

Original

GRID EDGE (PRIVATE) LIMITED

To:

Iftikhar Ali Khan

Director

Registrar Office, NEPRA

NEPRA Tower, Ataturk Avenue (East) G-5/1, Islamabad

September 9th, 2018

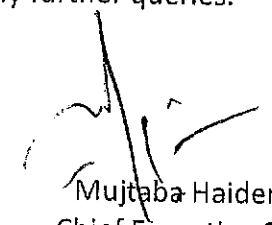
Subject: **APPLICATION OF GRID EDGD (PRIVATE LIMITED) FOR GRANT OF GENERATION LICENSE IN RESPECT OF 2 MW SOLAR POWER PROJECT, PORT QASIM, KARACHI SINDH**

I, Mujtaba Haider Khan, Chief Executive Officer, being the duly authorized representative of GRID EDGE (PRIVATE) LIMITED by virtue of BOARD RESOLUTION dated (3rd September 2018), hereby apply to National Electric Power Regulatory Authority for the grant of a Generation License to GRID EDGE (PRIVATE) LIMITED pursuant to 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 PAY ORDER in the sum of Rupees 159,176, being the non-refundable license application fee calculated in accordance with Schedule II to the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, is also attached herewith.

I hope this meets all the requirements. Feel free to contact me for any further queries.


Mujtaba Haider Khan
Chief Executive Officer
GRID EDGE (Private) Limited
3rd Floor, Dawood Centre,
MT Khan Road, Karachi

APPLICATION FOR GENERATION LICENSE FOR 2,000 kWp (DC) SOLAR POWER PLANT

SUBMITTED BY: GRID EDGE (PRIVATE) LIMITED

3(1) Authorization from Board Resolution / Power of Attorney

GRID EDGE (PRIVATE) LIMITED

Extract of the Board of Directors Resolution Held on September 3, 2018

I, Mujtaba Haider Khan, Chief Executive of Grid Edge (Private) Limited, hereby certify that the following Resolution was passed by the Board of Directors on September 3, 2018.

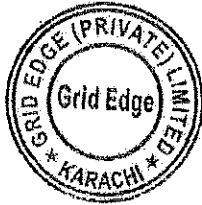
"RESOLVED that the Company shall proceed with all acts necessary to comply with the legal and regulatory requirements in relation to its business objects and activities.

FURTHER RESOLVED that Mr. Mujtaba Haider Khan, Chief Executive Officer has been duly authorized in file; (i) an application for grant of Generation License; (ii) any other clarification submission application petition or document in support thereof; (iii) to make any oral or written representations on behalf of the Company before the National Electric Power Regulatory Authority and any other body, organization, department judicial and quasi-judicial body in relation to the aforesaid filings and to do all other acts, deeds, things and matters as may be deemed expedient in giving effect to the aforesaid resolution.

FURTHER RESOLVED that Mr. Mujtaba Haider Khan, Chief Executive Officer may further delegate the aforesaid powers, in writing, to one or more persons, as deemed expedient from time to time."

Certified True Copy

Mujtaba Haider Khan
Chief Executive



Dated: September 7, 2018

GRID EDGE (PRIVATE) LIMITED

RESOLUTION BY CIRCULATION

Passed on: September 3, 2018

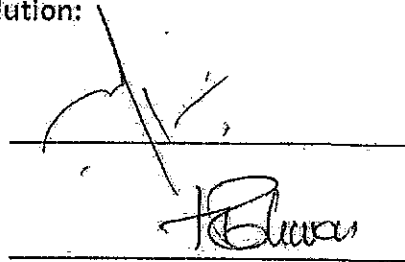
"RESOLVED that the Company shall proceed with all acts necessary to comply with the legal and regulatory requirements in relation to its business objects and activities.

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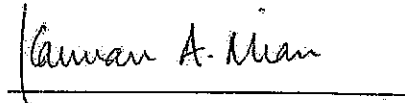
FURTHER RESOLVED that Mr. Mujtaba Haider Khan, Chief Executive Officer may further delegate the aforesaid powers, in writing, to one or more persons, as deemed expedient from time to time."

Signatures of Directors approving the above Resolution:

1. Mujtaba Haider Khan

A handwritten signature in black ink, appearing to be 'Mujtaba Haider Khan', written over a horizontal line.

2. Inam ur Rahman

A handwritten signature in black ink, appearing to be 'Inam ur Rahman', written over a horizontal line.

3. Kamran Ajmal Mian



A044063

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

COMPANY REGISTRATION OFFICE, KARACHI

CERTIFICATE OF INCORPORATION

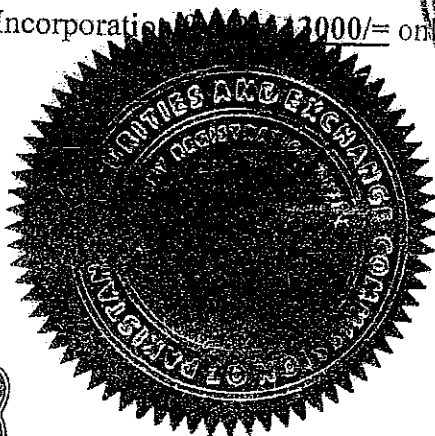
[Under section 16 of the Companies Act, 2017 (XIX of 2017)]

Corporate Universal Identification No. 0122474

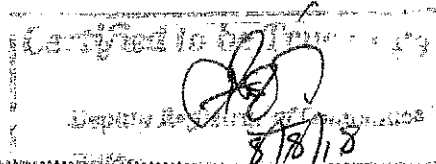
I hereby certify that GRID EDGE (PRIVATE) LIMITED is this day incorporated under the Companies Act, 2017 (XIX of 2017) and that the company is limited by shares.

Given under my hand at Karachi this Eighth day of August, Two Thousand and Eighteen

Incorporation fee 1000/= only



(Kashif Mahmood)
Additional Joint Registrar



THE COMPANIES ACT, 2017 (XIX of 2017)

(COMPANY LIMITED BY SHARES)

MEMORANDUM

OF

ASSOCIATION

OF

GRID EDGE (PRIVATE) LIMITED

1. The name of the Company is Grid Edge (Private) Limited.
2. The registered office of the Company will be situated in the Province of Sindh.
3. (i) The principal line of business of the Company shall be to generate, accumulate, transmit, distribute, purchase, sell and supply electric power or any other energy and power generated by any source, from conventional or non-conventional energy by bio-mass, hydro, thermal, gas, air, diesel oil, or solar, hydrocarbon fuel or any other form, kind or description or through renewable energy sources, wind mill or another means/ source on a commercial basis and to construct, lay down, establish, operate and maintain power/energy generating stations, including buildings, structures, works, machineries, equipments, cables, wires, lines, accumulators, lamps, and works and to undertake or to carry on the business of managing, owning, controlling, erecting, commissioning, operating, running, leasing or transferring power plants and plants based on conventional or non-conventional energy source, thermal power plants, solar energy plants, wind energy plants, mechanical, electrical, hydel, civil engineering works, boiler houses, steam turbines, switch yards, transformer yards, sub stations, transmission lines, accumulators, workshops and to do all such other things and acts as may appear to be incidental or conducive to the attainment of the above objects and to have full power to exercise all powers to achieve or to endeavour to achieve the above objects.
- (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 to do all such other things and acts in connection therewith and ancillary thereto as may appear to be incidental or conducive to the attainment of the above objects.
- (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, real estate

business, 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:

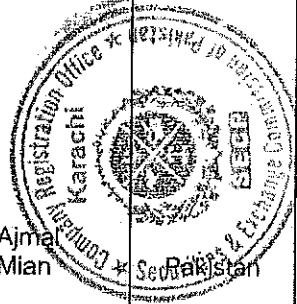
- (a) engage in any of the business mentioned in sub-clause (iii) above or any unlawful operation;
- (b) launch multi-level marketing (MLM), Pyramid and Ponzi Schemes, commodity, future contract or share trading business locally or internationally or other related activities/businesses or any lottery business as restricted under the law or any unlawful operation;
- (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 1,200,000 (Rupees One Million and Two Hundred Thousand only) divided into 120,000 (One Hundred and Twenty thousand) ordinary shares of Rs. 10/- (Rupees Ten only) each. The Company shall have powers to increase, reduce or re-organize the capital of the Company or increase or reduce the nominal value of the shares and divide shares in the capital for the time being into several classes to the extent permissible by law in accordance with the provisions of the Companies Act, 2017 or any statutory modifications thereof



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
ENI International B.V Through Nominee Kamran Ajmal Mian	33264964 42101-3402641-3	Subscriber  Ajmal Mian	Netherlands	Services	Strawinskylaan 1725, 1077 XX Amsterdam, the Netherlands. House no 9-B, 1 East Street, Phase 1 DHA Clifton Cantt Karachi South	48,000(Forty Eight Thousand Shares Only)	
Mujtaba Haider Khan	42201-0492212-1	Ansar Haider Khan	Pakistan	Services	Bhayani Sunview, Gulshan-e-Iqbal, House no 124 Block 11, Karachi Central Pakistan	1 (One Share Only)	
Inam ur Rahman	35201-1378474-9	Fazal Rahmaan	Pakistan	Services	House no 3/300, Sarwar Road, Lahore Cantt	1 (One Share Only)	

Reon Energy Limited	0089881	Subscriber	Pakistan		Dawood Centre, M.T. Khan Road, Karachi	71,998 (Seventy One Thousand Nine Hundred and Ninety Eight Shares Only)	
Thorough Nominee							
Mujtaba Haider Khan	42201-0492212-1	Ansar Haider Khan	Pakistan	Services	Bhayani Sunview, Gulshan-e-Iqbal, House no 124 Block 11, Karachi Central Pakistan		
		Total number of shares taken (In figures and words)				120,000 (One Hundred and Twenty Thousand Shares Only)	

Dated the 7th day of August, 2018.



Handwritten signature and date 5/8/18.

THE COMPANIES ACT, 2017 (XIX of 2017)

(Company Limited by Shares)

ARTICLES OF ASSOCIATION

OF

GRID EDGE (PRIVATE) LIMITED

PRELIMINARY

1. (1) The Regulations in Table A in the First Schedule to the Companies Act 2017, shall not apply to the Company except in so far as they are repeated or contained in these Articles.

- (2) In these Articles-

“REON” means Reon Energy Limited, a company incorporated and existing under the laws of Pakistan, being the holder of 60% shareholding in the Company;

“ENI” means ENI International BV, a company incorporated and existing under the laws of the Netherlands, being the holder of 40% shareholding in the Company;

“section” means section of the Act;

“the Act” means the Companies Act, 2017; and

“the Company” means Grid Edge (Private) Limited;

“the seal” means the common seal or official seal of the Company as the case may be.

“these Articles” means these Articles of Association as originally framed or as from time to time altered by Special Resolution.

- (3) Unless the context otherwise requires, words or expressions contained in these Articles shall have the same meaning as in the Act; and words importing the singular shall include the plural, and *vice versa*, and words importing the masculine gender shall include feminine, and words importing persons shall include bodies corporate.

2. The registered office of the Company shall be situated in the Province of Sindh.

3. The directors shall have regard to the restrictions on the commencement of business imposed by section 19 if, and so far as, those restrictions are binding upon the Company.

SHARES

4. In case of shares in the physical form, every person whose name is entered as a member in the register of members shall, without payment, be entitled to receive, within thirty days after allotment or within fifteen days of the application for registration of transfer, a certificate under the seal specifying the share or shares held by him and the amount paid up there on. Provided that if the shares are in book entry form or in case of conversion of physical shares and other transferable securities into book entry form, the Company shall, within ten days after an application is made for the registration of the transfer of any shares or other securities to a central depository, register such transfer in the name of the central depository.

5. The Company shall not be bound to issue more than one certificate in respect of a share or shares in the physical form, held jointly by several persons and delivery of a certificate for a share to one of several joint holders shall be sufficient delivery to all.

6. If a share certificate in physical form is defaced, lost or destroyed, it may be renewed on payment of such fee, if any, not exceeding one hundred rupees, and on such terms, if any, as to evidence and indemnity and payment of expenses incurred by the Company in investigating title as the directors think fit.

7. Except to the extent and in the manner allowed by section 86, no part of the funds of the Company shall be employed in the purchase of, or in loans upon the security of, the Company's shares.

TRANSFER AND TRANSMISSION OF SHARES

8. The instrument of transfer of any share in physical form in the Company shall be executed both by the transferor or and transferee, and the transferor shall be deemed to remain holder of the share until the name of the transferee is entered in the register of members in respect thereof. Shares in physical form in the Company shall be transferred in the form attached as Annexure A or in any usual or common form which the directors shall approve.

9. (1) Subject to the restrictions contained in Articles 10 and 11, the directors shall not refuse to transfer any share unless the transfer deed is defective or invalid. The directors may also suspend the registration of transfers during the ten days immediately preceding a General Meeting or prior to the determination of entitlement or rights of the shareholders by giving seven days' previous notice in the manner provided in the Act. The directors may, in case of shares in physical form, decline to recognise any instrument of transfer unless-

- a. a fee not exceeding fifty rupees as may be determined by the directors is paid to the Company in respect thereof; and
- b. the duly stamped instrument of transfer is accompanied by the certificate of the shares to which it relates, and such other evidence as the directors may reasonably require to show the right of the transferor to make the transfer.

(2) If the directors refuse to register a transfer of shares, they shall within fifteen days after the date on which the transfer deed was lodged with the Company's end to the transferee and the transfer or notice of the refusal indicating the defect or invalidity to the transferee who shall, after removal of such defect or invalidity been titled to re-lodge the transfer deed with the Company.

Provided that the Company shall, where the transferee is a central depository the refusal shall be conveyed within five days from the date on which the instrument of transfer was lodged with it notify the defect or invalidity to the transferee who shall, after the removal of such defect or invalidity, been titled to re-lodge the transfer deed with the Company.

TRANSMISSION OF SHARES

10. The certificates of title to shares shall be issues under the Seal of the Company and signed by two (2) directors. Every certificate of shares shall bear the following legend thereon:

"Any disposition, transfer, charge, sale, pledge, hypothecation, assignment of or dealing in any other manner in the Shares represented by this certificate is restricted by a Shareholders Agreement to be signed between REON and ENI. Copies of such Agreements are available in the custody of the Company."

The executors, administrators, legal successors, or nominees, as the case may be, of a deceased sole holder of a share shall be the only persons recognised by the Company to deal with the share in accordance with the law. In the case of a share registered in the names of two or more holders, the survivors or survivor, or the executors or administrators of the deceased survivor, shall be the only persons recognised by the Company to deal with the share in accordance with the law.

11. The shares or other securities of a deceased member shall be transferred on application duly supported by succession certificate or by law ful award, as the case may be, in favour of the successors to the extent of their interests and their names shall be entered to the register of members.

ALTERATION OF CAPITAL

12. The Company may, by special resolution, passed at a shareholders meeting-
- (a) increase its authorised capital by such amount as it thinks expedient, provided that the nominal value of shares is PKR10/- each;
 - (b) consolidate and divide the whole or any part of its share capital into shares of larger amount than its existing shares;
 - (c) Any capital raised by the creation of new shares shall be considered part of the authorized capital and the new shares be subject to provisions herein contained with reference to transfer, transmission, voting an otherwise.

13. Subject to the provisions of the Companies Act, 2017 all new shares before issue, shall at the first instance be offered to the Shareholders of the Company strictly in proportion to the number of existing shares held by such shareholder. The offer shall be made, following the unanimous approval of the issuance of new shares, by letter of offer specifying the number of shares offered, and limiting a time within which the offer, if not accepted, will deem to be declined, and after the expiration of that time, or on the receipt of an intimation from the person to whom the offer is made that he/she declines to accept the shares offered, the directors under Section 83 of the Companies Act, 2017, may dispose of the same in such manner as they think most beneficial to the Company. The directors may like wise so dispose of any new shares which (by reason of the ratio which the new shares bear to shares held by persons entitled to an offer of new shares) cannot, in the opinion of the directors, be conveniently offered under this Article.

14. The new shares shall be subject to the same provisions with reference to transfer, transmission and otherwise as the shares in the original share capital.

15. The Company may, by special resolution, passed by the Shareholders of the Company reduce its share capital in any manner and with, and subject to any incidental authorisation and consent required, by law.

16. Subject to provisions of Section 85 of the Companies Act, 2017 the Company may, by special resolution, passed by the Shareholders of the Company at unanimity, alter the conditions of the Memorandum so as to cancel any shares which at the date of passing of the resolution in that respect have not been taken or agreed to be taken by any person, any diminish the amount of its authorized share capital by the amount of shares so cancelled.

GENERAL MEETINGS

17. The Statutory General Meeting of the Company shall be held within a period of one hundred and eighty days from the date on which the Company is entitled to commence business or nine months from the date of incorporation, which ever is earlier, as required by Section 131 of the Companies Act, 2017.

18. An Annual General Meeting, shall be held, in accordance with the provisions of section 132 of the Companies Act, 2017, within sixteen months from the date of incorporation of the Company and there after once atleast in every year within a period of one hundred and twenty days following the close of its financial year. All such General Meetings will be called 'Annual General Meetings' and all other General Meetings will be called 'Extraordinary General Meetings'.

19. Subject to provision of Section 133 the directors may, when ever they think fit, call an Extra ordinary General Meeting of the Company which require approval of the Shareholders in a General Meeting and shall, on requisition of Shareholders representing not less than 10% of the voting power on the date of deposit of such requisition, forthwith proceed to call an Extraordinary General meeting. Any director of the Company may call an Extra ordinary

General Meeting as long as the quorum is complete.

20. Twenty one (21) day notice at the least specifying the agenda, place, the day and the hour of meeting and, in case of special business, the general nature of the business, shall be given in the manner provided by Section 134(4) of the Act to such persons as prescribed for under the Act and who are entitled to receive such notices. In the event of an emergency affecting the business of the Company, the Board may in accordance with Companies Act, 2017, make application to the Registrar for a shorter notice period, and, if the Registrar authorizes a shorter notice, then an Extraordinary General Meeting may be convened upon such shorter notice.

21. Chairman of Board will also be Chairman of Extraordinary General Meeting, but if there is no such Chairman, or the Chairman is not present within thirty (30) minutes after the meeting commences, the Shareholders present may choose one of the directors appointed by Reon and present at the meeting to be the Chairman.

22. The Company may provide video-link facility to its members for attending General Meetings at places other than the town in which General Meeting is taking place after considering the geographical dispersal of its members.

23. Minutes shall be made in books provided by the Board pursuant to Section 151 of the Act for the purposes of all resolutions and proceedings at General Meetings, and any such Minutes is signed by the Chairman of the General Meeting or of the next following General Meeting and approved by the Shareholders shall constitute sufficient evidence of the facts therein stated without further proof.

24. All the business transacted at a General Meeting shall be deemed special other than the business stated in sub-section (2) of section 134 namely; the consideration of financial statements and the reports of the board and auditors, the declaration of any dividend, the election and appointment of directors in place of those retiring, and the appointment of the auditors and fixing of their remuneration.

25. No business shall be transacted at any General Meeting unless a quorum of members is present at that time when the meeting proceeds to business. The quorum of the General Meeting of the Company shall be two members present personally, or through video-link who jointly represent not less than seventy-five percent of the total voting power, representatives or nominees from REON and ENI to be present, either of their own account or as proxies.

VOTES OF MEMBERS

26. Except as to voting for the election of directors under Section 159 of the Act, every Shareholder entitled to vote, either in person or by proxy, and upon a poll every Shareholder entitled to vote and present in person or by proxy shall have one vote for every share conferring voting rights as aforesaid held by him.

27. A member of unsound mind, or in respect of whom an order has been made by any court having jurisdiction in lunacy, may vote, whether on show of hands or on a poll or through video link, by his committee or other legal guardian, and any such committee or guardian may, on a poll, vote by proxy.

28. On a poll votes may be given either personally or through video-link, by proxy or through postal ballot:

Provided that no body corporate shall vote by proxy as long as a resolution of its directors in accordance with the provisions of section 138 is in force.

29. (1) The instrument appointing a proxy shall be in writing under the hand of the appointer or of his attorney duly authorised in writing.

(2) The instrument appointing a proxy and the power-of-attorney or other authority (if any) under which it is signed, or an otially certified copy of that power or authority, shall be deposited at the registered office of the Company not less than forty-eight hours before the time for holding the meeting at which the person named in the instrument proposes to vote and in default the instrument of proxy shall not be treated as valid.

30. An instrument appointing a proxy may be in the form attached as Annexure B, or a form as near there to as

may be.

31. A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the proxy or of the authority under which the proxy was executed, or the transfer of the share in respect of which the proxy is given, provided that no intimation in writing of such death, insanity, revocation or transfer as aforesaid shall have been received by the Company at the office before the commencement of the meeting or adjourned meeting at which the proxy is used.

DIRECTORS

32. Unless otherwise agreed by the Shareholders in General Meeting, the Company shall have at least three (3) directors the majority of which being resident in Pakistan, with REON appointing two (2) directors and ENI appointing one (1) director. The following shall be the first directors of the Company, so, however, that the number of directors shall not in any case be less than that specified in section 154 of the Act and they shall hold office until the election of directors in the first Annual General Meeting:

1. Mujtaba Haider Khan
2. Inam ur Rahman
3. Kamran Ajmal Mian

33. The Board shall fix the number of directors thirty-five (35) days before convening the General Meeting at which the directors are to be elected, and the number so fixed shall not be changed except with the prior approval by special resolution of the Company in a General Meeting. It is clarified that in no event shall the number of directors increase beyond three (3) until the same has been so approved by all the Shareholders in a General Meeting.

34. The directors shall appoint a nominee director from REON as the Chairman of the Company. The Board may remove Chairman at any time by unanimous vote (except the vote of the Chairman to be removed) and appoint a new Chairman and such Chairman shall be appointed from amongst the nominee directors of REON on the Board. The term of the Chairman shall be co-terminous with the term of the Board. A retiring Chairman shall be eligible for reappointment and shall preside over the General Meeting at which an election of directors shall be held.

35. An elected director shall hold office for a period of three (3) years. Election of directors to be held every three years.

36. The Company may by resolution in a General Meeting remove a director in accordance with Companies Act, 2017.

37. If any director resigns or becomes disqualified or ceases for whatever reason prior to the expiry of the three year term, the Board shall appoint any person to be a director to fill such vacancy within ninety (90) days of the vacancy. Any director so appointed shall complete remainder of the term of the director in whose place he is appointed.

38. The remuneration of the directors shall from time to time be determined by the Board, provided that unless otherwise agreed the nominee directors of REON and ENI shall not be entitled to any remuneration, directors may be reimbursed all reasonable travelling, hotel and other expenses properly incurred by him/ her in attending and returning from meetings of directors or General Meetings of the Company or in connection with the discharge of their duties as directors of the Company.

39. Save as provided in section 153 of the Act, no person shall be appointed as a director unless he is a member of the Company or the only nominee of a corporate Shareholder.

POWERS AND DUTIES OF DIRECTORS

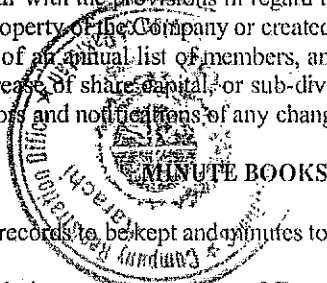
40. The Board shall be responsible for the overall direction, supervision and management of the Company. The Board may pay all expenses incurred in promoting and registering the Company, and may exercise all such powers of the Company as are not by the Act or by these articles or by the Shareholder Agreement or by a special resolution required to be exercised by the Company in General Meetings, subject nevertheless to the provisions of the Act or to any of the Articles, or to any such regulations as may be prescribed by the Company in General Meeting but no regulations made by the Company in General Meeting shall invalidate any prior act of the directors which would have been valid if such regulations had not been made.

41. The Board shall appoint a director nominated by REON as the chief executive in accordance with the provisions of sections 186 and 187 of the Act, or if he ceases to be a director for any cause, appoint another director as Chief Executive from REON.

42. Subject to approval by the Board, any director not permanently resident in Pakistan or any director so resident but intending to be absent from Pakistan for a period of not less than three (3) months may appoint any person acceptable to the Board to be an alternate director of the Company to act for him. Every such appointment shall be made by notice to the Board in writing under the hand of the director making the appointment (with a copy to the Shareholders). An alternate director will be an acting director, entitled to receive notice of all meetings, and to attend and vote as a director. An appointee director shall cease to be the director if his appointer for any reason is disqualified or ceases to be a Director or if his appointer returns to Pakistan or if the appointee is removed from office by notice in writing under the hand of the appointer.

43. The amount for the time being remaining undischarged of moneys borrowed or raised by the directors for the purposes of the Company (otherwise than by the issue of share capital) shall not at anytime, without the sanction of the Company in General Meeting, exceed the issued share capital of the Company.

44. The directors shall duly comply with the provisions of the Act, or any statutory modification thereof for the time being in force, and in particular with the provisions in regard to the registration of the particulars of mortgages, charges and pledge affecting the property of the Company or created by it, to the keeping of a register of the directors, and to the sending to the registrar of an annual list of members, and a summary of particulars relating thereto and notice of any consolidation or increase of share capital, or sub-division of shares, and copies of special resolutions and a copy of the register of directors and notifications of any changes therein.



45. The directors shall cause records to be kept and minutes to be made in book or books with regard to

- (a) all resolutions and proceedings of General Meeting(s) and the meeting(s) of directors and Committee(s) of directors, and every member present at any General Meeting and every director present at any meeting of directors or Committee of directors shall put his signature in a book to be kept for that purpose;
- (b) recording the names of the persons present at each meeting of the directors and of any committee of the directors, and the General Meeting; and
- (c) all orders made by the directors and Committee(s) of directors:

Provided that all records related to proceedings through video-link shall be maintained in accordance with the relevant regulations specified by the Commission which shall be appropriately rendered into writing as part of the minute books according to the said regulations.

THE SEAL

46. The directors shall provide for the safe custody of the seal and the seal shall not be affixed to any instrument except by the authority of a resolution of the board of directors or by a committee of directors authorized in that behalf by the directors and in the presence of at least two directors and of the secretary or such other person as the directors may appoint for the purpose; and those two directors and secretary or other person as a fore said shall sign every

instrument to which the seal of the Company is so affixed in their presence.

DISQUALIFICATION OF DIRECTORS

47. No person shall become the director of a Company if he suffers from any of the disabilities or disqualifications mentioned in section 153 or disqualified or debarred from holding such office under any of the provisions of the Act as the case may be and, if already a director, shall cease to hold such office from the date he so becomes disqualified or disabled:

Provided, however, that no director shall vacate his office by reason only of his being a member of any company which has entered into contracts with, or done any work for, the Company of which he is director; but such director shall not vote in respect of any such contract or work, and if he does so vote, his vote shall not be counted. In case of such conflict of interest, the resolution shall be adopted by the General Meeting.

PROCEEDINGS OF DIRECTORS

48. The directors may meet together for the dispatch of business, adjourn and otherwise regulate their meetings, as they think fit; provided that the directors shall meet at least once in each quarter of a calendar year. A director may, and the secretary on the requisition of a director shall, at anytime, summon a meeting of directors. Notice sent to a director or through he mail whether such director is in Pakistan or outside Pakistan shall be a valid notice.

49. The directors shall from among the directors appointed by REON, elect a chairman of the Board of directors and determine the period for which he is to hold office. If at any meeting the chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as chairman, the directors present may choose one of their number to be chairman of the meeting.

50. Atleast two (2) directors of whom at least one is nominated by each Shareholder, for the time being of the Company, present personally or through video-link shall constitute a quorum.

51. Save as otherwise expressly provided in the Act, ordinary questions at meetings of the board shall be determined by a majority of votes of the directors present in person or through video-link, each director having one vote. In case of an equality of votes or tie, the chairman shall have a casting vote in addition to his original vote as a director.

52. Other questions as listed in the Shareholder Agreement, at meetings of the Board shall be determined by unanimity of votes of the director from each Shareholder present.

53. The directors may delegate any of their powers not required to be exercised in their meeting to committees consisting of such member or members of their body as they think fit; any committees formed shall, in the exercise of the powers so delegated, conform to any restrictions that may be imposed on them by the directors.

54. (1) A committee may elect a chairman of its meetings; but, if no such chairman is elected, or if at any meeting the chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as chairman, the members present may choose one of their number to be chairman of the meeting.

(2) A committee may meet and adjourn as it thinks proper. Questions arising at any meeting shall be determined by a majority of votes of the members present. In case of an equality of votes, the chairman shall have and exercise a second or casting vote.

55. All acts done by any meeting of the directors or of a committee of directors, or by any person acting as a director, shall, notwithstanding that it be afterwards discovered that there was some defect in the appointment of any such directors or persons acting as aforesaid, or that they or any of them were disqualified, be as valid as if every such person had been duly appointed and was qualified to be a director.

56. A copy of the draft minutes of meeting of the board of directors shall be furnished to every director within seven working days of the date of meeting.

57. A resolution in writing signed by all the directors – signatures being in the same document or severally – for

the time being entitled to receive notice of a meeting of the directors shall be as valid and effectual as if it had been passed at a meeting of the directors duly convened and held.

FILLING OF VACANCIES

58. At the first Annual General Meeting of the Company, all the directors shall stand retired from office, and directors shall be elected in their place in accordance with section 159 for a term of three years.
59. A retiring director shall be eligible for re-election.
60. The directors shall comply with the provisions of sections 154 to 159 and sections 161, 162 and 167 relating to the election of directors and matters ancillary thereto.
61. Any casual vacancy occurring on the board of directors may be filled up by the directors, but the person so chosen shall be subject to retirement at the same time as if he had become a director on the day on which the director in whose place he is chosen was last elected as director.
62. The General Meeting may remove a director but only in accordance with the provisions of the Act.

DIVIDENDS AND RESERVE

63. The Company in General Meeting shall declare dividends by unanimous decision of the Shareholders.
64. The directors may from time to time pay to the members such interim dividends as appear to the directors to be justified by the profits of the Company, if approved by unanimous decision of the Shareholders.
65. Any dividend may be paid by the Company either in cash or in kind only out of profits. The payment of dividend in kind shall only be in the shape of shares of listed company held by the distributing company.
66. Dividend shall not be paid out of unrealized gain on investment property credited to profit and loss account.
67. Subject to the rights of persons (if any) entitled to shares with special rights as to dividends, all dividends shall be declared and paid according to the amounts paid on the shares.
 - (1) The directors may, before recommending any dividend, set aside out of the profits of the company such sums as they think proper as a reserve or reserves which shall, at the discretion of the directors, be applicable for meeting contingencies, or for equalizing dividends, or for any other purpose to which the profits of the company may be properly applied, and pending such application may, at the like discretion, either be employed in the business of company or be invested in such investments (other than shares of the company) as the directors may, subject to the provisions of the Act, from time to time think fit.
 - (2) The directors may carry forward any profits which they may think prudent not to distribute, without setting them aside as a reserve.
68. If several persons are registered as joint-holders of any share, any one of them may give effectual receipt for any dividend payable on the share.
69. (1) Notice of any dividend that may have been declared shall be given in manner hereinafter mentioned to the persons entitled to share there in but, in the case of a public company, the company may give such notice by advertisement in a newspaper circulating in the Province in which the registered office of the company is situate.
 - (2) Any dividend declared by the company shall be paid to its registered shareholders or to their order. The dividend payable in cash may be paid by cheque or warrant or in any electronic mode to the shareholder sent it led to the payment of the dividend, as per their direction.
70. The dividend shall be paid within the period laid down under the Act.

ACCOUNTS

71. The directors shall cause to be kept proper books of account as required under section 220.
72. The books of account shall be kept at the registered office of the Company or at such other place as the directors shall think fit and shall be open to inspection by the directors during business hours.
73. The directors shall from time to time determine whether and to what extent and at what time and places and under what conditions or regulations the accounts and books or papers of the Company or any of them shall be open to the inspection of members not being directors, and no member (not being a director) shall have any right of inspecting any account and book or papers of the Company except as conferred by law or authorised by the directors or by the Company in General Meeting.
74. The directors shall as required by sections 223 and 226 of the Act cause to be prepared and to be laid before the company in General Meeting the financial statements duly audited and reports as are referred to in those sections.
75. The financial statements and other reports referred to in Article 79 shall be made out in every year and laid before the Company in the annual General Meeting in accordance with sections 132 and 223.
76. A copy of the financial statements and reports of directors and auditors shall, at least twenty-one days preceding the meeting, be sent to the persons entitled to receive notices of General Meetings in the manner in which notices are to be given here under.
77. The directors shall in all respect comply with the provisions of sections 220 to 227.
78. Auditors shall be appointed and their duties regulated in accordance with sections 246 to 249.

NOTICES

79. (1) A notice may be given by the Company to any member, to his registered address or if he has no registered address in Pakistan to the address, if any, supplied by him to the Company for the giving of notices to him against an acknowledgement or by post or courier service or through electronic means or in any other manner as may be specified by the Commission.
- (2) Where a notice is sent by post, service of the notice shall be deemed to be effected by properly addressing, prepaying and posting a letter containing the notice and, unless the contrary is proved, to have been effected at the time at which the letter will be delivered in the ordinary course of post.
80. A notice may be given by the company to the joint-holders of a share by giving the notice to the joint-holder named first in the register in respect of the share.
81. A notice may be given by the company to the person entitled to a share in consequence of the death or insolvency of a member in the manner provided under Article 84 addressed to them by name, or by the title or representatives of the deceased, or assignees of the insolvent, or by any like description, at the address, supplied for the purpose by the person claiming to be so entitled.
82. Notice of every General Meeting shall be given in the manner here in before authorised to (a) every member of the Company and also to (b) every person entitled to a share in consequence of the death or insolvency of a member, who but for his death or insolvency would be entitled to receive notice of the meeting, and (c) to the auditors of the Company for the time being and every person who is entitled to receive notice of General Meetings.

WINDING UP

83. (1) In the case of members' voluntary windingup, with the sanction of a special resolution of the Company, and, in the case of creditors' voluntary windingup, of a meeting of the creditors, the liquidator shall exercise any of the powers given by sub-section (1) of section 337 of the Act to a liquidator in a windingup by the Court including *inter-alia* divide amongst the members, in specie or kind, the whole or any part of the assets of the Company, whether

they consist of property of the same kind or not.

(2) For the purpose a fore said, the liquidator may set such value as he deems fair upon any property to be divided as a fore said and may determine how such division shall be carried out as between the members or different classes of members.

(3) The liquidator may, with the like sanction, vest the whole or any part of such as sets in trustees upon such trusts for the benefit of the contributories as the liquidator, with the like sanction, thinks fit, but so that no member shall be compelled to accept any shares or other securities where upon there is any liability.

INDEMNITY

84. Every officer or agent for the time being of the Company may be indemnified out of the assets of the company against any liability incurred by him in defending any proceedings, whether civil or criminal, arising out of his dealings in relation to the affairs of the company, except those brought by the Company against him, in which judgment is given in his favour or in which he is acquitted, or in connection with any application under section 492 in which reliefs granted to him by the Court.



We, the several persons whose names and addresses are subscribed below, are desirous of being formed into a Company, in pursuance of these articles of association, and we respectively agree to take the number of shares in the capital of the Company 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
ENI International B.V. Through Nominee Kamran Ajmal Mian	33264964 42101-3402641-3	Subscriber Ajmal Mian	Netherlands Pakistan	 Services	Strawinskylaan 1725, 1077 XX Amsterdam, the Netherlands. House no 9-B, 1 East Street, Phase 1 DHA Clifton Cantt Karachi South	48,000 (Forty eight Thousand Shares Only)	
Mujtaba Haider Khan	42201-0492212-1	Ansar Haider Khan	Pakistan	Services	Bhayani Sunview, Gulshan-e-Iqbal, House no 124 Block 11, Karachi Central Pakistan	1 (One Share Only)	
Inam ur Rahman	35201-1378474-9	Fazal Rahmaan	Pakistan	Services	House no 3/300, Sarwar Road, Lahore Cantt	1 (One Share Only)	
Reon Energy Limited Thorough Nominee Mujtaba Haider Khan	0089881 42201-0492212-1	Subscriber Ansar Haider Khan	Pakistan Pakistan	Services	Dawood Centre, M.T. Khan Road, Karachi Bhayani Sunview, Gulshan-e-Iqbal, House no 124 Block 11, Karachi Central Pakistan	71,998 (Seventy One Thousand Nine Hundred and Ninety Eight Shares Only)	
		Total number of shares taken (in figures and words)				120,000 (One Hundred and Twenty Thousand Shares Only)	

Dated the 7th day of August, 2018

Annexure A

Form for Transfer of Shares
(First Schedule to the Companies Act, 2017)

I.....s/o..... r/o.....(hereinafter called "the transferor") in consideration of the sum of rupees..... paid to me by.....s/o..... r/o..... (here in after called "the transferee"), do here by transfer to the said transferee.....the share (or shares) with distinctive numbers fromto.....inclusive, in the **GRID EDGE (PRIVATE) LIMITED**, to hold unto the said transferee, his executors, administrators and assigns, subject to the several conditions on which I held the same at the time of the execution hereof, and I, the said transferee, do here by agree to take the said share (or shares) subject to the conditions afore said.

As witness our hands this.....day of....., 20....

Signature.....
Transferor
Full Name, Father's/Husband's Name
CNIC Number(in case of foreigner,
Passport Number)
Nationality
Occupation and usual Residential Address

Signature.....
Transferee
Full Name, Father's/Husband's Name
CNIC Number(in case of foreigner,
Passport Number)
Nationality
Occupation and usual Residential Address
Cell number
Land line number, if any
Email address

Witness 1:

Signature.....date.....
Name, CNIC Number and Full Address

Witness 2:

Signature.....date.....
Name, CNIC Number and Full Address

Bank Account Details of Transferee for Payment of Cash Dividend
(Mandatory in case of a listed company or optional for any other company)

It is requested that all my cash dividend amounts declared by the Company, may be credited into the following bank account:

Title of Bank Account	
Bank Account Number	
Bank's Name	
Branch Name and Address	

I stated that the above mentioned information is correct and that I will intimate the changes in the above-mentioned information to the Company and the concerned Share Registrar as soon as these occur.

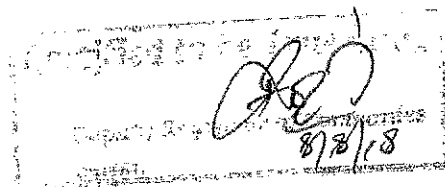
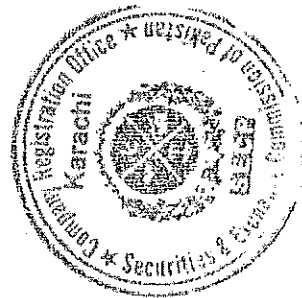
.....
Signature of the Transferee(s)

Annexure B

INSTRUMENT OF PROXY

XXXXXXX (Private) Limited

"I.....s/o.....r/o.....
 being a member of the **GRID EDGE (PRIVATE) LIMITED**, hereby
 appoints/o.....r/o..... as my proxy
 to attend and vote on my behalf at the (statutory, annual, extraordinary, as the case may be) General Meeting of the
 Company to be held on the.....day of....., 20.....and at any adjournment thereof."



ANNEXURE – 6

3(5)(b) Profile of experience of the applicant its management, staff and its members in power sector.

Grid Edge Private Limited

The applicant Grid Edge Private Limited is Joint Venture between REON Energy Limited and Eni.

The electricity market is changing fast. Technology advancements, evolving consumer preferences, and new policies are leading to a surge of adoption of solar, energy storage, microgrids, electric vehicles, and other new energy technologies. These distributed energy resources are forcing new models to rethink how the energy market works, consequently, new models for customer energy management, grid infrastructure and electricity market design are arising to address these changes.

The Company, has been incorporated by the two partners to bring innovation in the energy market by providing power purchase agreements via renewable technologies to private sector and public-sector customers in Pakistan by setting up Solar PV plants on the site of the customer by offering hybrid or grid tied solutions.

This allows savings on transmission infrastructures to the government of Pakistan and allows customers to take advantage of cheaper renewable power without having to undertake expensive capex on its own accord as asking clients to undertake expensive capex on technology, which has capacity risk, has inhibited the growth of this industry in Pakistan even with all the great effort of NEPRA and Ministry of Water and Power to unlock the value of Solar in Pakistan.

Accordingly, the company has decided to apply for a generation license for its proposed project with P&G Pakistan.

Reon Energy Limited

Reon Energy Limited, a wholly owned subsidiary of Dawood Lawrencepur Limited is renewable solar energy arm of Dawood Group looking after the solar energy business for the Group and is in the process of crafting the best possible business portfolio within the solar energy realm for better long term shareholder returns.

REON is the largest solar national leading EPC (Engineering, Procurement and Construction) solution providers in Pakistan. These solutions include designing of system, procurement of material from distinct manufacturers and construction of complete PV System (on-grid and hybrid) to deliver cost effective & trustworthy solutions.

Projects have been delivered at various sites with projects greater than 1MW for a variety of customers, including Servis Industries, Kohinoor Textiles and Nobel Energy - a part of the Wah Nobel Group. The Company with an installed distributed captive capacity of over 10MW in the C&I sector with further 15 MW underway, is now recognized as the leader in high quality installations whilst providing customers with clean energy and minimizing their energy price risk.

Since inception, REON has focused on supply chain management and engineering collaborations to bring in efficiencies, which have ultimately benefited customers. The Company is now directing all focus to the high-growth areas in the solar energy space. Solar energy solutions help provide energy security and minimize energy costs for businesses. In addition, renewable energy addresses environmental concerns regarding carbon emissions and greenhouse gases. These factors together with declining prices of solar generation equipment indicate a huge potential in the market.

Reon Energy believes in adhering to the highest levels of safety for all stakeholders; customers, staff, contractors. Company safety policies and procedures are strictly complied with and zero tolerance is exercised for misdemeanors. As a step towards reaffirming its safety commitment, the Company successfully obtained ISO 14001 Certification.

Eni

Eni International B.V. is a wholly owned subsidiary of an Italian company, Eni S.p.A. (Eni), which is one of the world's largest integrated energy company. Eni is operating in 71 countries worldwide and employing around 33,000 people. As of March 31, 2018, the company's market capitalisation was calculated at \$64 billion. Eni is consistently ranked among the top 150 companies on the Fortune Global 500 list according to revenue.

Eni is engaged in oil and natural gas exploration, field development and production, as well as in the supply, trading and shipping of natural gas, LNG, electricity and fuels, and operates across the entire energy chain (including Renewable Energy).

Eni places about 25 TWh of production on the Italian market each year with bilateral sales and sales on the energy market. Eni is the second producer of electricity in Italy with a share of 9% of Italian electricity production. Eni is one of the market leaders in the services and dispatching market (MSD), thanks to the flexibility of its generating fleet. As of December 2017, Eni installed operational capacity of electricity production is 4,700 MW.

Eni is working closely with all the stakeholder towards improving access to energy in the countries where it operates and making maximum effort to reduce direct emissions of CO₂. With these goals in mind Eni launched a new business unit called Energy Solutions Department (DES) in November 2015 to lead the energy transition process of the group towards a low carbon future by introducing renewable energies development at industrial level as part of the Company core business.

In this regard, different development projects, both solar and wind, have been identified in countries of strategic interest in which Eni already operates both in Italy and abroad. Eni is currently developing a 50MW wind project in Kazakhstan and a number of cooperation/framework agreements have also been executed with the Northern Territory in Australia, Pakistan, Ghana, Angola, Algeria, Tunisia and Egypt, in order to strengthen Eni's historic presence in those territories and to expand the company's sphere of activities in the field of Renewables.

Profile of Experience of Applicant (Grid Edge Pvt Ltd)

Mujtaba Haider Khan

Chief Executive Officer

Mujtaba is CEO of Reon Energy Limited since 2016 and has also served as the Head of Strategy for Dawood Hercules Corporation Limited. Before that, he worked as the Head of Strategy and Transformation for BT Fleet, a wholly-owned subsidiary of British Telecom in London. Mujtaba has led BT in a range of commercial and transformation roles including as Project Director in Global Services Division and as the Head of Procurement for the UK wide fiber rollout program. Mujtaba holds his BS in Computer Systems Engineering and an MBA from Cranfield School of Management. His area of expertise includes Growth Strategy, Start-up, and Cost Transformation.

Inam-ur Rehman

Director

Inam ur Rahman is currently the Chief Executive Officer of Dawood Hercules Corporation. In the recent past, he has led the renewable businesses of the group as CEO of Reon Energy Limited and has set up a 50MW wind power plant Tenaga Generasi Limited. With more than 25 years of professional experience Mr. Rahman has expertise across a spectrum of industries including renewable energy, foods, textiles, fashion & apparel, lifestyle, and business consulting.

His present portfolio of directorships includes Engro Corporation Limited, Hub Power Company Limited and Cyan Limited. He has earlier also served as a director on the Boards of Sui Northern Gas Pipelines Limited, Dawood Lawrencepur Limited, Sind Engro Coal Mining Company, Laraib Energy Limited, SACH International Limited, and Pebbles Private Limited.

Kamran Mian

Director

Kamran Mian is currently working with Eni Pakistan Limited as Commercial and Business Development Manager. He is a Chartered Accountant from England and has more than 25 years of multi-dimensional work experience in the fields of Finance, Commercial Negotiations, External Affairs and Business Development, including over 10 years of foreign experience in the United Kingdom, Saudi Arabia and Libya. He is the lead negotiator for Eni Pakistan Limited for past 8 years and has helped the company in closing major negotiations successfully.

3(5)(g)(a) The type, technology,
model, technical details and
design of the facilities
proposed to be acquired,
constructed, developed or
installed

Type, Technology, Model, Technical Details and Design of facility

- Polycrystalline 330W Solar Modules with efficiency 17% are used in the design
- 60KW grid connected solar inverters, 400V three phase, 98.7% have been considered
- Step up Transformers 0.4 / 11KV ONAN are used
- Medium Voltage Switchgears 11KV / 630A
- System will be connected to 11KV Bus Bar of P&G Hair Care Plant's electrical room
- DC/AC Ratio of 1.23 for Inverters has been considered
- Maximum AC output of the system is assumed to be 1620 KW
- Output of the system is based on instantaneous Irradiation values of Solar Energy
- 7 Acres of land area required for the installation of solar plant

Bill of Materials:

S. No.	Components	Qty (No.)
1	Polycrystalline Solar Modules 330W	6080
2	Grid Connected Solar Inverters 60KW 3 Phase	27
3	0.4 / 11KV Step up Transformers	2
4	Medium Voltage Switchgears	3
5	Solar Energy Control System for Grid Feed in Control	1

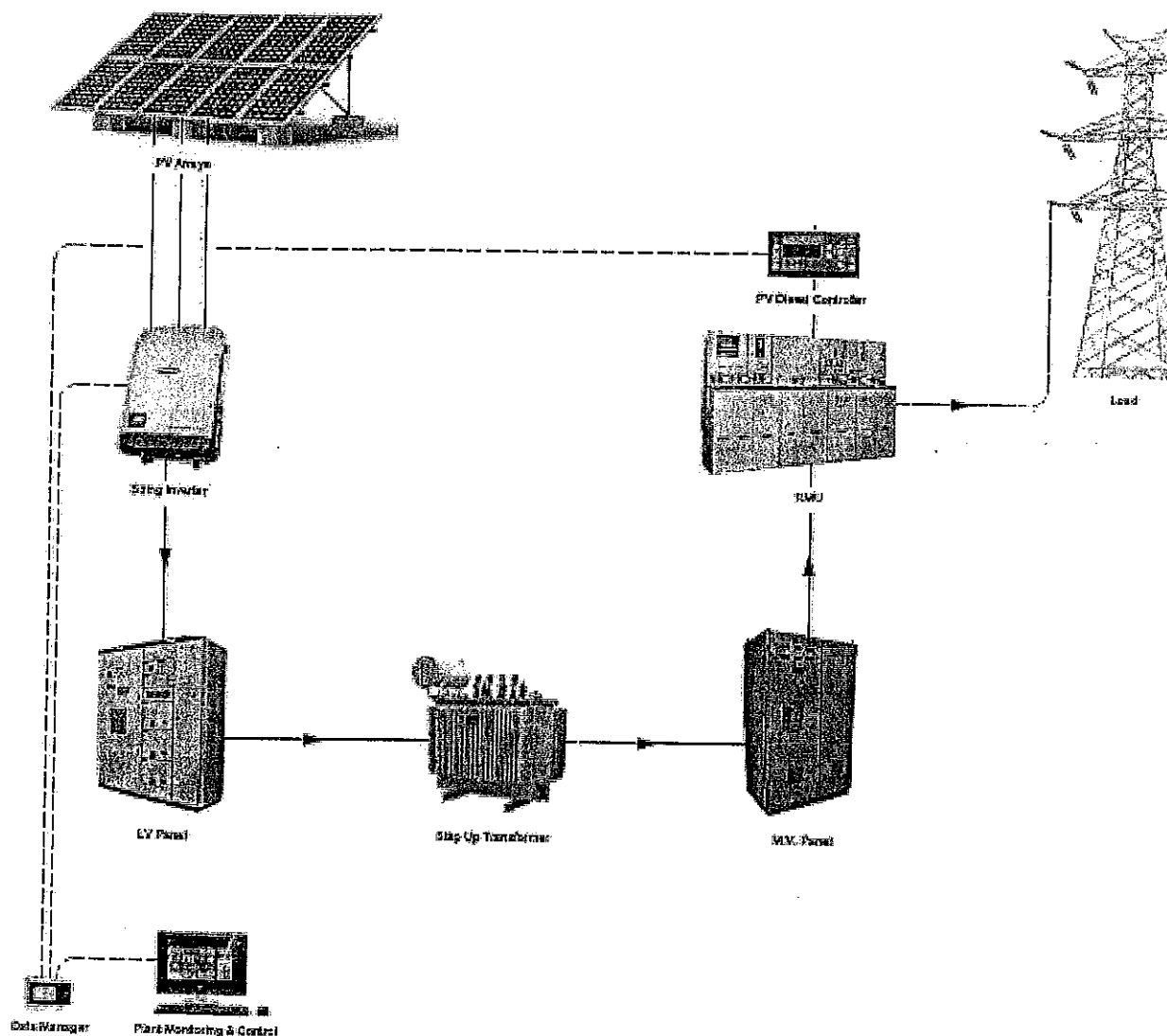
Energy Generation:

S. No.	Efficiency Parameters	
1	Performance Ratio of the System	79.19 %
2	Capacity Utilization Factor	17.2%
3	Energy Generation Units	3,169,000 KWh

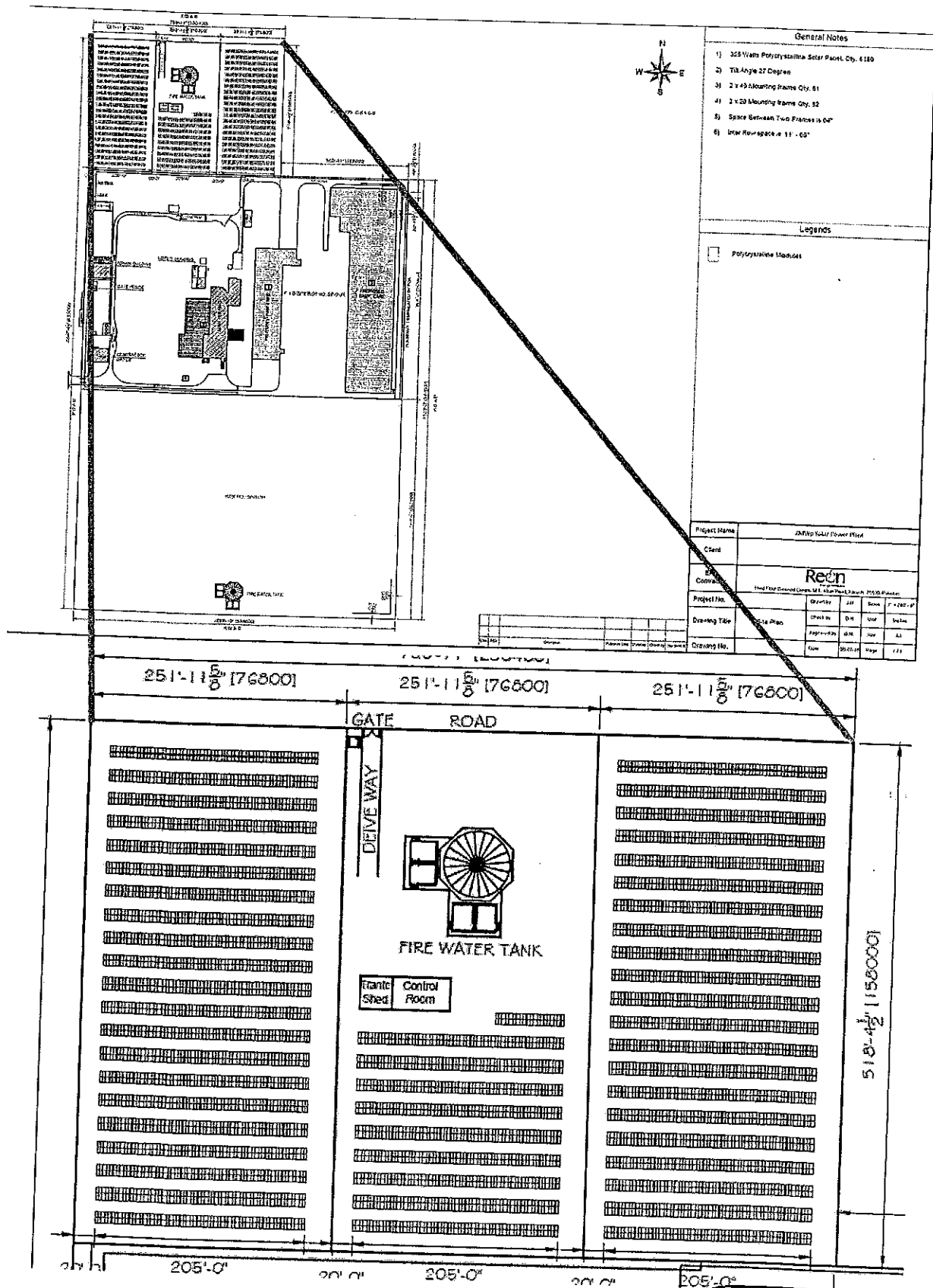
Technology used

S.No.	Parameters		Qty
1	Technology	Solar Photovoltaic (SPV)	
2	Size of Plant	2MW	
3	Solar Modules	Polycrystalline Solar Modules 330W GCL or Tier 1 Equivalent	6080
4	Inverter	Sungrow 60KW Grid Connected Inverter	27
5	Transformers	1000KVA 0.4 /11KV ONAN Transformers Siemens or Equivalent	2
6	Medium Voltage Switchgears	11KV 630 Amps 25KA Siemens or Equivalent RMU Type	1

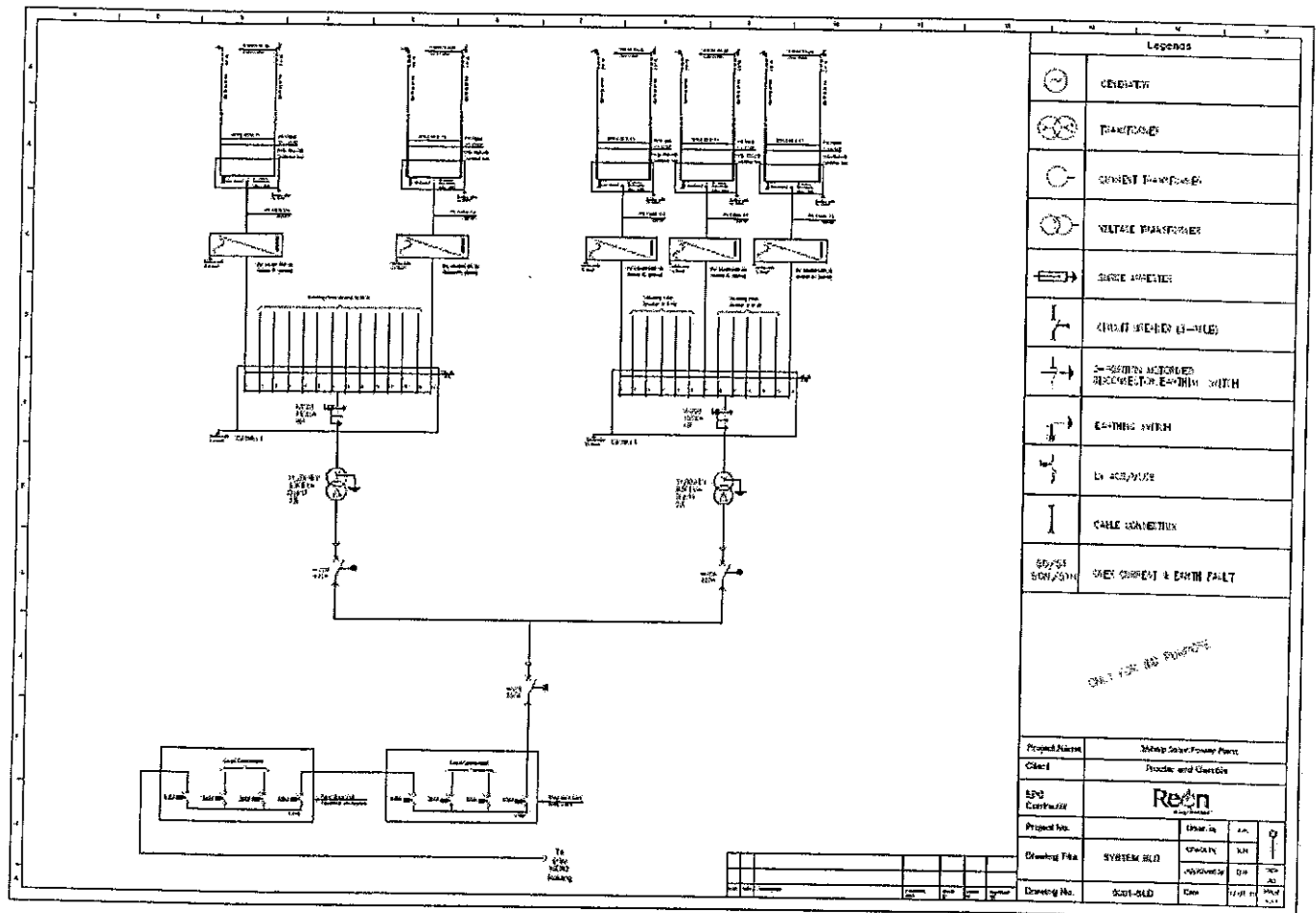
Conceptual Design



General Layout



SLD



Data Sheet (PV)



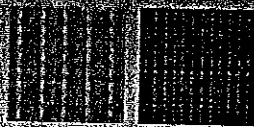
GCL-P6/72

GCL-P6/72H

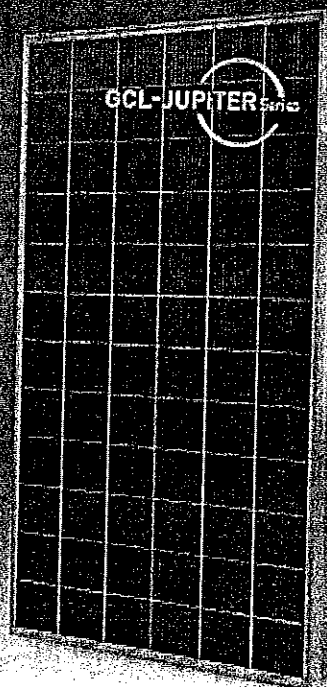
Polycrystalline Module

325-360W

Cell Type



✓ Ideal choice for large scale ground installation

**360W**

Maximum Power Output

18.6%

Maximum Module Efficiency

0~+5W

Power Output Guarantee



High conversion efficiency due to top quality wafers and advanced cell technology



Selected encapsulating material and stringent production process control ensure the product is highly PID resistant and snail trails free



Sand blowing test, salt mist test and ammonia test passed to endure harsh environments



Optimized system performance due to module level current sorting



Special cell process ensures great performance under low irradiance conditions...



Highly transparent self-cleaning glass brings additional yield and easy maintenance

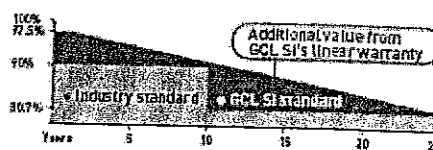
Company Introduction

GCL System Integration Technology Co. Ltd (002506 Shenzhen Stock) (GCL System) is part of GOLDEN CONCORD Group (GCL) which is an international energy company specializing in clean and sustainable power production. The group, founded in 1993 now employs 30,000 people.

GCL Delivers Reliable Performance Over Time

- World-class manufacturer of crystalline silicon photovoltaic modules
- Fully automatic facility and world-class technology
- Rigorous quality control to meet the highest standards: ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007
- Tested for harsh environments (salt mist, ammonia corrosion and sand blowing test: IEC 61701, IEC 62716, DIN EN 60068-2-68)
- Long term reliability tests
- 2*100% EL inspection ensuring defect-free modules

Linear Performance Warranty



10 Years Product Warranty 25 Years Linear Power Warranty

* Please refer to GCL standard warranty for details

Additional Insurance Backed by Swiss RE



* Please refer to GCL for details

Bringing Green Power To Life

en.gcl.com

GCL-P6/72
GCL-P6/72HGCL-Jupiter Series
Polycrystalline Module

325-360W

Electrical Specification (STC)

Maximum Power	Power(W)	325	330	335	340	345	350	355	360
Maximum Power Voltage	Vmp(V)	37.65	37.80	38.00	38.20	38.39	38.70	39.19	39.38
Maximum Power Current	Imp(A)	8.64	8.73	8.82	8.90	8.97	9.03	9.09	9.15
Short Circuit Current	Isc(A)	9.24	9.33	9.41	9.49	9.51	9.63	9.74	9.80
Open Circuit Voltage	Voc(V)	45.40	45.70	45.80	46.00	47.30	47.60	47.90	48.20
Module Efficiency	(%)	18.3%	17.8	17.3	17.5	17.8	18.0	18.3	18.4
Power Output Tolerance	(W)	±3%							

* Irradiance 1000W/m², Module Temperature 23°C, Air Mass 1.5

Electrical Specification (NOCT)

Maximum Power	Power(W)	260.82	263.64	267.79	271.32	275.59	279.93	284.92	288.79
Maximum Power Voltage	Vmp(V)	34.65	34.70	34.90	35.10	35.50	35.70	36.00	36.30
Maximum Power Current	Imp(A)	6.94	7.03	7.10	7.16	7.23	7.28	7.33	7.37
Short Circuit Current	Isc(A)	7.47	7.54	7.61	7.67	7.77	7.87	7.97	7.97
Open Circuit Voltage	Voc(V)	42.00	42.70	42.90	43.30	43.80	44.50	44.70	44.80

Mechanical Data

Solar Cell Type	Poly 156.75×156.75 mm
Number of Cells	72 Cells (6×12)
Dimensions of Module L×W×H (mm)	1956×992×35mm (W×H×L) ±0.5mm ±1.35 inches
Weight (kg)	22.2 kg
Glass	High transparency solar glass 3.2mm (0.13 inches)
Backsheet	White
Frame	Aluminum anodized aluminum alloy
J-Box	UV6 Rated
Cable	4 Bundles (3×0.35 inches ² 1, 1200mm (23.6 inches))
Number of J-Boxes	3
Wind Snow Load	2400Pa/5.02kPa*
Connector	MCA Compatible

* For more details please check the technical manual of GCL

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	45±2°C
Temperature Coefficient of Pmax	-0.41%/°C
Temperature Coefficient of Voc	-0.23%/°C
Temperature Coefficient of Isc	+0.035%/°C

Packaging Configuration

Module per box	30 pieces
Module per 40' container	720 pieces

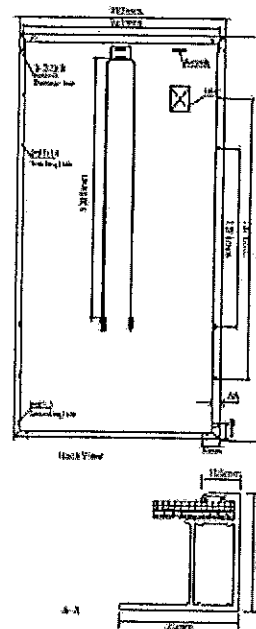
Maximum Ratings

Operational Temperature	-40~+85°C
Maximum System Voltage	1000V DC
Max System Power Rating	1000V DC-10A

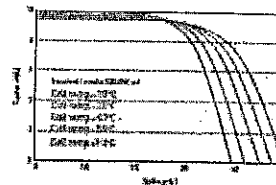
Optional

Connector: ☐ Original MCA

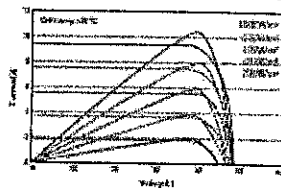
Module Dimension



U-I Curve at Different Temperature (350W)



U-V-P Curve at Different Irradiation (350W)



CAUTION: READ INSTRUCTIONS AND SAFETY RULES BEFORE USING THE PRODUCT



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Bringing Green Power To Life

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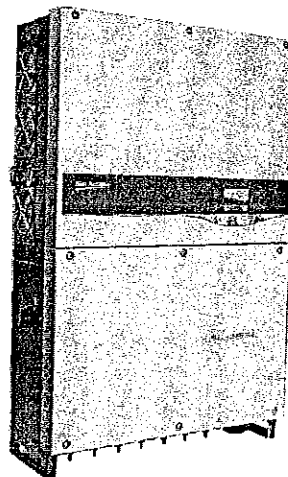
Datasheet (Inverter)

SUNGROW



SG60KTL

String Inverter



High Yield

- Max. efficiency 98.9 %, European efficiency 98.7 %
- Long-term overload at 1:1 Pn
- Full power operation without derating at 50 °C



Easy O&M

- Compact design and light weight for easy installation
- Plug-in design of fan and SPD, convenient for on-site maintenance
- Integrated string current monitoring function for fast trouble shooting



Saved Investment

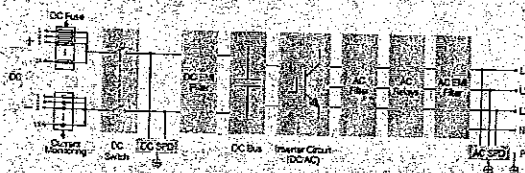
- Max. DC/AC ratio up to 1.4
- Integrated DC combiner box and DC/AC overvoltage protection



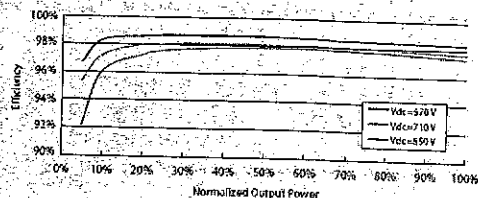
Grid Support

- Compliance with standards: IEC 62109, IEC 61727, IEC 62116, VDE0126-1-1, G59/3, VDE-AR-N-4105, VDE-AR-N-4120, BDEW
- Low/High voltage ride through (L/HVRT)
- Active & reactive power control and power ramp rate control

Circuit Diagram



Efficiency Curve



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SG60KTL

Input (DC)	
Max. PV input voltage	1000 V
Min. PV input voltage / Startup input voltage	570 V / 620 V
Nominal input voltage	710 V
MPP voltage range	570 – 950 V
MPP voltage range for nominal power	570 – 850 V
No. of independent MPP inputs	1
Max. number of PV strings per MPPT	14
Max. PV input current	120 A
Max. current for input connector	12 A
Max. DC short-circuit current	140 A
Output (AC)	
AC output power	66000 VA @ 45 °C / 60000 VA @ 50 °C
Max. AC output current	96 A
Nominal AC voltage	3 / N / PE or 3 / PE, 230 / 400 V
AC voltage range	310 – 480 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 65 Hz, 60 Hz / 55 – 65 Hz
THD	< 3 % (at nominal power)
DC current injection	< 0.5 % In
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading – 0.8 lagging
Feed-in phases / Connection phases	3 / 3
Efficiency	
Max. efficiency / Euro. efficiency	98.9 % / 98.7 %
Protection	
DC reverse connection protection	Yes
AC short-circuit protection	Yes
Leakage current protection	Yes
Grid monitoring	Yes
DC switch / AC switch	Yes / No
DC fuse	Yes (positive, 15A)
PV string current monitoring	Yes
Overvoltage protection	DC Type II / AC Type III
General Data	
Dimensions (W*H*D)	634*959*267 mm
Weight	60 kg
Isolation method	Transformerless
Degree of protection	IP65
Night power consumption	< 1 W
Operating ambient temperature range	-25 to 60 °C (> 50 °C derating)
Allowable relative humidity range (non-condensing)	0 – 100 %
Cooling method	Smart forced air cooling
Max. operating altitude	4000 m (> 3000 m derating)
Display / Communication	Graphic LCD / RS485
DC connection type	MC4 (Max. 6mm ²)
AC connection type	Screw clamp terminal (Max. 95 mm ²)
Compliance	IEC 62109, IEC 61727, IEC 62116, IEC 60068, IEC 61683, VDE0126-1-1, G59/3, VDE-AR-N-4105, VDE-AR-N-4120, BDEW, IEC 61000-3-11/-12, EN 50438, UTE C 15-712-1/07.13, CEA, PEA, MEA LVRT, HVRT, active & reactive power control and power ramp rate control
Grid support	
Type designation	SG60KTL-182



ANNEXURE – 15

3(5)(h) Feasibility Report

FEASIBILITY REPORT

P&G 2 MW Solar Power Plant

Executive Summary:

P&G Solar Solution is a 2MW On-Grid Solar PV Power Plant which is to be installed in P&G factory at Port Qasim, Karachi. The DC installed capacity of the plant is proposed by critically analyzing the current load and future load projections of the site. Main objective of this Solar plant is to provide smooth low-cost energy production from solar plant.

In a move that speaks of the confidence multinationals have in Pakistan's economy, Proctor and Gamble Pakistan has decided to enter into 15-year Power Purchase Agreement for its factory in Port Qasim where in addition to its home care products, the company also intends to start local production of its bestseller Pampers brand.

For this energy project, the company has partnered with Grid Edge, a company backed by energy conglomerate Dawood Hercules, and ENI, one of the biggest names in oil and gas internationally, with Reon Energy chosen as the preferred EPC partner.

Introduction:

This report has the objective to assess the feasibility of this project and is structured as follows:

- Introduction to Solar
- Solar Potential in Pakistan
- Project Overview
- Site Overview
- Conceptual Design
- Environmental Benefits
- Socio Economic Benefits
- Technical Summary

Introduction to Solar:

Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect.

Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by an off-grid rooftop PV system.

As the cost of solar electricity has fallen, the number of grid-connected solar PV systems has grown into the millions and utility-scale solar power stations with hundreds of megawatts are being built. Solar PV is rapidly becoming an inexpensive, low-carbon technology to harness renewable energy from the Sun.

The productivity of solar power in a region depends on solar irradiance, which varies through the day and is influenced by latitude and climate.

The locations with highest annual solar irradiance lie in the arid tropics and subtropics. Deserts lying in low latitudes usually have few clouds and can receive sunshine for more than ten hours a day. These hot deserts form the Global Sun Belt circling the world. This belt consists of extensive swathes of land in Northern Africa, Southern Africa, Southwest Asia, Middle East, and Australia, as well as the much smaller deserts of North and South America. Africa's eastern Sahara Desert, also known as the Libyan Desert, has been observed to be the sunniest place on Earth according to NASA.

Solar Potential in Pakistan:

Increasing demand of power in the domestic, commercial and industrial sectors as Pakistan's population and its economy continue to expand—with annual GDP growth forecasts averaging 6 percent for the medium term. Currently, electricity consumption is severely suppressed by supply shortfalls and persistent load shedding, and there also exist significant levels of latent demand in the country as rising income levels allow more people to switch to electricity from using traditional fuels. The validity of the assumption that electricity use in Pakistan remains constrained due to availability—rather than access—issues is borne out by the fact that the penetration of the power network in the country is the highest in the South Asian region at 93.6 percent, as compared to 88.7 percent in Sri Lanka, 78.7 percent in India, 76.3 percent in Nepal, and 59.6 percent in Bangladesh.

Pakistan's per capita electricity consumption is currently significantly lower in comparison to other countries in a similar development stage, and much below that of OECD countries. Per capita electricity consumption is strongly correlated with the human development index (HDI), and the current trends of rising incomes and energy supplies, falling poverty levels, and increasing economic activity are predicted to lead to rapid increases in per capita consumption rates in Pakistan, creating a healthy demand for additional power generation.

Even with the projected surplus in power generation capacity by 2020, there will still be sufficient economic feasibility for small and medium-sized (50-100 MW) renewable energy-based power projects in the Pakistan, especially those located near remote and isolated load centers and extremities of the grid network or based on bilateral bulk contracts or for augmenting peak supplies on the grid. The viability of such projects will be further enhanced by the continued decline in technology prices and the emphasis by the government on indigenous energy resources that also help the country meet its environmental objectives and reduce carbon emissions.

Project Overview:

Proctor and Gamble Pakistan in 2010 moved production of its detergents in Pakistan, marking a move to grow its business locally. Since then, its electricity requirement has been on a high growth and will continue to do so as it serves a high-growth population with a growing middle class. In light of this confidence in the economy, P&G Pakistan is also choosing to localize production of its child care products.

In light of the above considerations and expected rise in electricity prices in Pakistan especially owing to a devaluing currency, P&G Pakistan is partnering with Grid Edge to purchase more than 3 million units of electricity at highly competitive rates to deliver savings to the multinational.

Project Rationale:

P&G Pakistan is partnering with Grid Edge to purchase more than 3 million units of electricity at highly competitive rates to deliver savings to the multinational.

Due to falling solar prices internationally and the presence of a strong EPC contractor in Pakistan, Reon Energy, the multinational P&G decided to solicit proposal for a 15 year energy sale agreement structured as a Power Purchase Agreement. The electricity will be sold by the company Grid Edge and deliver savings for each unit of electricity sold, which will be on Take or Pay terms.

The financing will be a combination of debt and equity capital with the terms and tariff set at a level to ensure substantial savings for the customer while ensuring reasonable returns for providers of capital.

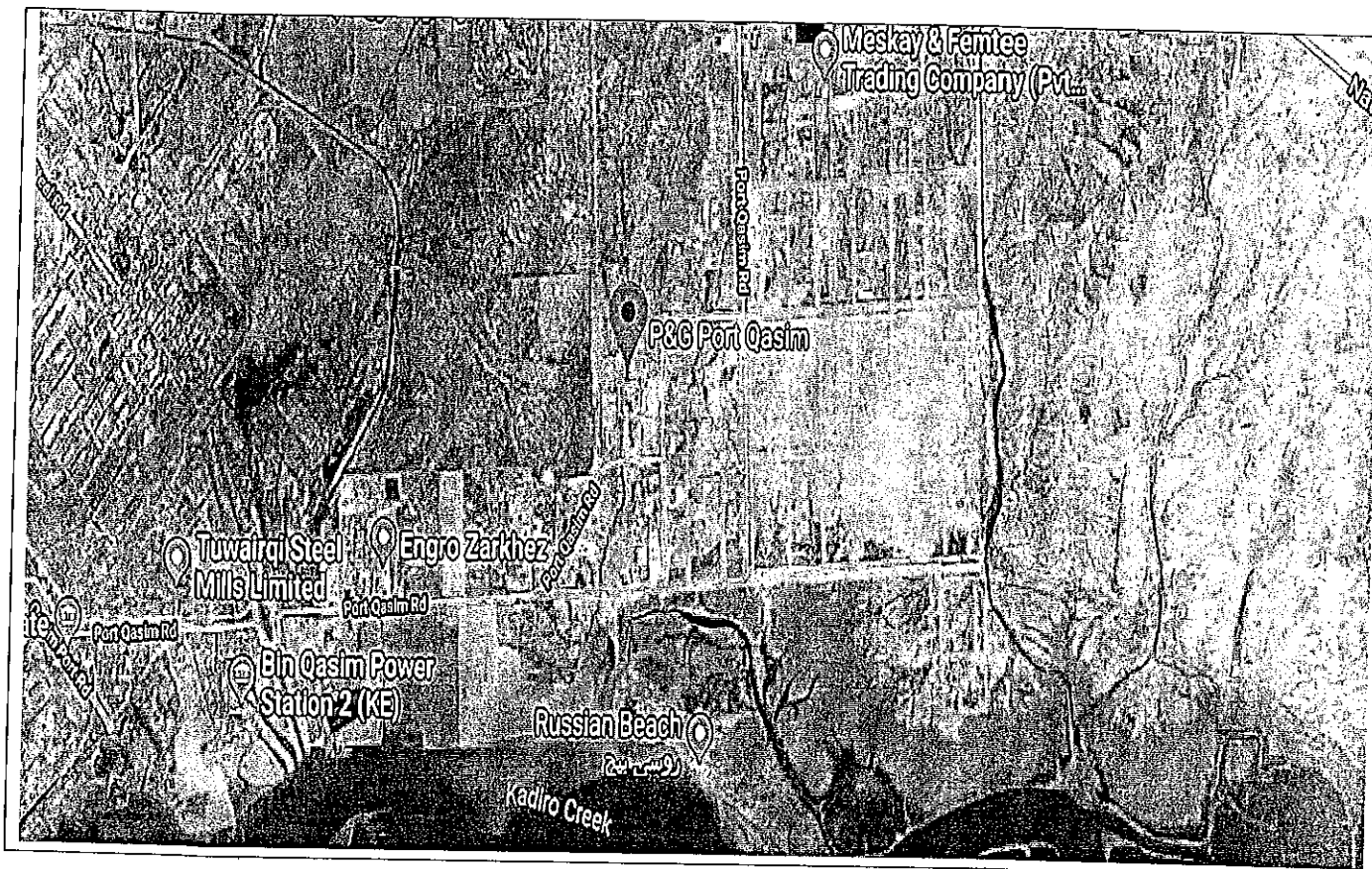
The contractors through EPC and O&M contracts will ensure performance of the system throughout the contract term, 15 years.

Technology

- Solar based Power Generation System, civil structures and Auxiliaries.
- Complete Solar Based Power Generating Panels with their protection, instrumentation, monitoring, control and grid feed in protection.
- 11kV Cable for interconnection with the 11kV Switchgear located in Hair Care plant's electrical room as shown in the drawings attached here. Also, various control cables required within the Power Plant or external to it for interfacing 11kV Switchgear or sensors or any other sub-systems including cable trenches, raceways, etc.
- All technical parameters including but limited to net efficiency, net output, power plant availability, construction of power plant building including all facilities as well as all related sub-systems such as:
 - Electrification and lighting systems
 - c. Emergency Lighting System, etc.
 - d. Fire Protection System w.r.t NFPA Standards
- The installed system shall meet applicable codes and standards. Safety signage and labelling should be mounted on the system as required.
- All Solar Panels shall be made of Crystalline Silicon solar cells.
- Contractor must install PV modules of highest efficiency in consideration with Solar map of Karachi, Port Qasim to utilize the day time effectively in all weather conditions.
- All the electrical installations and wiring for the PV system in accordance with codes and standards.

Project Location

The project will be located within the P&G factory in Port Qasim, Karachi.



Operations and Maintenance Costs

The project also includes 24/7 O&M of the complete Power Plant including all its related systems and equipment. The O&M services shall be carried out for a period of 15 years (180 Months).

1. Provision of all manpower as duly approved by the Company.
2. Provision of all consumable material and parts.
3. Provision of all routine and preventive maintenance parts.
4. Full costs relating to any repairs and replacements due to defects in the or break down of the equipment and systems strictly in accordance with OEMs requirements. The cost shall also include all dismantling, handling, shipment, etc.
5. Provision of all lubricating oils, greases, coolants, rust inhibitors, and any other items as recommended by the original equipment manufacturers (OEMs).
6. Provision of all emergency spare parts as per the recommendations of the OEMs or as directed by the Company.
7. Capital and Operational spares for 02 years to be kept in the inventory which will handed over to Company at the end of the Project.

It's specifically pointed out that the O&M shall also be inclusive of following as incurred throughout the O&M contract period

1. Vehicles and their drivers for travel within and outside the Project site, including purchase, insurance, taxes, etc. relating to vehicles, their O&M and safety.
2. All return travel costs of company's personnel coming from abroad (if required).
3. Medical expenses, insurance, etc. as required on company's personnel.
4. Regular monitoring of requirements of all necessary items for O&M and arrangements for their timely availability at site.
5. Reporting on all aspects of Power Plant operation and performance.

Feasibility & Financing:

The Project will cost approximately PKR One Hundred Sixty Eight Million One Hundred Twenty Eight Thousand Nine Hundred Forty Three.

Total Major Components Cost	109,555,658
Total Local Supply and Service Cost	44,847,814
Service and Development Expenses	12,150,289
O&M Equipment	1,575,182
Total - PKR	168,128,943

Whilst the sponsors of Grid Edge have some of the strongest balance sheet from any corporate in Pakistan and can finance the project on 100% equity it is expected to be funded from a combination of Equity and Debt as the group has adequate banks lines.

Site Overview:

The proposed project site is in the Eastern Zone of Port Qasim, Sindh. The size of the plot is 158m x 230m (8.9 Acres). Solar plant covering an area of around 7 Acre and has a geographical coordinates of 24° 48' 21.65" N and 67° 24' 6.89"E. The proposed site is approximately 3 km southeast of Arabian Sea Country Club, 5 km south of Pipri Railway station, 5 km southwest of Textile Institute of Pakistan, 1.5 km northeast of ICI PTA Plant, 1.1 km northeast of Mac Pack facility, 0.75 km northwest of Raiwind Chemicals, and 6 km southwest of National Highway. The area is generally flat with average elevation of 16±1.0 meters from mean sea level. Few depressions are present in the area with a depth varying up to 2 meters.

The prediction of the potential earthquake is mainly attributed to the presence of active faults in the area. There are four active faults near Karachi and its vicinity. These have been estimated at IX to X intensity at Modified Mercalli (MM) Scale and up to 7.6 magnitude (M) of Richter Scale. The seismic potential of this fault over its full length (225 km) is estimated by several seismologists ranging from 7.7 to 8.2 M. The Pub Fault is an active thrust fault oriented roughly north south. The seismic potential of Pub Fault is over its entire length (135 km) and is estimated to be 7.2 to 7.8 M.

The climate in Karachi is moderate, sunny with up to 83 % mean relative humidity during summer months. The mean relative humidity decreases during winter to 40 %. The mean maximum summer air temperature is 96.8° F (37° C), while the mean minimum winter air temperature is 50.7° F (11.5°C).

Wind blows throughout the year with highest velocities occurring during summer months, when the direction is primarily from southwest to west. During winter, the wind blows from north to northeast, shifting southwest to west during the evening hours. The wind usually carries sand and salts resulting in severe erosion and corrosion. Wind speeds have been observed to range between 3 to 15 m/s.

Cyclone storms in the Arabian Sea generally move in a west-north-westerly direction. However, Karachi area does not fall within the zone of major cyclone activity of the Arabian Sea. There have been a total of 87 cyclone storms in the last 69 years and an average of 10 thunderstorms per year. Karachi lies in a relatively arid zone, experiencing only a few inches of rain during the summer months. Average rainfall during the peak month of July is about 3 inches out of the annual mean of 7.7 inches.

Environmental Benefits:



This system will help substitute the main generation source i.e. Gas fired plant of DISCO, curtailing the emissions. Annual CO₂ emission reduction is 5,123 metric tonnes per year. This is equivalent to the CO₂ sequestration done by planting 65000 trees per year.

A life cycle assesment of the CO₂ produced by solar PV is 410g per kWh as opposed to 700g CO₂ per kWh for gas fuel

Reference: Life cycle greenhouse gas emission of energy sources.

https://en.wikipedia.org/wiki/Life-cycle_greenhouse-gas_emissions_of_energy_sources

Socio Economic Benefits:

Renewable energy technologies have experienced rapid deployment over the past few years, mainly driven by the ambition to improve energy security, enhance energy access and mitigate climate change. Many countries are now exploring ways to stimulate social and economic growth through the development of the renewable energy sector. Investment in renewable energy can generate new sources of growth, increase income, improve trade balances, contribute to industrial development and create jobs.

Upon commissioning of a solar project, the economic benefit of the solar plant starts with the savings on foreign exchange for import of fossil fuel and reduction of transmission and distribution losses of the local utility.

This project will provide employment to semi-skilled and unskilled labor for cleaning and maintenance work at the plant, and they would also receive training.

Conceptual Design:

Generation Voltage:

Solar power plant will be generating AC power at Low voltage levels of 400V 4W+PE system. Low voltage level will then step up through power transformers to incoming Voltage levels i.e. 11KV to be synced with existing electrical network.

Power Factor & Frequency

P&G solar power plant is using solar grid connected string Inverters of 60KW each to convert DC power of solar panels to Alternating Power. The range of Power Factor can be set from 0.8 – 1 leading /lagging, making it suitable for absorbing or delivering reactive power. The nominal power factor for Inverters is 0.99 and nominal Frequency of generation is 50Hz.

Reverse Feed in protection at 11KV Incomer Panel

The Automatic Sustainable Controller (DEIF ASC-4) is a controller designed to serve as a link between sustainable power plant (Solar) and 11KV incoming grid, combining to work as sync system.

Ramp rate of inverters is the function of MPPT algorithm. Normally solar power is set to ramp up or ramp down the generation within the period of 5-10 seconds from 0 – 100 percent. Ramp rate can be adjusted according to the load variation of the facility.

Metering and Protection:

The distance between solar field and point of common coupling (POCC) has been calculated as 500 meters approximately. The metering of solar units will be performed at the main 11KV load bus bar. It is designed that all auxiliary loads will be connected before the point of connection to get the true reading for energy being evacuated into 11KV grid.

Sensitivity Class for meter is 0.5 M5 with bidirectional 4 quadrant calculations algorithm. Features including, total import and export units can be extracted over the period, TOD calculations, MDI, active and reactive power calculations, Et al.

2 MWp Solar power plant will be terminated on a single RMU unit having following protections for the line and load side;

- Over and Under voltage protections (at Inverters' end)
- Short Circuit protections
- Earth Fault detection
- Over current protection
- Emergency system shutdown

Technical Summary:

- Polycrystalline 330W Solar Modules with efficiency 17% are used in the design
- 60 KW grid connected solar inverters, 400V three phase, 98.3% have been considered
- Step up Transformers 0.4 / 11KV ONAN are used
- Medium Voltage Switchgears 11KV / 630A
- System will be connected to 11KV Bus Bar of Hair Care plant.
- DC/AC Ratio of 1.23 for Inverters has been considered
- Maximum AC output of the system is assumed to be 1620KW
- Output of the system is based on instantaneous Irradiation values of Solar Energy
- 7 Acres of land area required for the installation of solar plant

Bill of Materials:

S. No.	Components	Qty (No.)
1	Polycrystalline Solar Modules 330W	6080
2	Grid Connected Solar Inverters 120KW 3 Phase	27
3	0.4 / 11KV Step up Transformers	2
4	Medium Voltage Switchgears	1
5	Grid Feed in protection control system	1

Energy Generation:

S. No.	Efficiency Parameters	
1	Performance Ratio of the System	79.19 %
2	Capacity Utilization Factor	17.2%
3	Energy Generation Units	3,169,000 KWh

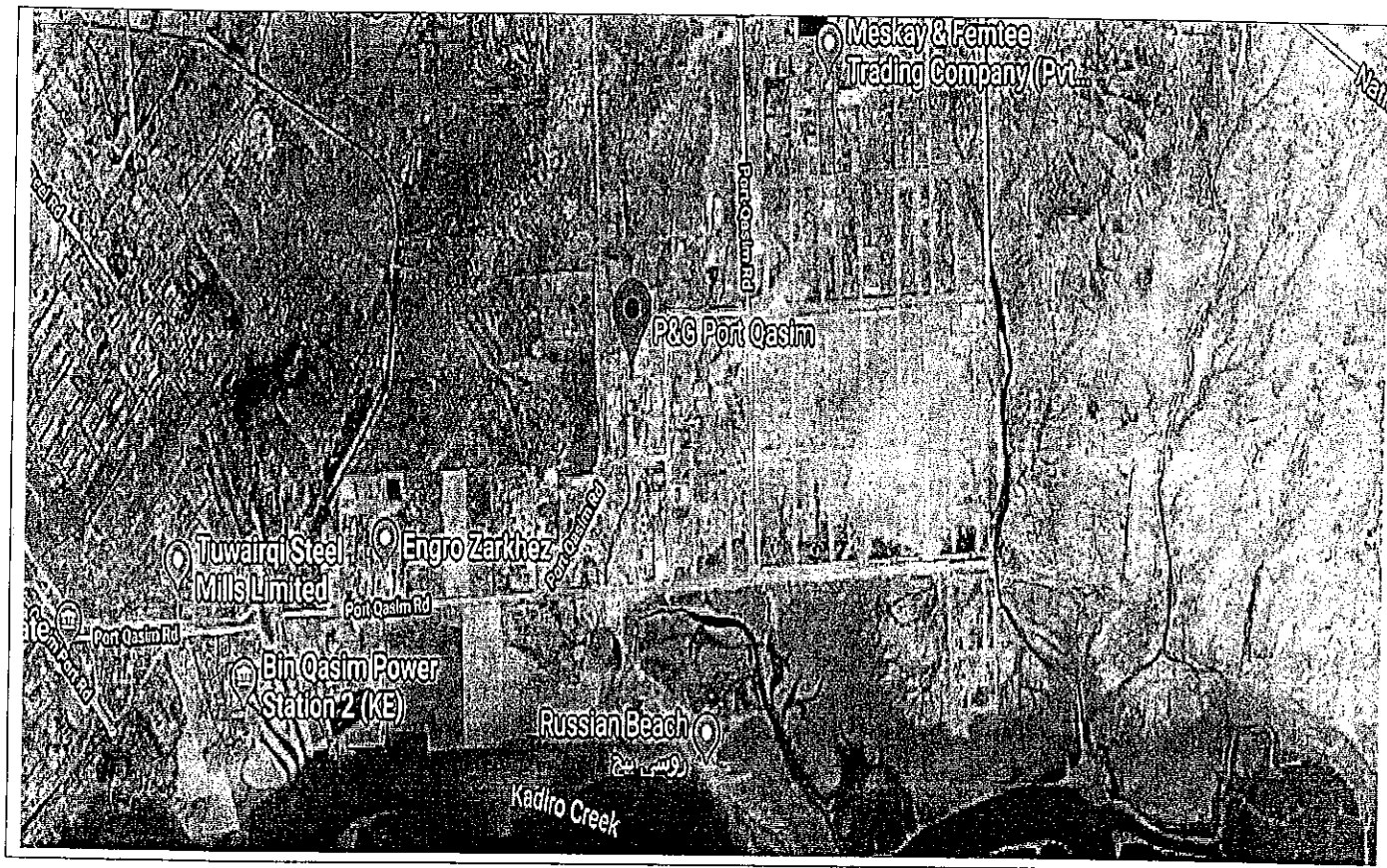
ANNEXURE - 16

SCHEDULE – III

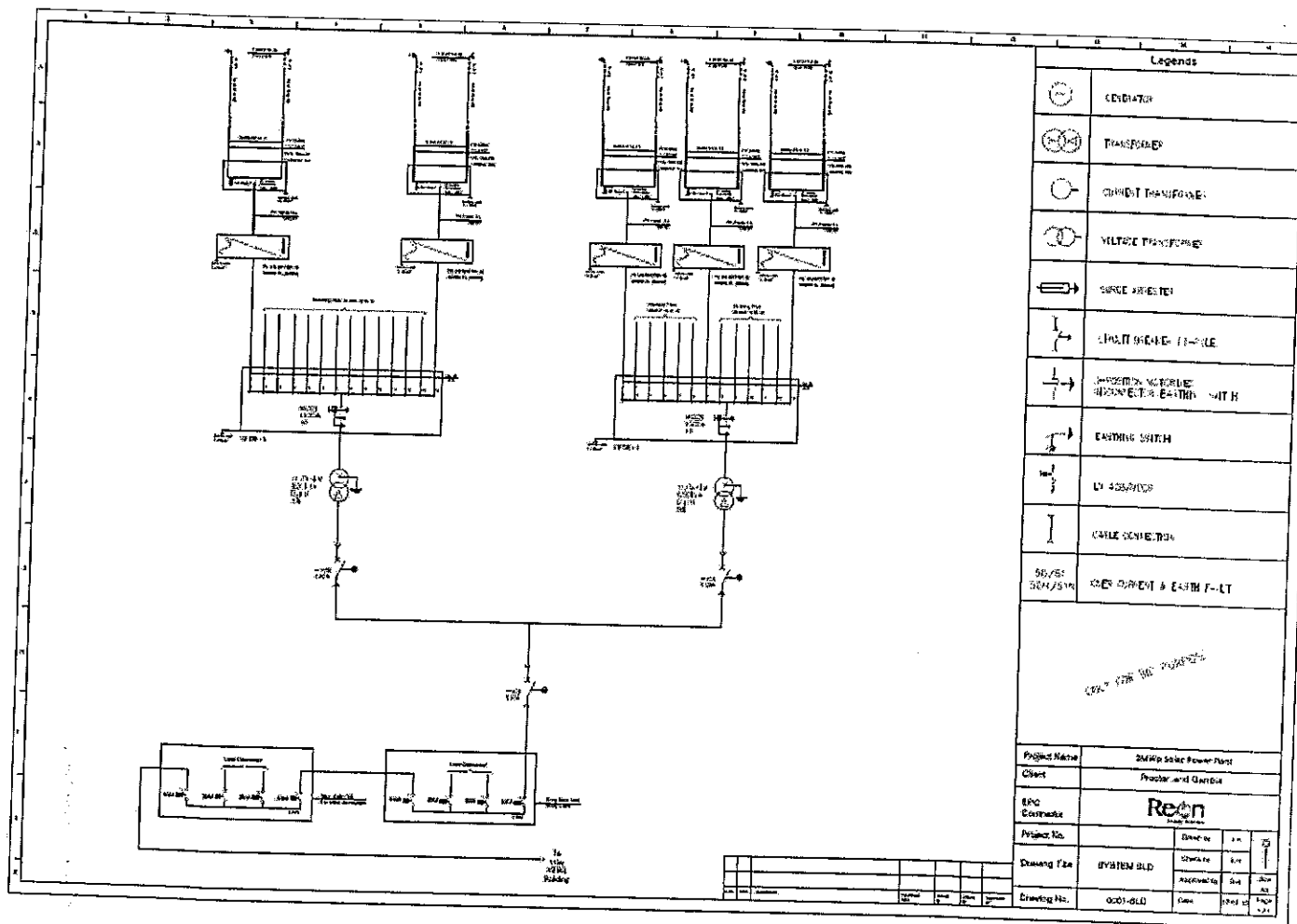
LOCATION MAPS, SITE MAPS, LAND

Location Map:

The project will be located within the P&G factory in Port Qasim, Karachi.



Site Location and Layout:



TECHNOLOGY, SIZE OF PLANT, NUMBER OF UNITS

System Components

S. No.	Components	Qty (No.)
1	Polycrystalline Solar Modules 330W	6080
2	Grid Connected Solar Inverters 60KW 3 Phase	27
3	Stepup 0.4 / 11KV 1000KVA ONAN Transformers	2
4	Medium Voltage Switchgears (RMU type)	1
5	Grid feed in control system	1

System Design Assumptions

- Polycrystalline 330W Solar Modules with efficiency 17% are used in the design
- 60 KW grid connected solar inverters, 400V three phase, 98.7% have been considered
- Step up Transformers 0.4 / 11KV ONAN are used
- Medium Voltage Switchgears 11KV / 630A
- System will be connected to 11KV Bus Bar of Diesel Generators
- DC/AC Ratio of 1.23 for Inverters has been considered
- Maximum AC output of the system is assumed to be 1620KW
- Output of the system is based on instantaneous Irradiation values of Solar Energy
- 7 Acres of land area required for the installation of solar plant

Energy Generation Number:

The solar plant is designed to produce 3,030,000 Units for the first year from the date of COD.

Technology & Number of Units:

S.No.	Parameters		Qty
1	Technology	Solar Photovoltaic (SPV)	
2	Size of Plant	2 MW	
3	Solar Modules	Solar Poly-crystalline Tier-1 Solar 330 or Tier 1 Equivalent	6080
4	Inverter	Sungrow 60KW Grid Connected Inverter	27
5	Transformers	Stepup 0.4 / 11KV 1000KVA ONAN Transformers Siemens or Equivalent	2
6	Medium Voltage Switchgears	11KV 630 Amps 25KA Siemens or Equivalent	1

Fuel Type

Since, this is a Solar Energy based Plant, no fossil fuel will be used for the generation.

Emission Values

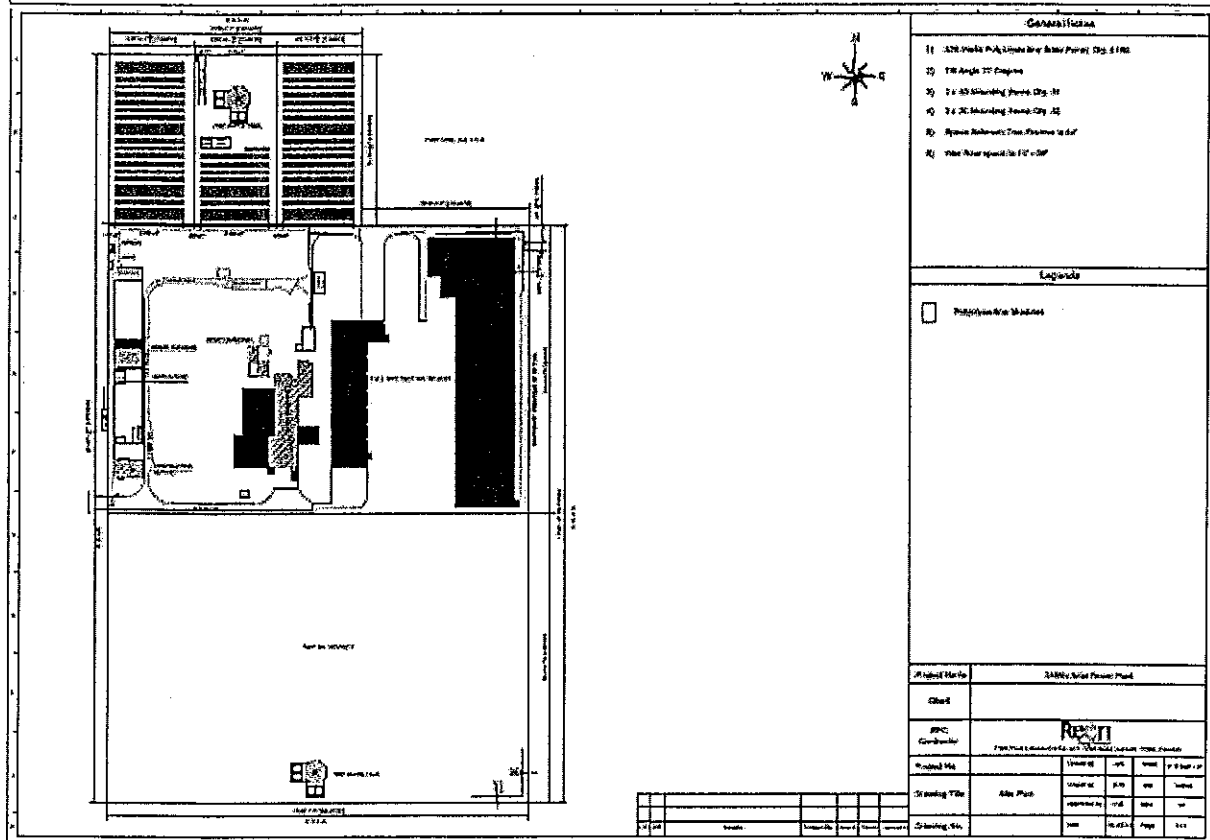
There will be “NO” carbon emission by the generation of Solar Energy.

Cooling Water Source

Not Applicable in Solar Energy Plant.

Interconnection with National Grid

Not Applicable. This power plant is for captive generation and use by P&G's manufacturing plant and thus does not need an interconnection with the Grid. It will, however, be safely integrated into the manufacturing plant's existing electricity supply by the EPC contractor.



Project cost, information regarding sources and amounts of equity, debt.

Feasibility & Financing:

The Project will cost approximately PKR One Hundred Sixty Eight Million One Hundred Twenty Eight Thousand Nine Hundred Forty Three

Total Major Components Cost	109,555,658
Total Local Supply and Service Cost	44,847,814
Service and Development Expenses	12,150,289
O&M Equipment	1,575,182
Total - PKR	168,128,943

Project Commencement & Completion

This project will be completed in a period of 6 months. Major activities of project involve, Detailed Engineering Design, procurement of Local and Imported Equipment, and Construction involving civil, electrical and mechanical works. Major Milestones are;

S. No.	Major Milestone	Timeline
1	Detailed Engineering Design	1 month
2	Procurement	1.5 months
3	Construction	2.5 months
4	Commissioning and Testing	1 month

ESSA (Environmental and Social Soundness Assessment)

Executive Summary:

P&G Solar Solution is a 2MW On-Grid Solar PV Power Plant which is to be installed in P&G factory at Port Qasim, Karachi. The DC installed capacity of the plant is proposed by critically analyzing the current load and future load projections of the site. Main objective of this Solar plant is to provide smooth low-cost energy production from solar plant.

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Description of Environment:

The proposed project site is in the Eastern Zone of Port Qasim, Sindh. The size of the plot is 158m x 230m (8.9 Acres). Solar plant covering an area of around 7 Acre and has a geographical coordinates of 24° 48' 21.65" N and 67° 24' 6.89"E. The proposed site is approximately 3 km southeast of Arabian Sea Country Club, 5 km south of Pipri Railway station, 5 km southwest of Textile Institute of Pakistan, 1.5 km northeast of ICI PTA Plant, 1.1 km northeast of Mac Pack facility, 0.75 km northwest of Raiwind Chemicals, and 6 km southwest of National Highway. The area is generally flat with average elevation of 16±1.0 meters from mean sea level. Few depressions are present in the area with a depth varying up to 2 meters.

The prediction of the potential earthquake is mainly attributed to the presence of active faults in the area. There are four active faults near Karachi and its vicinity. These have been estimated at IX to X intensity at Modified Mercalli (MM) Scale and up to 7.6 magnitude (M) of Richter Scale. The seismic potential of this fault over its full length (225 km) is estimated by several seismologists ranging from 7.7 to 8.2 M. The Pub Fault is an active thrust fault oriented roughly north south. The seismic potential of Pub Fault is over its entire length (135 km) and is estimated to be 7.2 to 7.8 M.

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Wind blows throughout the year with highest velocities occurring during summer months, when the direction is primarily from southwest to west. During winter, the wind blows from north to northeast, shifting southwest to west during the evening hours. The wind usually carries sand and salts resulting in severe erosion and corrosion. Wind speeds have been observed to range between 3 to 15 m/s.

Cyclone storms in the Arabian Sea generally move in a west-north-westerly direction. However, Karachi area does not fall within the zone of major cyclone activity of the Arabian Sea. There has been a total of 87 cyclone storms in the last 69 years and an average of 10 thunderstorms per year. Karachi lies in a relatively arid zone, experiencing only a few inches of rain during the summer months. Average rainfall during the peak month of July is about 3 inches out of the annual mean of 7.7 inches.

Project Environmental Impacts and Mitigation Measures:

This section discusses the potential environmental impacts, assesses the significance, recommends mitigation measures to minimize adverse impacts, and identifies the residual impacts associated with the proposed activities of the project during the construction and operation phase of the proposed project at the proposed site and of secondary actions like potable, raw water and wastewater lines.

Identification of Potential Impacts

In the first step, potential impacts of the project are identified, using professional judgment, published literature on environmental impact of similar projects, environmental guidelines and checklists, and field visits.

- Impact on Occupational health and safety/ Public Health (of contractors, workers and nearby community. It includes safety at work, Fire, explosives, diseases etc)
- Ground water or surface water
- Impact on energy
- Impact on natural resources
- Impact on aesthetics
- Impact on land use
- Impact on land form
- Impact on soils
- Impact on traffic and transportation
- Noise or vibration
- Air quality (ambient air quality and indoor air quality).
- Solid Waste Management (including domestic waste, construction waste)
- Impact on population
- Impact on utilities and infrastructure
- Socio-economic impact (people, their social, cultural values, and aspirations)

Design Phase

Design phase is the phase that is meant for the preparations prior to the construction. During design phase, engineers (meant for construction) will come and visit the site. Necessary preparations will be started for construction. Gant chart will be prepared. Visits by the engineers and contractors to check the site and structure to be build but there will not be routine or regular visits to the site but once in a week and design phase will last only for a month or so.

Impacts Prediction

Impact on Air

During design phase, air emissions that exceed federal or provincial limits or standards will not be exceeded because during design phase, there would be lesser visits to the site, so

lesser would be the atmospheric emissions. And the source of these emissions would be the motor vehicles only (for personal use). There would be no hazardous emissions (e.g. high amount of NO_x, SO_x and CO_x) and no objectionable odours as well as alternation of air temperature.

Impact on Ground water/ surface water

There would be no utilization or alteration to the course or flow of water during design phase so there would be no impact on this component of environment.

Impact on Solid Waste

It may create only litter and trash waste (recyclables).

Noise Impact

It will not increase significant amount of noise during design phase of the proposed project and will be within acceptable limits or NEQs.

Impact on Soils

There would be no change in soils and land forms i.e. the construction activity is not going to occur on ground.

Impact on Land forms

Land forms will not change and this component is also having no impacts as there would be no change in ground contours. There are no unique physical features at the site so land forms will not be changed.

Impact on Land use

The project will have a positive impact on land use but during design phase the land use is not going to be altered, so this impact would be neglected in this phase.

Impact on energy

Design phase is not going to alter or use the energy like electricity, gas, petrol etc. in excessive amount as there will not be routine or regular visits to the site but once or twice in a week and design phase will last only for a month or so.

Impact on transportation and traffic circulation

There will be few additions to the movement of additional vehicles but these will also for once or twice in a week during design phase. In this phase, there is no need for the additional parking facility. This would in turn lead to no traffic hazards.

Impact on natural resources

There won't be any increase in the rate of usage of any natural resource like any minerals, additional fuel for vehicles, oil, construction materials, and natural food products. But there would be increase in the amount of usage of paper for map-making, enlisting items (e.g. types of construction materials to be used), letter writing and receipts (e.g. of billing & quotations), etc.

Impact mitigation

- Try to recycle the paper and prevent throwing it in the ordinary bin.
- Use of computer technology i.e. E-mails instead of focusing on paper

- Lessen the paper use and conserve the natural resources.

Impact on population

This project is not going to disturb or relocate the existing community, so there would be no change in population.

Impact on utilities and infrastructures

There would be no alteration in the existing utilities like communication system, water courses, power transmission lines, electrical wirings, etc due to the project's design phase. There would be no impact on nearby infrastructure e.g. nearby shops/molls, residences, institutes, mosques, communication offices, banks etc. during design phase.

Impact on economy

The economy is having no adverse effects on local or regional income levels, land values, or employment etc. but there will be regional beneficiary impacts on income during design phase of the project in such a way that there will be hiring of consultants, engineers, contractors and labors etc that will increase their income.

Impact on Public health

The design phase will impart no adverse potential health effects to the people. **Accidental Risk**

Impact on Flora/ Fauna

There will be no disturbance to the existing flora and fauna of the proposed design phase of the project.

Impact on Aesthetics

No change would result in any scenic vista or aesthetics of the vicinity. No visual or temporary scenic blight during design phase.

Construction Phase

Construction phase is the phase that is meant for the construction by the hired contractor. Contractor responsibility is to bring labors, materials and equipment from suppliers. Then in the next step there will be commencement of the construction, construction vehicles & machines (concrete mixer machine and trolleys) and materials (course aggregate and fine aggregate, cement, bricks) and other equipment and tools (trolleys, cutters, hammers, saws, ladders, screwdrivers, wrenches, steel reinforcement, scaffolding etc.) will be assembled.

This section is also focusing the potential impacts (both positive and negative) related to the construction phase along with the mitigation measures stepwise because it is likely that the new construction activities will surely affect the surrounding areas.

Impact on Air

The impact on air of this construction activity will be for short-term i.e. for construction phase only. Therefore, no high violation will be resulted.

Impact on Ground water/ surface water

There would be drilling and boring holes in the groundwater for the construction activities. There would be little alteration to the course or flow of water during this phase so there would be less impact on this component of environment.

Noise Impact

Noise pollution will be caused by heavy vehicles movement. The project site is located away from residential area. So, noise will not create any harmful impact.

Impact on Soils and landform

There will be change in soil condition. Soil erosion will decrease, and it will positively impact by reducing carbon footprints.

Impact on Flora and Fauna

There will be no impact on fauna but little number of bushes will be cut during structure installations.

Impact on Land use

The project will have a positive impact on land use as this land will be used for emission free power generation.

Impact on energy

Construction phase is going to use the energy like electricity, petrol or diesel in excessive amount as there will be routine or regular visits to the site (i.e. energy will be used for transport in the form of petrol or diesel) and for moving machinery.

Impact Mitigation

There will be a minimal impact on the use of energy as this phase is for short term period say e.g. 5-6 months and the only solution is to use these energy resources in conservation mode (i.e. minimize the use but do not misuse like for example, keep turning on the machine even when it is not required).

Impact on transportation and traffic circulation

There will be additions to the movement of additional vehicles during construction phase but there are already existing alternating routes for traffic (street traffic) so no need to define alternating routes and parking facilities.

Impact mitigation

For transportation of the construction equipment, routes and duration must be defined.

Impact on population

This project is not going to disturb or relocate the existing community, so there would be no change in population during this phase as well.

Impact on utilities and infrastructures

There might be little disturbances to the existing utilities like communication system, water courses, power transmission lines, electrical wirings and nearby infrastructure e.g. nearby residences, mosques, communication offices, etc. during construction phase. But that impact is usually in terms of noise only and easily neglected.

Impact on economy

The economy is having positive impacts on local and regional income levels, land values, & employment in such a way that there will be hiring of consultants, engineers, contractors and labors etc that will increase their income. Therefore, this project will surely enhance socio-economic welfare e.g. health and employment (of labors, contractors, environmentalists, equipment/ materials suppliers, nearby hotels).

Accidental Risk

There may be accidental risks like falls or slips; cuts or injuries during hammering, sawing and drilling; and electric failure or sudden short circuit during electrocution works. There will be no handling of such chemical, drugs, radiations or explosives during construction phase that leads to catastrophic events or accidents.

Impact mitigation

Trained workers must be hired for construction by the contractors.

First aid team must be assigned by the hospital management to provide aid to the workers during time of emergency.

Impact on Aesthetics

There will be visual, temporary scenic blight during construction phase due to the construction activity but as this will be temporary and only if there is no containment of the construction materials dumping and usage, so it is neglected and predicted that the current project will impart no negative impact on the aesthetics of the area.

Impact mitigation

Containment or enclosure must be provided around the storage of construction materials.

Impact of Solid Waste

Solid wastes generated from construction include abandoned construction materials. These solid wastes are usually harmless but will affect environmental sanitation of the construction site and cause environmental damage if improperly dumped offsite.

Impact Mitigation

- Implement Solid Waste Management procedure of Reon energy Limited.
- Construction waste must be collected separately with segregation and routinely.
- Multi-compartment collection bins should be installed to facilitate reuse, recycle of this kind of waste i.e. if the construction material is in such form that can be reused or recycled so put separate bins for that and they can either be reused or recycled at the current project or if it is not needed then sell and transport it to the local market in sealed containment.
- The solid wastes must be collected regularly by the solid waste management authority and cleaned up by the contractors in a timely manner.
- The construction activity should be taken place in containment, boundary and limits so that it does not create harm to any person, place or property.

Safety and Emergency Plan

EMERGENCY RESPONSE PLAN (ERP)

Purpose

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

Priorities

Secure the Health and Safety of all personnel involved Minimize any impact on the environment Minimize any impact on property and assets.

Roles and Responsibilities

(For events deemed to be major, CUSTOMER may be obliged, by its responsibilities under its agreements with the Government, to assume control of emergency response activities. In these circumstances the CUSTOMER Representative shall clearly advise REON that CUSTOMER is assuming control and the REON Project Manager will work under CUSTOMER instruction).

For emergency response activities managed by REON, key roles and responsibilities are detailed below.

Emergency Response Team Leader (Project Manager)

The ERT Leader shall carry overall responsibility for REON emergency response execution. Key responsibilities shall include:

- Providing leadership and direction in the event of an emergency.
- Ensuring that emergency response planning, preparedness and execution is consistent with the requirements of CUSTOMER.
- Ensuring that appropriate emergency response teams are defined and prepared for the various emergency response scenarios identified in this plan.
- Notification to CUSTOMER Project Manager of any emergency incident. This is a mandatory requirement for all emergencies. Notification of an emergency incident should be made via radio, telephone or messenger to CUSTOMER Operations CCR as soon as practicable upon receiving advice of same.
- Following initial notification, liaison with CUSTOMER Project Manager during the execution of any emergency response.

Mobilization of additional resources, third party assistance etc. Liaison with management.

Site Engineer HSE

Reporting to the ERT Leader, the Site Engineer HSE and/or his substitute is responsible for ensuring at site that provisions are in place for emergency response, including:

- Muster points.
- Arrangements for conducting head counts.
- Identification and Mobilization of the Fire Team.
- Setting up drills and exercises.
- Procurement of firefighting equipment.

In the event of any emergency the Site Engineer HSE or a member of the HSE team shall take the following actions:

- Shall attend the site of the incident, assess the situation and issue direction to the concerned parties and to the Fire Team.
- Ensure that messages have been communicated to The Emergency Response Team Leader.
- Evaluate the scale of the incident and decide whether additional resources are required to adequately deal with it.
- Liaise with site supervision for withdrawing any permits.
- Liaise with site supervision for the mobilisation of any plant and equipment necessary for dealing with the emergency.
- Limit access to the area with barriers or other means to prevent unauthorised access.
- Co-ordinate the reinstatement measures following stabilisation of incident.
- Prepare a full report.

Fire Team

- The fire team will be selected and trained appropriately.
- The Site Engineer HSE shall appoint a Fire Team Leader (and his substitute) who will direct personnel under his control.
- The fire team leader will have had training and preferably previous experience in emergency response actions.
- All the members of the fire team shall report to the Fire Team Leader.
- Appropriate training shall be provided to members of the fire team.
- An electrician or instrument specialist will be included in the fire team. His responsibility the electrical isolation of areas as necessary.

Firefighting appliances shall be maintained in accordance with their specifications. Sufficient redundancy shall be incorporated into the facilities to allow for periodic unavailability during maintenance. A designated member of the HSE Team shall regularly confirm that fire extinguisher and other appliances are recharged and maintained as appropriate.

General Considerations

Emergency response drills shall be conducted at least quarterly for each principal area i.e. camp and the work site, the observations and debrief notes shall be recorded. The Site Engineer HSE shall analyse the findings and identify any remedial actions required.

The emergency procedure shall be updated from time to time to reflect observations made.

- Training shall be conducted on regular basis for emergency response teams.
- The location of emergency facilities e.g. firefighting appliances shall be clearly identified on plans displayed at conspicuous locations.

Raising the alarm and plan activation

Activate the alarm and notify the ERT Leader.

Provide the following details:

- Location of the Incident.
- Natures of incident e.g. fire, number of injuries, etc.
- If it is a fire, state type - oil, gas, electric or other and state wind direction and strength.
- Identify yourself giving your name and telephone number or radio channel.

Alarm and Communication

Communication is a critical factor in handling an emergency. To control the situation by the earliest possible action, any employee must be able to act and raise an emergency alarm.

The assembly points shall be clearly indicated.

- On hearing an alarm all personnel shall vacate the work place. Before leaving, each person shall ensure that the area is as safe as possible by switching off all power tools, running machines etc.
- All personnel shall muster at the assembly point as per the plan. The designated members of the HSE team shall provide guidance and assistance for mustering at the correct assembly point.
- The subcontractor's HSE team members shall take directions from the Site HSE co-ordinator.

Emergency Contacts List

List of all emergency services contacts will be displayed at site, including contact numbers of ERT and key persons (Project Manager REON, subcontractor Manager, Site HSE Engineer)

Incident response

Emergency situations occurring at the work site have the potential to cause serious injury, loss of life and property damage.

The following is a list of incidents that may be classed as emergencies for this procedure:

- Scaffold collapse
- Fire involving fuels, gases and other materials
- Medical emergency / Serious Injury
- Failure of lifting equipment
- Pressure test failure
- Collapse of an excavation involving personnel
- Vehicle accidents
- Collapse of structures/steelwork
- Snake Bite

In an emergency, or on hearing the "Stop Work Alarm", every supervisor shall ensure the following:

- All work is stopped at once.
- All equipment is shut down and put in a safe place.
- All men are evacuated to a pre-determined assembly point in an orderly manner.
- Arrange best possible interim medical arrangements for patient or injured person during transfer to hospital or while attendance by doctor is being arranged.
- Ensure the presence of ambulance 24 hours with driver.
- Anti-Snake Venom must be present at site.
- A roll call is taken and every man is accounted for, awaiting further instructions
- Keep the zone affected by the emergency clear and remove any vehicles that could cause a restriction to the emergency team

Evacuation

Activate the emergency alarm to evacuate the area safely and ensure that unnecessary personnel leave the site by a safe route. Assign someone to advise security to open the Facility main gate for emergency vehicles.

System Studies

Depending on the size of the PV Plant, distribution is carried out via different busbars. These multiple configurations usually depend upon:

- Current carrying capacity in Normal and Fault conditions
- No of outputs
- Fault Isolation
- Connection method used

The project has 2 Transformers of 1000 KVA which are terminated on a PV Bus through individual separate MV panels.

The breakers used for connection at MV are 630A ACBs which can withstand 25kA of short circuit. The normal operating current is calculated to be around 100A. The breaker will be adjusted to 100A of overcurrent tripping using relays. The short circuit from Solar Panels is not expected to exceed 100A due to the nature of the solar panels used. Major short circuit faults are expected from the load and grid side.

Each MV breaker will have an earth connection (along with an earth fault relay) to isolate the faults (if they occur).

The connection of the solar system to the load is by single busbar topology.

Plant Characteristics

Conceptual Design:

Generation Voltage:

Solar power plant will be generating AC power at Low voltage levels of 400V 4W+PE system. Low voltage level will then step up through power transformers to incoming Voltage levels i.e. 11KV to be synced with existing electrical network.

Power Factor & Frequency

P&G solar power plant is using solar grid connected string Inverters of 60KW each to covert DC power of solar panels to Alternating Power. The range of Power Factor can be set from 0.8 – 1 leading /lagging, making it suitable for absorbing or delivering reactive power. The nominal power factor for Inverters is 0.99 and nominal Frequency of generation is 50Hz.

Reverse Feed in protection at 11KV Incomer Panel

The Automatic Sustainable Controller (DEIF ASC-4) is a controller designed to serve as a link between sustainable power plant (Solar) and 11KV incoming grid, combining to work as sync system.

Ramp rate of inverters is the function of MPPT algorithm. Normally solar power is set to ramp up or ramp down the generation within the period of 5-10 seconds from 0 – 100 percent. Ramp rate can be adjusted according to the load variation of the facility.

Metering and Protection:

The distance between solar field and point of common coupling (POCC) has been calculated as 500 meters approximately. The metering of solar units will be performed at the main 11KV load bus bar. It is designed that all auxilliary loads will be connected before the point of connection to get the true reading for energy being evacuated into 11KV grid.

Sensitivity Class for meter is 0.5 M5 with bidirectional 4 quadrant calculations algorithm. Features including, total import and export units can be extracted over the period, TOD calculations, MDI, active and reactive power calculations, Et al.

2 MWp Solar power plant will be terminated on a single RMU unit having following protections for the line and load side;

- Over and Under voltage protections (at inverters' end)
- Short Circuit protections
- Earth Fault detection
- Over current protection
- Emergency system shutdown

Training and Development

ORIENTATION, SITE HSE INDUCTION AND OTHER TRAINING ACTIVITIES

Initial HSE Orientation Program

Each and every person will undergo a HSE orientation program. On completion of orientation he will be permitted to enter the site.

REON Site Engineer HSE with the help of CUSTOMER HSE personnel shall perform the initial orientation based on but not limited to the following:

- Explaining REON HSE Policy and organizations of REON site and CUSTOMER.
- General HSE rules and regulations for working on site including use of Personal Protective Equipment, incident reporting, getting first aid, emergency response (alarm system, escape route, assembly point), HSE inspection, housekeeping, etc.
- Hazards at construction site
- Environmental hazards

Note:

This Initial HSE Orientation would also be given to all the workers of the sub-contractors working at site.

Site Engineer HSE will keep a record of staff having completed induction.

Specific Induction for Workers (On Job)

Subsequent to the general induction first line supervisor shall conduct a specific orientation for new staff, which would comprise:

- Introduction of the workers on the nature of their jobs.
- Explaining to the workers the work environment of a particular location and specific job hazards

Permit to Work System Course

- It is mandatory for all work permit recipient and signatories to attend a permit to work course held by CUSTOMER. Work permits will often be required prior to commencement of work.
- Refresher courses will be arranged by REON HSE.

Tool Box Talk by Line Supervisors

All supervisors will be trained to deliver daily tool box talk in their respective areas.

- Subjects for "tool box talks" would be selected to reflect the specific hazards of a particular site, feedback from first line supervisors/ HSE inspectors and observation / input from any other employee.
- Incidents, which may occur in the site/works, shall also be discussed in "tool box talks".
- Records of "tool box talks" shall be maintained by site HSE supervisor.

Management Employees Training Program

- The management employees training program will be conducted during the project to ensure that all management employees are trained.
- Site HSE Engineer will conduct HSE trainings for all staff based on training plan.

Task Specific Training Courses (Whenever Required)

In addition to the above, specific training courses shall also be provided for staff and workers. Subjects for the training courses will be identified in the training plan as advised by the CUSTOMER.