.1.2. the execution of this Agreement constitutes legal, valid and binding obligations of each Party, enforceable in accordance with the terms of this Agreement;

Carbon Power (Private) Ltd.

10.1.3. the execution, delivery and performance of this Agreement shall not conflict with or result in any breach/violation of, or constitute a default under the articles of association or any other constitutional document of such Party, or applicable Law or of any agreement to which it is a Party or is subject;

10.1.4. there is no lawsuit, arbitration, or legal, administrative or other proceeding or governmental investigation pending or, to the best of the knowledge of such Party, threatened against it with respect to the subject matter of this Agreement or that would affect in any way its ability to enter into or perform its obligations under this Agreement;

10.1.5. it has not received any written notice of any order being made, petition presented, resolution passed or meeting convened for its winding up (or other process whereby the business is terminated or its assets are distributed amongst the creditors or shareholders or other contributories) or for an administration order against it and there are no proceedings that it has received a written notice under any applicable insolvency, reorganisation, or similar applicable Laws concerning it; and

10.1.6. all the representations, warranties, other statements made, or information provided by it to the other Party under this Agreement are true, accurate, complete and not misleading as on the date of this Agreement and shall remain so through the Term of this Agreement.

## 11 EVENTS OF DEFAULT AND TERMINATION

### 11.1. PURCHASER EVENT OF DEFAULT

The occurrence of any of the following events, unless any such event occurs as a result of a Force Majeure Event, shall constitute a Purchaser's event of default (the **"Purchaser's Event of Default"**):

(i) any breach by the Purchaser of any of the material undertakings, covenants, representations and/or warranties under the Agreement, including but not limited to the following:

(a) repudiation by the Purchaser of this Agreement; or

(b) any representation or warranty of the Purchaser under this Agreement being untrue, incomplete or misleading; or

(c) breach of Clause 15 (*Confidentiality*) hereof;

(ii) failure of the Purchaser to make payment of any undisputed amount of any two consecutive monthly bills raised by the Seller, for more than twenty (20) Business Days from the due date of the latter monthly bill subject to the Seller providing timely bills and all required documentation to the Purchaser; or

(iii) failure of the Purchaser to provide, maintain or replenish the Bank Guarantee; or

(iv) bankruptcy, liquidation or dissolution of the Purchaser pursuant to applicable Law, except for the purpose of a merger, consolidation or reorganization that does not affect the ability of the resulting entity to

perform all its obligations under this Agreement and provided that such resulting entity expressly assumes all such obligations.; or

(v) transfer, pursuant to the applicable Law, of either the rights and/or obligations of the Purchaser hereunder or all or a substantial portion of the assets or undertakings of Purchaser, except where such transfer, in the reasonable opinion of the Seller, does not affect the ability of the transferee to perform all the obligations under this Agreement and provided that such transferee expressly assumes all such obligations in compliance with applicable Law; or

(vi) failure to provide the Project site to the seller under the terms of this Agreement or a change of ownership of the Project Site from the Purchaser to a third party that leads to a change in terms of this Agreement without the consent of the Seller.

11.2. **SELLER EVENT OF DEFAULT**

The occurrence of any of the following events, unless any such event occurs as a result of a Force Majeure Event, shall constitute a Seller's event of default (the **"Seller's Event of Default"**):

(i) any breach by the Seller of any of the material undertakings, covenants, representations and warranties under the Agreement, including but not limited to the following:

(a) repudiation by Seller of this Agreement; or

(b) if the Project is designed, constructed, operated or maintained in violation of applicable Law; or

(c) breach of Clause 15 (*Confidentiality*) hereof; or

(d) any representation or warranty of the Seller under this Agreement being untrue, incomplete or misleading;

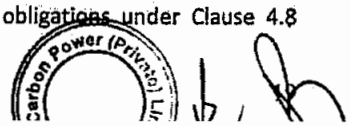
(ii) bankruptcy, liquidation or dissolution of the Seller pursuant to applicable Law, except for the purpose of a merger, consolidation or reorganization that does not affect the ability of the resulting entity to perform all its obligations under this Agreement and provided that such resulting entity expressly assumes all such obligations.

(iii) transfer, pursuant to the applicable Law, of either the rights and/or obligations of the Seller hereunder or all or a substantial portion of the assets or undertakings of Seller, except where such transfer, in the reasonable opinion of the Purchaser, does not affect the ability of the transferee to perform all the obligations under this Agreement and provided that such transferee expressly assumes all such obligations in compliance with the applicable Law; or

(iv) a change of ownership of the Project from the Seller to a third party that leads to a change in terms of this Agreement without the consent of the Purchaser; or

(v) an incurable Seller's Event of Default as expressly set out in this Agreement; or

(vi) the Seller's failure or inability to fulfill its obligations under Clause 4.8 hereinabove.



11.3 In the event of occurrence of (i) a Purchaser's Event of Default, the Seller; and (ii) a Seller Event of Default, the Purchaser, may issue a notice of default specifying in reasonable detail, the Event of Default giving rise to the issue of such notice to the defaulting Party.

11.4 If the Event of Default is, in the sole and reasonable opinion of the non-defaulting party, curable (except in the cases of an incurable Seller's Event of Default expressly set out in this Agreement), a maximum cure period of ninety (90) days from the date of serving of notice of default shall be provided for remedying the same (**"Cure Period"**) provided, however, that the Cure Period granted by the Purchaser to the Seller in respect of the Seller's Event of Default set out in Clause 12.2(vi) shall not exceed thirty (30) days. During the Cure Period, the Parties shall continue to perform their respective obligations under and pursuant to this Agreement.

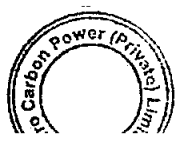
**11.5 TERMINATION**

(i) In case of an incurable Event of Default, any time after the service of notice of default, and in case of curable Event of Default, at the end of the Cure Period without the Event of Default having been cured, the non-defaulting Party shall have the right to terminate this Agreement forthwith by issuing a termination notice to the defaulting Party.

(ii) If the Agreement is terminated by Purchaser on account of the Seller's Event of Default, the Seller shall, in addition to and without prejudice to any other remedies available to the Purchaser under this Agreement, be liable to pay Purchaser the savings resulting from six (6) months' loss in solar Energy (for the six (6) months immediately succeeding the date of service of notice of termination by Purchaser) based on Annual Guaranteed Generation from the Project (prorated for such six (6) months) multiplied by the Daytime Tariff. Until the time the Seller fails to pay the penalty amount under this sub-clause 12.5(ii), Purchaser shall (provided that the Project has been Commissioned) have the right to use the Project and the electricity generated during such period shall be adjusted against the penalty amount at the prevailing Tariff Rate. The Seller shall be entitled to remove the Project from the Project Site only after payment/set-off of the penalty amount, as verified by Purchaser.

(iii) If the Agreement is terminated by Seller on account of the Purchaser's Event of Default, the Purchaser shall, in addition to and without prejudice to any other remedies available to the Seller under this Agreement, be liable to pay Seller the Tariff resulting from six (6) months' loss in revenue (six (6) months immediately succeeding the date of service of notice of termination by Seller) based on Annual Guaranteed Generation from the Project (prorated for six (6) months) multiplied by the Tariff Rate.

(iv) Termination of this Agreement shall be without prejudice to the accrued rights and liabilities of the Parties up to the date of termination, unless waived in writing by the Parties.



## 12 DISPUTE RESOLUTION

12.1. All disputes, controversies or difference of opinion, other than the instances of default mentioned herein, which may arise between the Parties in respect of this Agreement or the termination thereof will be settled amicably through mutual consultation.

12.2. In case the said dispute is not settled through mutual consultation in thirty (30) days, all disputes arising out of or in connection with this Agreement, including any question regarding its existence, validity or termination, shall be referred to and finally resolved by arbitration by a sole arbitrator under the Arbitration Act, 1940, which shall be deemed to be incorporated by reference into this clause.

12.3. The seat and venue of arbitration shall be Lahore, Pakistan.

12.4. The language to be used in the arbitration shall be English.

12.5. Unless otherwise determined by the arbitrator, each Party to the dispute will bear all of its own costs incurred in connection with the arbitration, and each Party to the dispute will contribute equally towards the fees and other costs of the arbitrator. The Parties shall continue the performance of their respective obligations under this Agreement during the resolution process of any dispute or disagreement including during any period of arbitration.

12.6. The award rendered shall be in writing and shall set forth in reasonable detail the facts of the dispute and the reasons for the arbitrator's decision. An award rendered shall be final and binding upon the Parties.

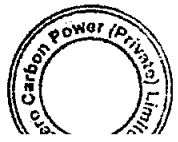
12.7. The Parties waive, to the fullest extent permitted by law, any rights to appeal to, to seek review of any award by, or to seek a determination of a preliminary point of law from, any Court.

12.8. Notwithstanding anything to the contrary of this Clause 13, either Party hereto shall have the right to obtain temporary restraining orders or temporary or preliminary injunctive relief from a Court of competent jurisdiction, provided, however, such Party shall contemporaneously submit the dispute for arbitration on the merits as provided herein.

## 13 INDEMNIFICATION

13.1. Each Party (the **"Indemnifying Party"**) will defend, indemnify and hold harmless the other Party, its officers, shareholders, managers, members, employees, sub-contractors and agents (if any) (each an **"Indemnified Party"**) from and against any and all claims, actions, damages, losses, obligations, liabilities, recoveries or deficiencies, costs and expenses (including, but not limited to, advocates / attorney / legal fees and other costs, interest and expenses incidental to any suit, action or proceedings) that the Indemnified Party may incur, suffer or bring and which, directly or indirectly, arise or relate to:

(a) any breach, non-observance or non-performance by the Indemnifying Party of any of the Indemnifying Party's covenants, representations and warranties and the terms and conditions contained in this Agreement; and



(b) the representations and warranties of the Indemnifying Party hereunder being untrue, inaccurate, incorrect, incomplete or misleading in any material respect.

## 14 CONFIDENTIALITY

14.1. Each Party agrees that it will treat all information concerning the other Party which comes to its knowledge pursuant to this Agreement or any activities carried out pursuant to this Agreement, as confidential and will not, except as hereinafter provided, disclose, use or permit the disclosure or use of such information to any third party (the **"Confidential Information"**). For the purpose hereof, Confidential Information shall include all business, financial and technical information or data relating to the disclosing Party, its representatives, officers, employees or its affiliates.

14.2. Any Party may disclose Confidential Information only to such of its employees and advisors who have a demonstrable need to know such information and who are informed of the confidential nature of such information (and have agreed to be bound by similar confidentiality provisions).

14.3. The restrictions referred to above will not apply to any Confidential Information to the extent that such information:

(a) is already known to the Party to whom it is disclosed; or

(b) is in or comes into the public domain otherwise than as a result of any breach of this Agreement.

14.4. Nothing herein will restrict any Party from disclosing any Confidential Information pursuant to a judicial or other lawful government order, but only to the extent of such order or as may be mutually agreed by the Parties.

14.5. This Clause 15 will survive the termination and/or expiry of this Agreement.

## 15 AGREEMENT WITH THE LENDERS ETC.

16.1 The Seller has intimated the Purchaser, and the Purchaser acknowledges that the Seller shall enter into Finance Agreements with the Lenders for the purpose of arranging funds for undertaking its obligations under this Agreement at any time during the Term. The Purchaser further understands that in the event the Seller violates its Finance Agreements with the Lenders, the Lenders shall be entitled to exercise their rights vis a vis the Seller under the financing arrangements in the manner stipulated herein.

16.2 In the event of the Seller becoming insolvent or being in breach or default under the Finance Agreements towards the Lenders, the Lenders shall, with a prior written approval from Purchaser, have the right to substitute the Seller as the Party under this Agreement, along with all associated rights and obligations, either themselves directly or through their agents, trustees, nominees or selectees for the residual period of this Agreement.

16.3 The Lenders may seek to exercise the right of substitution through an amendment or novation of this Agreement, and Purchaser hereby agrees and covenants to promptly execute all such deeds and agreements and do all such acts or things as may be

Carbon Power (Private) Ltd

necessary or required in the reasonable opinion of the Lenders for the purpose of achieving this substitution as long as terms of agreement remain the same.

## 16 MISCELLANEOUS

### 16.1. COUNTERPARTS

This Agreement may be executed in any number of counterparts or duplicates each of which will be an original, but such counterparts or duplicates will together constitute but one and the same Agreement.

### 16.2. SUCCESSORS AND ASSIGNMENT

This Agreement will be binding upon and inure for the benefit of the respective successors in interest and permitted assigns of the Parties. The Parties hereby agree that this Agreement may not be assigned by any Party without the written consent of the other Party.

### 16.3. WAIVER AND CUMULATIVE RIGHTS AND REMEDIES

No waiver of any provision of this Agreement will be effective unless set forth in a written instrument signed by the Party waiving such provision. Any failure or delay in exercising any rights, power or privilege hereunder will not operate as a waiver thereof, nor will any single or partial exercise preclude any other further exercise thereof.

### 16.4. SEVERABILITY & SURVIVAL

(a) The recitals at the beginning and the Annexures at the end, if any, shall be read as an integral part of this Agreement. If any provision of this Agreement is adjudged by a Court of competent jurisdiction to be unlawful, void, or unenforceable, such provision will to the extent required be severed from this Agreement and rendered ineffective as far as possible without modifying the remaining provisions of this Agreement and will not in any way affect any other circumstances or the validity or enforcement of this Agreement.

(b) All sections of this Agreement which either are expressed to survive or which by implication are intended to survive termination or expiry of this Agreement will continue to survive notwithstanding termination or expiry of this Agreement.

### 16.5. MODIFICATIONS OR VARIATIONS

This Agreement may not be amended, modified or supplemented except by a written instrument executed by the Parties hereto.

### 16.6. NOTICES

All notices, requests or other communications to be given to any Party under, or in connection with, the Agreement shall be made in writing and shall be delivered by (i) personal delivery, (ii) registered mail (iii) a courier service, or (iv) email to the following addresses:

| Seller | Purchaser |
|---|---|
| Address: 63, Block E/1, Hali Road, Gulberg III, Lahore | Address: Bulleh Shah Packaging Pvt Ltd, 4th Floor, the Forum, Suite no. 416-422, G-20, Block 9, Khayaban-e- Jami, Clifton, |
| Authorized Representative:<br><br>Mr. Zain ul Abideen | Authorized Representative:<br><br>Mr. Ali Wajid |
| Email: zain@zerocarbon.com.pk | Email: ali.wajid@bullehshah.com.pk |
| Telephone: 0311-1111926 | Telephone: +92 321 8821966 |

or such other address as either of the Parties may notify to the other Party in accordance with the above. Unless the contrary shall be proved, each such notice or communication shall be deemed to have been given or made and delivered, (a) if by personal, registered mail or courier delivery, when left at the relevant address and, (b) if by electronic mail or facsimile transmission, when transmitted subject to confirmation of uninterrupted and error free transmission by a transmission report. However, if such notice or communication is received by the addressee after working hours on any Business Day, then such notice shall be deemed to have been given or received at the start of the next Business Day. For the purposes of this Clause 17.6 "working hours" means 9 a.m. to 3 p.m. in the jurisdiction in which the notice is to be served.

16.7. **GOVERNING LAW**

This Agreement shall be governed by and constructed in accordance with the laws of Pakistan.

16.8. **ENTIRE AGREEMENT**

This Agreement, together with all the Annexures hereto, constitutes the entire Agreement and understanding between the Parties hereto in connection with the subject matter hereof, and supersedes any previous representations, negotiations and agreements (whether oral or written) on the subject matter.

16.9. **FORCE MAJEURE**

16.9.1 No delay or failure by either of the Parties in the performance or observance of the terms and conditions of this Agreement shall give rise to any claim by the other Party or shall be deemed to be a breach of this Agreement if such delay or failure is the result of occurrence and/or continuation of Force Majeure Event, provided that:

(i) The Party affected by the Force Majeure Event, within seven (7) days of the occurrence of a Force Majeure Event, gives the other Party written notice of the occurrence of the Force Majeure Event, describing the particulars of the occurrence, including an estimation of its duration and probable impact on the performance of such Party's obligations hereunder, and thereafter continues to furnish timely regular reports with respect thereto during the continuation of the Force Majeure Event;

Carbon Power (Private) Limited

(ii) The suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;

(iii) No liability of either Party which arose before the occurrence of the Force Majeure Event causing the suspension of performance shall be excused as a result of such occurrence;

(iv) The Party affected by Force Majeure Event shall exercise all reasonable efforts to mitigate or limit damages arising from the Force Majeure Event;

(v) The Party affected by Force Majeure Event shall use its best efforts as is reasonable to continue to perform its obligations hereunder and to correct or cure or overcome the effects of the Force Majeure Event or condition excusing performance;

(vi) The Party affected by Force Majeure Event shall give notice to the other Party of the cessation of the Force Majeure Event being claimed as soon as possible after becoming aware thereof; and

(vii) When the Party affected by Force Majeure Event is able to resume performance of its obligations under this Agreement, it shall give the other Party written notice to that effect and shall promptly resume performance hereunder.

16.9.2 If the performance of any obligation under this Agreement is delayed or suspended as a result of continuation of any of a Force Majeure Event, the time allowed to comply with such obligation shall be extended by the period of subsistence of relevant Force Majeure Event causing such delay or suspension.

16.9.3 In the event that a Force Majeure Event subsists for a period longer than six (6) months and the Parties do not reasonably feel that the continuation of the Project is possible, the Parties may choose to terminate the Agreement following mutual agreement.

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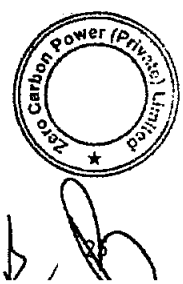


**IN WITNESS WHEREOF** the Parties have caused this Agreement to be executed by their duly authorized representatives on the day, month and year first above written.

**THE SELLER**

Bilal Afzal
CEO
Zero Carbon power Pvt Ltd
Director Punjab Group

**THE PURCHASER**

Aftab Khan
Group Head of Supply Chain
Bulleh Shah Packaging Pvt Ltd

Asghar Abbas
CEO
Bulleh Shah Packaging Pvt Ltd

**WITNESSES:**

Name: MOAZZAM SALIM
CNIC # 35202-0249687-3

Name: M. UZAIR KHASHMI
CNIC # 54400124028S-3

ZERO CARBON SOLAR

# Power Purchase Agreement (PPA) description

ZERO CARBON SOLAR

# POWER PURCHASE AGREEMENT DISCRIPTION

## Power Seller

Zero Carbon Power Pvt Ltd, a company registered and existing under the laws of Pakistan having its registered office 123-C, Block E1, Gulberg III, Hali Road, Lahore, Pakistan (the "Seller"). The Seller desires to design, install, commission and operate the Grid-Tied Solar Power Plant of 1.82 $MW_p$. The Seller intends to an agreement of power purchase by The Bulleh Shah Packaging (Private) Limited (Buyer), the energy will be generated by the Solar Power Plant for the period of 25 years.

| DISCO | Location | Plant Capacity ( $MW_p$) | District | Province | Coordinates |
|---|---|---|---|---|---|
| LESCO | Kot Krishan Radha Road, Kasur | 1.82 | Kasur | Punjab | 31.1325443, 74.3551421 |

## Power Purchaser

Bulleh Shah Packaging (Private) limited a company incorporated and existing under the laws of Pakistan and having its registered office located at Kot Krishan Radha Road, Kasur. (the "Purchaser").

The Purchaser shall provide land on rent to the Seller for the construction, operation and maintenance of a Grid-Tied Solar PV Plant of 1.82 $MW_p$ aggregated for the period of 15 years. The Seller shall invest, design, construct, install, own, operate, and maintain the Plant located at the land provided on rent by the Purchaser to the Seller for duration of the Power Purchase Agreement and the Purchaser shall purchase all of the power generated or available by the Plant from the Seller under the agreed terms and conditions. The Purchaser shall provide land on Rent to the Seller for the construction, operation and maintenance of a Grid Connected Solar PV Plants of 1.82 $MW_p$ aggregate for the period of 15 years. The Purchaser will provide facilitation to the Seller in early achievement of commercial operation date defined in the contract.

ZERO CARBON SOLAR

**Overview of the project**

Bulleh Shah Packaging (Private) Limited intends to install a Grid-Tie Solar PV Power Plant at different locations in their premises, by which they can reduce the electricity consumption from the grid and use the solar generated units for running the load. The buyer wants to decrease the electricity utilization from conventional grid due to cost-saving, under these circumstances, buyer has decided to switch the maximum load on Solar PV System that will produce the cheaper units than the conventional grid units.

Zero Carbon Power Pvt Limited is found to be very much suitable among different EPC contractors technically as well as financially, therefore Bulleh Shah Packaging (Private) Limited has awarded the 1.82 MW Grid-Tied Solar Power project to Zero Carbon Power Private Limited.

**TECHNOLOGY DISCRIPTION**

- Solar PV Grid-tied system with all necessary protection, instrumentation, monitoring, control and synchronizing with grid.
- Customized civil structures along with efficient protective coating to prevent any structural damage along the tenure of 25 years.
- Tier-1 manufactured JA Solar JAM72S30 535/MR Mono crystalline Half Cell PERC technology PV modules with 20.7 % panel efficiency.
- Grid-tied smart string inverters Fusion Solar Huawei SUN2000 series with all necessary protections.
- Dual string DC combiner box to isolate the DC part when required.
- LV panel containing the energy meter, AC breakers and necessary indications.
- All the electrical installations and wiring for the PV system in accordance with the codes and standard.

**Project Financing**

This document states the project cost, information regarding sources and amounts of equity and debt. The project will have approximated cost of **PKR 164,100,000**.

| DESCRIPTION | PROJECT COST PKR |
|---|---|
| EPC | 162,231,900 |
| Insurance during Construction | 243,348 |
| CAPEX | **162,475,248** |
| Financing Fee | 324,950 |
| Interest During Construction | 1,299,802 |
| **Total cost of project** | **164,100,000** |
| Equity | 32,820,000 |
| Debt | 131,280,000 |

ZERO CARBON SOLAR

ENERGY GENERATION

| Sr. No | Efficiency Parameters | |
|---|---|---|
| 1 | Capacity Utilization Factor | 16.00% |
| 2 | Energy Generation Units | 2,418,700 kWh |

## Project cost, information regarding sources and amounts of equities and debt.

This document states the project cost, information regarding sources and amounts of equity and debt. The project will have approximated cost of **PKR 164,100,000**.

| DISCRIPTION | PROJECT COST PKR |
|---|---|
| EPC | **164,100,000** |
| Insurance during Construction | |
| CAPEX | |
| Financing Fee | |
| Interest During Construction | |
| **Total cost of project** | |
| Equity | |
| Debt | |

ZERO CARBON SOLAR

# SECTION IV:

# SCHEDULE II

ZERO CARBON SOLAR

## SCHEDULE-II

The Total Installed Gross ISO Capacity of the Generation Facility/Power Plant/Solar Plant (kW), Total Annual Full Load (Hours ), Average Sun Availability , Total Gross Generation of the Generation Facility /Solar Farm (kWh), Annual Energy Generation (15 years Equivalent Net Annual Production-AEP) kWh and Net Capacity Factor of the Generation Facility/Power Plant/ SolarFarmof LicenseeisgiveninthisSchedule.

ZERO CARBON SOLAR

## SCHEDULE-II

**Zero Carbon Power's 1.82 MW On-Grid Solar Plant Generation Facility/Solar Power Plant/SPPL**

| | | |
|---|---|---|
| (1). | Total PV Installed Capacity of Generation facility | 1.82 $MW_P$ DC<br>1.60 $MW_P$ AC |
| (2). | Average Sun Availability/Day (Irradiation on inclined Surface) | 3.8 hrs |
| (3). | Days per Year | 365 |
| (4). | PV Plant Generation Capacity Annually (as per simulation) | 2.546 GWh |
| (5). | Expected Total Generation in 15 years life span | 534 GWh |
| (6). | Generation per year from plant keeping 24 Hours Working | 22303 GWh |
| (7). | Net Capacity factor | 16.0 % |

Note :

All the above figures are indicative as provided by the applicant. The Net Energy available to power purchaser for dispatch will be determined through procedures contained in the Power Purchase Agreement.

ZERO CARBON SOLAR

## LIST OF ANNEXURES

| | |
|---|---|
| ANNEXURE I | PV MODULE DATA SHEET |
| ANNEXURE II | INVERTER DATA SHEETS |
| ANNEXURE III | SIMULATION REPORT |

ZERO CARBON SOLAR

# ANNEXURE I

# PV MODULE DATASHEET

## Schedule I

The Location, Size (i.e. Capacity in MW), Type of Technology, Interconnection Arrangements, Technical Limits, Technical/Functional Specifications and other details specific to the Generation Facilities of the Licensee are described in this Schedule.

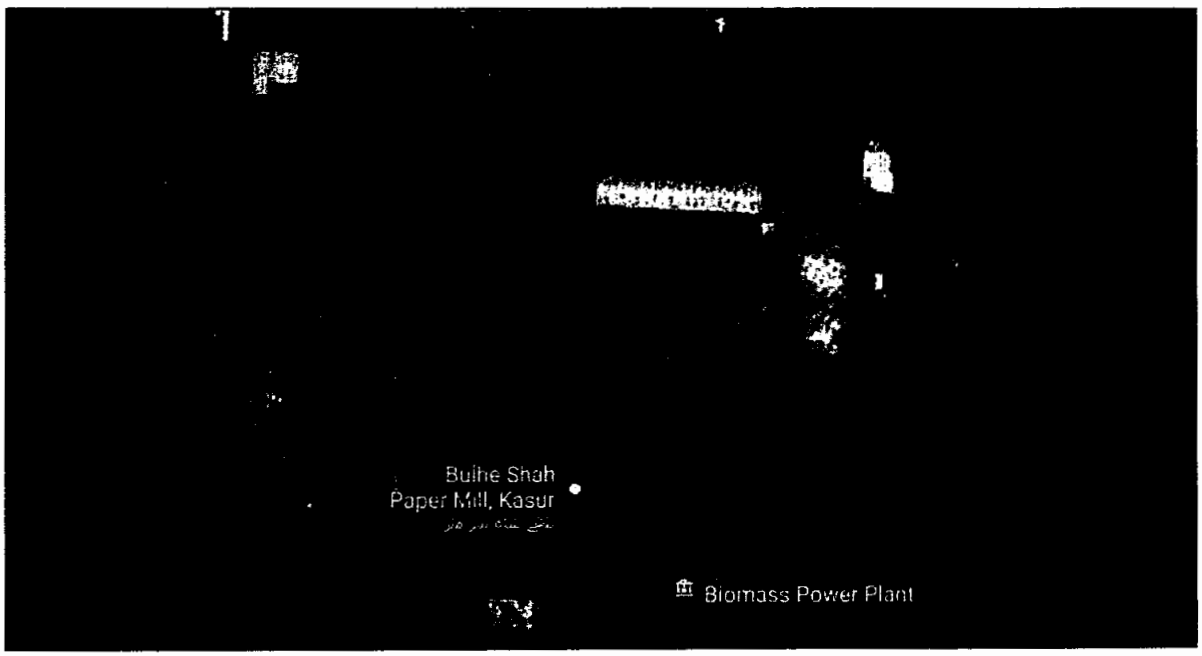
## Location Coordinates of the Generation Facility/Solar Power Plant of the Licensee

**Generation facility: Zero Carbon Power's 1.82 MW Grid-Tied Solar Power Plant**

**Address:** Bulleh Shah Packaging (Private) Limited, Kot Krishan Radha Road, Kasur.

**Location coordinates**

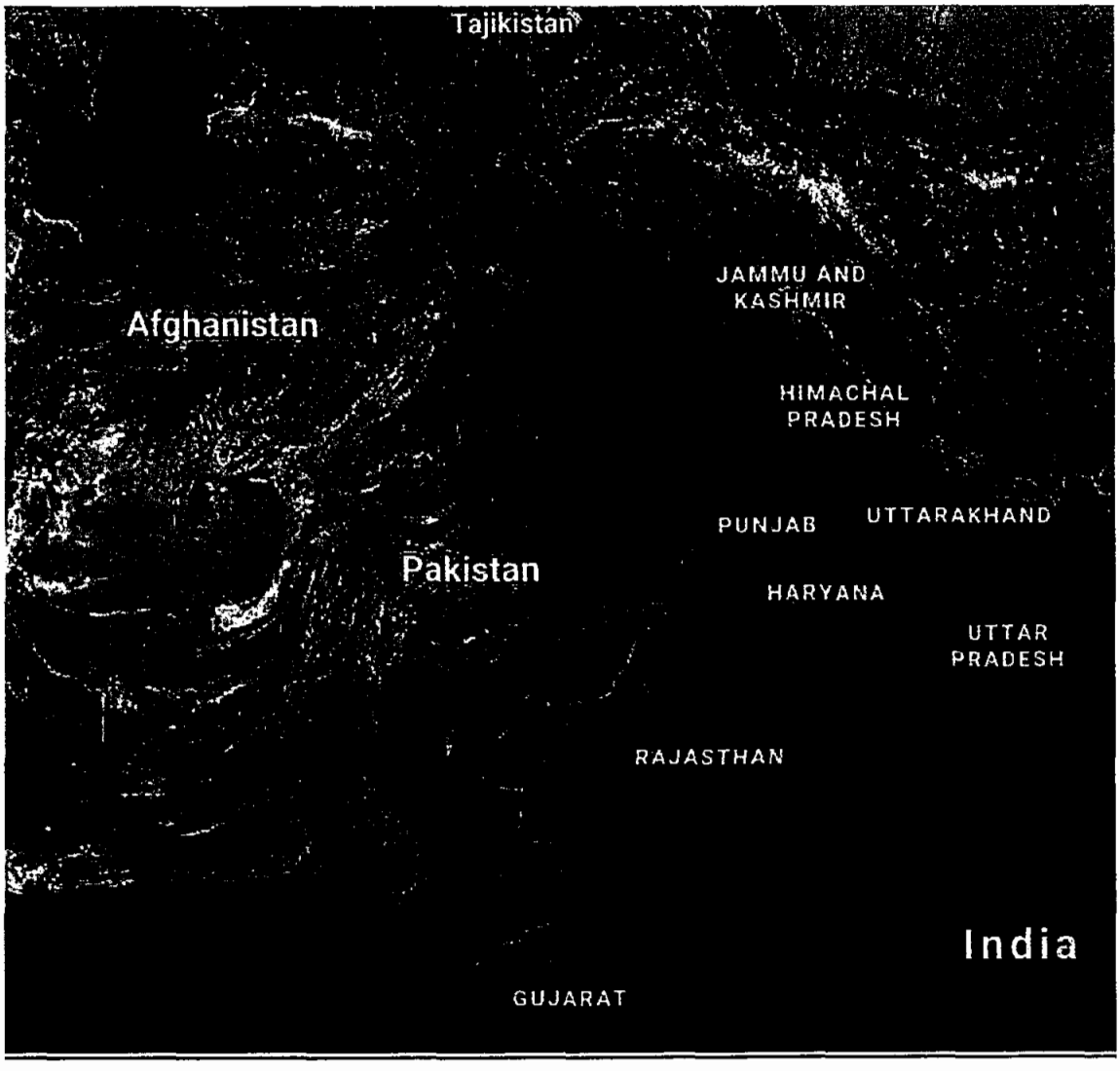
| Latitude (North) | Longitude (East ) |
|---|---|
| 31.1325443 | 74.3551421 |




**Site Location: Bulleh Shah Packaging (Private) Limited, Kasur**

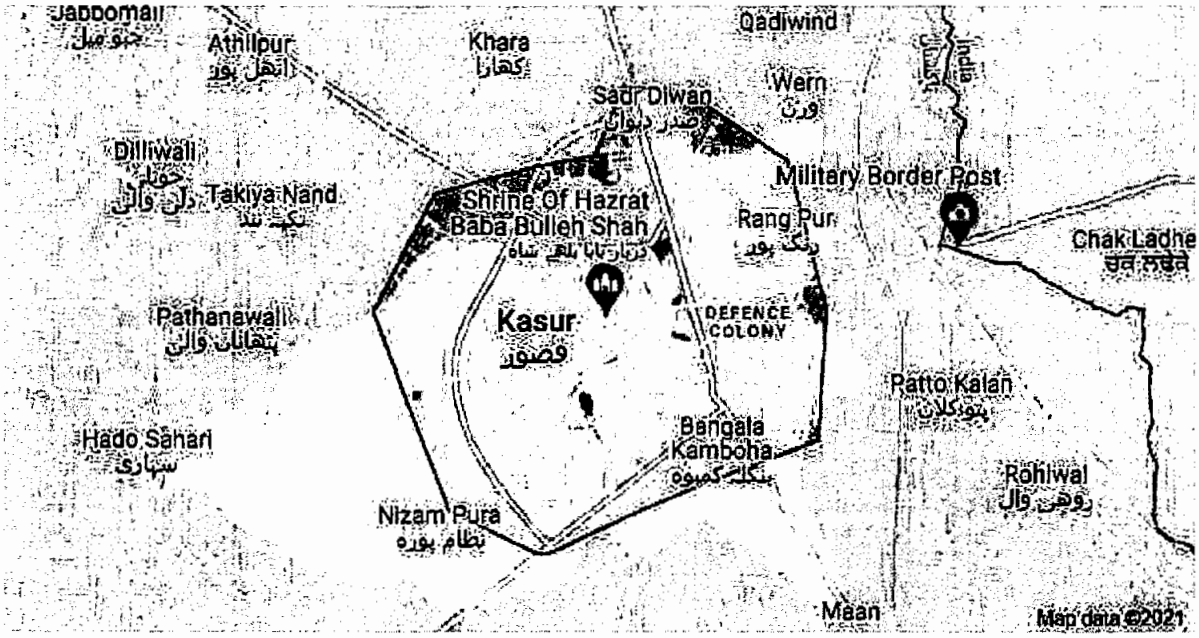
**Location of Bulleh Shah Packaging (Private) Limited, Generation Facility/ Solar Power Plant of the Licensee on**

**Map of Pakistan**

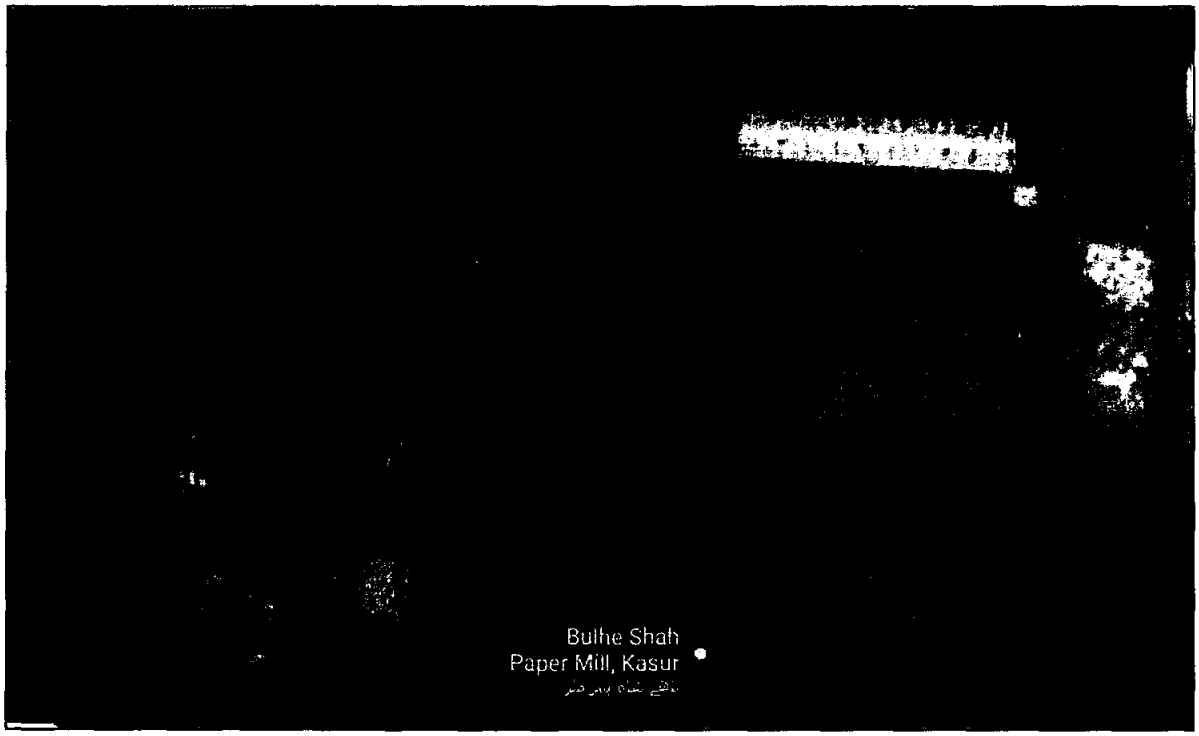


**Location of the Bulleh Shah Packaging (Private) Limited, Kasur, Generation Facility /Solar Power Plant of the Licensee on**

## Map of Kasur



**Location of the Bulleh Shah Packaging (Private) Limited, Generation Facility/Solar Power Plant of the Licensee**



**Location of the Bulleh Shah Packaging (Private) Limited, Generation Facility/Solar Power Plant of the Licensee marked on the map**

**Process Flow Diagram of the Generation Facility/Solar Farm/ Solar Power Plant of the Licensee**

## Single Line Diagrams of the Generation Facility/Solar Farm/ Solar Power Plant of the Licensee

- Single Line diagrams of the power plant have been attached as Annexure III of Schedule II under this application.

## Interconnection of the Generation Facility/ Solar Power Plant of the Licensee

1. The power generated from the Zero Carbon Power's 1.82 MW On-Grid Solar Power Plant, installed at the Bulleh Shah Packaging (Private) Limited, rooftops/ Shell roofs of the vicinity located at Kot Krishan Radha Road, Kasur, will be dispersed for in-house utilization.
2. The AC side of Solar Power Plant will be terminated at the Low voltage panel of the Bulleh Shah vicinities at 230/400 V.
3. Any change in the above Interconnection Arrangement duly agreed by Zero Carbon Power (Private) Limited and Packages Converter (Private) Limited shall be communicated to the authority in due course of time.

## Technical Details of Generation Facility/ Solar Power Plant

| (A). | General Information | |
|---|---|---|
| (i) | **Name of the Company/Licensee** | Zero Carbon Power Private Limited |
| (ii) | **Registered office of the Licensee** | 63 E-1, Gulberg III, Lahore |
| (iii) | **Principle Office** | 63 E-1, Gulberg III, Lahore |
| (iv) | **Plants Location** | Kot Krishan Radha Road, Ksur |
| (v) | **Field Type** | Fixed Tilted Roof top Plane/Shell Roofs |
| (vi) | **Field Parameters** | Fixed Tilt Angle : 20◦ , Azimuth Angle 183.4◦ |
| (vii) | **Type of Generation Facility** | Solar Photovoltaic (PV) |

| (B). | Solar Power Generation Technology & Capacity | |
|---|---|---|
| (i) | **Type of Technology** | Photovoltaic Half Cell |
| (ii) | **Type of Cell** | Multi busbar Mono crystalline PERC Cells |
| (iii) | **Type of System** | Grid Tied |
| (iv) | **Installed Capacity of the Generation facility** | 1.82 MWp DC |

| ( C ). | Technical Details of Equipment | |
|---|---|---|
| (a). | **Solar Panels-PV Modules** | JA Solar, JAM72S30 – 535 W |
| (i). | **Type of Module** | Mono Crystalline |

| | | | |
|---|---|---|---|
| (ii). | **Surface Area of Module** | Roof top ,Shell roof | |
| (iii). | **Dimension of each Module** | 2279 ± 2mm x 1135 ±2mm x 35 ± 1 mm | |
| (iv). | **Total area incorporated** | Approx 16,526 $m^2$ | |
| (v) | **No.of Modules** | 3,402 | |
| (vi) | **Frame of Module** | Galvonized Iron alloy | |
| (vii). | **Weight of one Module** | 28.5 kg ± 3% | |
| (viii). | **Module output Warranty** | For 1st Year<br>97.5 % or above | For 2nd Year till 25 th year<br>0.7 % /yr Reduction |
| (ix). | **Number of Solar Cells in each Module** | 144 (6×24) | |
| (x). | **Efficiency of Module** | 20.7% | |
| (xi). | **Environment Protection System** | Encapsulation and sealing arrangement | |
| (xii). | **Maximum Power (Pmax)** | 535 Wp | |
| (xiii). | **Power Tolerance at STC** | 0 ~ + 5 W | |
| (xiv). | **Operating Voltage at Pmax (Vmp)** | 41.93 V | |
| (xv). | **Operating current at Pmax (Imp)** | 12.76 A | |
| (xvi). | **Open Circuit Voltage (Voc)** | 49.78 V | |
| (xvii). | **Short Circuit Current (Isc)** | 13.52 A | |
| (xviii). | **Optimum Operating voltage at NOCT** | 38.78 V | |
| (xix). | **Optimum Operating Current at NOCT** | 10.43 A | |
| (xx). | **Open Circuit voltage (Voc) at NOCT** | 46.31 V | |
| (x) | **Maximum system Open circuit voltage** | 1500 V(IEC/UL) or 1000V (IEC/UL) | |

| | | |
|---|---|---|
| (xi) | **Short circuit current (Isc)** | 11.05 A |

| (b). | PV Array | |
|---|---|---|
| (i) | **Modules in a String** | 15-18 |
| (ii) | **Total No of inverters** | 16 |
| (iii) | **Total No of Modules** | 3402 |

| (c). | PV Capacity | |
|---|---|---|
| (i) | **Total Capacity** | 1.82 MWp DC |
| (ii) | **Net Capacity Factor** | 16.0 % (w.r.t AC) |

| (d). Inverters<br>1. Inverter no 1 :Huawei Fusion Solar SUN 2000-100 KTL-M1 | | |
|---|---|---|
| (i). | Maximum DC Power Output | 100000 $W_p$ |
| (ii). | Inverter Model | SUN2000-100-KTL-M1 |
| (iii). | Manufacturer | HUAWEI |
| (iv). | Maximum DC Input Voltage | DC 1100 V |
| (v) | Start Voltage | DC 200 V |
| (vi) | Number of Inverters | 21 |
| (vii). | Efficiency | 98.60% |
| (viii). | Max.Input Current per MPPT | DC 26 A |

| | | | |
|---|---|---|---|
| **(ix).** | MPPT Voltage Range | 200-1000 V | |
| **(x).** | Output Electrical System | 3 Phase 4 Wire | |
| **(xi).** | Rated Output Voltage | 230/400 AC | |
| **(xii).** | Rated Frequency | 50 Hz | |
| **(xiii).** | Power Factor | Adjustable-0.8 lag to 0.8 lead | |
| **(xiv).** | Power Control | MPP Tracker (10 MPPT/Tracker) | |
| **(xv).** | Environmental Enclosure | Operating Temperature Range | -25°C to + 65°C |
| | | Relative Humidity: 100 % Non-Condensing | |
| | | Protection Class | IP66 |
| | | Audible Noise | NA |
| | | Operating Elevation | < 4000 m |
| **(xvi).** | Protection Devices | (a). | DC Disconnect Switch |
| | | (b). | Anti-Islanding |
| | | ( c). | DC SPD |
| | | (d). | DC Reverse Polarity Protection |
| | | ( e). | AC SPD |
| | | (f). | Residual Current Monitoring Unit |
| **( e).** | Junction boxes | NA | Strings directly connected to inverter |
| **(f).** | **Data Collecting System** | | |
| **(i).** | Weather Data | (a). | Meteo Control WS501-UMB Temperature, Air Pressure, Wind Speed, Relative Humidity |
| **(ii).** | System Data | (a). | DC Input Voltage V & current A of each Inverter (Phase, Line) |
| | | (b). | Total DC Power (kW) generated by PV Array |
| | | ( c). | AC Output Voltage(V) & current(A) of each Inverter (Phase, Total ) |

| | | |
|---|---|---|
| | (d). | AC Output Power kW and energy (kwh) of each inverter |
| | ( e). | Frequency (Hz) |
| | (f). | Power Factor (PF) |

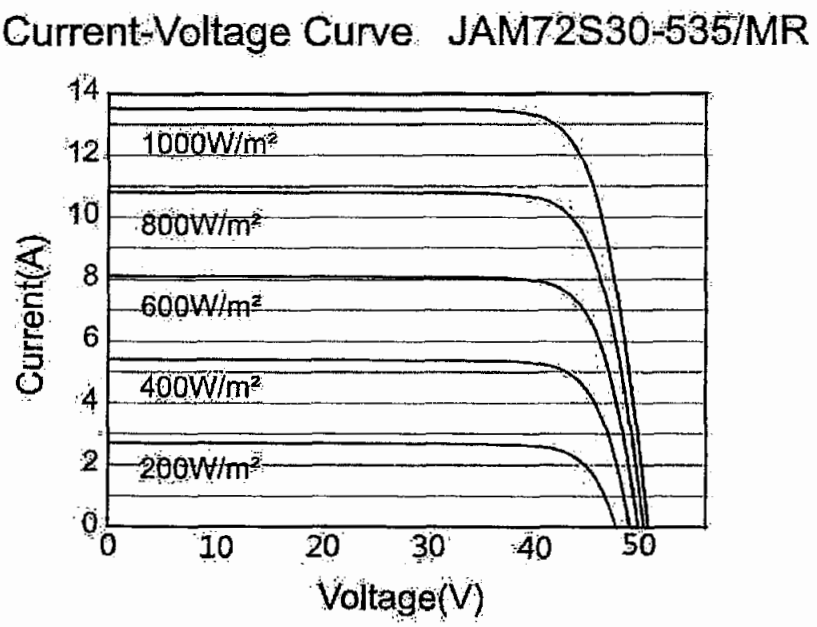
## Metering and protection

The power produced by the Grid-Tied Solar Power Plant will be limited to inverters and a separate CT meter will be installed for the monitoring at the site, by which instantaneous power, units generated daily and monthly will be recorded.

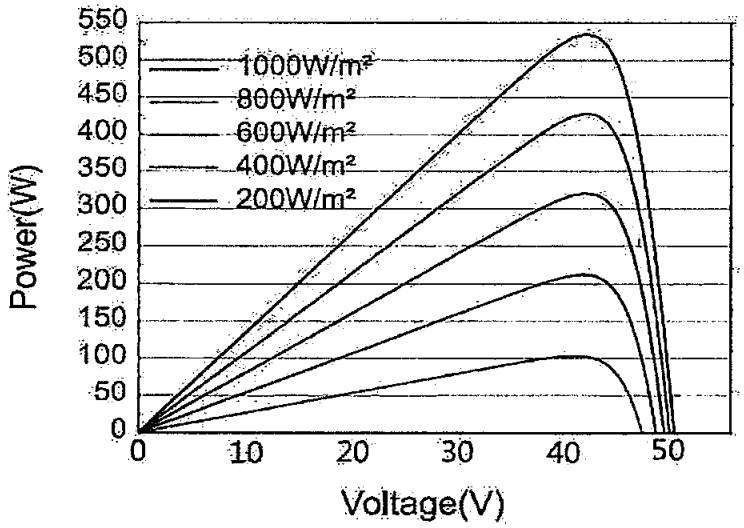
The following protection will be placed for inverters and some features are built in.

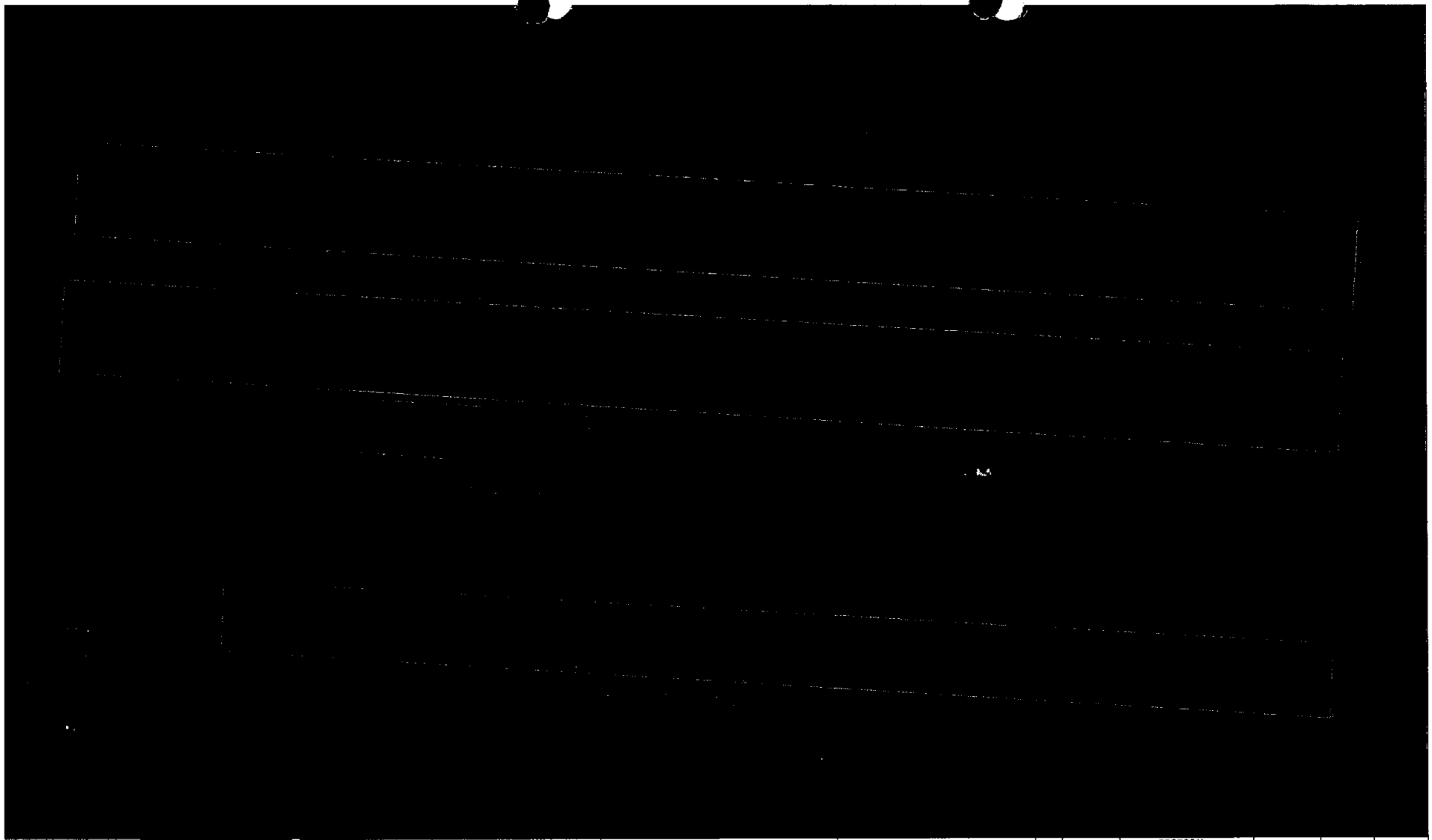
- DC reverse protection device
- AC short circuit protection
- Grid monitoring
- Leakage current protection
- Anti-PID function
- Overvoltage protection

## VI Curve of Solar Panel at STC for the Generation Facility/ Solar Power Plant of Licensee



## Power-Voltage Curve JAM72S30-535/MR



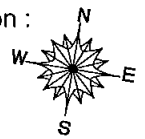



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| R O | DESCRIPTION | DOC/DRAWING NO | 0 | ISSUE FOR APPROVAL | UR | ZA | ZA |
| REFERENCE DOCUMENT/ DRAWING | | | REV NO | DESCRIPTION | DRAWN BY | DESIGN BY | APPVD BY | DATED |

## DESIGN PARAMETERS

| Load Description | Value | Unit | Reference |
|---|---|---|---|
| PV Module Weight | 28 | Kgs | PV Panel |
| Wind Speed | 35 | m/s | ASCE-7-10l |
| Seismic Zone | 2A | | Pakistan Building Code |

Navigation :




## Notes:

1-Material ASTM-A-36.
2-Tilt Angle 20 Degree.
3-Total No. Panels 3402.
4-Total Power 1820.07 KW.
5-JA 535W PV Module.

| REV | DATED | DESCRIPTION | DRAWN BY | CHECKED BY | APPROVED BY |
|---|---|---|---|---|---|
| A | 00-00-00 | PROPOSAL DRAWINGS | UR | AA | ZA |

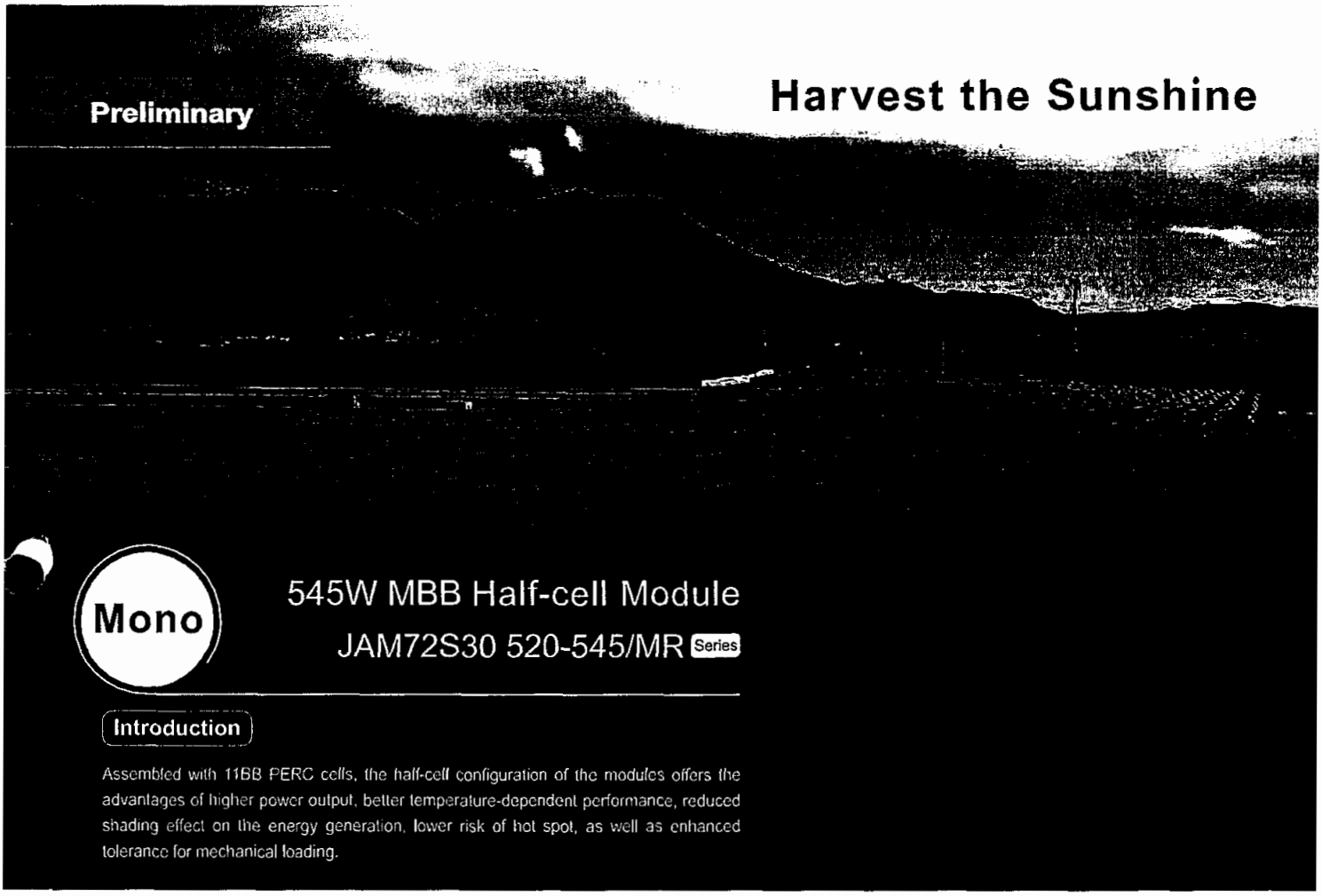
ZERO CARBON
87-Block B1 MM Alam Road
Gulberg, III Lahore.
info@zerocarbon.com.pk

DATE 23-08-2021

PROJECT Bulleh Shah Paper Mill

TITLE Panel Layout Plan

| SCALE | SHEET SIZE | | REV |
|---|---|---|---|
| - | A3 | 00 | - | 00 |



Preliminary

# Harvest the Sunshine

Mono

## 545W MBB Half-cell Module

## JAM72S30 520-545/MR Series

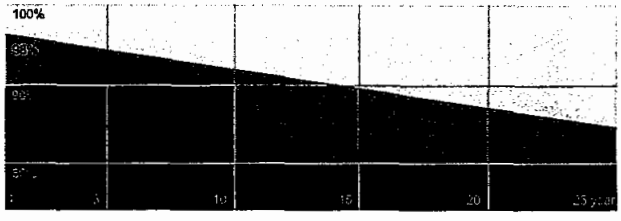
### Introduction

Assembled with 11BB PERC cells, the half-cell configuration of the modules offers the advantages of higher power output, better temperature-dependent performance, reduced shading effect on the energy generation, lower risk of hot spot, as well as enhanced tolerance for mechanical loading.

- Higher output power
- Lower LCOE
- Less shading and lower resistive loss
- Better mechanical loading tolerance

### Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty




■ JA Linear Power Warranty ■ Industry Warranty

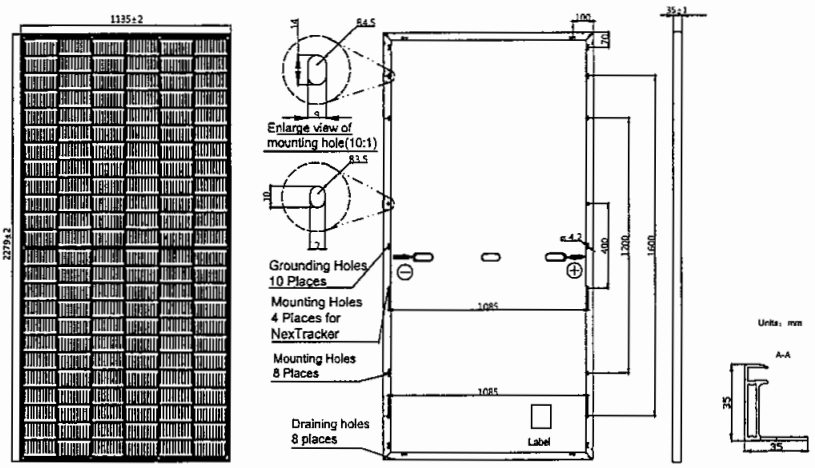
### Comprehensive Certificates

- IEC 61215, IEC 61730,UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- OHSAS 18001: 2007 Occupational health and safety management systems
- IEC TS 62941: 2016 Terrestrial photovoltaic (PV) modules – Guidelines for increased confidence in PV module design qualification and type approval

JA SOLAR

# JAM72S30 520-545/MR Series

## MECHANICAL DIAGRAMS




Remark: customized frame color and cable length available upon request

## SPECIFICATIONS

| | |
|---|---|
| Cell | Mono |
| Weight | 28.5kg±3% |
| Dimensions | 2279±2mm×1135±2mm×35±1mm |
| Cable Cross Section Size | 4mm² (IEC) , 12 AWG(UL) |
| No. of cells | 144(6×24) |
| Junction Box | IP68, 3 diodes |
| Connector | QC 4.10(1000V)<br>QC 4.10-35(1500V) |
| Cable Length (Including Connector) | Portrait: 300mm(+)/400mm(-);<br>Landscape: 1200mm(+)/1200mm(-) |
| Packaging Configuration | 31pcs/Pallet, 620pcs/40ft Container |

## ELECTRICAL PARAMETERS AT STC

| TYPE | JAM72S30 -520/MR | JAM72S30 -525/MR | JAM72S30 -530/MR | JAM72S30 -535/MR | JAM72S30 -540/MR | JAM72S30 -545/MR |
|---|---|---|---|---|---|---|
| Rated Maximum Power(Pmax) [W] | 520 | 525 | 530 | 535 | 540 | 545 |
| Open Circuit Voltage(Voc) [V] | 49.41 | 49.53 | 49.65 | 49.78 | 49.90 | 50.01 |
| Maximum Power Voltage(Vmp) [V] | 41.24 | 41.47 | 41.70 | 41.93 | 42.16 | 42.38 |
| Short Circuit Current(Isc) [A] | 13.38 | 13.42 | 13.47 | 13.52 | 13.57 | 13.62 |
| Maximum Power Current(Imp) [A] | 12.61 | 12.66 | 12.71 | 12.76 | 12.81 | 12.86 |
| Module Efficiency [%] | 20.1 | 20.3 | 20.5 | 20.7 | 20.9 | 21.1 |
| Power Tolerance | 0~+5W | | | | | |
| Temperature Coefficient of Isc(α_Isc) | +0.045%/°C | | | | | |
| Temperature Coefficient of Voc(β_Voc) | -0.275%/°C | | | | | |
| Temperature Coefficient of Pmax(γ_Pmp) | -0.350%/°C | | | | | |
| STC | Irradiance 1000W/m², cell temperature 25°C, AM1.5G | | | | | |

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer.They only serve for comparison among different module types.

## ELECTRICAL PARAMETERS AT NOCT

| TYPE | JAM72S30 -520/MR | JAM72S30 -525/MR | JAM72S30 -530/MR | JAM72S30 -535/MR | JAM72S30 -540/MR | JAM72S30 -545/MR |
|---|---|---|---|---|---|---|
| Rated Max Power(Pmax) [W] | 393 | 397 | 401 | 404 | 408 | 412 |
| Open Circuit Voltage(Voc) [V] | 45.93 | 46.05 | 46.18 | 46.31 | 46.43 | 46.55 |
| Max Power Voltage(Vmp) [V] | 38.15 | 38.36 | 38.57 | 38.78 | 38.99 | 39.20 |
| Short Circuit Current(Isc) [A] | 10.93 | 10.97 | 11.01 | 11.05 | 11.09 | 11.13 |
| Max Power Current(Imp) [A] | 10.30 | 10.35 | 10.39 | 10.43 | 10.47 | 10.51 |
| NOCT | Irradiance 800W/m², ambient temperature 20°C,wind speed 1m/s, AM1.5G | | | | | |

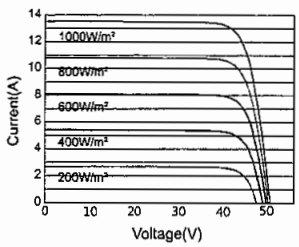
*For NexTracker installations ,Maximum Static Load, Front is 1800Pa while Maximum Static Load, Back is 1800Pa.

## OPERATING CONDITIONS

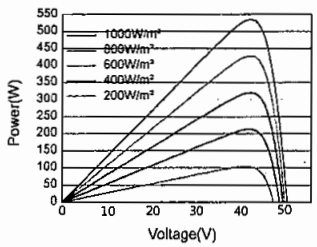
| | |
|---|---|
| Maximum System Voltage | 1000V/1500V DC |
| Operating Temperature | -40°C~+85°C |
| Maximum Series Fuse | 20A |
| Maximum Static Load,Front*<br>Maximum Static Load,Back* | 5400Pa(112lb/ft²)<br>2400Pa(50lb/ft²) |
| NOCT | 45±2°C |
| Safety Class | Class Ⅱ |
| Fire Performance | UL Type 1 |

## CHARACTERISTICS

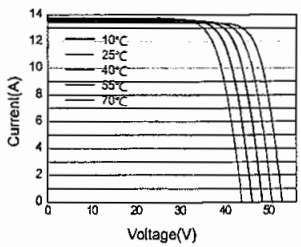
Current-Voltage Curve JAM72S30-535/MR



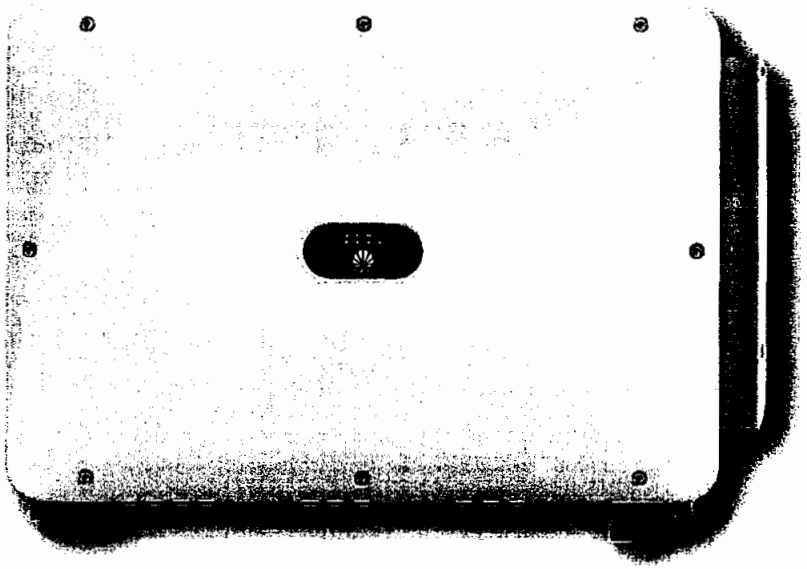

Power-Voltage Curve JAM72S30-535/MR




Current-Voltage Curve JAM72S30-535/MR



# SUN2000-100KTL-M1
## Smart String Inverter



10
MPP Trackers

98.8%
Max. Efficiency

String-level
Management

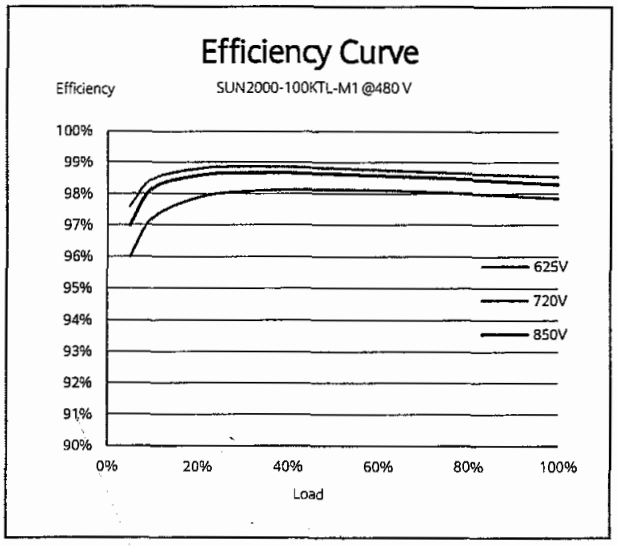
Smart I-V Curve
Diagnosis Supported

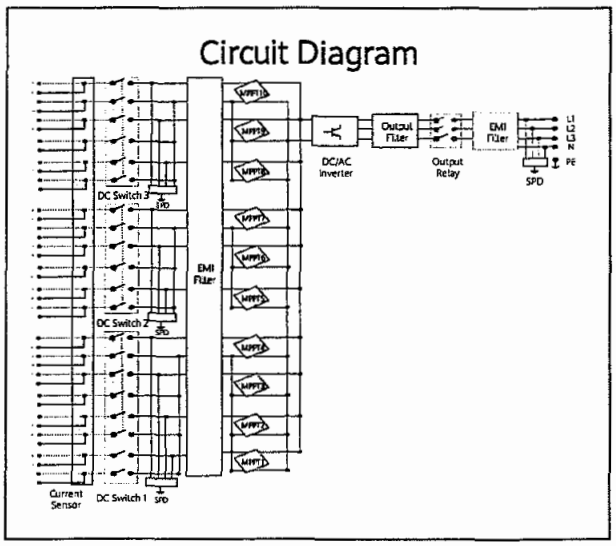
MBUS
Supported

Fuse Free
Design

Surge Arresters for
DC & AC

IP66
Protection



SUN2000-100KTL-M1

# Technical Specifications

## Efficiency

| | |
|---|---|
| Max. Efficiency | 98.8% @480 V; 98.6% @380 V / 400 V |
| European Efficiency | 98.6% @480 V; 98.4% @380 V / 400 V |

## Input

| | |
|---|---|
| Max. Input Voltage | 1,100 V |
| Max. Current per MPPT | 26 A |
| Max. Short Circuit Current per MPPT | 40 A |
| Start Voltage | 200 V |
| MPPT Operating Voltage Range | 200 V ~ 1,000 V |
| Nominal Input Voltage | 570 V @380 V; 600 V @400 V; 720 V @480 V |
| Number of Inputs | 20 |
| Number of MPP Trackers | 10 |

## Output

| | |
|---|---|
| Nominal AC Active Power | 100,000 W (380 V / 400 V / 480 V @40°C) |
| Max. AC Apparent Power | 110,000 VA |
| Max. AC Active Power (cosϕ=1) | 110,000 W |
| Nominal Output Voltage | 220 V / 230 V, default 3W + N + PE; 380 V / 400 V / 480 V, 3W + PE |
| Rated AC Grid Frequency | 50 Hz / 60 Hz |
| Nominal Output Current | 152.0 A @380 V; 144.4 A @400 V; 120.3 A @480 V |
| Max. Output Current | 168.8 A @380 V; 160.4 A @400 V; 133.7 A @480 V |
| Adjustable Power Factor Range | 0.8 LG ... 0.8 LD |
| Max. Total Harmonic Distortion | <3% |

## Protection

| | |
|---|---|
| Input-side Disconnection Device | Yes |
| Anti-islanding Protection | Yes |
| AC Overcurrent Protection | Yes |
| DC Reverse-polarity Protection | Yes |
| PV-array String Fault Monitoring | Yes |
| DC Surge Arrester | Type II |
| AC Surge Arrester | Type II |
| DC Insulation Resistance Detection | Yes |
| Residual Current Monitoring Unit | Yes |

## Communication

| | |
|---|---|
| Display | LED Indicators, APP |
| USB | Yes |
| RS485 | Yes |
| MBUS | Yes (isolation transformer required) |

## General

| | |
|---|---|
| Dimensions (W x H x D) | 1,035 x 700 x 365 mm (40.7 x 27.6x 14.4 inch) |
| Weight (with mounting plate) | 90 kg (187.4 lb.) |
| Operating Temperature Range | -25°C ~ 60°C (-13°F ~ 140°F) |
| Cooling Method | Smart Air Cooling |
| Max. Operating Altitude without Derating | 4,000 m (13,123 ft.) |
| Relative Humidity | 0 ~ 100% |
| DC Connector | Staubli MC4 |
| AC Connector | Waterproof Connector + OT/DT Terminal |
| Protection Degree | IP66 |
| Topology | Transformerless |

## Standard Compliance (more available upon request)

| | |
|---|---|
| Certificate | EN 62109-1/-2, IEC 62109-1/-2, EN 50530, IEC 62116, IEC 61727, IEC 60068, IEC 61683 |

ZERO CARBON SOLAR

# ANNEXURE III

# SIMULATION REPORT

Annual Production Report

# 1.825MW Solar Power Plant Bulleh Shah Paper Mills, 31.1325443,74.3551421

## Report

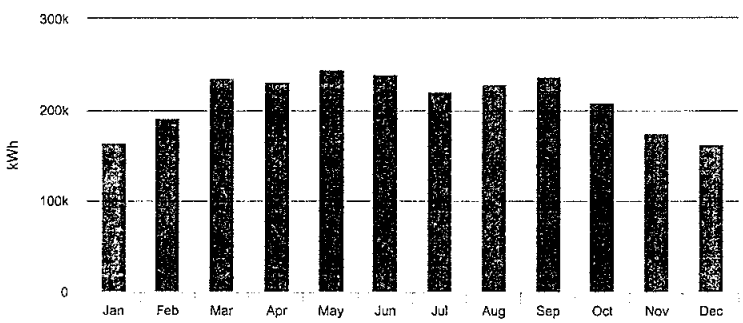
| | |
|---|---|
| Project Name | Bulleh Shah Paper Mills |
| Project Address | 31.1325443,74.3551421 |
| Prepared By | Zero Carbon<br>talal.abid@zerocarbon.com.pk |

## System Metrics

| | |
|---|---|
| Design | 1.825MW Solar Power Plant |
| Module DC Nameplate | 1.82 MW |
| Inverter AC Nameplate | 1.60 MW<br>Load Ratio: 1.14 |
| Annual Production | 2.545 GWh |
| Performance Ratio | 73.9% |
| kWh/kWp | 1,398.1 |
| Weather Dataset | TMY, 10km Grid, meteonorm (meteonorm) |
| Simulator Version | 79ae66d755-6c48e55c95-131952e5b2-5a8a302cd0 |

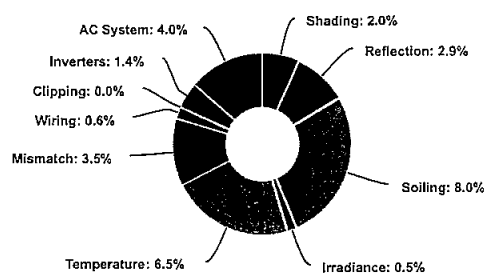
## Project Location


## Monthly Production




| Month | GHI (kWh/m²) | POA (kWh/m²) | Shaded (kWh/m²) | Nameplate (kWh) | Grid (kWh) |
|---|---|---|---|---|---|
| January | 89.7 | 116.9 | 114.3 | 185,710.7 | 164,715.8 |
| February | 110.9 | 137.4 | 135.3 | 220,390.5 | 191,931.1 |
| March | 152.5 | 173.2 | 170.4 | 277,495.2 | 235,993.7 |
| April | 166.6 | 174.0 | 170.7 | 277,354.0 | 232,310.3 |
| May | 188.9 | 188.0 | 184.2 | 299,516.2 | 245,458.2 |
| June | 188.0 | 182.4 | 178.6 | 290,138.1 | 239,328.3 |
| July | 170.5 | 167.3 | 163.7 | 265,627.5 | 220,711.6 |
| August | 169.4 | 173.6 | 170.0 | 276,254.1 | 229,598.8 |
| September | 161.6 | 178.2 | 175.1 | 285,200.6 | 237,500.7 |
| October | 131.3 | 155.1 | 152.3 | 247,855.7 | 208,759.3 |
| November | 98.9 | 127.1 | 124.5 | 202,427.1 | 174,921.1 |
| December | 86.9 | 117.4 | 114.4 | 185,796.9 | 163,494.5 |

## Sources of System Loss



# Annual Production Report [redacted]

## Annual Production

| | Description | Output | % Delta |
|---|---|---|---|
| Irradiance (kWh/m²) | Annual Global Horizontal Irradiance | 1,715.2 | |
| | POA Irradiance | 1,890.7 | 10.2% |
| | Shaded Irradiance | 1,853.5 | -2.0% |
| | Irradiance after Reflection | 1,800.0 | -2.9% |
| | Irradiance after Soiling | 1,656.0 | -8.0% |
| | **Total Collector Irradiance** | **1,656.0** | **0.0%** |
| Energy (kWh) | Nameplate | 3,013,766.6 | |
| | Output at Irradiance Levels | 2,999,014.1 | -0.5% |
| | Output at Cell Temperature Derate | 2,803,394.1 | -6.5% |
| | Output After Mismatch | 2,704,819.2 | -3.5% |
| | Optimal DC Output | 2,688,399.2 | -0.6% |
| | Constrained DC Output | 2,688,391.1 | 0.0% |
| | Inverter Output | 2,650,753.5 | -1.4% |
| | **Energy to Grid** | **2,544,723.5** | **-4.0%** |

**[redacted]rature Metrics**

| | |
|---|---|
| Avg. Operating Ambient Temp | 26.8 °C |
| Avg. Operating Cell Temp | 36.6 °C |

**Simulation Metrics**

| | |
|---|---|
| Operating Hours | 4552 |
| Solved Hours | 4552 |

## Condition Set

| | |
|---|---|
| Description | Condition Set 2 |
| Weather Dataset | TMY, 10km Grid, meteonorm (meteonorm) |
| Solar Angle Location | Meteo Lat/Lng |
| Transposition Model | Perez Model |
| Temperature Model | Sandia Model |

**Temperature Model Parameters**

| Rack Type | a | b | Temperature Delta |
|---|---|---|---|
| Fixed Tilt | -3.56 | -0.075 | 3°C |
| Flush Mount | -2.81 | -0.0455 | 0°C |
| East-West | -3.56 | -0.075 | 3°C |
| Carport | -3.56 | -0.075 | 3°C |

**Soiling (%)**

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| | |
|---|---|
| Irradiation Variance | 5% |
| Cell Temperature Spread | 4° C |
| Module Binning Range | -2.5% to 2.5% |
| AC System Derate | 4.00% |

**Module Characterizations**

| Module | Uploaded By | Characterization |
|---|---|---|
| JAM72S30-535/MR (JA Solar) | Folsom Labs | Spec Sheet Characterization, PAN |

**Component Characterizations**

| Device | Uploaded By | Characterization |
|---|---|---|

## Components

| Component | Name | Count |
|---|---|---|
| Inverters | SUN2000-100KTL-M1 (380/400) (Huawei) | 16 (1.60 MW) |
| Strings | 4 mm2 (Copper) | 189 (16,240.0 m) |
| Module | JA Solar, JAM72S30-535/MR (535W) | 3,402 (1.82 MW) |

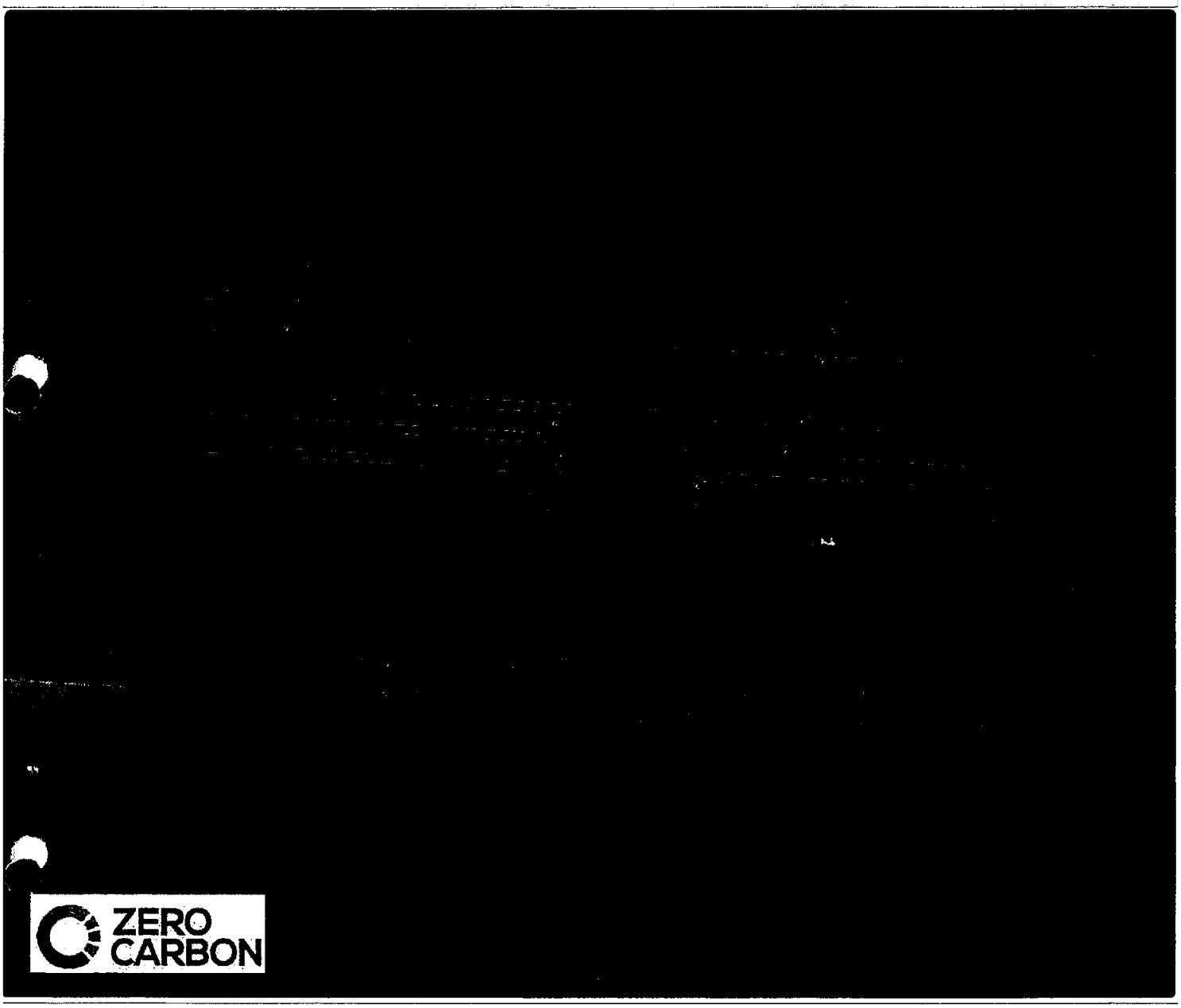
## Wiring Zones

| Description | Combiner Poles | String Size | Stringing Strategy |
|---|---|---|---|
| CTMP | - | 18-18 | Along Racking |
| Coater | - | 15-18 | Along Racking |

## Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|---|---|---|---|---|---|---|---|---|---|
| Coater | Fixed Tilt | Portrait (Vertical) | 20° | 183.378° | 3.0 m | 2x18 | 22 | 792 | 423.7 kW |
| PM 6 | Fixed Tilt | Portrait (Vertical) | 20° | 183.378° | 3.0 m | 2x1 | 684 | 1,308 | 699.8 kW |
| PM 7 | Fixed Tilt | Portrait (Vertical) | 20° | 183.378° | 3.0 m | 2x1 | 655 | 1,254 | 670.9 kW |
| PM 7 Extension | Fixed Tilt | Landscape (Horizontal) | 20° | 183.378° | 1.5 m | 2x1 | 30 | 60 | 32.1 kW |

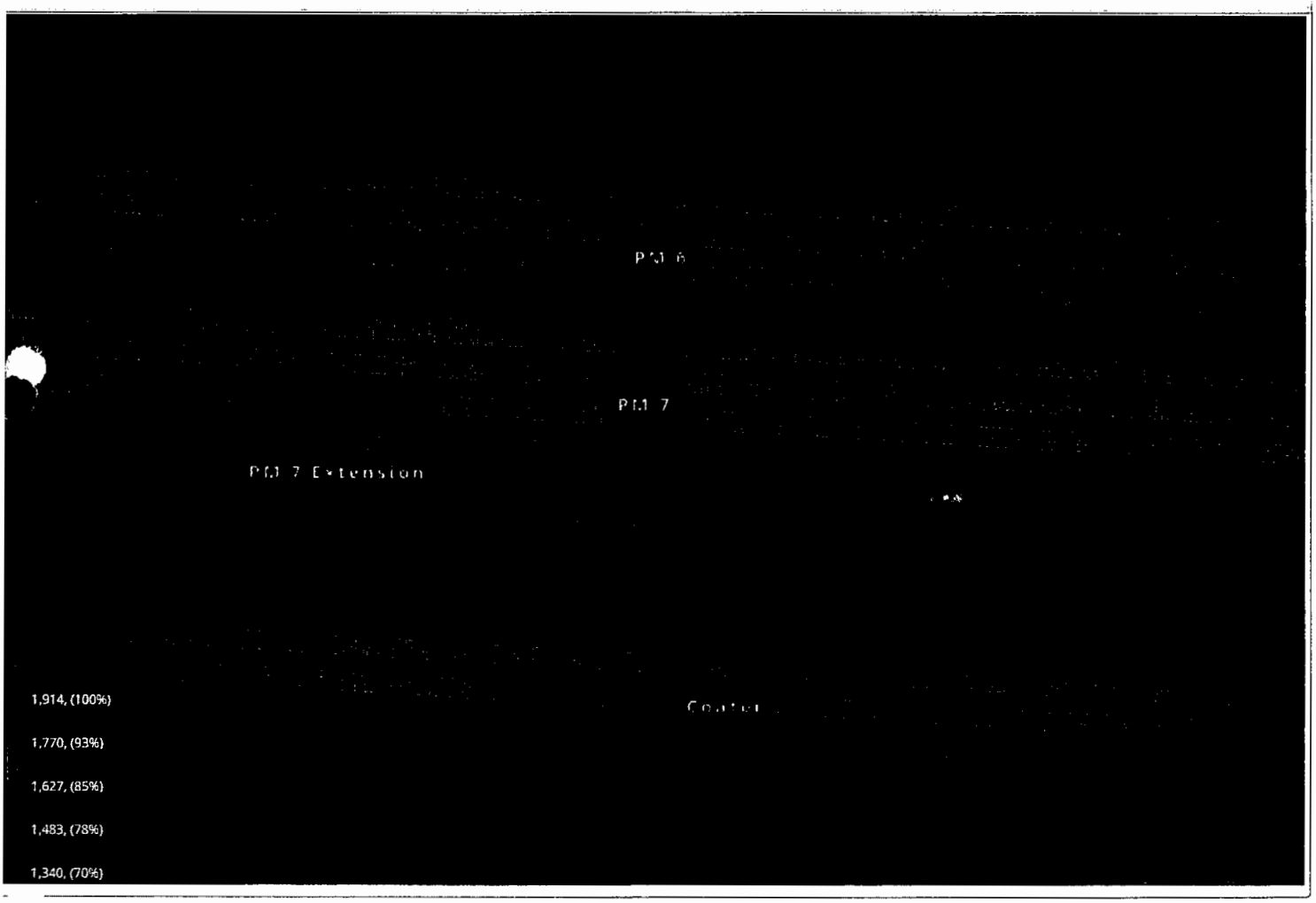
Detailed Layout



Shading Report

# .825MW Solar Power Plant Bulleh Shah Paper Mills, 31.1325443,74.3551421

Shading Heatmap




## hading by Field Segment

| )escription | Tilt | Azimuth | Modules | Nameplate | Shaded Irradiance | AC Energy | TOF[2] | Solar Access | Avg TSRF [2] |
|---|---|---|---|---|---|---|---|---|---|
| :oater | 20.0° | 183.4° | 792 | 423.7 kWp | 1,868.1kWh/m$^2$ | 593.4 MWh[1] | 98.8% | 98.8% | 97.6% |
| 'M 6 | 20.0° | 183.4° | 1,308 | 699.8 kWp | 1,848.5kWh/m$^2$ | 973.3 MWh[1] | 98.8% | 97.8% | 96.6% |
| 'M 7 | 20.0° | 183.4° | 1,254 | 670.9 kWp | 1,849.4kWh/m$^2$ | 933.3 MWh[1] | 98.8% | 97.8% | 96.6% |
| 'M 7 Extension | 20.0° | 183.4° | 60 | 32.1 kWp | 1,854.1kWh/m$^2$ | 44.7 MWh[1] | 98.8% | 98.1% | 96.9% |
| 'otals, weighted by kWp | | | 3,414 | 1.83 MWp | 1,853.5kWh/m$^2$ | 2.54 GWh | 98.8% | 98.0% | 96.8% |

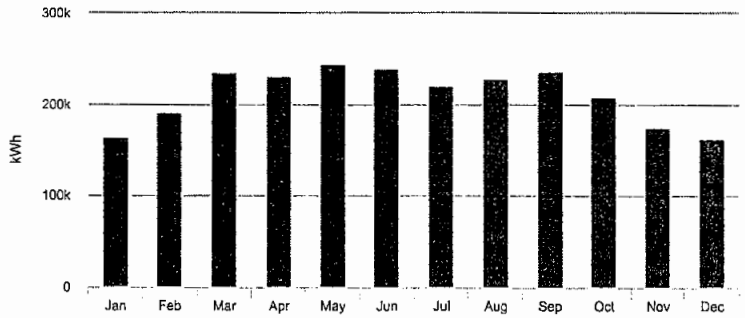
[1] approximate, varies based on inverter performance
[2] based on location Optimal POA Irradiance of 1,913.9kWh/m$^2$ at 30.5° tilt and 181.3° azimuth

## Solar Access by Month

| )escription | jan | feb | mar | apr | may | jun | jul | aug | sep | oct | nov | dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| :oater | 99% | 99% | 99% | 99% | 99% | 99% | 99% | 99% | 99% | 99% | 99% | 98% |
| 'M 6 | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 97% |
| 'M 7 | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 97% |
| 'M 7 Extension | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 97% |
| olar Access, weighted by kWp | 97.8% | 98.4% | 98.4% | 98.1% | 98.0% | 97.9% | 97.9% | 97.9% | 98.3% | 98.2% | 97.9% | 97.4% |
| .C Power (kWh) | 164,715.8 | 191,931.1 | 235,993.7 | 232,310.3 | 245,458.2 | 239,328.3 | 220,711.6 | 229,598.8 | 237,500.7 | 208,759.3 | 174,921.1 | 163,494.5 |

# Shading Report

## Monthly Production




| Month | GHI (kWh/m²) | POA (kWh/m²) | Shaded (kWh/m²) | Nameplate (kWh) | Grid (kWh) |
|---|---|---|---|---|---|
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| February | 110.9 | 137.4 | 135.3 | 220,390.5 | 191,931.1 |
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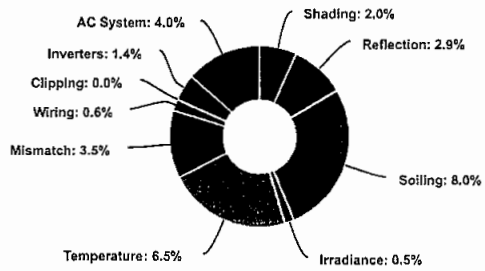
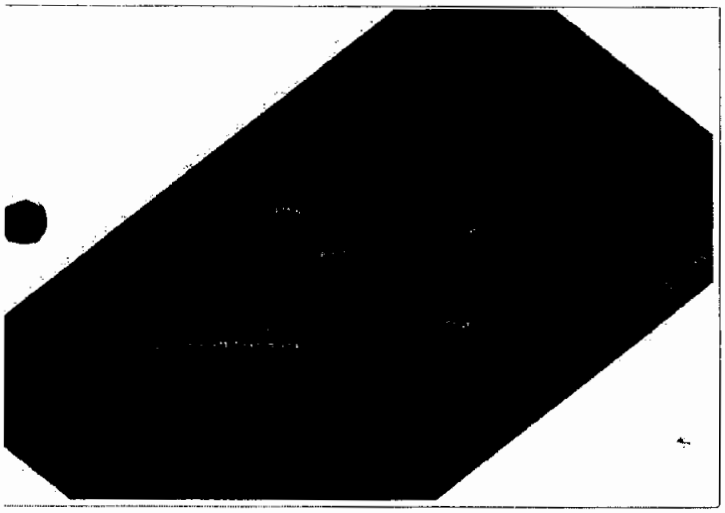
| November | 98.9 | 127.1 | 124.5 | 202,427.1 | 174,921.1 |
| December | 86.9 | 117.4 | 114.4 | 185,796.9 | 163,494.5 |

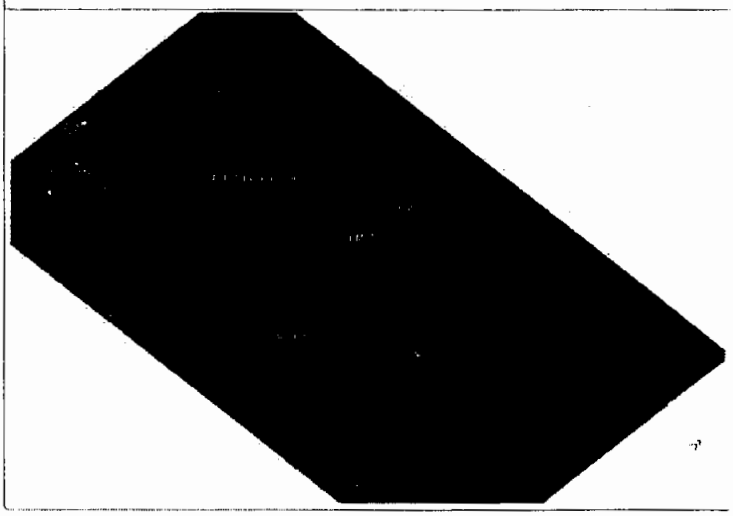
## Sources of System Loss




## Southwestern Angle



## Southeastern Angle



# SECTION V

# FEASIBILTY STUDY

1.82 MW GRID-TIED SOLAR POWER PLANT

BULLEH SHAH PACKAGING PRIVATE LIMITED

ZERO CARBON SOLAR

**LIST OF FIGURES**

**LIST OF TABLES**

## EXECUTIVE SUMMARY

The feasibility study examines the financial, technical, practical and cost effective outcome ofthe proposed Solar Photovoltaic (PV) installation on the rooftop of Bulleh Shah Packaging Private Limited for the generation of electricity. All the relevant factors including topographical, legal and economic influencing the performance of the power plant are taken into account. The main outcomes of the feasibility report are given below:

***Technical Site Analysis***: The project site is an adequate site for a Solar PV energy system installation. For the purpose of estimation. The annual average mean daily solar irradiation in Kasur is considered to be 4.53 kWh/ m2, orientation azimuth angle of solar panels is 183.3◦ and panel tilt 20 ◦ for rooftops. The condition of rooftop location is considered satisfactory for Load bearing. The DC/AC ratio is kept 1.14 with the AC side being 1.6 0 $MW_p$.

***Anticipated System Information***: The project will accommodate a 1.8 2 $MW_p$ (DC) Solar PV System with a projected annual production of 2.546 GWh/year with an AC capacity of 1.60 $MW_p$ (AC). The Solar panel used are of PV panel as a basis for design will result in an acceptable system weight density of 5.00 lbs/SF. The inverters incorporated are of Huawei String Inverters SUN 2000 series. The system will offset approximately three millions of carbon dioxide annually.

***Financial Analysis***: Zero Carbon Power Private Limited is an initiative of The Punjab group having a strong financial benchmark. The project under consideration will be funded by State Bank's loan under category III. The total estimated project cost is PKR 16 4, 10 0, 0 0 0.

In conclusion the technical and financial analysis propose that installation of a 1.8 2 MWp Solar PV System at the proposed location is deemed feasible.

## INTRODUCTION

### *Description of the Project*

The project is being installed under reservations by Zero Carbon Power (Pvt) Ltd. The sponsors of the company are interested to install the Solar PV plant to generate electricity. Zero Carbon Power intends to install a Grid-Tied Solar PV Power Plant at different location in their premises, by which they can reduce the electricity consumption from the conventional grid for Bulleh Shah Packaging Pvt. Ltd and use the solar generated units for running the load.

A 1.8 2 MW Solar PV Plant has been designed for Bulleh Shah Packaging Private Limited, which will get synchronize with the LV termination panel of the proposed site located at Kot Radha , Krishan Road, Kasur. The total area of the project is around 4.08 Acres (16,526m2) for the installation of Solar PV panels. The project area is already cleared and the solar PV panels will be installed with customized structures according to the rooftop and vicinities requirement. The mounting of panels will be done on concrete roofs and shell roofs structures.

### *Location of the Project*

The project site is the rooftops of Bulleh Shah Packaging Pvt. Limited, Kot Radha Krishan Road, Kasur. The proposed project site lies between 31.1325 4 4 3 and 7 4 .35 5 14 21 located in Kasur.

The Land area of project site is around 4 .08 Acres (16,526m2) located at Kot Radha Krishan Road Kasur. The project land is owned by the buyers as specified in the Power Purchase Agreement for the installation of 1.82 MW Solar PV plant. The location of site can be viewed in Figure.1 and overview of the project site is highlighted and shown in Figure.2

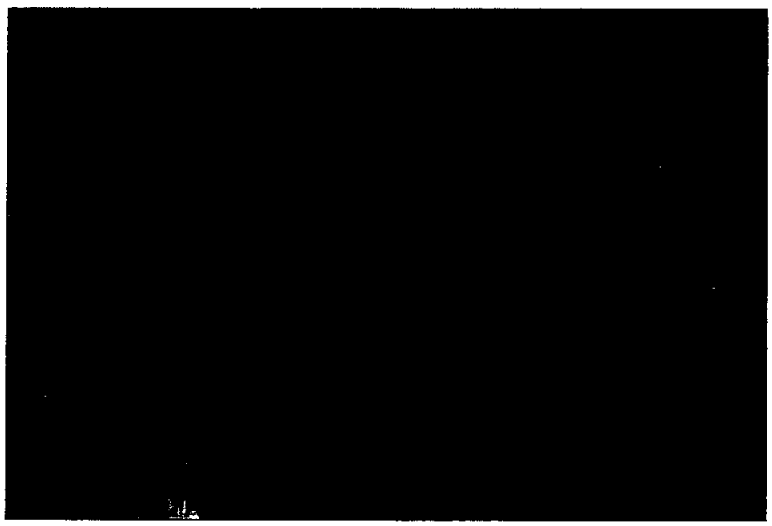


**Figure.1- Overview of the site location**

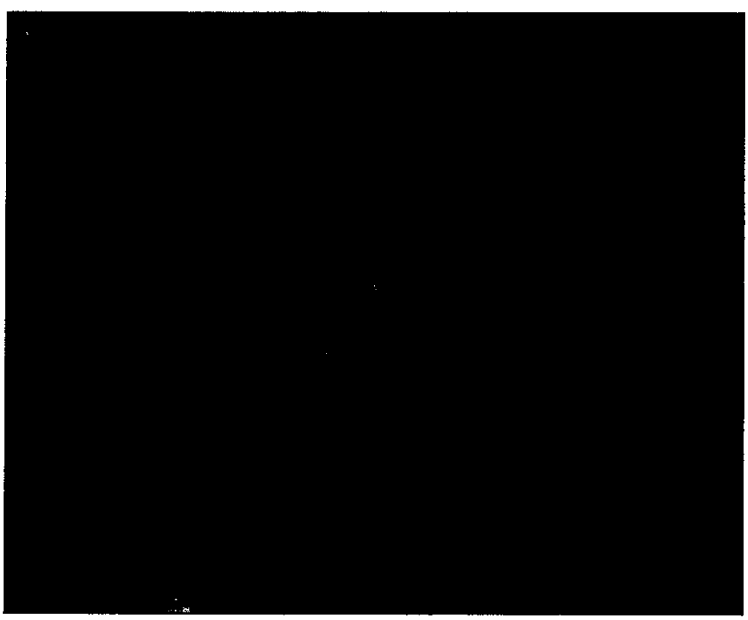


**Figure.2- Project site to be utilized**

*Site Overview*

The clear rooftops is to be installed at the Bulleh Shah vicinity. The site is clear from any obstructions and deems viable for installation. The major hindrances were removed to make a parallel base for mounting the PV panel frames. Irradiance level were measured by pyrometer and wind speed data was gathered by Pakistan Meteorological Department to analyse the wind stresses.

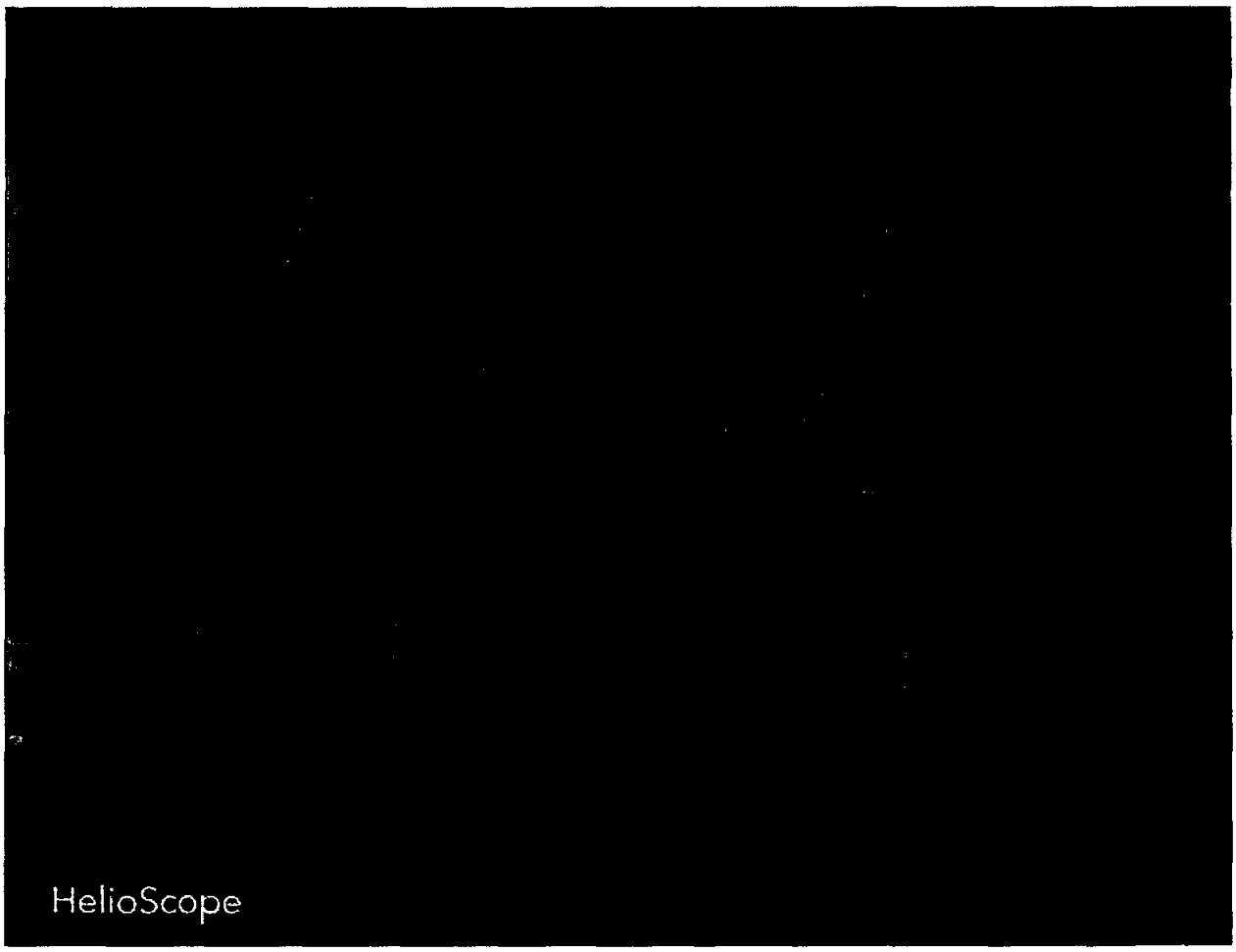



**Figure-3. 2D Site Layout**

## CLIMATE AND WEATHER IN KASUR

### *Topography*

For the purposes of this report, the geographical coordinates of Kasūr are 31.116 deg latitude, 74.447 deg longitude, and 689 ft elevation.

The topography within *2 miles* of Kasūr is *essentially flat*, with a maximum elevation change of *92 feet* and an average elevation above sea level of *666 feet*. Within *10 miles* is *essentially flat* (*144 feet*). Within *50 miles* also contains only *modest* variations in elevation (*305 feet*).

The area within *2 miles* of Kasūr is covered by *cropland* (*55%*) and *artificial surfaces* (*40%*), within *10 miles* by *cropland* (*89%*), and within *50 miles* by *cropland* (*90%*).

### *Solar Impact*

This section discusses the total daily incident shortwave solar energy reaching the surface of the ground over a wide area, taking full account of seasonal variations in the length of the day, the elevation of the Sun above the horizon, and absorption by clouds and other atmospheric constituents. Shortwave radiation includes visible light and ultraviolet radiation.

The average daily incident shortwave solar energy experiences *significant* seasonal variation over the course of the year.

The *brighter* period of the year lasts for *3.0 months*, from *April 16* to *July 15*, with an average daily incident shortwave energy per square meter above *6.8 kWh*. The *brightest* day of the year is *May 30*, with an average of *7.7 kWh*.

The *darker* period of the year lasts for *2.9 months*, from *November 8* to *February 6*, with an average daily incident shortwave energy per square meter below *4.1 kWh*. The *darkest* day of the year is *December 23*, with an average of *3.3 kWh*.

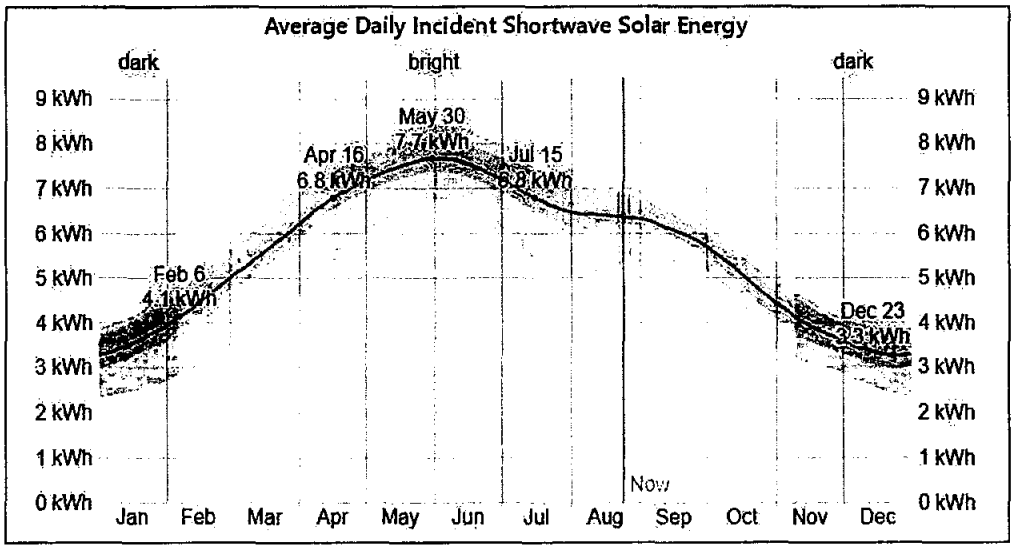



**Figure-4. Distribution of solar hours per day annually**

According to the Alternative Energy Development Board (AEDB), the mean global solar irradiance falling on a horizontal surface is about 200–250 W/m$^2$ amounting 6840–8280 MJ/m$^2$ in a year. For daily global radiation up to 23MJ/m$^2$, 24 (80%) consecutive days are available in this area for solar energy. Such conditions are ideal for solar thermal applications. Pakistan has potential of producing 92% of its electricity requirements from solar energy, at a rate that's amongst the highest in the world. Solar PV plants can produce 58.1% and concentrated solar plants (CSP) can produce 15% of electricity production. Study of the different solar potential co-ordinates of Pakistan is worth for forth coming planning to utilize solar potential properly and meet power demand of the country.

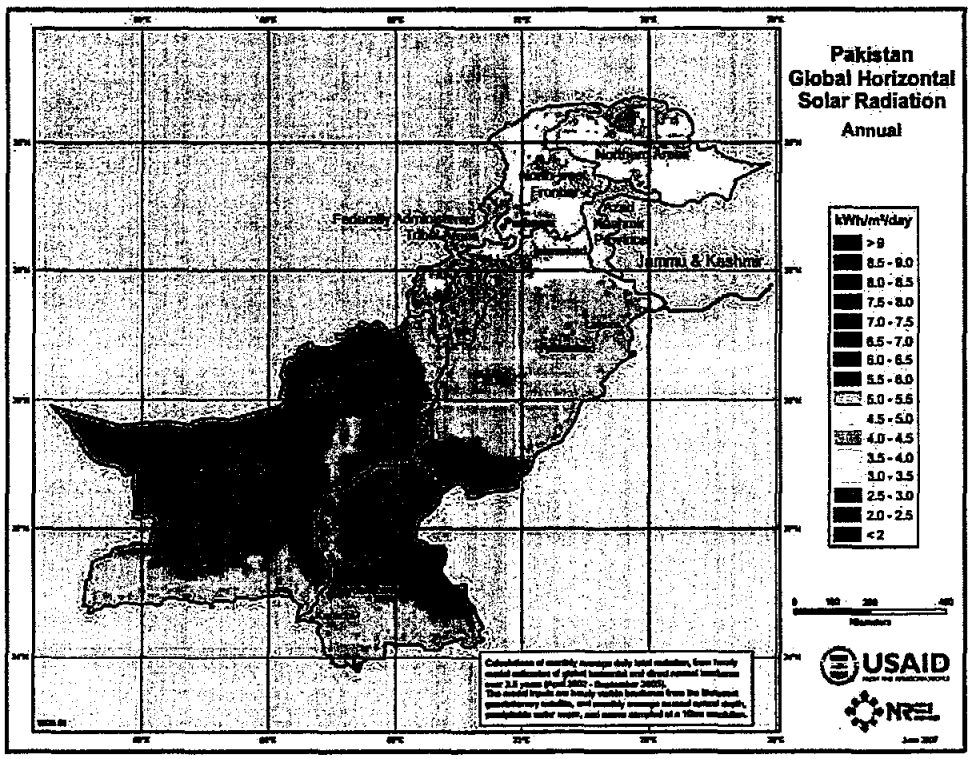



**Figure-5: Global horizontal Solar Radiation in Pakistan, mapping done by NREL**

*Temperature variation in Kasur*

As Pakistan is also facing the change in its climatic conditions, especially in the temperature which seems to be risen considerably. Climate has intrinsic variability and has been changing in past few decades, even, before we started measuring the climate parameters. The uniqueness of this issue in modern world is that human activities are now playing significant role in causing the climate to change. This is evident from the recent rise in carbon dioxide ($CO_2$) concentration in the atmosphere and in response the rise of global temperatures on land and ocean's surface. Kasur experiences significant seasonal variations in temperature with the average monthly temperature varying from 15.9°Cin January to 40 °C in June.

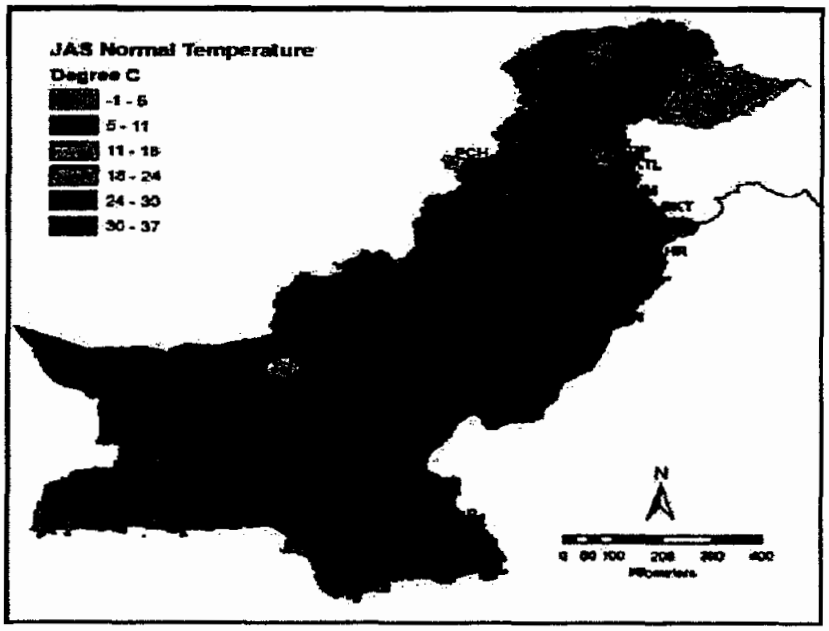



**Figure-6. Average temperature distribution over Pakistan.**

There is only a single weather station, Allama Iqbal International Airport, in our network suitable to be used as a proxy for the historical temperature and dew point records of Kasur.

At a distance of 45 kilometers from Kasur, closer than our threshold of 150 kilometers, this station is deemed sufficiently nearby to be relied upon as our primary source for temperature and dew point records.

The station records are corrected for the elevation difference between the station and Kasur according to the International Standard Atmosphere, and by the relative change present in the MERRA-2 satellite-era reanalysis between the two locations.

Please note that the station records themselves may additionally have been back-filled using other nearby stations or the MERRA-2 reanalysis.

In Kasur, the summers are short, sweltering, humid, and clear and the winters are short, cool, dry, and mostly clear. Over the course of the year, the temperature typically varies from 41°F to 105°F and is rarely below 36°F or above 112°F.

Based on the beach/pool score, the best times of year to visit Kasur for hot-weather activities are from mid-April to early May and from mid-September to mid October.

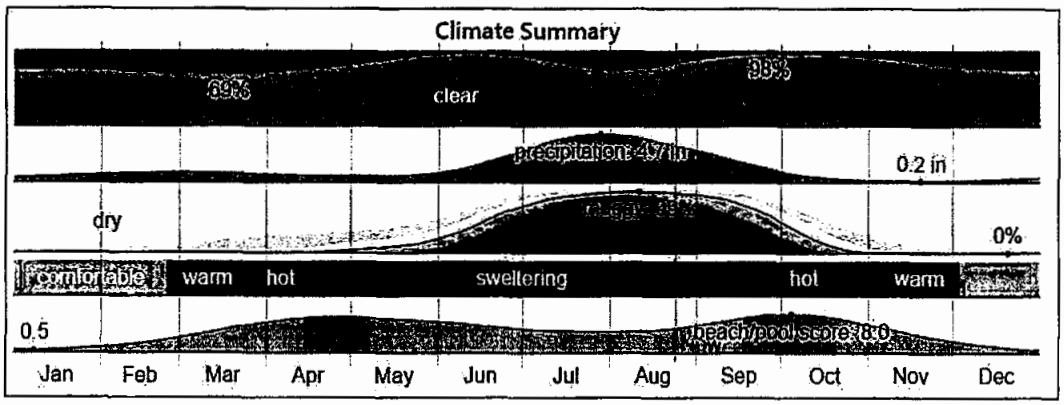



**Figure-7. Climate Summary of Kasur**

## 1. Temperature and Dew Point

The hot season lasts for 2.8 months, from April 22 to July 16, with an average daily high temperature above 97°F. The hottest day of the year is May 30, with an average high of 105°F and low of 79°F.

The cool season lasts for 2.5 months, from December 6 to February 20, with an average daily high temperature below 74°F. The coldest day of the year is January 6, with an average low of 41°F and high of 66°F.

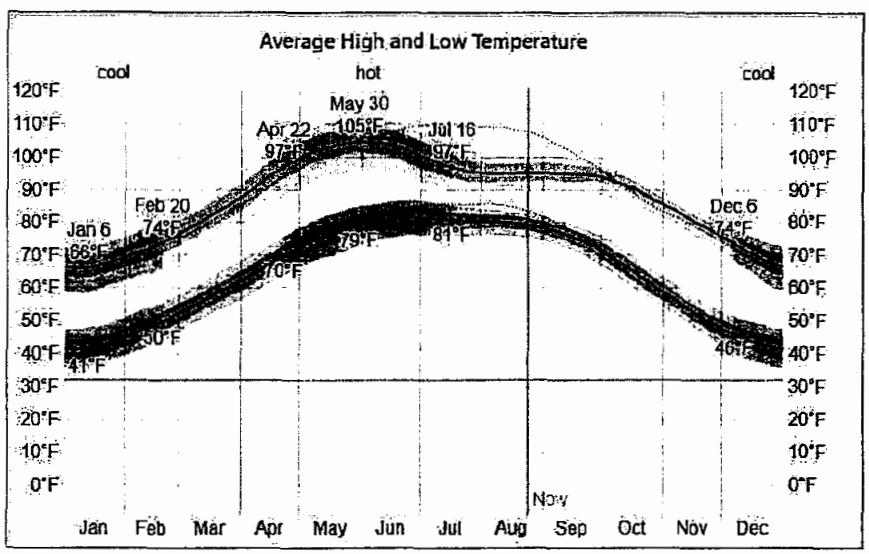



**Figure-8. The daily average high (red line) and low (blue line) temperature**

## 2. Clouds of Kasur

In Kasur, the average percentage of the sky covered by clouds experiences significant seasonal variation over the course of the year.

The clearer part of the year in Kasur begins around August 22 and lasts for 3.0 months, ending around November 23. On September 26, the clearest day of the year, the sky is clear, mostly clear, or partly cloudy 98% of the time, and overcast or mostly cloudy 2% of the time.

The cloudier part of the year begins around November 23 and lasts for 9.0 months, ending around August 22. On March 18, the cloudiest day of the year, the sky is overcast or mostly cloudy 31% of the time, and clear, mostly clear, or partly cloudy 69% of the time.

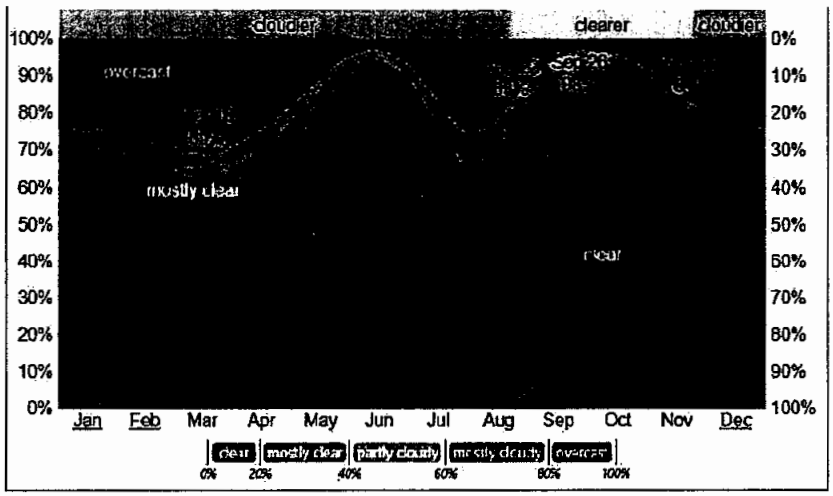



**Figure-9. Annual Cloud Cover statistics of Kasur**

The percentage of time spent in each cloud cover band, categorized by the percentage of the sky covered by clouds.

### 3. Precipitation

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Kasur varies significantly throughout the year.

The wetter season lasts 2.6 months, from June 22 to September 9, with a greater than 24% chance of a given day being a wet day. The chance of a wet day peaks at 46% on July 23.The drier season lasts 9.4 months, from September 9 to June 22. The smallest chance of a wet day is 2% on November 5.

Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 46% on July 23.

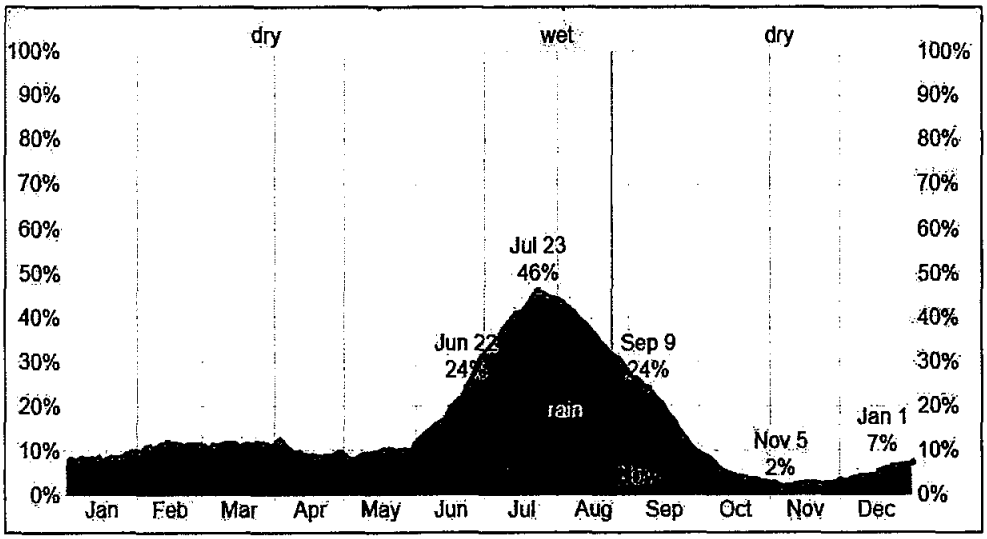



**Figure-10. Daily Chance of Precipitation**

**4. Rainfall in Kasur**

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered on each day of the year. Kasur experiences *extreme* seasonal variation in monthly rainfall.

The *rainy* period of the year lasts for *9.2 months*, from *January 6* to *October 13*, with a sliding 31-day rainfall of at least *0.5 inches*. The *most rain* falls during the 31 days centered on *July 29*, with an average total accumulation of *4.7 inches*.

The *rainless* period of the year lasts for *2.8 months*, from *October 13* to *January 6*. The *least rain* falls around *November 19*, with an average total accumulation of *0.2 inches*.

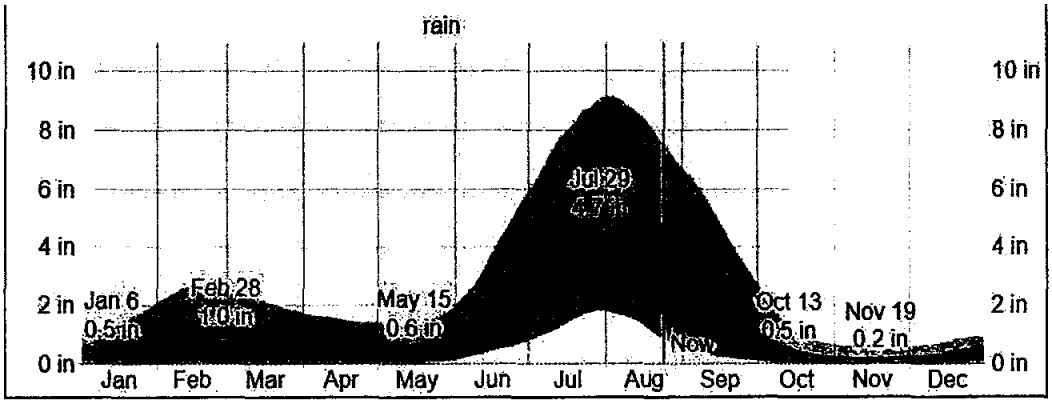



**Figure-11. Average Monthly Rainfall**

## 5. Wind speed in Kasur

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters over the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages. The average hourly wind speed in Kasur experiences mild seasonal variation over the course of the year.

The windier part of the year lasts for 5.9 months from January 21 to January 27, with average wind speeds of more than5.3 miles per hour. The windiest part of the year is April 16, with an average hourly wind speed of 6.3 miles per hour.

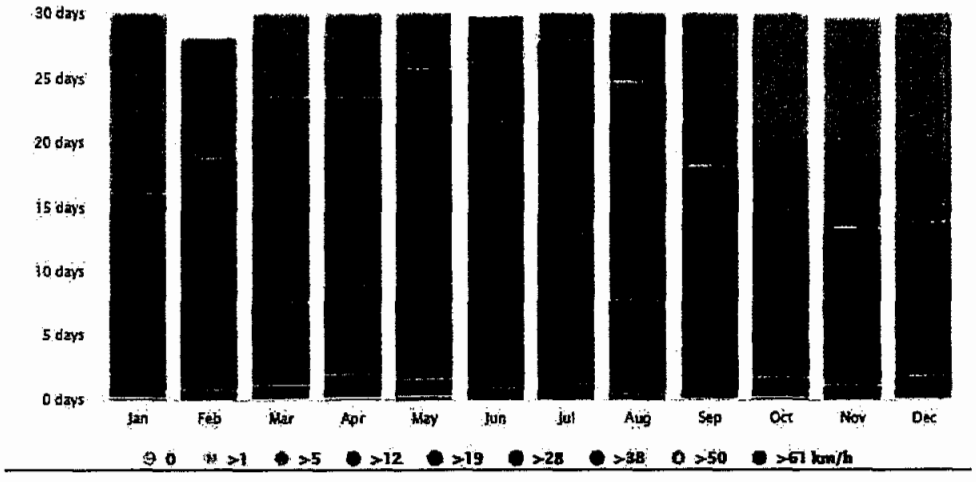



**Figure-12. Monthly wind distribution in Kasur**

The above figure represents the day per month during which the wind reaches a certain speed in Kasur. The monsoon creates steady strong winds from December to April, and calm winds in October. The calmer time of year lasts for 6.1 months, from July 17 to January 21. The calmest day of the year is September 23, with an average hourly wind speed of 4.3 miles per hour.

The wind rose for Kasur shows how many hours per year the wind blows from the indicated direction.

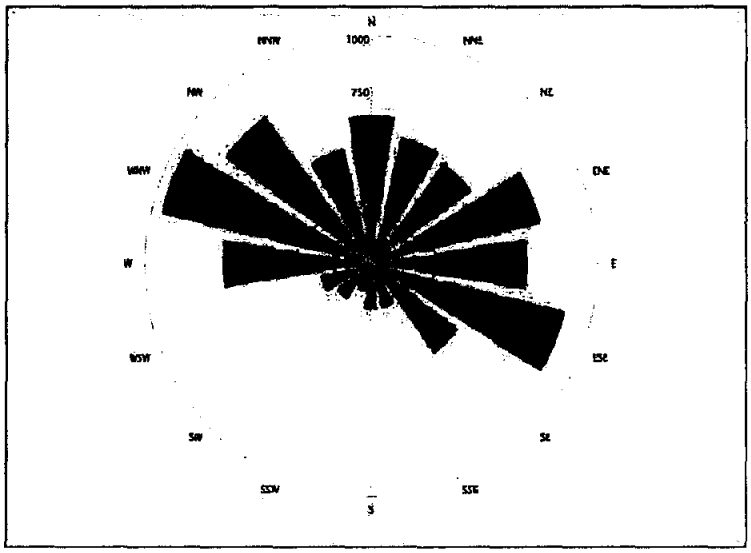



**Figure-13. Wind rose diagram indicating the direction of wind in Kasur**

## 6. Relative Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night.

Kasur experiences *extreme* seasonal variation in the perceived humidity.

The *muggier period* of the year lasts for *4.3 months*, from *June 2* to *October 11*, during which time the comfort level is *muggy*, *oppressive*, or *miserable* at least *25%* of the time. The *muggiest day* of the year is *August 11*, with muggy conditions *99%* of the time.

The *least muggy* day of the year is *December 20*, when muggy conditions are essentially unheard of.

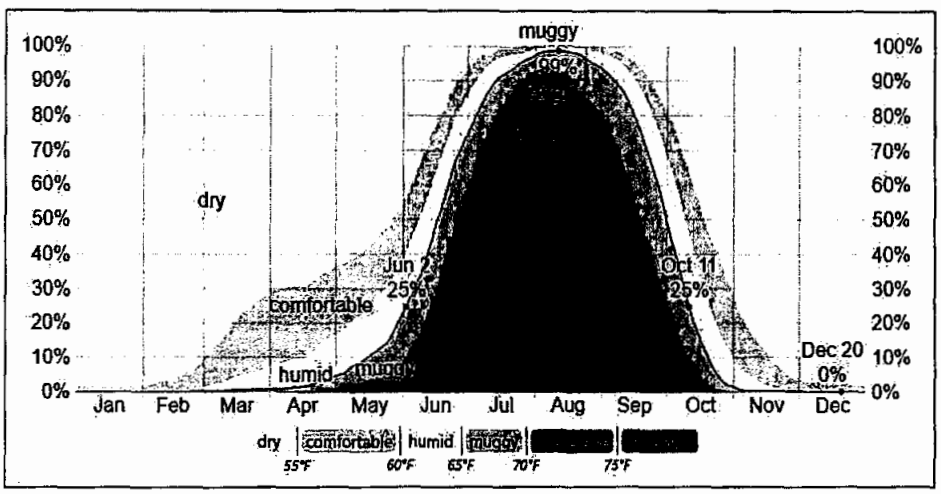



**Figure-14.Annual Humidity distribution in Kasur**

*Ecology*

Kasur has a semi-arid climate. Kasur has extremes of climate; the summer season begins from April and continues till September. June is the hottest month. The mean maximum and minimum temperature for this month are about 45 °C (113.0 °F) and 27 °C (80.6 °F) respectively. The winter seasons lasts from November to February. January is the coldest month. The mean maximum and minimum temperatures for the coldest month are 22 °C (71.6 °F) and 0 °C (32.0 °F) respectively. Rainfall towards the end of June monsoon conditions appear and during the following two and a half months the rainy season alternates with sultry weather. The winter rain falls during January, February and March ranging from 23 millimeters (0.91 in) to 31 millimeters (1.2 in). Water logging and salinity has effected a large area of the district making the underground water brackish.

As for the birds, there is no impact on the birds due to the solar panels; the panels that are used in the project are lined with anti-reflection coating which helps to reduce the reflection of the panels to almost zero. When the Solar PV panels will be installed on the ground mounted structure, there is a minor disturbance of flora and fauna due to execution of this project.

## TECHNICAL ANALYSIS

### *Site Conditions*

The following tasks were carried out:

- Global Horizontal Irradiation, annual and inter-annual variation was assessed.
- Near shading objects were taken into account for placement of PV modules.
- Area required for selected module technology was calculated, keeping in view available area and minimum inter row shading, tilt angle and appropriate spacing was calculated from near shading objects.

### *Technology Review and Selection*

Zero Carbon Power has been recognized for utilizing Tier-1 brands only. The following is the details of technology rendered within this project.

**Table-1. Solar PV Modules**

| Sr. # | Specifications | Data |
|---|---|---|
| 1 | Type of Module | JA Solar, JAM72S30 – 535 W |
| 2 | Type of Cell | Mono Crystalline |
| 3 | Type of Technology | Half cell PERC technology |
| 3 | Dimensions of each module | 2279 ± 2mm x 1135 ±2mm x 35 ± 1 mm |
| 4 | Weight | 28.5 kg |
| 5 | Number of Modules | 3402 |
| 7 | Total Land Area Used | Approx. 16,526 $m^2$ |
| 8 | Module Frame | Galvanized Iron |
| 9 | Nominal Max. Power (Pmax) | 535 Wp |
| 10 | Opt. Operating Voltage (Vmp) | 41.93 V |

| | | |
|---|---|---|
| 11 | Opt. Operating Current (Imp) | 12.76 A |
| 12 | Open Circuit Voltage (Voc) | 49.78 V |
| 13 | Short Circuit Current (Isc) | 13.52 A |
| 14 | Module Efficiency | 20.7 % |
| 15 | Operating Temperature | -40°C ~ +85°C |
| 16 | Max System Voltage | 1500V (IEC/UL) or 1000V (IEC/UL) |
| 17 | Module Fire Performance | TYPE 1 (UL 1703) or CLASS C (IEC 61730) |

**Table-2. PV Capacity**

| Sr. # | Specifications | Data |
|---|---|---|
| 1 | Total Size | 1.8 2 $MW_P$ |
| 2 | Net Capacity Factor | 16.0% |

**Table-3. Inverter**

**Model : HUAWEI SUN 2000 -100 KTL-M1**

| Sr. # | Specifications | Data |
|---|---|---|
| 1 | Manufacturer | Huawei |
| 2 | Capacity of each Inverter | 100,000 Watts |
| 3 | No of Inverters | 16 |
| 4 | MPPT Input Voltage Range | 200~1000 V |
| 5 | Rated Input Voltage | 600 V |
| 6 | Max input Voltage | 1100 V |
| 7 | Total Power AC | 110,000 Watts |
| 8 | Max Input Current Per MPPT | 26 A |
| 9 | Max Output Current | 40 A |

| | | |
|---|---|---|
| **10** | Output Electrical System | 3 Phase 4 Wire |
| **11** | AC Nominal Voltage | 230/400 V |
| **12** | Rated Power Frequency | 50 Hz |
| **13** | Efficiency | 98.7% |
| **14** | Relative Humidity ( Non Condensing) | 0 ~ 100% |
| **15** | Degree of Protection | IP 66 |

**Table-4. PV Mounting Structure**

| Sr. # | Specifications | Data |
|---|---|---|
| 1 | Structure | GI Based Roof Mounted and Shell roof sheds |
| 2 | Tilt For Roof arrays | 20 ◦ |

**Table-5. Data Logging and Monitoring System**

| Sr. # | Specifications | Data |
|---|---|---|
| 1 | System Data Logging | Continuous Data logging and monitoring through web portal. |

***Solar PV Yield Estimation and Simulation***

The aim of yield estimation is to predict the average annual energy output of the site. Helioscope software is used for simulation and near shading analysis. The land was cleared earlier to place the Solar Panels, any remaining hindrance is considered as keepout in the simulation process.

***Working Conditions***

The solar system will have automatic mechanism to ensure that PV power currently generated by the inverters always matches the current power consumption of the site load. A closed loop control system of inverter AC output is implemented in reference to energy flow at grid connection point which will reduce inverter AC output of the inverter if site load will be less than the solar production in case of load shedding.

*Plant Characteristics*

Generation Voltage: 230/400 V three phase four wire system

Power Factor at rated power: 1

Frequency: 50 Hz

Generation characteristic: Inverter has built-in features of controllable active power ramp following grid disturbance or normal connection, voltage regulation and frequency response. There are no additional control metering and instrumentations.

*Design Parameters*

The following tasks were carried out for PV layout and shading.

•Assessment of shading (horizon and nearby building)

•Outline layout of area suitable for PV development

•Designing row spacing to reduce inter-row shading and associated shading losses.

•Designing the layout to minimize cable runs and associated electrical losses

•Creating access routes and. sufficient space to allow movement for maintenance purposes

•Choosing a tilt angle that optimizes the annual energy yield according to the latitude of the site and the annual distribution of solar resource.

•Module cleaning strategy

•Simulating the annual energy losses associated with various configurations of tiltt angle, orientation and row spacing. The optimized configuration and simulation results are given in section "Energy Yield Prediction"

*Energy Yield Estimation*

The energy yield prediction provides the basis for calculating project revenues. The aim is to predict the average annual energy output for the lifetime of the proposed power plant. To estimate accurately the energy produced from a PV power plant, information is needed on the solar resource and temperature conditions of the site. Also required are the layout and technical specifications of the plant components.

A number of solar energy yield prediction software packages are available in the market. These packages use time step simulation to model the performance of a project over the course of a year.

Helioscope software has been used for energy yield prediction for this site and its results are given below.

Details of the simulation steps are presented in the technical schedule.

*Layout*

The detailed layout (2D) of the solar panels is given 'below' PV layout may change depending upon site constraints before or during installation. Helioscope simulation. Is also performed as per following layout:

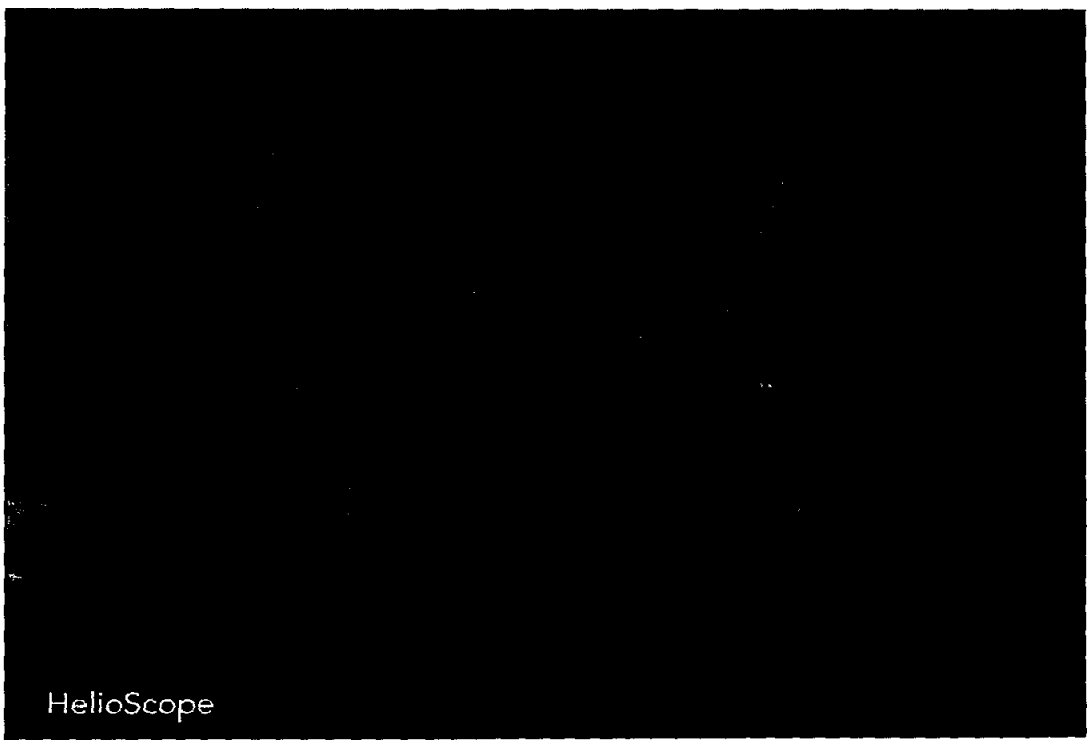



**Figure-12. 2D layout of project site to be utilized.**

*Electrical Design*

The electrical system comprises the following components:

- Array(s) of Solar Photovoltaic modules
- DC cables for string connections and AC cables for inverters interconnections.

- DC connectors (plugs and sockets)
- Disconnects/switches
- Protection devices e.g. fuses, surge protective devices, beakers
- Smart Energy Meters/ Bi directional meters.
- To ground the Solar Power plant, earthing and boring.

Protections DC Side: Surge Protective Device and DC Disconnect Switches

Protections AC Side: MCBs, Main Breaker and Surge Protective Device

***Single Line Diagram***

The single line diagrams of the 1.8 2 MW On-Grid Solar Power Plants has been attached as **Annexures** in **Section IV** of **Schedule II**. The detailed description is that various rooftops and shell roofs have been used with separate termination points along the vicinity.

**OPERATION AND MAINTENANCE SERVICES**

1. Operations and Maintenance services involve three basic functions: rapid problem identification and resolution, minimization of downtime due to faults, and comprehensive reporting and transparency of the operational solar PV plant.
2. The real time cloud based data monitoring will be done by the O&M team as a part of preventive maintenance.
3. The maintenance and servicing tasks will be carried out under the supervision of designated Zero Carbon's Operations & Maintenance (O&M) manager, only qualified and trained individuals will comprise of the O&M team who will be allowed to do undertake the required tasks.
4. The O& M team will wear appropriate Personal Protective Equipment PPE, including a safety harness to restrain from falling off the roof.
5. The PPE will include sturdy shoes that will have thick rubber soles to provide electrical insulation, good grip and appropriate clothing, including a hat, sunglasses, gloves and long pants.
6. Lock out and tag out procedures will be used before commencement of maintenance tasks.

7. On-going operation and maintenance concerns for solar power systems will be addressed properly. These systems are exposed to outdoor weather conditions that enhance the aging process, and the infrastructure needs to be in place for the on-going maintenance of these systems to assure their safe operation.
8. Properly grounded or double insulated power tools will be used for maintenance tasks. Tools will be maintained in good condition.
9. Working on electrical equipment and circuits will be carried out in non-operational state after shut down.
10. Proper pathways will be available for operation, maintenance and firefighting.
11. Fire protection and suppression will be placed at site.

## HEALTH AND SAFETY POLICY

Zero Carbon Power Private Limited considers safety as an integral part of its vision and mission, to comply with best international practices, its Health and Safety Policy ensures safe working environment for every individual on field. Working safely is as important as the skills and techniques used with typical construction tools. Good safety practices are considered a more valuable skill. Safe installations are more efficient and cost effective. Using equipment properly and working safely results in less time lost to injuries and the delays on the working end. Thus, saving time and efficiency. We commit to offering a safe and healthy working environment for our employees and additional workforce, eliminating hazards and reducing occupational health and safety risks in all our operations.

### *Personal Protective Equipment (PPE)*

Using personal protective equipment is often essential, but it is generally the last line of defense, after engineering controls, work practices, and administrative controls. Solar energy workers can be exposed to many hazards that may require the use of personal protective equipment.

- The On-site PPE mandatory for all workers include, PPE jackets, Hard hats and glasses while working on welding and electrical operations.
- Workers exposed to potential electrical hazards must utilize the appropriate electrical protective equipment provided by Zero Carbon's HSE or site supervisor.

- HSE Supervisor should enforce the use of PPE necessary to execute the task that poses a potential threat to workers.
- Electrical protective equipment must be maintained in a safe and reliable condition.

*Emergency Response Plan*

To describe responsibilities in preparation for, response to and recovery from any reasonably foreseeable incident.

**Team Leader**

- Secure the Health and Safety of all personnel involved Minimize any impact on the environment. Minimize any impact on property and assets.
- The person is responsible to manage the execution of emergency response. The main responsibilities include.
- Lead the team in case of emergency.
- Ensuring that appropriate emergency response teams are defined and prepared for the various emergency response in different cases.
- Notification to Project Manager of any emergency incident.
- Emergency should be notify via radio, telephone or messenger.

**7.Site Engineer (HSE)**

Site Engineer is responsible for ensuring at site that provisions are in place for emergency response, including:

- In the event of any emergency, following actions shall be taken by Site Engineer.
- Maintenance and overlooking of the equipment regularly.
- Identification & mobilization of Fire Team in case of emergency.
- Analyse the situation and issue direction to the concerned parties and to the Fire Team.
- To make sure that the emergency situation is properly communicated to ERT leader.
- Analyse the intensity of the incident and raise the requirement of any additional equipment if necessary.
- Communicate with site supervisor for withdrawing any permits and for mobilization of any plant and equipment necessary for dealing with emergency.

They personal protective equipment must be periodically inspected for wear and tear or any other damage.

**TRAINING AND CAPACITY DEVELOPMENT**

Trained and qualified personnel will be available at site 24/7 with proper safety and fire fighting training. Training program will focus on but not limited to Solar Resource Assessment, Site Survey, Technology, Engineering Design, Regulation, Policy, Metering & Billing and Project Management of Rooftop Solar System. The following components will include in training and Development program.

a) Collection of Resource Data
b) Variability and uncertainty of resource data
c) Site evaluation for installation purposes.
d) The technology comparison of PV Modules.
e) Rooftop solar system components
f) Module mounting structure and material selection
g) Selection of inverter based on the design.
h) Design of PV Array (stringing)
i) Shadow Analysis via simulations in different software.
j) DC cable sizing
k) DC cable layout
l) Protection equipment including circuit breakers, DC switches and switchgears.
m) Installation and testing standards for solar PV plants
n) Solar Module testing standards
o) Economy of Roof top Solar System
p) Detailed Project Report
q) Operation and maintenance of rooftop and carport solar system
r) Safety and firefighting training.

***Environmental Aspects***

Every energy generation and transmission method affects the environment. Conventional generating options can damage air, climate, water, land and wildlife, landscape as well as raise the levels of harmful radiation. PV technology is substantially safer offering a solution to-many environmental and social problems associated with fossil and nuclear fuels: Solar PV energy technology provides obvious environmental advantages in comparison to the conventional energy sources thus contributing to the sustainable development of human activities. Not counting the depletion of the exhausted natural resources, their main advantage is related to the reduced CO2 emissions and normally absence of any air emissions or waste products during their operation. The use of solar power has additional positive implications such as:

- Reduction of the emissions of the greenhouse gases (mainly $CO_2$, $NO_x$) and prevention of toxic gas emissions ($SO_2$ particulates).
- Reduction of the required transmission lines of the electricity grids.

*Socio-Economic Aspects*

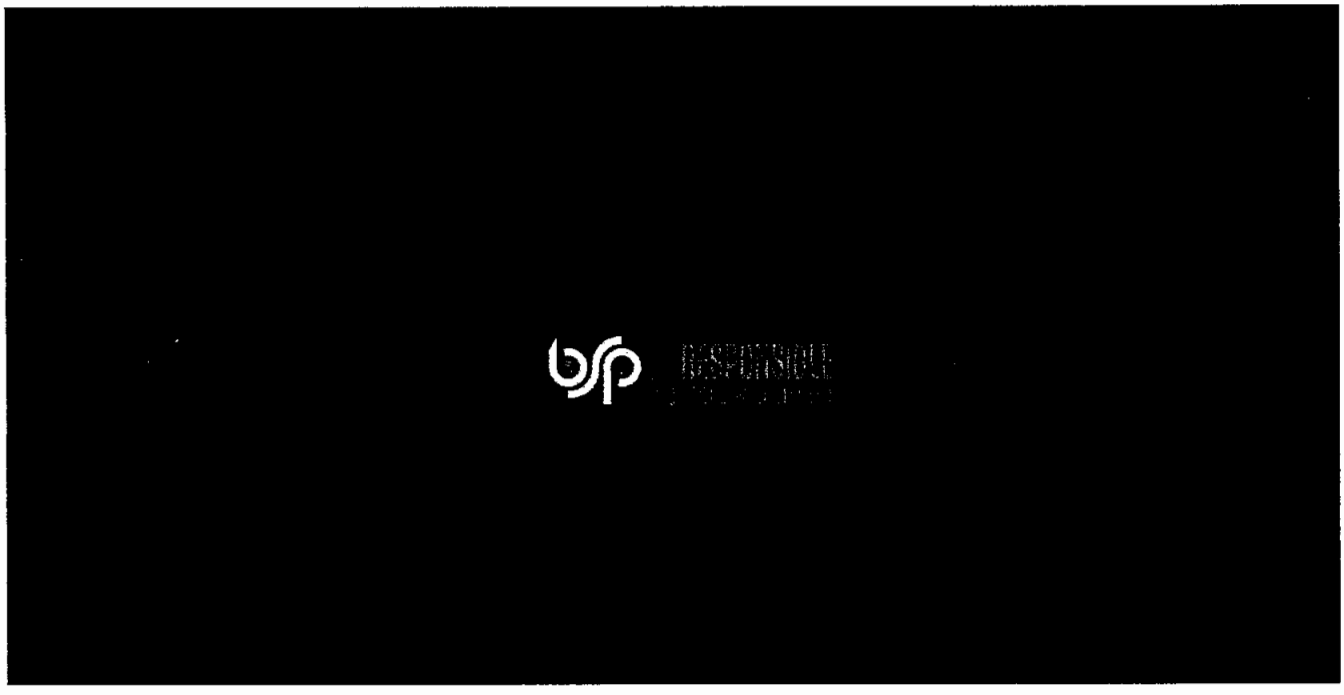
In regard to the socio-economic viewpoint, the benefits of generating electricity from solar PV system comprise of:

- Increase of the regional/national energy independency
- Provision of significant work opportunities
- Diversification and security of energy supply
- Support of the deregulation of energy markets

## CONCLUSION

This feasibility study is conducted to ascertain the technical feasibility and commercial viability of installation of 1.8 2 MWp rooftop PV system installations at B ulleh Shah Packaging Private Limited, Kot Radha Krishan Road, Kasur. Installation of the PV system will result in annual power generation of 2.5 4 6 GWh, The results of the financial analysis indicate that the project is feasible. Based on the outcomes of both the technical and financial analysis, the project is deemed viable.

# PREMILINARY ENVIRONMENTAL IMPACT ASSESSMENT STUDY OF KASUR, BULLEH SHAH PACKAGING PVT. LTD.



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# EXECUTIVE SUMMARY

Bulleh Shah Packaging (PVT) Limited (BSPPL) is interested to install Solar PV Panels on the rooftop of the factory with capacity of 1.82 MW in Lahore. Around 3400 monocrystalline (Tier 1 Manufactured) PV panels will be installed with power rated of 535 Watts and the capacity factor is approximately 16.0%. The total energy generation will around
2.546 GWh.

Bulleh Shah Packaging (PVT) Limited (BSPPL) wants to decrease the electricity utilization from conventional grid due to cost-saving. Under these circumstances, BSPPL has decided to switch the maximum load on Solar PV System that will produce the cheaper units than the conventional grid units.

# CHAPTER – 1

# INTRODUCTION

# 1 INTRODUCTION

## 1.1 PROJECT BACKGROUND AND JUSTIFICATION

The project is financed by Standard Chartered Bank (SBP). The sponsors of the company will be interested to install the solar PV plant to generate electricity. Zero Carbon Power Pvt. Ltd (The Seller)intends to install a Grid-Tie Solar PV Power Plant at Bulleh Shah Packaging (PVT) Limited (BSPPL) (The Purchaser) in Kasur in the factory premises (rooftops), by which they can reduce the electricity consumption from the conventional grid and use the Solar generated units for running the load of 1.82 MW Solar PV Plant has been designed for BSPPL which will get synchronize with the LV termination panel of the proposed site located at Kot Radha Kishan Rd, Kasur, Punjab.

## 1.2 Description of the Project

The project company will be installed 1.82 MW of Solar PV plant in Bulleh Shah Private Limited, Kasur to produce electricity. The total area of the project is around 4.14 acres for the installation of PV panels. The project area is already a developed area and cleared area at rooftop of the factory.

## 1.3 Project Location

The project site is the rooftops of Bulleh Shah Packaging Private Limited, Kot Radha Kishan Rd, Kasur, Punjab.

The proposed project site with estimated area 4.14 Acres (16,753.99 m2) lies between 31.1417458 N and 74.3593049 E located in Kasur. The project land is owned by the purchaser as specified in the Power Purchase Agreement for the installation of 1.82 MW Solar PV plant. The location of site can be viewed in Figure.1.1 and overview of the project site is highlighted and shown in Figure. 1.2

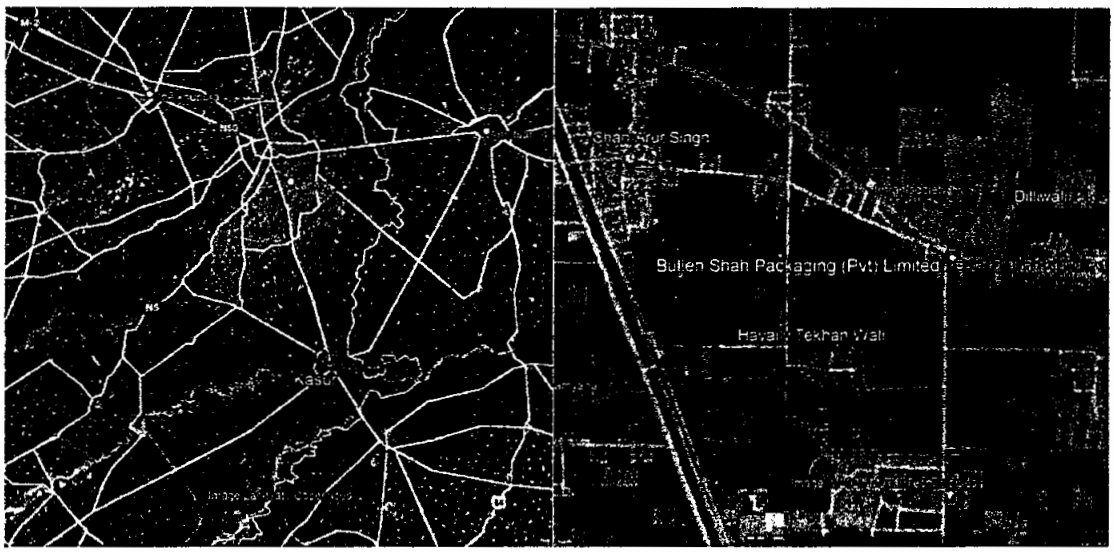


Figure 1.1: Location of Project Site

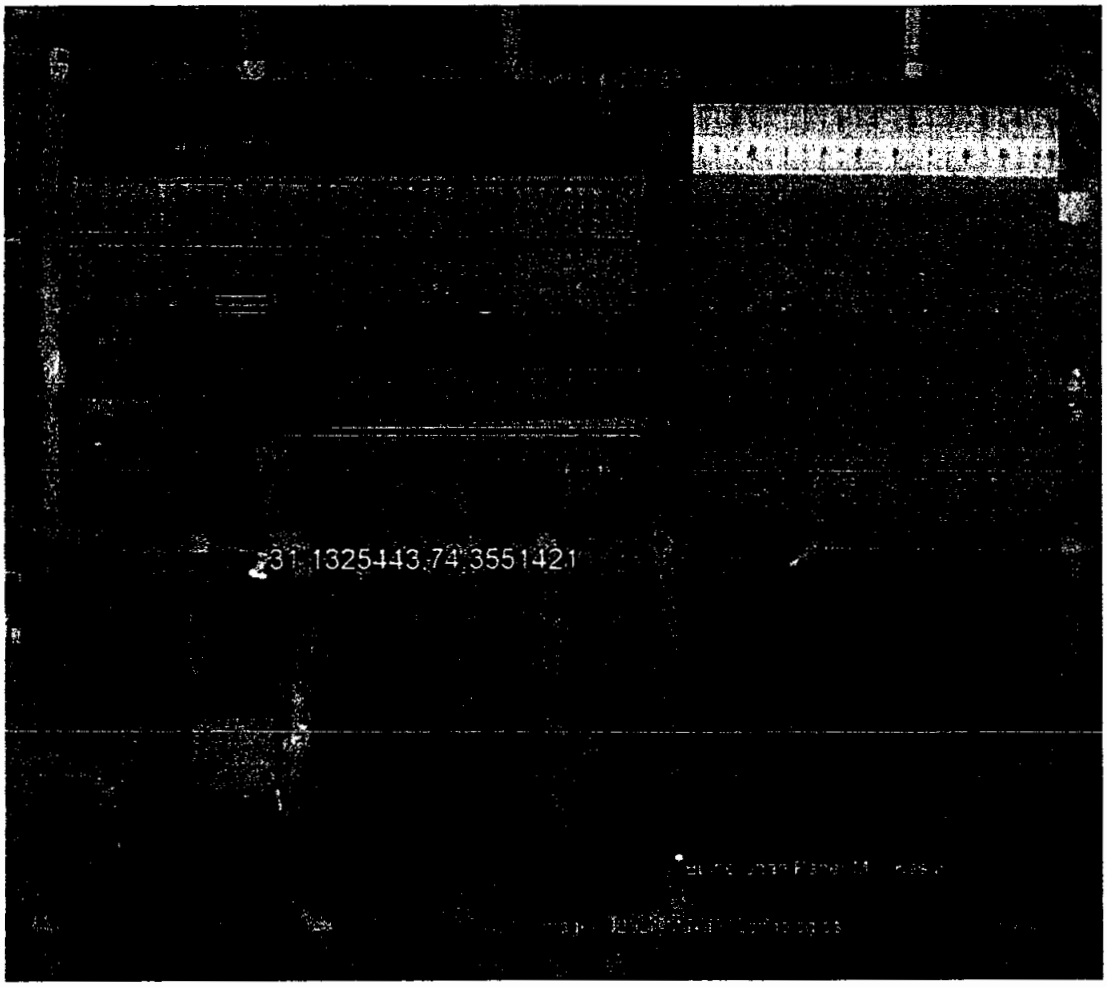

Figure 1.2: Overview of Project Site

# CHAPTER 2

# SOLAR ENERGY IN PAKISTAN

## 2 PROSPECTS OF SOLAR ENERGY IN PAKISTAN

Solar energy has excellent potential in areas of Pakistan that receive high levels of solar radiation throughout the year. Every day, for example, the country receives an average of about 19 Mega Joules per square meter of solar energy. Pakistan being in the Sun Belt is ideally located to take advantage of solar energy technologies. This energy source is widely distributed and abundantly available in the country. The mean global irradiation falling on horizontal surface is about 200-250 watt per sq. m in a day. This amounts to about 2500-3000 sun shine hours and 1.9 - 2.3 MWh per sq. m in a year. It has an average daily global insolation of 19 to 20 MJ/sq. m per day with annual mean sunshine duration of 8 to 8.5 hours (6-7hrs in cold and 10-12 hrs in hot season) and these values are among the highest in the world. For daily global radiation up to 23MJ/m2, 24 (80%) consecutive days are available in this area for solar energy. Such conditions are ideal for solar thermal applications.

To summarize, the sun shines for 250-300 days per years in Pakistan with an average sun shine hour of 8-10 per day. This gives huge amount of energy to be used for electricity generation by solar thermal power plants. A quick potential of solar energy in Pakistan can be obtained from the map of solar energy resource released by World Bank Group from 1999 to 2016 as shown in **Figure 2.1.**

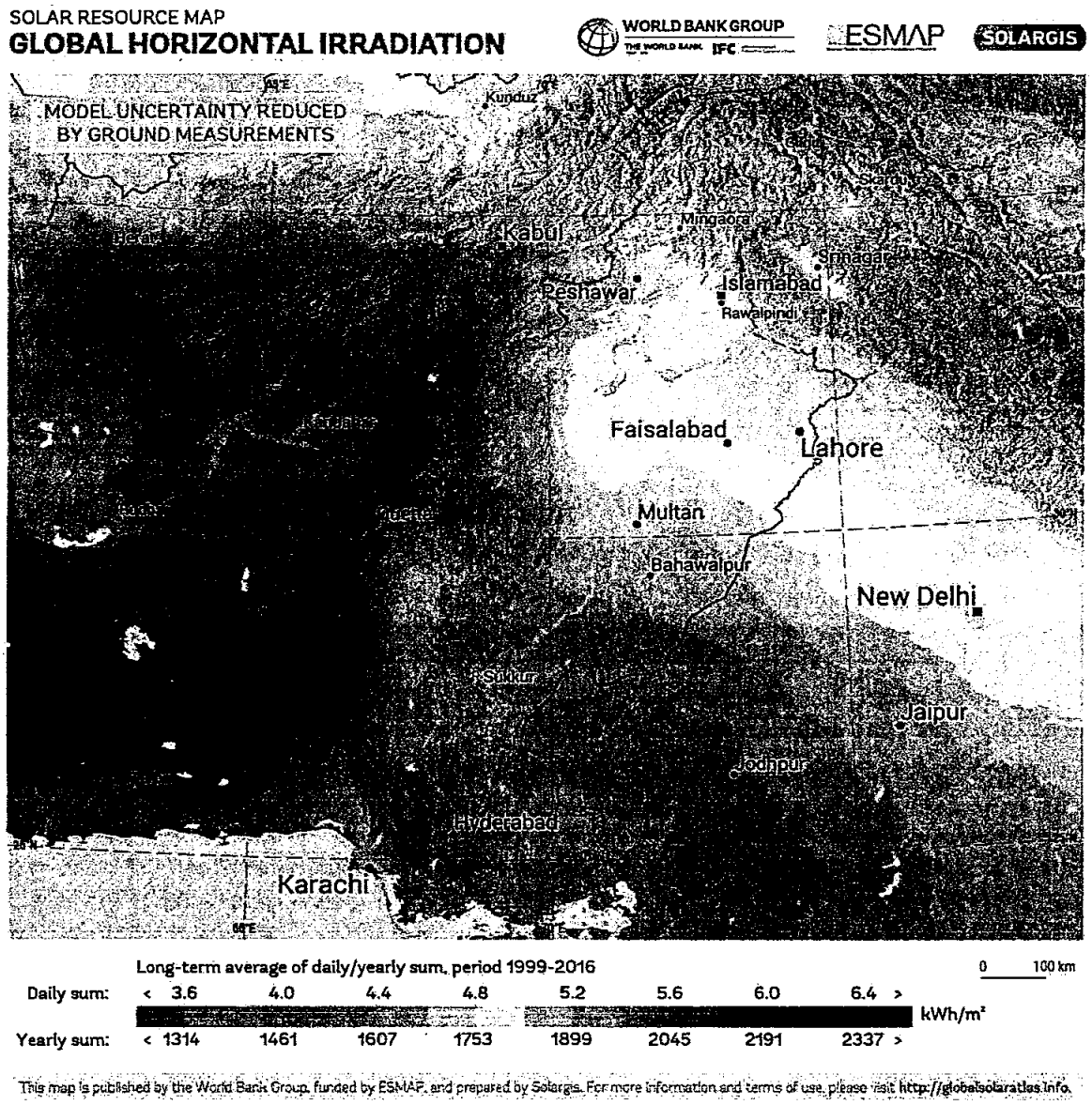


**Figure 2.1: Solar Resource Potential Map of Pakistan**

## 2.1 Road Access to the Project Site

The Project site is easily accessible throughout the year. The Lahore-Kasur Road is the major connecting road to the Project site. The Lahore Ring Road also connects to the project site. The total distance from Lahore to the project site through Lahore-Kasur road is approximately 53.8 km to the project site as shown in **Figure 2.2 & Figure 2.3**.

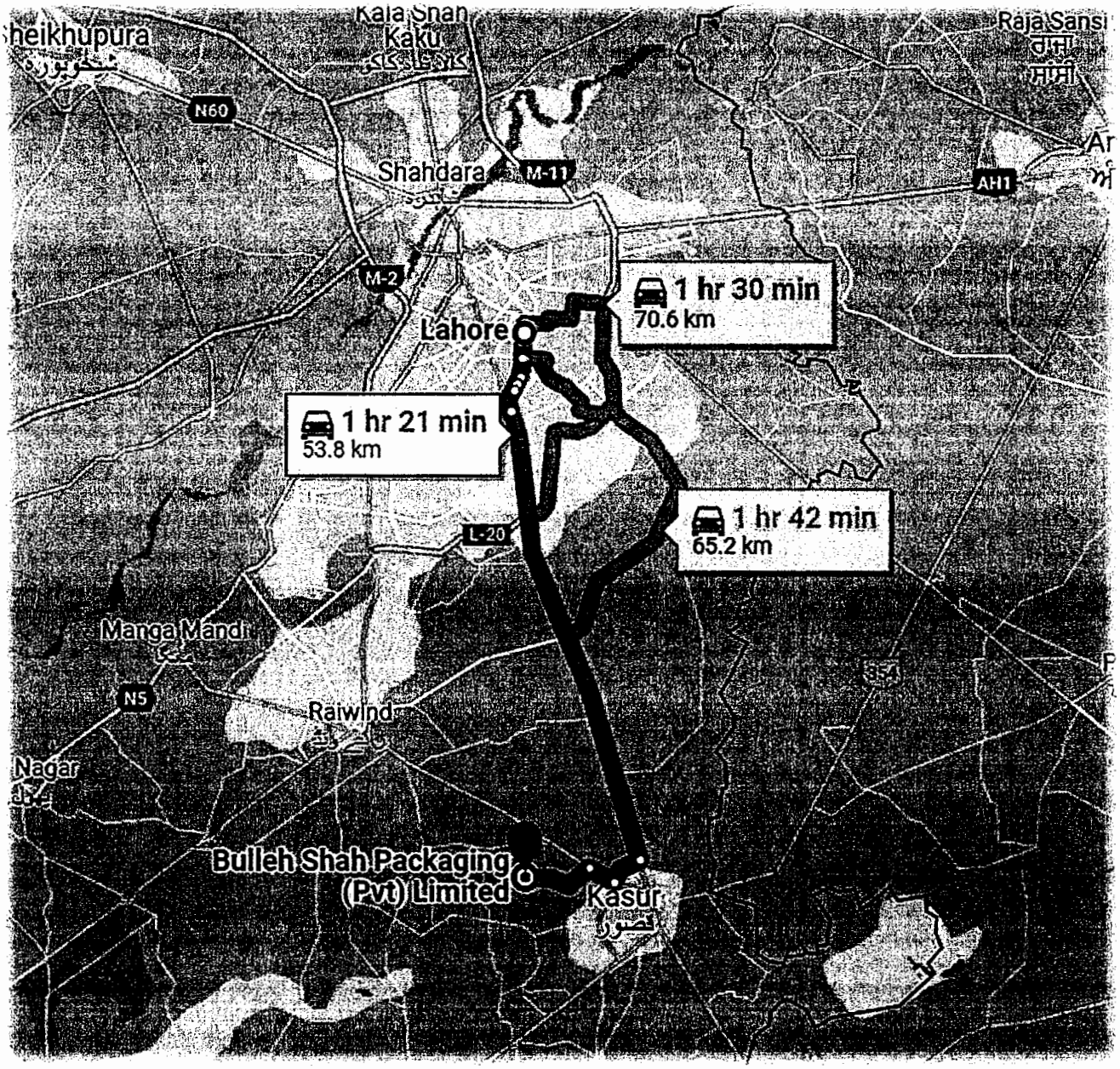


**Figure 2.2: Orientation of Project Site from Lahore**

The planned movement from Port Qasim to the site will be through the National and Super highways. The major section of the track from Karachi to the site is a multi-lane road, having a relatively flat terrain. The distance from port Qasim to the site is approximately 1206km and the Arial distance is around 1018km as shown in figure **Figure 2.4**.

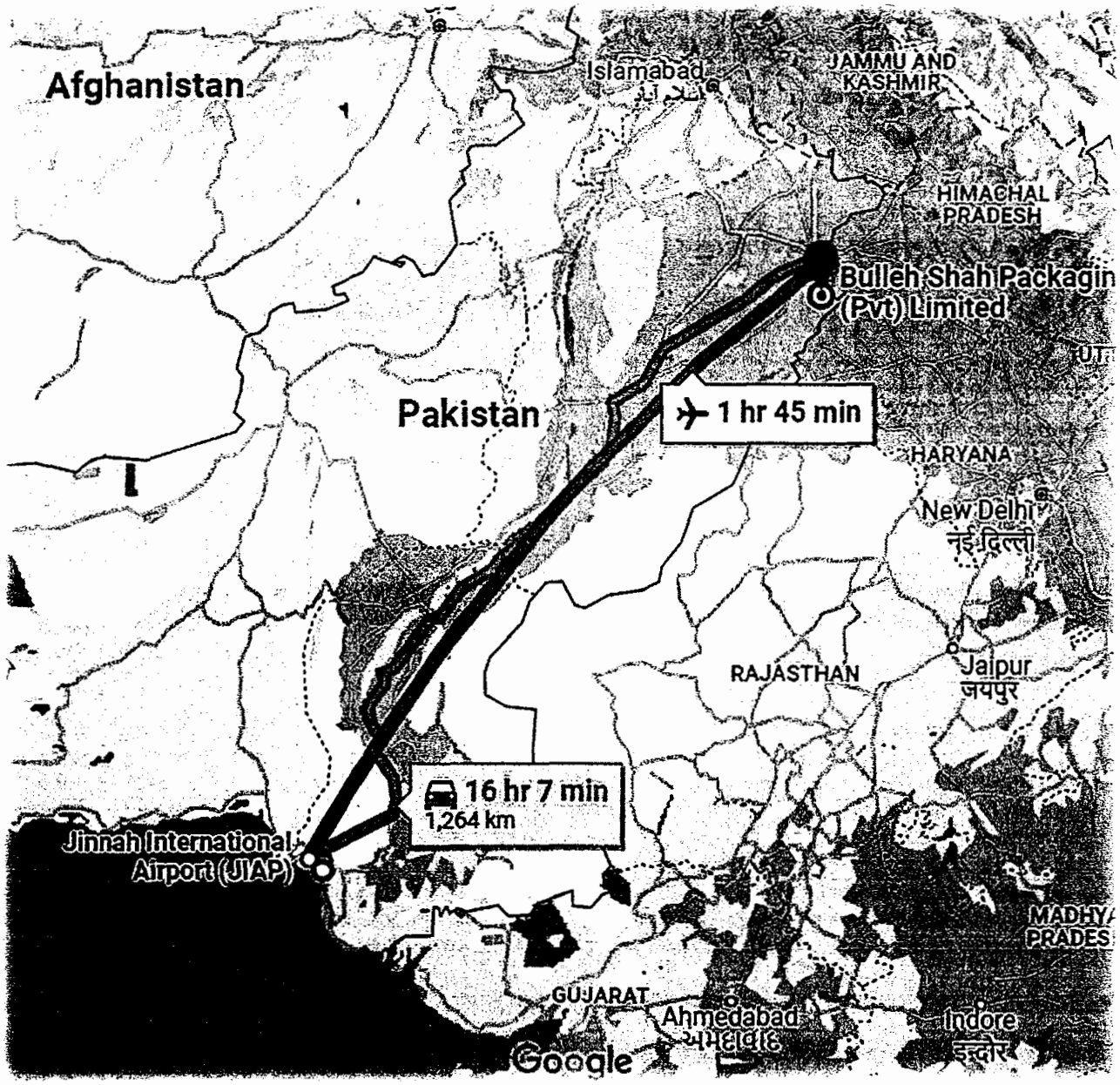


**Figure 2.4: Distance from Site to Port Qasim (Arial Distance)**

# CHAPTER 3

# DESCRIPTION OF ENVIRONMENT

## 3.1 General

The existing environment around the site of project has been studied with respect to physical ecological and socio-economic resources. The existing information to establish a database for the IEE of the project was collected from different departments, review of previous studies and through the site visits carried in out in the project area.

## 3.2 Physical Environment

The study examines the physical resources, topography, soil, climate, surface and ground water and geology of not only the project site but also the city as whole to assess whether the project under review can or does impact on any of these parameters. The description of physical environment of Kasur city and the project site is present in the following sub sections.

### 3.2.1 Geological Formation

The soil of the Kasur belongs to the typical alluvium of the Indo-Gangetic plains. The majority of the soils are loamy or sandy loam consisting of soil crust of different depths. Hardly any profile characteristics are observed; soluble soils are present in considerable amounts. The lower layer consists Ofkankar nodules. The soils have generally an alkaline reaction and are adequately supplied by phosphorus and potash, but are deficient in organic matter and nitrogen. Geologically the alluvium is divided into khaddar, i.e., the newer alluvium of sandy generally light colored and of less concretionary composition; and Bhangar, i.e., the older alluvium of the more clayey composition, generally of dark appearance and full Ofkankar. The soil differs in consistency from drift sand to loam and from fin silt to stiff clay. A few occasional pebble beds are also present. Layers of Kankar in the Indo-Gangetic alluvium of the district are also observed.

### 3.2.2 Climate

Kasur's climate is a local steppe climate. There is little rainfall throughout the year. The Climate of Kasur is tropical. Except of few months of summer, Kasur is a suitable place to live.

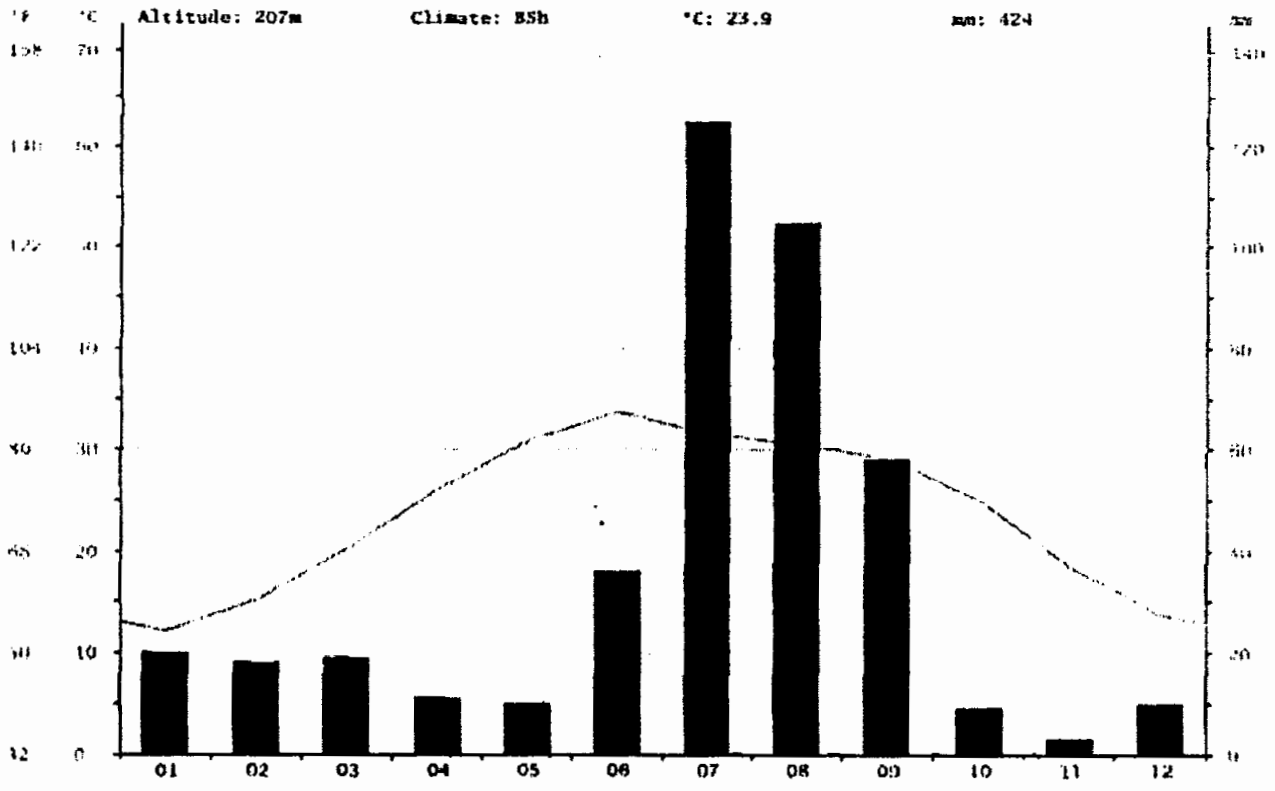


*Figure 3.1 Climate Graph of Kasur*

The people of Kasur have to experience extremes of temperature. The summers are really hot and the winters are very cold. There are three main seasons in Kasur, namely, summer, winter and rainy season. During the summers Kasur experiences heat waves.

| Weather | Months |
|---|---|
| Autumn | Oct – Nov |
| Winter | Nov – Feb |
| Spring | Feb – Apr |

*Table 3.1 Seasons in Kasur*

### 3.2.3 Temperature

Kasur weather is hot and humid. The city experiences an extreme climate during the months of May, June and July, when the city witnesses summer season. The temperature in Kasur ranges between 40°C to 45°C, during the summer months. Kasur experiences winters during the months of December, January and February. The temperature during this season varies between 5°C to s-c. Given below are the maximum and minimum temperatures of Kasur throughout the year:

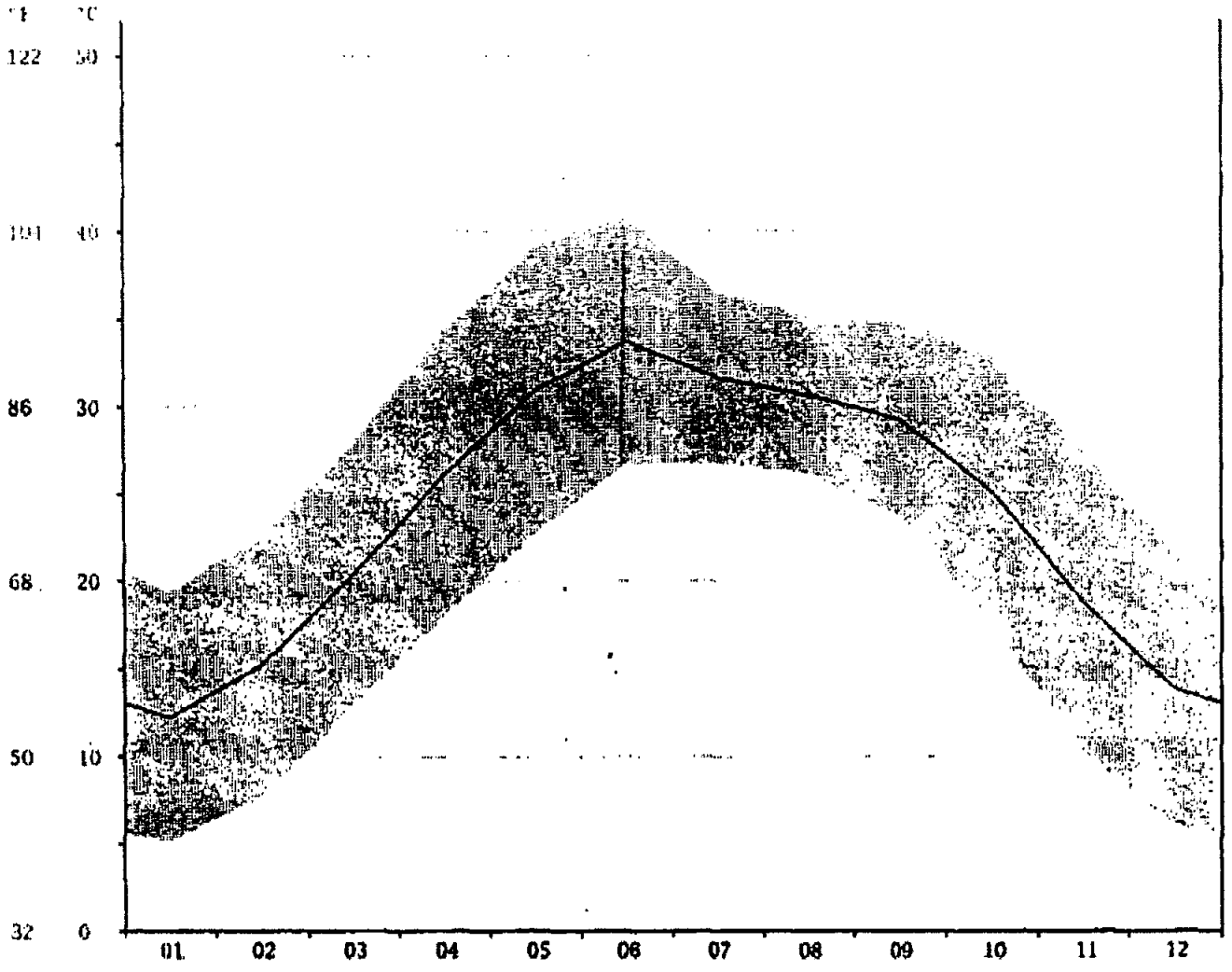


*Figure 3.2 Average Annual Temperatures in Kasur*

### 3.2.4 Rainfall

Kasur has a distinct rainy season, during which the weather is very humid. The rainiest months of the year are July and August, with June and September also gets some rain. During the rest of the year, barely any rain falls in Kasur. About 424 mm of precipitation falls annually. Precipitation is the lowest in November, with an average of 3 mrn. The greatest amount of precipitation occurs in July, with an average of 125 mm,

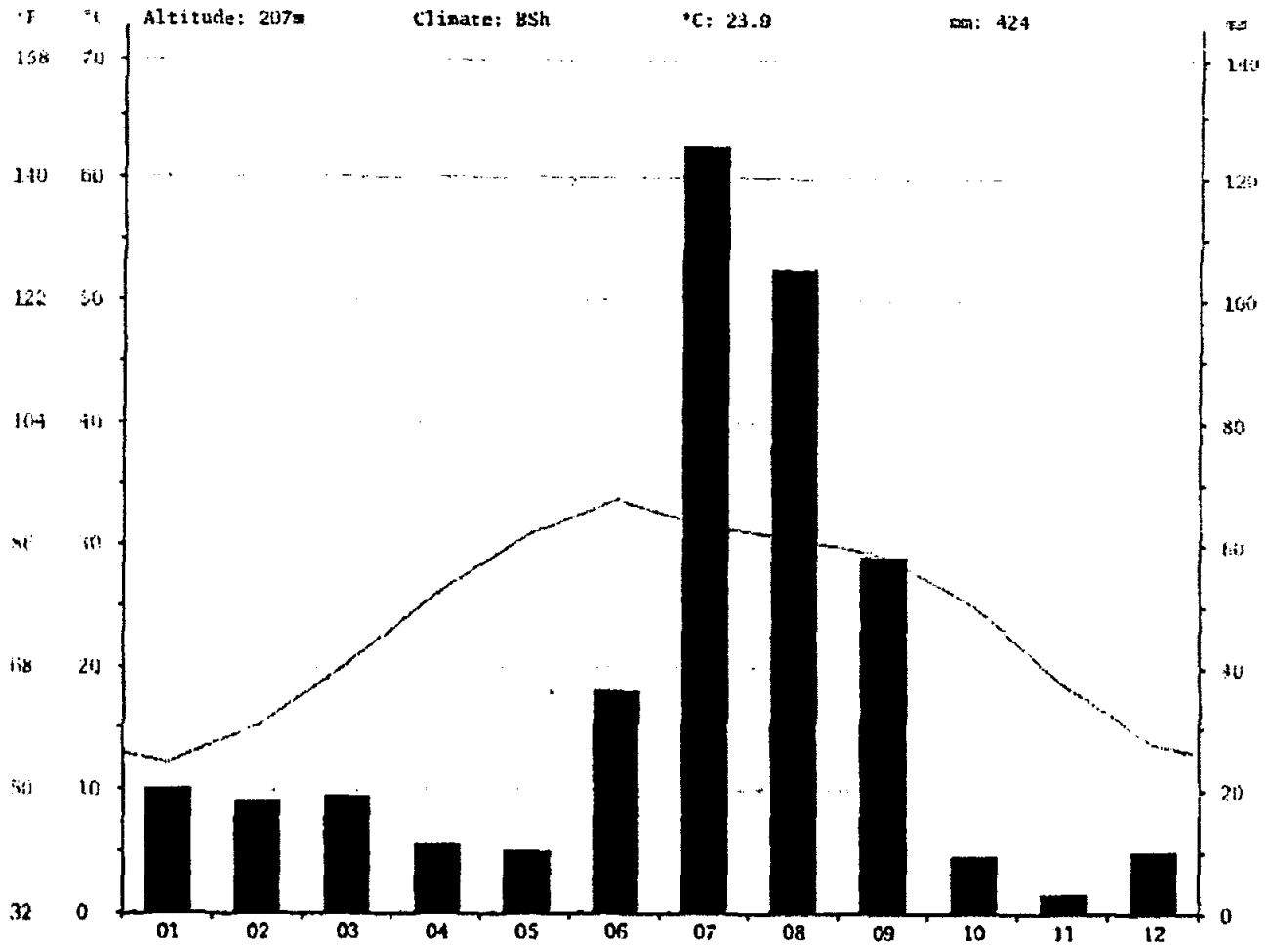


*Figure 3.3 Average Yearly Precipitation in Kasur*

### 3.2.5Wind Direction

The Kasur region experiences westerly and north westerly winds during the winter and spring seasons, known usually as the dry stable times of year and southerly and south easterly winds during summer and monsoons. Wind speeds are low during winter picking up during spring season and peaking during the summer months.

### 3.2.6 Ambient Air Quality

Atmospheric pollution particularly in urban area has a strong impact upon daily life. Its economic growth and rising energy consumption are causing the increase in air pollution. The main sources of the air pollution are motor vehicles and industrial activities. $SO_2$. $NO_2$, $CO_2$, CO, $O_3$ and Particulate Matter (PM) are investigated as the pollution indicators. The overall air quality in the study area is of moderate nature. Dust particles along with oxides of nitrogen, Sulphur and carbon are the major causes of air pollution in the ambient air quality. It was however observed during the visit that environment of the project area is clean as the area is far away from the city Centre.

### 3.2.7 Water Resources

#### 3.2.7.1 Surface Water

There are no surface water resources other than BRBD link Canal on which the proposed project is constructed. Which is non perennial the flow of water is only between April to October.

#### 4.2.7.2 Drinking Water Quality

WASA (Water and Sanitation Agency) is providing drinking water to the residents of Kasur. WASA claims the quality of water conform to the Drinking Water Standards. The increase in population will have direct impact on the water sector for meeting the domestic, industrial and agricultural needs. Pakistan has now essentially exhausted its available water resources and is on the verge of becoming a water deficit country. The quality of water supplies in many cities of Pakistan is deteriorating fast. Over pumping of groundwater due to extended drought has affected the water quality adversely. Hand pump is installed on project site for drinking water purpose. There is no other source like WASA water supply on project site.

### 3.2.8 Noise Level

There are many a large, medium and small industries which are still working within city premises. Industrial activity and vehicular emissions are causing excessive noise in the city. The affluent areas of Kasur are quieter than rest of the city; the noise level in these areas is still far higher than the standards set by the World Health Organization and the Pak-EPA. Noise pollution in the city is on the rise with most residents complaining that the noise is becoming a public nuisance. At project site through canopy noise level of generators controlled.

## 3.3 Ecological Environment

Kasur is enriched with the presence of natural flora and fauna, although with the growing population and development activities, the presence of the same has been somewhat affected. There are no significant or well-shaped trees and shrubs on the project site as the site is located in plane land within the premises of project area.

### 3.3.1 Flora

Trees, also called the' lungs' of the earth, are important for the restoration of the ecosystem. People can benefit immensely from their survival and existence. Trees have also been a source of medicine for thousands of years and a refuge for various species of birds. Several species of the trees in Kasur are being used in medicine and provide excess raw material for Indian ayurvedics. Trees such as Neem, Bhaira, Harrar, Ohair and Moosri have great medicinal value and can be grown easily in the city. Many trees are found in the surrounding of the project area. Therefore there is no adverse impact on the flora. There is no Reserve Forest in the 5 km radius. No threatened or endangered species and no medicinal plants are present in the project area.

### 3.3.2 Fauna

With an increase in the rate of urbanization, the ecology of Kasur has been considerably affected and population of birds in Kasur has reduced to just 85 including the resident and migratory ones. Some birds and few animals like Buffaloes, cows, goats, donkeys, hen, rats, cats, dogs are present in the vicinity. Some reptiles like lizards are also present. No threatened or endangered species are found in the project site. Similarly no wildlife is present.

## 3.4 Socio economic

Social change is the consequence of almost any intrusion into the community life of any society. The intrusion can be in the form of any developmental projects or non-specific, less tangible forms such as increased exposure to other cultures, technological changes and so on. The social change that results from intrusion into community life can also be beneficial, but can have undesirable or negative outcomes. Even that change in the long run may have positive effect on the social wellbeing of a community. Social Impact Assessment is a methodology used for examining social change due to external sources, especially specific developmental projects, but also government policies, technological changes and social processes or anything that has a social impact.

The objectives of the given study are outlined as follow:

- To carry out the assessment of social impact.
- Acquire socio-economic data to evaluate and identify the project interventions.
- Assess needs of community related environmental concerns.
- To assess adverse and beneficial socio-economic and health impacts of the activity.
- To suggest remedial measures and solutions to improve socio-economic conditions.
- To analyze socio economic conditions of community, with special reference to environment and conservation of natural resources

### 3.4.1 Study Population

The target population was comprised of households around the project site which was a small village of Kasur. Study Size Therefore, approximately a total of 15 households of different socio-economic conditions were surveyed and their heads of households were our main respondents. Study Instrument Data collection tool was questionnaire; it was a 20- items based semi structured questionnaire. 4.4.2 Sampling Procedure for Questionnaire

### 3.4.2.1 Procedure

Before filling the questionnaire respondents were fully assured that their data will not be disclosed. They were told about the purpose of study. They were also told if they have any problem to understand the questions in questionnaire can ask. 4.4.2.2 Statistics Measures

After preparing the questionnaire, field surveys were conducted at 26-02-2017. The data selected from questionnaire was analyzed by using SPSS version 16. The data collected with the help of questionnaire was analyzed in SPSS to get the descriptions of current study. A part of questionnaire has been adopted from SF-36, a standard question to evaluate physic-social-health status.

4=3.4.2.3 Study Areas

Somehow at surrounding and nearer village was visited for socio-economic aspects. Detail of these sited are discussed below. These areas were surveyed by team of experts as per requirement of socioeconomic survey for Initial Environmental Examination Report of Hydropower Project.

3.4.2.4 Description of Tables

In the following table, only frequency and percentage has been measured (by SPSS) of those parameters which are probably present in maximum quantity.

| Sr. # | Variables | Frequency | Percent (%) |
|---|---|---|---|
| 1 | Name & Address | - | - |
| 2 | Date | - | - |
| 3 | Address & CNIC | - | - |
| 4 | Age | 89 (above 30 years) | 89% |
| 5 | Education | 93 (under metric) | 92.8 |
| 6 | Occupation | 96 (Private jobs) | 95.9 |
| 7 | Marital Status | 99 (married) | 99 |
| 8 | If married then no. of children | 87 (> 4) | 86.7 |
| 9 | Total Family members | 90 (< 5) | 90 |
| 11 | No. of earning members in family | 88 (< 3) | 88 |
| 12 | Total income | 97 (> 25 PKR) | 96.3 |
| 13 | Source of income | 99 (Private jobs) | 99 |

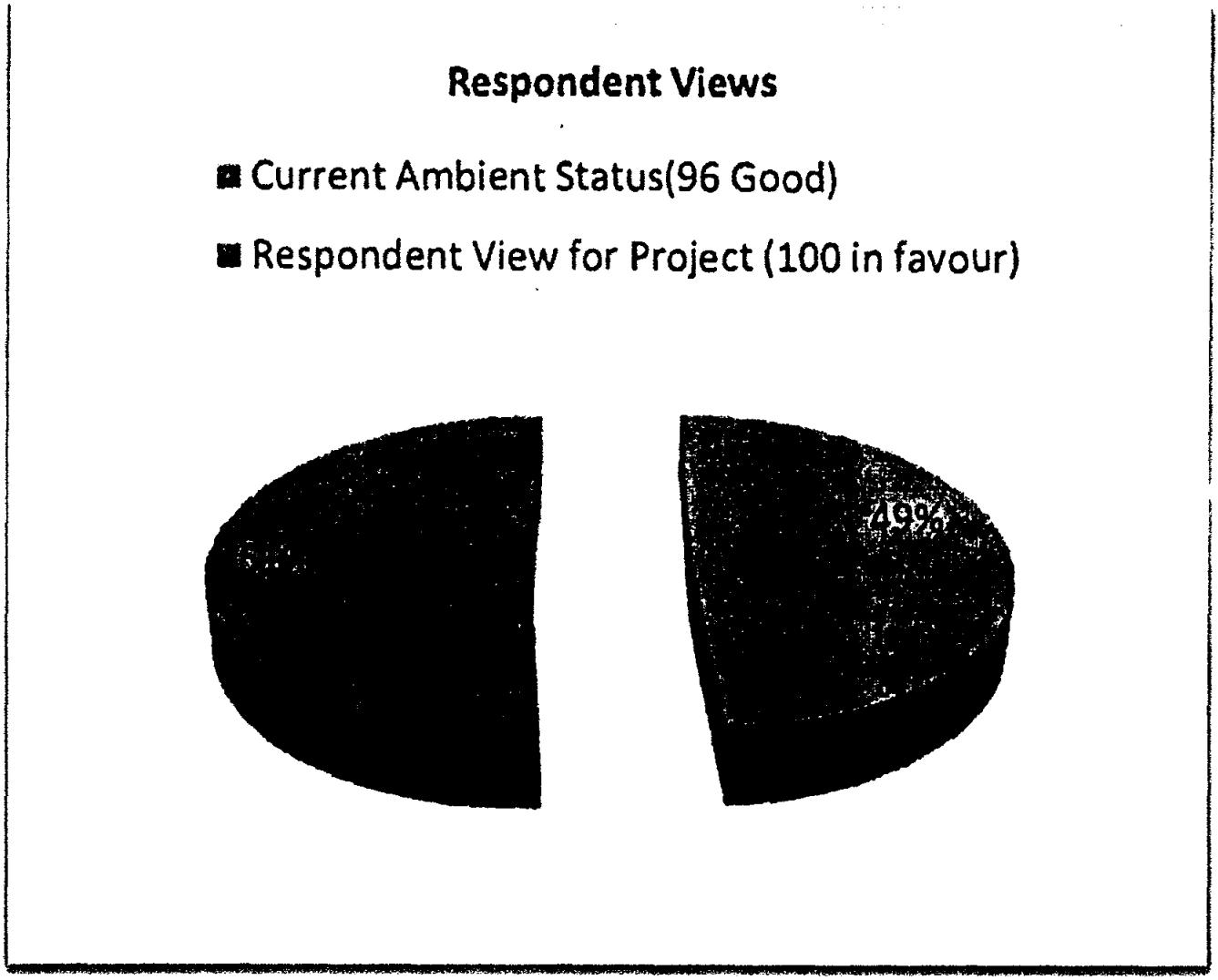


*Figure 3.4 Respondent View about Project*

## 4.5 Quality of life

No residential area is present near the project site; therefore, individuals and workers from neighboring areas were interviewed. The individual assessed from the neighboring communities of the project area were involved in agricultural practices and private jobs in nearby industries. Most of the people work in the shops or small units. Neighboring community inhabitants involved in different occupations were asked about their monthly income but most of them hesitated to tell and stated that they earn just enough to fulfill their basic demands. Regarding the project, almost all of the interviewed members were in favor of the project as it does not involve any chemical manufacturing or pollution causing operational activities which generate pollution. Data was also collected to assess the health status of the community members at the project site. Complaints about different diseases were also recorded during the study.

The diseases prevalent in the community were stomach disorders, fatigue, joint pain, diabetes and arthritis. But it was also observed that all these disease are commonly due to improper diet and water contamination.

### 3.4.1 Health facilities

The city of Kasur in Punjab Province of Pakistan is served by a number of private and government hospitals offering world class medical facilities. The rural and urban areas are served by various other medical centers and dispensaries offering modern medical facilities. The hospitals, dispensaries and medical centers in Kasur aim to provide the citizens best medical facilities and prevention from contagious and other harmful diseases. There is no health facility or any dispensary near the project area.

### 3.4.2 Transportation and Communication

Kasur is one of the most accessible cities of Pakistan and the only unique city of Pakistan where you can find Public and private Transport, 24 hrs a day and 7 days in a week. To fulfill the remaining needs of transport there are thousands of rickshaws and taxis which run on compressed natural gas to reduce pollution in the city and of course about 75 percent of the residents have their own conveyances. Public transport is not available in the project area. Private transport is used by staff and workers and officials used their own conveyance.

### 3.4.3 Industrial Activities

Kasur trade and industries thrives on certain large-scale industries such as steel, textile, carpet and IT industries. Kasur is known as the industrial belt of Pakistan contributing the largest share in the GOP of the country. The city is home to 20% of Pakistan industrial producers; manufactures include textiles, rubber, iron, and steel. Handicrafts, especially gold and silver work, also flourish. The project area is present in a plain area and IS surrounded by agricultural land.

### 3.4.4 Water Supply

The project will have an independent water supply system comprising storage tank of sufficient capacity. Water will be supplied to office and works through motor pump.

### 3.4.5 Telephone Facilities

Landline and Cellular telephone facilities are present in the project area.

## 3.5 Lab reports analysis

### 3.5.1 Ambient Air Quality Monitoring

Ambient Air Quality was monitored for the parameters according to Punjab Environmental Quality Standards (PEQS) 2016 i.e. Carbon Monoxide (CO), Sulphur Dioxide (S02), Nitrogen Oxide (NO), Nitrogen Dioxide (N02) and Particulate Matters (PMIO), Ozone (03), Carbon Dioxide (C02), Volatile Organic Compounds (VOC's), Humidity (%), Suspended Particulate Matters (SPM) and Humidity of ambient air at proposed site of 2.49 MW Hydropower Plant atBambawali-Ravi-Bedian Canal (BRB) at RD 510+600 within main Link canal in Kasur. This monitoring is carried out under standard time of monitoring i.e. 24 hrs. Monitoring reports are attached herewith Annexure 4.5.2 Ground Water Analysis Ground water analysis was done for

the parameters according to Punjab Environmental Quality Standards (PEQS) 2016 i.e. Alkalinity, Calcium, Carbonates, Total Coliform, Conductivity, Hardness as CaC03, Magnesium, Odor, pH, Sulfate, Sodium, Taste, Turbidity, NitrogenINitrates, Lead and Mercury of the water samples collected from the proposed site of 2.49 MW Hydropower Plant at Bambawali-Ravi-Bedian Canal (BRB) at RD 510+600 within main Link canal in Kasur.. Results are obtained by ESP AK Laboratory are attached herewith Annexure.

3.5.3 Noise Monitoring

Monitoring of was done according to Punjab Environmental Quality Standards (PEQS) 2016 for proposed site of 2.49 MW Hydropower Plant at Bambawali-Ravi-Bedian Canal (BRB) at RD 510+600 within main Link canal in Kasur .. Results are obtained by ESPAK Laboratory are attached herewith Annexure.

## 3.6 Conclusion

Comparison of potential adverse and beneficial impacts of the project shows that project will prove to be beneficial for the inhabitants of the Kasur city. The project will provide job opportunities for the local inhabitants as well as provide climate-friendly energy source, generating power without producing air pollution or toxic by-products. Hence improve their socio-economic status. Employment opportunities generated by the project include workers, helpers and guards. The overall socio-economic impact of the project is interpreted in relation to the existing environmental conditions. The project, overall, does not have adverse impacts on the existing environment and people with due implantation of the mitigation measures, there will be very insignificant adverse impacts on the socio-economic environment. The project has more beneficial impacts on the socio-economic environment than adverse impacts. In conclusion, it can be said that overall the project would have positive impacts on the socio-economic status of the workers the neighboring community inhabitants, because it is a green project and release less amount of GHGs because fuel is not used in the process.

# CHAPTER 4

# ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

## 3 Potential Environmental Impacts and Mitigation Measures

The project may have environmental impact during construction and operation phase of the project. During construction phase, the impacts may be temporary and short term while long term impacts may be observed during the operational phase of the project. The project has positive impacts overall by providing a competitive, pollution free and cost effective. It may also meet the increasing demand of power and reduce the gap between demand and supply of power.

The construction and operation phase of the proposed project comprises various activities each of which may have an impact on environmental parameters. The impacts of the project are envisaged during the design and planning, during pre-construction phase, construction phase.

### 3.1 Impact on Air Quality

As the proposed project is Solar PV project, the impact during construction of project is expected to be minimal as a Greenfield Project plant. Particulate matter in the form of dust would be the predominant pollutant affecting the air quality during the construction phase. Dust will be generated mainly through the movement of vehicles (transportation activities). No excavation and filling are required because the PV panels will install on rooftop and parking sheds of the factory. The main source of gaseous emission during the construction phase is movement of equipment and vehicles at site. Equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO2, NOX, and particulate matter. The impact is reversible, marginal and temporary in nature.

### 3.2 Impact on Noise Quality

The major noise generating sources during the construction phase are vehicular traffic, construction equipment like; generators, compressors, vibrators etc. The operation of this

equipment will generate noise ranging between 75 – 90 dB (A). As noise generated during construction phase of the project is low and within the Limits of NEQ's. As there is no human settlements and villages near the project vicinity so overall, the impact of generated noise on the environment during construction period is insignificant, reversible and localized in nature.

## 3.3 Impact on Water Use and Quality

The construction personnel would be housed in factory premises and compounds provided by the project sponsors. These compounds and TSF would discharge considerable amount of domestic wastewater. Stagnant pools of water would increase breeding of mosquitoes and generally create insanitary conditions. The main pollutants are organic components and microorganisms with the potential to cause contamination of water quality. To address potential impacts on water quality, disinfected washroom (e.g., through regular liming) will be used as main component of the sanitation system. As the PV panels will be installed on rooftop so no use of water during construction phase of the project and overall, no impact on water use and its quality.

## 3.4 Impact on Groundwater Contamination

There is no harm to the ground water due to construction of PV project because panels will be installed on the rooftop and parking sheds of the factory and there is no require any excavation to fix the structure and the project site is already cleared on the rooftop in premises of factory. There is no impact on the Ground water.

Ground water due to plant operation will be drawn during operation phase for any purpose. There shall be minimal discharge of wastewater from cleaning of Solar PV modules. The wastewater emanating from cleaning operations shall be recycled or used for plantation around the plant. For 01 MW, one vehicle of water is required for the cleaning and duration of the cleaning for 3.1 MW is required approximately 02 or 03 days. For 03.1 MW, approximately 46000 liters of water is required for washing of panels and on monthly basis and the process will be done on monthly basis.

During the operation & maintenance period, natural underground water can be used for cleaning the modules with manual washing. The water for cleaning the module doesn't include any chemical agents, so the untreated underground water will be used for cleaning. Based on our project circumstances, modules shall be cleaned one in every month. The water supply system will be installed along the solar panel array and will be used by the cleaning staff to use the tap water for manual cleaning.

## 3.5 Impact on Land Use

The mobilization of construction equipment and construction materials will require space for storage and parking of construction vehicles and equipment, construction material storage yards, disposal sites, and labor camps for human resource to avoid environmental impact and public inconvenience. The total land available for the Project is 7.23 acres. At the Project site, there is no any agricultural land or any natural habitat or projected area in the premises of the project. Overall, there will be no impact on the land use. There is no excavation require for the panels installation and no piling required because the PC panels will be installed on the rooftop and parking sheds. Only a small chunk of land is required for the space of storage of equipment, construction material and waste handling which have a no or minor impact and will be temporary only in construction phase.

## 3.6 Impact on Biological Environment

The project site is already developed area and there is no harm to the biological environment for the installation of PV plant. There will be no impact on flora and fauna of the project area. Thus, the site development works would not lead to any significant loss of important species or ecosystems. The panels will be installed on the rooftop and parking sheds so there is no cutting of trees in the area.

## 3.7 Impact on Solid Waste

Solid waste during the construction phase consists primarily of excess concrete and cement, rejected components and materials, packing and shipping materials (pallets, crates, Styrofoam, plastics etc.) and human waste. During the construction there will be generation of garbage, for which designated practices of solid waste disposal shall be followed.
Solid waste disposal will be done as follows;

- A waste inventory of various waste generated will be prepared and periodically updated.
- The scrap metal waste generated from erection of structures and related construction activities will be collected and stored separately in a stack yard and sold to local recyclers.

- ❖ Food waste and recyclables viz. paper, plastic, glass etc will be stored in designated waste bins/containers. The recyclables will be periodically sold to local recyclers while food waste will be disposed through proper waste handling mechanism.
- ❖ Hazardous waste viz. waste oil etc will be collected and stored in paved and bounded area and subsequently sold to authorized recyclers.

The complete details of scrap metal details will be given as; scrap metal waste generated from erection of structures and related construction activities will be collected and stored separately in a stack yard and sold to local recyclers as per to manage the solid waste handling team. A separate yard area will be allocated for storing the waste material as per the required industrial practice. Waste handling agency will be hired at the start of project construction to manage the waste generating during the construction and operational phase of the plant and the practices used for handling the waste disposal to manage proper waste management through different mechanisms like, make a proper dumping site for the disposal of waste, handling of waste. The wastes which are recyclable are sold to the external contractors and the non-hazardous waste will be dumped through municipal waste collection system and services. The solid waste will be dumped away from the project site and where nearby no settlements or any other affected environment is present. It may the proper dumping site that is used for local municipality. Although the PV cells will not be disposed but sent back under as warranty is for 25 years.
There are some solid wastes in the project site, including the packing material for the equipment, like the wooden pallets and carton boxes. Solid waste management plan will be followed third party EPA certified contractor will be hired for disposal of solid waste (No Impact).

# CHAPTER 5

# INSTITUTIONAL REQUIREMENT AND ENVIONMENTAL MONITORING PLAN

## 4 Institutional Requirement and Environmental Monitoring Plan

During the construction and operation of PV Project, the project company will comply all the rules and regulations of EPA and the standard practices as well as NEQs standards. And implement the environmental mitigation and monitoring plan during construction of the project. Environmental Management and Monitoring Plan provides the mechanism to address the adverse environmental as well as social impacts of the proposed project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted for all project works.

The main purpose of Environmental Monitoring Plan is to provide a detailed summary of the predicted impacts associated, mitigating measures and monitoring actions so as to minimize potential negative impacts and enhance positive impacts from the Project.

### 4.1 Preconstruction Phase

During pre-construction phase of the project, a field survey was conducted by the team to identify the potential impacts and address into the monitoring plan to mitigate their affects to the project and the surrounding environment. Define the roles and responsibilities for those who involved in the implementation of the EMP during construction. Also define the implementation mechanism for the mitigation measures identified during the present study.

### 4.2 Construction Phase

During construction phase of the project, a solid waste will be handled properly as per the standard industrial practices and dumped into the proper waste disposal sites which are already identified. Provide safety trainings to the workers who works during the construction phase. Provide instructions to project personnel and contractors regarding procedures for

protecting the environment and minimizing environmental impact during construction of the project.

## 4.3 Operational Phase

During operational phase, the environment and social impact will be minimum as there is no dust and any gaseous emission from the plant. Only the waste water that used for the cleaning mechanism of PV panels will be generated and will be handled properly as per the standards. Also provide trainings and awareness sessions rising on the environmental and social issues related to power transmission projects to the project. Ensure the legal compliance properly during O & M phase of the project. The waste water will be used for plantation purposes.

# CHAPTER 6

# CONCLUSIONS AND RECOMMENDATIONS

## 5 Conclusions and Recommendations

The Project will be the replacement of conventional power generation with renewable energy. Solar energy will replace fossil fuel powered generation, and therefore reduce suspended particulate matter and greenhouse gas emissions into the atmosphere.

The project is cost effectively and environmental impacts are likely to be minimum in result from the proposed Power project. Careful mitigation and monitoring, specific selection criteria and review/assessment procedures have been specified to ensure that minimal impacts will take place. The detailed design would ensure inclusion of any such environmental impacts that could not be specified or identified at this stage are taken into account and mitigated where necessary. Those impacts can be reduced through the use of mitigation measures such as correction in work practices at the construction sites, or through the careful selection of sites and access routes. As proposed land is already the cleared and Solar PV panels will be installed on the rooftop or roof mounted structure and parking sheds and there is no harm to the natural environment or any biological habitat.

Based on the environmental and social assessment and survey conducted for the Project, the potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the mitigation measures identified during visit. Adequate provisions are being made in the Project to cover the environmental mitigation and monitoring requirements, and their associated costs.

ZERO CARBON SOLAR

# **ANNEXURE I** – WATER SOURCE AT SITE FOR MAINTENANCE

APPLICATION OF ZERO CARBON POWER (PVT) LTD. FOR GRANT OF GENERATION LICENSE AT DISTRICT KASUR.

ZERO CARBON
SOLAR

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Lahore, Pakistan
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## Annexure - I

**Water Cleaning System for Manual operation.**

**a.** Arrangement for cleaning of modules to be provided, inclusive of water tank, water pump and necessary PPRC piping.

**b.** Access nozzles with individual shut off provisions to be installed on the roof at regular intervals of 10 meters along the entire length of the roof.

**c.** Necessary sizing of the booster pump is required to have adequate water pressure for cleaning of modules.

**d.** Water outlet points are marked on the project site layout provided in figure 1.

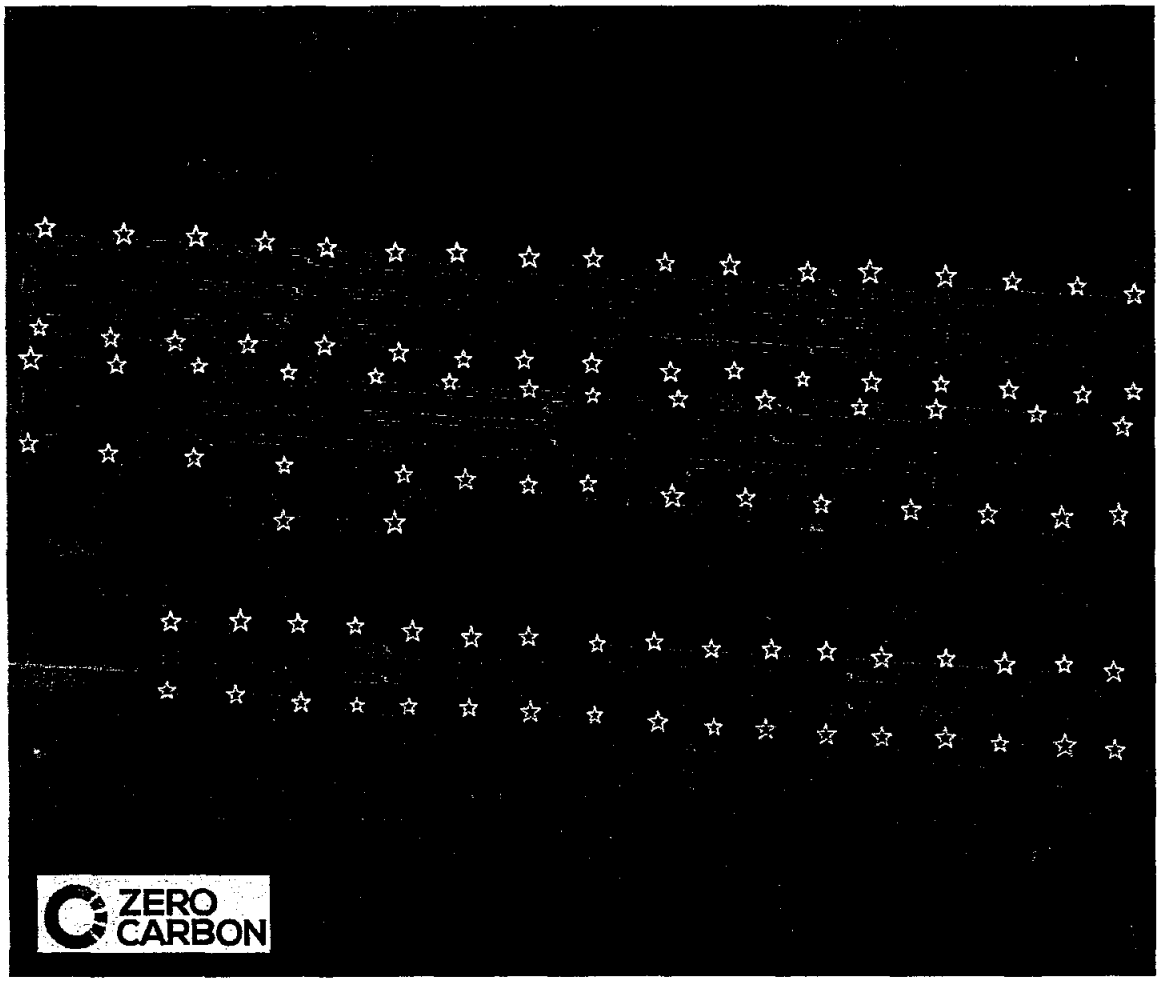
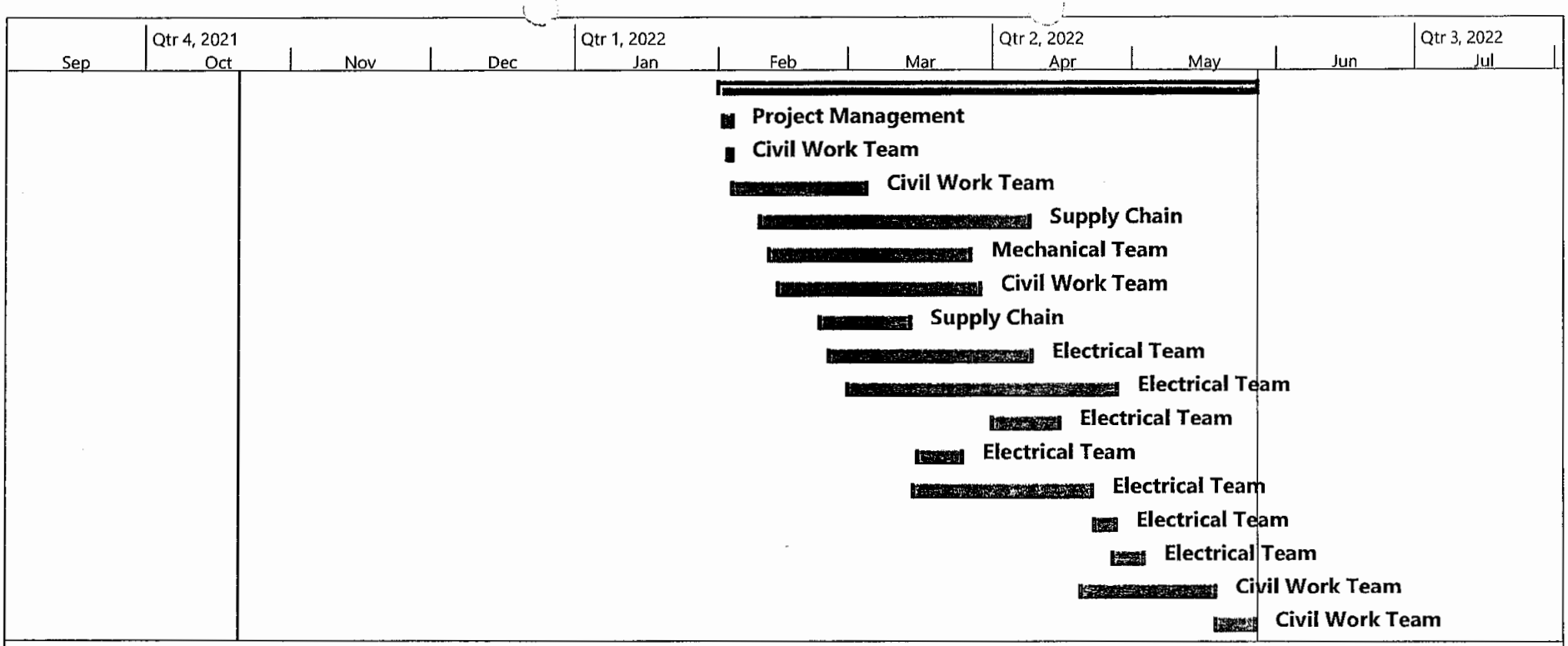



*Figure 1 Water outlet points for Cleaning and Maintenance*

# **ANNEXURE J** – PROJECT TIMELINE

APPLICATION OF ZERO CARBON POWER (PVT) LTD. FOR GRANT OF GENERATION LICENSE AT DISTRICT KASUR.




Project: 1.82 MW Bulleh Shah Packaging Factory

Date: Thu 21-10-21

| | | | | | |
|---|---|---|---|---|---|
| Task | | Inactive Summary | | External Tasks | |
| Split | | Manual Task | | External Milestone | |
| Milestone | | Duration-only | | Deadline | |
| Summary | | Manual Summary Rollup | | Progress | |
| Project Summary | | Manual Summary | | Manual Progress | |
| Inactive Task | | Start-only | | | |
| Inactive Milestone | | Finish-only | | | |