AJ POWER (PVT.) LIMITED

Ref.No.022-AJPPL/15

03 Jun. 2015

The Registrar
National Electric Power Regulatory Authority (NEPRA)
NEPRA Tower Attaturk Avenue (East),
Sector G-5/1, Islamabad

Sub: Application for a Generation License of 10 $MW_{(AC)}$ Solar PV Plant "AJ Solar Farm" Adhi Kot, Khushab.

I, Khalil Ahmad Hashmi being the duly authorized representative of AJ Power (Private) Limited by virtue of **Board Resolution** dated 06th May 2015, hereby apply to the National Electric Power Regulatory Authority for the grant of a GENERATION LICENCE to the **AJ Power (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 undertakes and confirms that the information provided in the attached documents-in-support is true and correct to the best of my knowledge and belief.

Demand Drafts in the sum [Rs. 137,576/- + Rs. 1040/-] of Rs.138,616/- (Rupees one hundred thirty eight and six hundred sixteen Only), being the non-refundable license application fee calculated in accordance with the Schedule II to the National Electric Power Regulatory Authority Licensing (App on and Modification Procedure) Regulations, 1999, is also attached herewith.

We shall be grateful for your prompt action as usual on our application

Thank you and best regards,

Your sincerely,

Khalil Ahmad Hashmi
Company Secretary

Copy to:

- The Managing Director, NTDC, 414 WAPDA House, Lahore.
- The Chief Executive Officer, FESCO, Faisalabad.
- The Chief Executive Officer, AEDB, Islamabad.

AJ POWER (PRIVATE) LIMITED AJ

127-S, Quaid-e-Azam Industrial Estate, Township, Kotlakhpat, Lahore-Pakistan
Tel: (+92- 42) 35115506-07 Fax: 35118507

AJ POWER (PVT.) LIMITED

CERTIFIED COPY OF THE RESOLUTIONS PASSED BY THE BOARD OF DIRECTORS OF AJ POWER (PRIVATE) LIMITED THROUGH CIRCULATION ON 06th MAY 2015.

"RESOLVED THAT AJ Power (Private) Limited (a company incorporated under the laws of Pakistan with its registered office located at 127-S Q.I.E Kotlakhpat Township, Lahore-Pakistan) be and is hereby authorised to file applications for the grant of Generation License and/or Determination of Tariff or Adoption of Upfront Solar Tariff for submission to the National Electric Power Regulatory Authority (NEPRA) in respect of **its 10MW[AC] Solar PV Plant "AJ Solar Farm"** at Adhi Kot, District Khushab and in relation thereto, enter into and execute all required documents, make all fillings and pay all applicable fees, in each case, of any nature whatsoever as required."

"FURTHER RESOLVED THAT in respect of application for the Grant of Generation License (including any modification to the application for the Grant of Generation License) for submission to National Electric Power Regulatory Authority, and that:

1 *Mr Almas Hyder, Chief Executive Officer;*
2 *Mr Zia Hyder-Naqi, Director; and*
3 *Mr Khalil Ahmad Hashmi, Company Secretary*

be and hereby singly empowered and authorised for and on behalf of the Company to review, execute, submit and deliver the Generation License/Tariff Applications (including any modification to the application for the Grant of Generation License/Tariff) and related documentation required by National Electric Power Regulatory Authority, including any contracts, documents, power of attorney, affidavits, statements, letters, forms, applications, deeds, guarantees, undertakings, approvals, memoranda, amendments, letters, communications, notices, certificates, requests, statements, and any other instruments of any nature whatsoever; sign and execute necessary documentation, pay the necessary fees, appear before the National Electric Power Regulatory Authority as needed, and do all acts necessary for completion and processing of the Generation License/Tariff Application (modification to the application for the Grant of Generation License/Tariff); do all such acts, matters and things as may be necessary for carrying out the purposes aforesaid and giving full effect to the above resolutions/resolution".

For and on behalf of
AJ Power (Private) Limited

A.J POWER (PRIVATE) LIMITED

127-S, Quaid-e-Azam Industrial Estate, Township, Kotlakhpat, Lahore-Pakistan
Tel: (+92- 42) 35115506-07 Fax: 35118507

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SECP

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

COMPANY REGISTRATION OFFICE, LAHORE

CERTIFICATE OF INCORPORATION

[Under section 32 of the Companies Ordinance, 1984 (XLVII of 1984)]

Corporate Universal Identification No.0090485

I hereby certify that **AJ POWER (PRIVATE) LIMITED** is this day incorporated under the Companies Ordinance, 1984 (XLVII of 1984) and that the company is **Limited by Shares.**

Given under my hand at **Lahore** this **Sixth** day of **November,** Two **Thousand** and **Fourteen.**

Fee Rs.**24,000/-**

07/05/2015

(LIAQAT ALI DOLLA)
Additional Registrar of Companies

No.ARL/7836 DATED: 6/11/2014

AJ Power Pvt (LTD)

THE COMPANIES ORDINANCE, 1984
(PRIVATE COMPANY LIMITED BY SHARES)

MEMORANDUM OF ASSOCIATION

OF

AJ POWER (PRIVATE) LIMITED

I. The name of the Company is AJ Power (Private) Limited (hereinafter referred to as the "**Company**")

II. The Registered office of the Company will be situated in the Province of Punjab.

III. The objects for which the Company is established are to undertake any or all of the following:

1. To design, build, establish, own, operate, maintain, manage electric power generating plants for the generation, supply & transmission of electric power, including solar power generation plants and in relation thereto, to establish, fix, carry out and maintain without limitation, any ancillary works, cables, wires, meter, lines, interconnect facilities, grid stations, transmission facilities, civil, electrical and mechanical works, subject to permission from NEPRA.

2. To carry put a feasibility study for and to carry on the business of power generation and in relation thereto, to generate, accumulate, transmit, distribute and sell electric power anywhere in Pakistan, to the public sector, including the Water and Power Development Authority, National Transmission and Despatch Company, Government and Government bodies, and the private sector subject to any permission required under the law.

3. To manufacture, purchase, import or otherwise acquire, construct, own, process, operate and maintain buildings, apparatus, fixtures, fittings, plants, machinery, materials, and things as may be necessary, incidental to or convenient in connection with power generating plant for the generation of electric power and/or in connection with supply, transmission and distribution of electric power.

4. To enter into any agreement or arrangements with any government or other authority, supreme, municipal, local or otherwise, that may seem conducive to all or any of the objects of the Company and/or to obtain from such government or authority including the State Bank of Pakistan or National Electric Power Regulatory Authority (NEPRA) any rights, concessions, or privileges, licenses which the Company may think desirable to obtain and to carry out, exercise and comply with any such arrangements, rights, privileges, concessions and licenses.

AJ

AJ Power Pvt LTD

5. To buy, sell, manufacture, store, repair, alter, improve, exchange or let out, import, export and deal in all works legally permitted, plant, machinery, engines, tanks, cylinders, valves, regulators, testing equipment, tools, utensils, appliances, cookers, stoves, heaters, apparatus, products, materials, substances, raw materials, chemicals, natural gas, liquefied petroleum gas, fuel oil, coal, lubricants, articles and things and to manufacture, experiment with, render marketable and deal in all products legally permitted, incidental to or obtained in the business carried on by the Company.

6. To purchase, take on tenancy or in exchange, hire, take options over or otherwise acquire for any estate or interest whatsoever and to hold, develop, work, cultivate deal with and turn to account, concessions, grants, decrees, licenses, privilege, claims, options, leases, property, real or personal or rights or powers of any kind which may appear to be necessary or convenient for the business of the Company but not to act as a leasing company or property developer.

7. To sell, exchange, mortgage, let on royalty or tribute, grant licenses, easements, options and other rights over and in any manner deal with or dispose of the Company's property or any part thereof for such consideration as may be thought fit and in particular for stocks, shares or securities of any company but in any event not to act as an investment company or leasing company.

8. To establish laboratories and to employ and promote research and invention, patronize such invention and enter into manufacture in collaboration with outside parties for transfer of technology from abroad and to promote transfer of technology from abroad, and to carry on business in all other allied fields permitted by law.

9. To invest and deal with any monies of the Company not required for the time being for any of the purposes of the Company in such investments as may be though proper and to hold, sell or otherwise deal with such investments but in any event not to act as investment company.

10. For the purposes of the business of the Company only, to advance money upon such terms as the Company may approve, and to guarantee the obligations and contracts of customers and others but not to act as a banking company.

11. To apply for, purchase or otherwise acquire and protect, prolong and renew, whether in Pakistan or elsewhere, any patents, patent rights, brevets d'invention, trademarks, design, licenses, protections, concessions and the like conferring any exclusive or non-exclusive or limited right to use any secret or other information as to any invention, process or privilege which may seem capable of being used for any of the purposes of the Company or the acquisition of which may seem calculated directly or indirectly to benefit the Company and to use, exercise, develop, manufacture under grant, licenses, privileges in respect of, or otherwise turn to account the property, rights and information so acquired and to carry on any business in any way connected therewith.

12. To get insured against losses, damages, risks, accidents and liabilities of all kinds which may affect the Company, whether in respect of servants or employees of the Company, or in respect of property belonging to or leased to hired by the Company, either by setting apart funds of the Company or by effecting such insurance and in later case to pay the premium thereon.

13. To train personnel and workers, both in Pakistan and abroad, to obtain technical proficiency in various specialties connected with the business of the Company.

14. To undertake and execute any project the undertaking whereof may seem desirable, either gratuitously or otherwise.

15. To procure the Company to be registered or recognized in any foreign country or place.

16. To acquire and undertake all or any part of the business, property, goodwill and liabilities of any person or company carrying on any business which the Company is authorized to carry on or possessed of property suitable for the purposes of the Company.

17. To adopt such means of making known the business and/or services of the Company as may seem expedient and in particular by advertising in the press or in other media or by way of participation in exhibitions.

18. To improve, develop, sell, exchange, take on lease, mortgage, pledge, hypothecate, assign, transfer, dispose of turn to account or otherwise deal with, all or any part of the present and future property, assets, equipment, immovable and movable, corporeal or incorporeal, tangible or intangible and any right, title and interest therein of the Company, including rights, licence, privileges, concessions, easements and franchises as may seem expedient.

19. To employ or appoint any persons, experts, consultants, advisers, contractors (including O&M contractors), brokers in connection with the business of the Company.

20. To pay for rights or property acquired by the Company, either in cash or fully paid up shares or by the issue of securities, or partly in one mode and partly in another and generally on such terms as may be determined.

21. To open, close and operate bank accounts of the Company with any bank or banks and to draw, make, accept, endorse, discount, execute and issue promissory notes, bills of exchange, bills of lading, warrants, debentures and other negotiable or transferable instruments and do any banking transactions which may be deemed appropriate in the best interest of the Company.

22. To borrow money and to receive the proceeds of loans from local and foreign institutions, subject to applicable laws, and to secure payment of money in such manner as the Company may decide is necessary for realization of the purposes mentioned above and in particular by:

    (i) the issue of perpetual or redeemable and convertible or nonconvertible PTCs, TFCs, sukuks and other Islamic modes of financing instruments, debentures or debenture stock (perpetual or otherwise), bonds, promissory notes, bills of exchange and such other securities;

    (ii) furnishing undertakings and guaranteeing the performance by the Company of any obligation undertaken by the Company or any other persons or company as the case may be, depositing securities, shares and documents of title;

(iii) hypothecating, charging and mortgaging all or any of the properties and assets (both present and future, movable and immovable) of the Company and creating pledge, liens etc., on such properties on the condition that such transactions shall not effect the performance of the Company; and

(iv) appointing attorneys, counsels and giving them powers and authority for executing documents, registering documents, selling and managing the properties, undertaking any business of the Company and furnishing and creating such other securities as maybe considered expedient; and for the purposes aforesaid, or otherwise, execute, complete and deliver agreements and such other documents as may be required;

23. To take, or otherwise acquire, and hold shares in any other company having objects altogether or in part similar to those of the Company or carrying on any business capable of being conducted so as to directly or indirectly benefit the Company but in any event not to act as an investment company.

24. To issue all or any part of the original or enhanced share capital of the Company at par or at a premium or discount subject to any permission required under law.

25. To establish and maintain or procure the establishment and maintenance of any contributory or non-contributory pension or superannuation funds for the benefit of and give or procure the giving of donations, gratuities, pensions, allowances or emoluments to any persons who are or were at any time in die employment or service of the Company, and also to establish and subsidize and subscribe to any institutions, associations, clubs or funds calculated to be for the benefit of or to advance the interests and well being of the Company or of any such other company as aforesaid and do any of the matters aforesaid, either alone or in conjunction with any such other company as aforesaid.

26. To payout of the funds of the Company all expenses of and incidental to the formation, registration, advertisement of the Company and the issue and subscription of the share or loan capital including brokerage and/or commission for obtaining applications for or placing or guaranteeing the placing of shares or any debentures, debenture stock and other securities of the Company and also all expenses relating to the issue of any circular or notice and the printing, stamping and circulating of proxies and forms to be filled up by the members of the Company.

27. To enter into any agreement or any arrangement for sharing profits, union of interest, co-operation, joint-ventures, reciprocal and other concessions, or otherwise with any individual, firm co-operative or other company, association, corporate body, research and education institutions, affiliates, Government or local authority or other legal entity whether national or not, as may be necessary or expedient for the purpose of carrying on any business of the Company, but in any event not to act as managing agents.

28. To distribute among the shareholders of the Company, in specie, any property of the Company, or any proceeds of sale or disposal of any property of the Company, in the event of winding up of the Company, so that no distribution amounting to a reduction of capital be made except with the sanction (if any) for the time being required by law.

29. To settle disputes by negotiation, conciliation, mediation, arbitration, litigation or other means and to enter into compromise with creditors, members and any other persons in respect of any difference or dispute with them.

30. To do all or any of the things herein in any part of the world either as principals, agents, contactors or otherwise, and either alone or in conjunction with others but in any event not to act as managing agents.

31. To carry on the business of buying, selling, manufacturing, importing, exporting, exchanging and otherwise dealing in merchandise of every description and all other articles or things, tangible or intangible, the business of which in the opinion of the Company may be conveniently carried on by the Company or calculated directly or indirectly to enhance the value of or render profitable any of the Company's property or rights, as permissible under law.

32. To accept stock or shares in, debentures, mortgage-debentures or other securities of any other company in payment or part payment for any services rendered or for any sale made to or debt owing from any such company.

33. To receive, declare and distribute profits and to capitalize such portion of the profits of the Company as are not distributed among shareholders of the Company, in the form of dividends, and as the Company may think fit, and to issue bonus shares, as fully paid up in favor of the shareholders of the Company.

34. The Company shall not engage in banking business or business of an investment company, insurance company or leasing/modaraba company, brokerage house or in any unlawful business.

35. To do all and everything necessary, suitable or proper, ancillary or incidental or conducive to the accomplishment of any of the purposes or the attainmentof any of the objects or furtherance of any of the powers herein before setforth, either alone or in association with other corporate bodies, firms orindividuals and to do every other act or thing incidental or appurtenant toor arising out of or connected with the business or powers of the Companyor part thereof, provided the same be lawful.

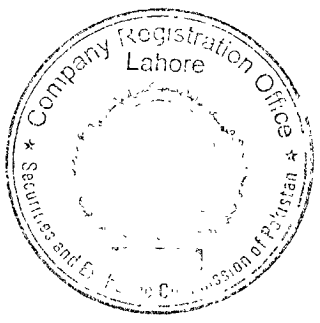
36. It is hereby declared that:

    (a) the objects specified in each of the paragraphs of this clause shall be regarded as independent objects, and accordingly shall in noway be limited or restricted (except where otherwise expressed insuch paragraphs) by reference to or inference from the terms of any other paragraph or the name of the Company but may be carried out in as full and ample manner and construed in as wide asense as if each of the said paragraphs defined the objects of a separate and distinct company; (b) the Company shall not engage in banking business or business of "an investment company or any unlawful business and that nothing in the object clauses shall be construed to entitle it to engage in such business or undertake business of banking company, investment, leasing, and insurance business directly and indirectly. The Company shall not launch multilevel marketing, pyramid and ponzi schemes.

37. Notwithstanding anything stated in any object clause, the Company shall obtain such other approval or license from the competent authority, as may be required under any law for the time being in force, to undertake a particular business.

IV. The Liability of the members is limited.

V. The authorized capital of the Company is Rs. 2,000,000/- (Rupees two million only) divided into 200,000 (two hundred thousand) Ordinary Shares of Rs. 10/- (Rupee ten only) each. The Company shall have power to increase and reduce its capital and divided the shares in the capital for the time being into several classes subject to anypermission required by law.



We, the several persons whose names and addresses are subscribed below, are desirous of being formed into a Company, in pursuance of these Memorandum of Association, and we respectively agree to take the number of shares in the Capital of the Company as set opposite to our respective names.

Sr. No.	Name and Surname (present and former) in full (in block letters) and CNIC #	Father's / Husband's Name in full	Nationality with any former Nationality	Occupation	Residential Address (in full)	Number of Shares taken by each subscriber	Signatures
1	Zia Hyder Naqi 35202-6813779-7	Sheikh Muhamad Naqi	Pakistani	Business	130-M Gulberg III, Lahore	25 (twenty - five)	
2	Almas Hyder 35202-2420438-3	Sheikh Muhamad Naqi	Pakistani	Business	9/94-K Sarwar Road, Lahore, Cantt., Lahore	75 (seventy-five)	
					Total Number of Shares	**100** (one hundred)	

Dated this 27th day of OCTOBER, 2014

Witness to the above signatures:
Full Name: Muhammad Imran Jahangir
Occupation: Private Job
CNIC # 35202-6502771-7
Father's Full Name: Jahangir Khan.

Signature ..... Muhammad Imran .....
Nationality: Pakistani

Full Address: House # 5 Henry-K Gulberg III Lahore

Corporate Registration Office Lahore
Securities and Exchange Commission of Pakistan

07/05/2015

THE COMPANIES ORDINANCE, 1984
(PRIVATE COMPANY LIMITED BY SHARES)

ARTICLES OF ASSOCIATION

OF

AJ POWER (PRIVATE) LIMITED

I. PRELIMINARY

1. **Application of Table "A"**

Subject as hereinafter provided, the Regulations contained in Table "A" provided in the First Schedule to the Companies Ordinance, 1984 shall apply to the Company in so far as these are applicable to Private Companies, with the exception of the Regulations which are modified, altered or added by these Regulations contained hereunder.

2. **Interpretation**

The head notes are inserted for convenience and shall not affect the construction of these Articles, and unless the context or the subject matter otherwise requires:

(a) "**Articles**" means these Articles of Association, as originally framed or from time to time altered in accordance with law.

(b) "**Board**" means a meeting of the Directors duly called and constituted or as the case may be Directors assembled at a Board.

(c) "**Chairman**" means chairman of the Board of Directors of the Company.

(d) "**Commission**" means the Securities and Exchange Commission of Pakistan.

(e) "**Company**" means AJ Power (Private) Limited.

(f) "**Debenture**" means Participation Term Certificates and Term Finance Certificates.

(g) "**Director**" means a Director of the Company appointed from time to time pursuant to these Articles.

(h) "**Dividend**" means distribution of profits of the Company to its members.

(i) "**Implementation Agreement**" means the Implementation Agreement to be entered into between the Government of Pakistan and the Company in relation to the power generation project to be established by the Company.

(j) "**Member**" means a member of the Company within the meaning of Clause 21 of sub-section (1) of Section 2 of the Ordinance.

(k) "**Memorandum**" means Memorandum of Association of the Company as originally framed or as altered from time to time in accordance with the provisions of the Ordinance.

(l) "**Month**" means a calendar month according to the English Calendar.

(m) "**Office**" means the registered office for the time being of the Company.

(n) "**Ordinance**" means the Companies Ordinance, 1984 or any modification or re-enactment thereof for the time being in force.

(o) "**Register**" means, unless the context otherwise requires, the register of members to be kept pursuant to section 147 of the Ordinance.

(p) "**Seal**" means the common or official seal adopted by the Company.

(q) "**Section**" means the section of the Ordinance.

(r) "**Special Resolution**" means the special resolution of the Company as defined in Section 2(1)(36) of the Ordinance.

(s) Words importing masculine gender include the feminine gender.

(t) Words importing singular number include the plural number and vice versa.

(u) Expression referring to writing shall, unless the contrary intention appears be construed as including reference to printing, lithography, photography and other modes of representing or reproducing words in a visible form.

(v) Words importing persons shall include bodies corporate.

(w) Unless the context otherwise requires words or expressions contained in these Articles shall bear the same meaning as in the Ordinance.

3. **Nature of the Company**

The Company is formed as a private limited company within the meaning of Clause 28 of Section 2(1) of the Ordinance and accordingly:

(a) No invitation shall be issued to the public to subscribe for any shares, debentures or debenture stocks of the Company;

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

(c) The right to transfer shares in the Company is restricted in the manner and to the extent hereinafter appearing.

The Company shall approve, ratify and adopt and give full effect to all or any agreements, undertakings, commitments or arrangements if any entered into by the sponsors for and on behalf of the Company prior to incorporation of the Company relating to establishment and operation of said project. However, nothing herein shall be construed as limiting or in any manner restricting the authorities of the Company as conferred by the Memorandum.

II. CAPITAL AND SHARES

A. SHARES RIGHTS

4. Authorized capital

The authorized capital of the Company is Rs. 2,000,000/- (Rupees two million only) divided into 200,000 (two hundred thousand) Ordinary Shares of Rs. 10/- (Rupees ten) each. The Company has the power from time to time to increase or reduce its capital and divided the shares in the capital for the time being into several classes subject to any permission required by law.

5. Increase in share capital

5.1 Subject to Section 86 of the Ordinance, where at any time the Board decides to increase the issued capital of the Company by issuing any further shares, then subject to any direction to the contrary that may be given by the Company in general meetings, such shares shall be offered to the members in proportion to the existing shares held by each member, and such offer shall be made by notice specifying the number of shares to which the member is entitled, and limiting a time within which the offer if not accepted will be deemed to be declined and after the expiration of such time or on receipt of information from the member to whom such notice is given that he declines to accept the shares offered, the Board may dispose of the same in such manner as it may consider most beneficial to the Company, provided if a member renounces all or any of the shares in favor of any member or any other person who is not a member of the Company, the Board shall accept renunciation.

5.2 If and whenever as a result of an issue of new shares or any consolidation or subdivision of shares any member becomes entitled to hold shares in fraction, the Board shall not be required to issue such fractional shares and shall be entitled to sell whole shares at a reasonable price and pay and distribute to and amongst the members entitled to such fractional shares in due proportion the net proceeds of the sale thereof. For the purpose of giving effect to any such sale the Board may authorize any member to transfer the shares sold to the purchaser thereof and the purchaser shall be registered as the holder of the shares comprised in such transfer but he shall not be entitled to see the application of the purchase money nor shall his title to the shares be affected by any irregularity or invalidity in the proceedings in reference to the sale.

5.3 Subject to the provisions of the Ordinance and the Articles, the Board may allot and issue shares in the capital of the Company as payment or part payment of any property sold or transferred goods or machinery supplied or for services rendered to the Company in the conduct of a business or affairs and any shares which may be so allotted may be issued as fully paid shares.

5.4 Any application or subscription signed by or on behalf of an applicant or subscriber for shares in the Company, followed by an allotment of any shares therein, shall be an acceptance of shares within the meaning of the Articles and every person whom thus or otherwise accepts any shares and whose name is entered on the Register shall for the purpose of the Articles be a member.

5.5 The Company shall be entitled to treat the person whose name appears on the Register of Members as holder of any shares as the absolute owner thereof and accordingly shall not (except as ordered by a Court of competent jurisdiction or as by law required) be bound to recognize any trust on entity or benami, equitable, contingent or other claim to or interest in such shares, on the part of any other person whether or not it shall have express or implied or constructive notice thereof.

6. **Shares under Director's control**

Subject to the provisions of the Ordinance and these Articles, the shares shall be under the control of the Board, who may allot or otherwise dispose of the same or any of them to such persons, on such terms and conditions, and at such times as the Board thinks fit and with full powers to give to any person the call of any shares at a premium or at par or at a discount, or on a redeemable basis, and for such time and for such consideration as the Board thinks fit.

7. **Allotment of shares**

The Director shall, as regards any allotment of shares, duly comply with such of the provisions of Section 68 to 73, as may be applicable to the Company.

8. **Share certificates**

8.1 Every person whose name is entered as a member in the Register shall, without payment, be entitled to receive within 90 days after allotment or within forty-five (45) days of the application for registration of transfer, Certificate under the Seal specifying the share or shares held by him and the paid up amount in respect thereof.

8.2 The Company shall not be bound to issue more than one (1) certificate in respect of a share or shares 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.

9. **Issuance of new certificates**

If a share certificate is defaced, lost or destroyed, it may be renewed on payment of such fee, if any, as may be prescribed under the Ordinance, and if any, as to evidence and indemnity and payment of expenses incurred by the Company in investigating title as the Directors think fit.

10. **Certificate under Seal**

The certificate of title to shares shall be issued under the authority of the Directors' or of a committee of Directors' when authorized thereto by the Directors' in such manner and form as the Directors' may from time to time prescribe, and shall bear the autographic signature of two Directors' or one Director and the secretary of the Company. The Seal shall be affixed to every share certificate issued by the Company.

11. **Trusts not recognised**

Except as required by law, no person shall be recognized by the Company as holding any shares upon any trust, and the Company shall not be bound by or be compelled in any way to recognize (even when having notice thereof) any equitable, contingent, future or partial interest in any share or any interest in any fractional part of a share or (except only as by these Articles or by law

otherwise provided) any other rights in respect of any share except an absolute right to the entirely thereof in the registered holder.

12. **Payment of commission**

The Company may at any time pay a commission to any person for subscribing/agreeing to subscribe (whether absolutely or conditionally) for any shares, debentures or debenture stock in the Company or procuring or agreeing to procure subscriptions (whether absolutely or conditionally) for any shares, debentures or debentures stock in the Company, so that the amount or rate of commission shall not exceed the percentage/rate as may be prescribed by the Board or by the Commission, but so that if the commission in respect of shares shall be paid or payable out of capital, the statutory requirements and conditions shall be observed and complied with, and the amount or rate of commission shall not exceed such percentage on the shares, debentures, debenture stock in each case subscribed or to be subscribed, as may be prescribed by law. The commission may be paid or satisfied, either wholly or partly, in cash or in shares, debentures or debenture stock. The Company may also on any issue of shares pay such brokerage as may be lawful; provided that such brokerage shall not exceed such percentage on the shares, debentures or debenture stock paid up, as may be prescribed by law.

B. TRANSFER OF SHARES

13. **Transfer**

The instrument of transfer of any share in the Company shall be executed both by the transferor and transferee, and the transferor shall be deemed to remain holder of the same until the name of the transferee is entered in the Register in respect thereof. The Company shall keep a book to be called the "Register of Transfers" and therein shall be fairly and distinctly entered the particulars of every transfer or transmission of any share.

14. **Form of transfer**

14.1 Shares in the Company shall be transferred in any usual or common form which the Directors shall approve or shall be in writing in the form appearing hereunder:

"I [•]of [•]being a [•]National,(hereinafter called the "Transferor") in consideration of (the sum of Rs.[•] (Rupees[•])paid to me by [•]s/o[•]of [•]National of[•] (hereinafter called the "Transferee") do hereby transfer to the Transferee [•]share(s)numbered[•] in the undertaking called the AJ Power (Private) Limited to hold the same unto the Transferee, his or her executors, administrators and assigns, subject to the several conditions on which I held the same immediately before the execution hereof and I [•], the Transferee, do hereby agree to take the said shares subject to the conditions aforesaid.

Signature of Transferor Signature of Transferee

Witness".

14.2 All applications for transfer of shares lodged with the Company must be returned by the Company to the shareholders duly completed within six (6) weeks from the date of its receipt. No share in any circumstances shall be transferred to an insolvent or as otherwise prohibited by law or by these Articles.

14.3 Without prejudice to the above, transfer of shares of the Company shall be subject to any further restrictions/procedures envisaged under the Implementation Agreement.

15. **Refusal of transfer of shares**

15.1. The Directors may decline to register any transfer of shares to transferees of whom they do not approve and shall be bound to show any reasons for exercising their discretion subject to the provisions of Sections 77 and 78 of the Ordinance.

15.2. In accordance with applicable laws, the Directors will not permit any transfer of shares resulting in any one person holding in its own right or beneficially owning or controlling voting strength in the Company equal to or exceeding ten percent of the total number of votes in any meeting of the shareholders or the creditors of the Company.

16. **Closure of Register**

On giving seven (7) days previous notice in the manner provided in the Ordinance, the Register may be closed for such period or periods not exceeding forty-five (45) days in any one (1) year as the Directors' may from time to time determine, but so that the Register shall not be closed for a longer period than thirty (30) days at a time.

C. TRANSMISSION OF SHARES

17. **Transmission**

The executors, administrators, heirs or nominees, as the case may be, of a deceased sole holder of a share shall be the only persons recognized by the Company as having any title to the share, but nothing herein contained shall release the estate of a deceased holder (whether sole or joint) from any liability (whether sole or joint) in respect of any share solely or jointly held by him. In any case in which a grant of probate or letters of administration to the estate of a deceased sole or any surviving holder has not been obtained, the Board may, but shall not be bound to recognize the title of any person claiming to be entitled to the deceased holder's shares on production by such claim of a succession certificate or such other evidence of title as the Board may deem sufficient, and upon the claimant furnishing such indemnity, if any, as the Board may require. In the case of a share registered in the names of two or more holders, the survivor or survivors shall be the only persons recognized by the Company as having any title to the share.

18. **Rights upon death or insolvency of a shareholder**

Any person becoming entitled to a share in consequence of the death or insolvency of a member shall, upon such evidence being produced as may from time to time be required by the Directors', have the right, either to be registered as a member in respect of the share or, instead of being registered himself, to make such transfer of the share as the deceased or insolvent person could have made: but the Directors' shall, in either case have the same right to decline or suspend registration as they would have had in the case of a transfer of the share by the deceased or insolvent person before the death or insolvency.

19. **Right of person entitled by transmission**

A person becoming entitled to a share by reason of the death or insolvency of the holder shall be entitled to the same dividends and other advantages to which he would be entitled if he was the

registered holder of the share, except that he shall not, before being registered as a member in respect of the share, be entitled in respect of it to exercise any right conferred by membership in relation to meetings of the Company.

20. **Liability for transmission**

The Company shall incur no liability or responsibility whatsoever in consequence of its registering or giving effect to any transfer of shares made or purporting to be made by any apparent legal owner thereof (as shown or appearing in the register) to the prejudice of persons having or claiming any equitable right, title or interest to or in the same shares, notwithstanding that the Company may have had notice of such equitable right, title or interest or notice prohibiting registration of such transfer, and the Company shall not be bound or required to regard or attend or give effect to any notice which may be given to it of any equitable right, title or interest or be under any liability whatsoever for refusing or neglecting so to do, but the Company shall nevertheless be at liberty to regard and attend any such notice and give effect thereto, if the Board shall so think fit.

D. ALTERATION OF CAPITAL

21. **Power to increase capital**

The Company may, from time to time, by special resolution increase the authorized share capital by such sum, to be divided into shares of such amount, as the resolution shall prescribe.

22. **Further issue of capital**

All further issue of shares capital shall first be subject to such of the provisions of Section 86 as are applicable to the Company. Thereafter, the Directors' may dispose of the same in such manner as they think most beneficial to the Company.

23. **Provisions applicable to new shares**

Except and so far as otherwise provided by the conditions of issue or by these Articles, any new shares shall be subject to the same provisions with reference to transfer, transmission and otherwise as the shares in the original share capital.

24. **Consolidation and sub-division**

The Company may, by ordinary resolution:

(a) consolidate and divide its share capital into shares of larger amount than its existing shares;
(b) sub-divide its existing shares or any of them into shares of smaller amount than is fixed by the Company's Memorandum of Association, subject, nevertheless, to the provisos to clause (d) of sub-section (1) of Section 92;
(c) cancel any shares which, at the date of the passing of the resolution, have not been taken or agreed to be taken by any person.

25. **Reduction of share capital**

The Company may by Special Resolution reduce its share capital in any manner subject to any conditions imposed by members and/or consents required by law.

III. MEETINGS AND PROCEEDINGS

E. GENERAL MEETINGS

26. **Annual general meetings**

A general meeting to be called the annual general meeting, shall be held, in accordance with the provisions of Section 158, within eighteen (18) months from the date of incorporation of the Company and thereafter once at least in every year within a period of four (4) months following the close of its financial year and not more than fifteen (15) months after the holding of its last annual general meeting as may be determined by the Directors.

27. **Other meetings**

All general meetings of the Company other than statutory meeting or any annual general meeting shall be called an extraordinary general meeting.

28. **Extraordinary meetings**

The Directors' may whenever they think fit, call an extraordinary general meeting and an extraordinary general meeting shall also be called on such requisition, or in default, may be called by such requisitionists, as is provided by Section 159. If at any time there are not within Pakistan sufficient Directors' capable of forming a quorum, any Director of the Company may call an extraordinary general meeting in the same manner as nearly as possible as that in which meetings may be called by the Directors.

F. NOTICE AND PROCEEDINGS

29. **Notice of meetings**

Twenty-one (21) days notice at the least (exclusive of the day on which the notice is served or deemed to be served, but inclusive of the day for which notice is given) specifying the place, the day and the hour of meeting and in case of special business, the general nature of that business, shall be given in the manner provided by the Ordinance for the general meeting, to such persons as are under the Ordinance or the regulations of the Company, entitled to receive such notices from the Company, and in case of any foreign company having a registered office outside Pakistan, notice must be given by telex if such foreign company so desires: but the accidental omission to give notice to, or the non-receipt of notice by, any member shall not invalidate the proceedings at any general meeting.

30. **Special business**

All business shall be deemed special that is transacted at an extraordinary general meeting, and also all that is transacted at an annual general meeting with the exception of declaring a dividend, the consideration of the accounts, balance sheet and the reports of the Directors' and auditors, the election of directors, the appointment of and fixing of remuneration of auditors.

31. **Notice for Special Resolution**

Where it is proposed to pass Special Resolution at any meeting, at least twenty-one (21) days notice shall be given specifying the intention to propose the resolution as a Special Resolution, and specifying the date, place and hour of meeting, whether annual or extraordinary and the nature of the business.

32. **Reduced period for notice**

With the consent of all members entitled to receive notice of an extraordinary general meeting or to attend and vote at such extraordinary general meeting, an extraordinary general meeting may be convened by shorter notice than specified above provided the Registrar on the application of the Directors, authorize such meeting to be held at a shorter notice.

33. **Accidental omission of notice**

In a case in which notice of a meeting is given to the shareholders individually, the accidental omission to give notice to any of the shareholders or the accidental non-receipt thereof shall not invalidate the proceedings at any such meeting.

34. **Quorum**

At least two (2) Members entitled and present in person and representing not less than twenty-five (25) percent of the total voting power either on their own account or as proxies shall be the quorum for a general meeting and no business shall be transacted at any general meeting unless the quorum requisite is present at the commencement of the business.

35. **Effect of absence of quorum**

If within half an hour from the time appointed for the meeting, a quorum is not present, the meeting if called upon the requisition of members, shall be dissolved, in any other case, it shall stand adjourned to the same day in the next week at the same time and place, or to such other day, time and place as the Board may by notice to the members appoint. If at the adjourned meeting a quorum is not present but those members who are present and entitled to vote not being less than three (3), shall be a quorum and they may transact the business for which the meeting was called.

36. **Chairman of meeting**

The Chairman of the Board and in his absence the Chief Executive shall preside as Chairman at every general meeting of the Company but if there is no such Chairman or if at any meeting he is not present within fifteen (15) minutes after the time appointed for the meeting, or is unwilling to act as Chairman, any one of the Directors' present may be elected to be Chairman and if none of the Directors is present or willing to act as a Chairman, the members present shall choose from amongst themselves to be the Chairman for that particular meeting.

37. **Adjournment**

The Chairman may with the consent of any meeting at which a quorum is present (and shall if so directed by the meeting) adjourn the meeting from time to time and from place to place but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjournment took place. When a meeting is adjourned for thirty (30) days or more, notice of the adjournment shall be given as in the case of an original meeting. Save as

aforesaid, it shall not be necessary to give any notice of any adjournment or of the business to be transacted at an adjourned meeting.

38. **Voting**

At any general meeting a resolution put to the vote of the meeting shall be decided by an affirmative vote of Members present in person or by proxy and holding or representing not less than fifty-one (51) percent of the issued capital of the Company for the time being.

39. **Demand for poll**

A poll may be demanded only in accordance with the provisions of Section 167. The demand for a poll may be withdrawn at any time by the person or persons who made the demand.

40. **Manner of taking poll**

If a poll is duly demanded, it shall be taken in accordance with the manner laid down in Section 168 and the result of the poll shall be deemed the resolution of the meeting at which the poll was demanded. A poll demanded on the election of Chairman or on a question of adjournment shall be taken at once. The demand for a poll shall not prevent the continuation of the meeting for the transaction of any business other than the question on which the poll was demanded.

G. VOTES OF MEMBERS

41. **Right to vote**

Subject to any rights or restrictions for the time being attached to any class or classes of shares, on a show of hand every member present in person or by proxy shall have one vote except for election of Directors' in which case the provisions of Section 178 shall apply. On a poll every member shall have voting rights as laid down in Section 160.

42. **Voting by joint holders**

In case of joint holders, the vote of the senior who tenders a vote, whether in person or by proxy, shall be accepted to the exclusion of the votes of the other joint holders and for this purpose seniority shall be determined by the order in which the names stand in the Register.

43. **Member of unsound mind**

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, by his committee or other legal guardian, and any such committee or guardian may on a poll vote by proxy.

44. **Voting – corporation representative**

44.1 On a poll votes may be given either personally or by proxy. Provided that no body corporate shall vote by proxy as long as a resolution of its Directors' in accordance with the provisions of Section 162 is in force.

44.2 A "Corporation", foundation or a company being a Member of the Company may appoint as proxy or as its representative under Section 162 any person to exercise the same powers on behalf of the

corporation or company which he represents to general meeting as that corporation or company could exercise if it were an individual member of the Company.

45. **Proxy to be in writing**

The instrument appointing a proxy shall be in writing under the hand of the appointer or by an agent duly authorized under a Power of Attorney or if such appointer is a Company or corporation under the common seal of the company or corporation or the hand of its attorney who may be appointer. A proxy must be a member of the Company.

46. **Instrument appointing proxy to be deposited**

The instrument appointing a proxy and the power of attorney or other authority (if any) under which it is signed or a notarized copy of that power or authority shall be deposited at the Office not less than forty-eight (48) 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.

47. **Form of proxy**

An Instrument appointing a proxy may be in the following form or a form as near thereto as may be:

"[*name of company*]

I/We [•] of [•] in the district of [•] being a member(s) of AJ Power (Private) Limited hereby appoint [•] of [•] as my proxy to vote for me/us and on my/our behalf at the annual / extraordinary general meeting of the Company to be held on the[•]day of [•]and at any adjournment thereof

Date: [•] Signature [•]

Witness [•]"

48. **Revocation of authority**

A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the prior 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. No objection shall be made to the validity of any vote except at the meeting or at the poll as which such vote shall be rendered and every vote whether given personally or by proxy not disallowed at such meeting or poll shall be deemed valid for all purposes of such meeting or poll shall be deemed valid for all purposes of such meeting or poll. If any question is raised, the Chairman of the meeting shall decide on the validity of every vote tendered at such meeting in accordance with these Articles.

49. **Irrevocable proxy**

Any proxy declared expressly on its place to be irrevocable shall not be revoked or be deemed revoked by the manner giving such proxy whether by attendance at any meeting held during the period of such proxy or by any other action on his part whatsoever or otherwise during the term of such proxy if such proxy is furnished to and filed with the records of the Company and the Company shall be bound to recognize and give effect to such proxy in accordance with the terms thereof.

IV. MANAGEMENT AND ADMINISTRATION

H. BOARD OF DIRECTORS

50. **Number of Directors**

The number of Directors shall be a minimum of two (2) Directors. Additionally, the Chief Executive, unless already a director, shall be deemed to be a director of the Company in accordance with Section 200(2). The following persons shall be the first Directors of the Company:

(1) **Zia Hyder Naqi;**
(2) **Almas Hyder.**

51. **Qualification of Directors & share qualification**

Save as provided in Section 187, no person shall be appointed as a Director unless he is a member of the Company. The qualification of a Director shall be holding of a minimum one (1) share in the Company at least in his own name.

52. **Chairman of the Board**

The Directors may elect one of their number as the Chairman of the Board and vest in him such powers and functions as they may deem fit in relation to the management and administration of the affairs of the Company subject to their general supervision and control.

53. **Chief Executive**

The Directors may within fourteen (14) days from the date of an election of Directors under Article 72 or within fourteen (14) days from the date on which such office falls vacant for whatsoever reason, elect one of their number or from outside their body to be the Chief Executive of the Company for such period (not exceeding three years) on such terms including remuneration (whether by way of salary, commission, participation in profits, allowances etc. or partly in one way and partly in another) as the Director may fix and vest in him such powers and functions as they may deem fit in relation to the management and administration of the affairs of the Company subject to their general supervision and control. The Chief Executive of the Company, if not already a Director, shall be deemed to be a Director of the Company and be entitled to all the rights and privileges and subject to all liabilities of that office. The Board may by resolution passed by not less than three-fourths of the total number of Directors for the time being or the Company may by Special Resolution remove a Chief Executive before the expiration of his term of office notwithstanding anything contained (if any) in these Articles or in any agreement

between the Company and the Chief Executive. Upon the expiry of his period of office, a Chief Executive shall be eligible for reappointment.

54. **Remuneration**

Subject to any approval or limits required by law, terms and conditions and remuneration of;
(a) a Director for performing extra services, including the holding of the office of the Chairman, serving on a committee or devoting special attention to the business of the Company.
(b) the Managing Director/ Chief Executive; and
(c) any Director for attending the meetings of the Directors or a Committee of Directors shall be determined by the Board.

I. POWERS AND DUTIES OF DIRECTORS

55. **General management powers**

55.1 The control of the Company shall he vested in the Board and the business of the Company shall be managed by the Directors, who 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 Ordinance or by these regulations, required to be exercised by the Company in general meeting, subject nevertheless to the provisions of the Ordinance or to any of these regulations and such regulations being not inconsistent with the aforesaid provisions as may be prescribed by the Company in general meeting but no regulation made by the Company in general meeting shall invalidate any prior act of the Directors which would have been valid if that regulation had not been made.

55.2 Without prejudice to the general powers conferred above and to any other powers or authorities conferred by these presents on the Directors, it is hereby expressly declared that the Directors shall have the following powers that is to say power:

(a) to pay cost, charges and expenses preliminary and accidental to the promotion, formation, establishment and registration of the Company and also to pay to the promoters all costs and charges they have incurred in acquiring properties, machinery or other rights which the Company may take over from them;

(b) to purchase or otherwise acquire from the Company any property, rights or privileges which the Company is authorized to acquire at such price and generally on such terms and conditions as they think fit and subject to the provisions of Section 196(3) to sell, let, exchange, or otherwise dispose of, absolutely or conditionally, any part of the property, privileges and undertaking of the Company upon such terms and conditions and for such consideration as they think fit;

(c) at their discretion to pay for any property rights and privileges acquired by or services rendered to the Company either wholly or partially in cash or in shares (subject to Section 86) bonds, debentures or other securities of the Company and any such shares shall be issued as fully paid-up and any such bonds, debentures or other securities may be either specifically charged upon all or any part of the property of the Company or not so charged;

(d) to secure the fulfillment of any contracts, agreements or engagements entered into by the Company by mortgage or charge of all or any of the property of the Company for the time being or in such manner as they think fit;

(e) to appoint and at their discretion remove or suspend such agents, managers, secretaries, officers, legal advisers, clerks, and servants for permanent, temporary or special services as they may from time to time think fit and to determine their powers and duties and fix their salaries or emoluments and to require security in such instances and to such amount as they think fit and to send any such persons to foreign countries for technical education or otherwise for the purpose of the Company's business and pay all expenses thereof on such terms as the Directors may think fit;

(f) to appoint any person or persons (whether incorporated or not) to accept and hold in trust for the Company any property belonging to the Company or in which it is interested or for any other purposes and not to execute and do all such trusts and also all such deeds, documents and things as may be requisite in relation to any such trust and to provide for the remuneration of such trustee or trustees;

(g) subject to the provisions of Section 196(3)(b), to institute, conduct, defend, compound or abandon any legal proceedings by or against the Company or its officer or otherwise concerning the affairs of the Company and also to compound and allow time for payment or satisfaction of any debts due and of any claims or demands by or against the Company;

(h) to refer any claims or demands by or against the Company to arbitration and observe and perform or resist the awards;

(i) to act on behalf of the Company to all matters relating to bankrupts and insolvents;

(j) to determine who shall be entitled to sign on the Company's behalf bills, notices, receipts, acceptances, endorsements, cheques, releases, contracts and documents;

(k) from time to time provide for the management of the affairs of the Company either in different parts of Pakistan or elsewhere in such manner as they think fit and in particular to establish branch office and to appoint any persons to be the attorneys or agents of the Company with such powers (including power to sub-delegate) and upon such terms as may be thought fit;

(l) subject to the provisions of the Ordinance, to invest and deal with any of the moneys of the Company upon such securities (not being shares in this Company) and in such manner as they think fit and from time to time vary or realize such investments;

(m) to execute in the name and on behalf of the Company in favor of any Director or other person who may incur or be about to incur personal liability for the benefit of the Company such mortgage of the Company's property (present or future) as they think fit and any such mortgage may contain a power of sale and such other powers, covenants and provisions as shall be agreed upon;

(n) to give to any persons employed by the Company as remuneration for their services as such a commission on the profits of any particular business or transaction or a share in the general profits of the Company and such commission or share of profit shall be treated as part of the working expenses of the Company;

(o) from time to time to make, vary and repeal by-laws for the regulation of the business, its officers and servants;

(p) to enter into all such negotiations and contracts and rescind and vary all such contracts and execute and do all such acts, deeds and things in the name and on behalf of the Company as they consider expedient for or in relation to any of the matters aforesaid or otherwise for the purposes of the Company;

(q) to establish, maintain, support and subscribe to any charitable or public objects and any institution, society or club which may be for the benefit of the Company or its employees or may be connected with any town or place where the Company carries on business; to give pensions, gratuities, bonuses or charitable aid to any person or persons who have served the Company or to the wives, children or dependents of such person or persons that may appear to the Directors just or proper, whether any person, his widow, children or dependents have or have not a legal claim upon the Company;

(r) subject to the provisions of Section 227, to form a fund to provide for such pensions, gratuities, compensation or to create any Provident or Benefit Fund in such or any other manner as the Directors may deem fit;

(s) to make and alter rules and regulations concerning the time and manner of payment of the contributions of the employees and the Company respectively to any such fund and the accrual, employment, suspension and forfeiture of the benefits of the said fund and the application and disposal thereof and otherwise in relation to the working and management of the said fund as the Directors shall from time to time think fit;

(t) to make and give receipt, releases and other discharges for money payable to the Company and for the claims and demands of the Company;

(u) to delegate any of their powers which are not required to be exercised by them under section 196 of the Ordinance.

55.3 The Board may exercise or delegate all the powers of the Company to borrow, obtain finances as may be reasonably required and mortgage or charge its undertaking, property and assets (both present and future) and to issue debentures and other securities, whether outright, subject to any conditions, or as collateral security for any debt, liability or obligation of the Company or of any third party.

56. **Borrowing powers**

The Board may from time to time borrow any moneys as may be reasonably required for the purposes of the Company from the members or from other persons, firms, corporations, companies, institutions or banks or the Directors may themselves lend any money to the Company. The Company shall have no power to buy its own shares and shall not give whether directly or indirectly and whether by means of a loan, guarantee, provision of securities or otherwise any financial assistance for the purpose of or in connection with purchase made or to be made by any person of any shares of the Company.

57. **Power to secure**

The Board may secure payment of such sum or sums of money in such manner and upon such terms and conditions as they think fit and in particular by the issue of bearer and registered bonds, perpetual or redeemable debentures or by mortgage or charge or other security on the whole or any part of the property, assets and rights of the Company (both present and future). Any bonds, debentures or other securities issued or to be issued by the Company shall be under the control of the Board which may issue them upon such terms and conditions and in such manner and for such consideration as shall be considered by the Board to be for the benefit of the Company.

58. **Special terms**

Any bonds, debentures or other securities may be issued at a discount, premium or otherwise and with any special privileges as to redemption, surrender, drawing, convertibility into shares, attending and voting at meetings of the Company, appointment of Directors and otherwise, provided that debentures with the right to vote or convertible into shares shall not be issued unless authorized by a Special Resolution.

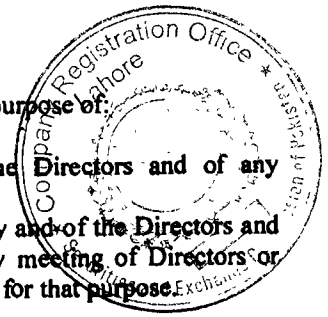
59. **Duties of Directors**

The Directors shall duly comply with the provisions of the Ordinance and in particular with the provisions in regard to the registration of the particulars of mortgages and charges affecting the property of the Company or created by it, to the keeping of a register of the Directors, chief executive, managing director, chief accountant, secretary or auditor of the Company and every other person holding not less than ten (10) percent of the beneficial interest in the Company, the number, description and amount of any share in or debenture of the Company or any other body corporate being the Company's subsidiary or holding Company, or a subsidiary of the Company's holding Company which are held by or in trust for him or of which he has a right to become holder whether on payment or not. The Directors shall be responsible for sending to the registrar 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 Resolution and a copy of the register of Directors and notifications of any changes therein.

60. **Benefits**

The Board may pay and agree to pay pension of other retirement, superannuation, death or disability benefits or allowances to any person in respect of any Director or former Director who may hold or may have held any executive office or employment under the Company and for the purpose of providing any such pensions or other benefits or allowances, may contribute to any scheme or fund and may make payments towards insurance or trusts in respect of such persons.

61. **Minute books**



61.1 The Directors shall cause minutes to be made in books provided for the purpose of:

(a) all appointments of officers made by the Directors;

(b) the names of the Directors present at each meeting of the Directors and of any committee of the Directors; and

(c) any resolution and proceedings at all meetings of the Company and of the Directors and of committees of Directors and every Director present at any meeting of Directors or committee of Directors shall sign his name in a book to be kept for that purpose.

61.2 Any such minutes signed by the Chairman of the meeting or of the next following meeting shall be receivable as evidence of the facts therein stated without further proof. The Books containing

minutes of proceedings of general meetings of the Company shall be kept at the Office of the Company and shall during business hours (subject to reasonable restrictions as the Board may from time to time impose but so that not less than two (2) hours each day is allowed for inspection), be open to the inspection of any Member without charge.

J. DISQUALIFICATION OF DIRECTORS

62. Disqualification of Directors

62.1 No person shall become a Director of the Company if he suffers from any of the disabilities or disqualifications mentioned in Section 187 and if already a Director, shall cease to hold such office from the date he so becomes disqualified or disabled or (a) if removed before expiration of period of office under Section 181 or by a Special Resolution passed by the Company at a general meeting, provided he is not a nominee Director appointed under Section 183; (b) If by notice in writing given to the Company he resigns from his office; (c) he absents himself from three (3) consecutive meetings of the Directors or from all the meetings of the Directors for a continuous period of three (3) months, whichever is the longer, without leave of absence from the Directors; (d) he or any firm of which he is a partner or any private company of which he is a director; (i) without the sanction of the Company in general meeting accepts or holds any office of profit under the Company other than that of chief executive or a legal or technical adviser or a banker; or (ii) accepts a loan or guarantee from the Company in contravention of Section 195.

62.2 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. These provisions shall not apply to any contract by or on behalf of the Company to give to the Directors or any of them any security for advances or by way of indemnity against any loss which they or any of them suffer by reason of becoming or being sureties for the Company. A general notice that any Director is a member of any specified company or is a member of any specified firm and is to be regarded as interested in any subsequent transaction with such firm or company shall be given for purposes of disclosure under this Article, and any such general notice shall expire at the end of the financial year in which it was given and may be renewed for a further period of one (1) financial year by giving fresh notice in the last month of the financial year in which it would otherwise expire.

K. PROCEEDINGS OF DIRECTORS

63. Meeting of Directors

63.1 The Directors may meet together for the dispatch of business, adjourn and otherwise regulate their meetings as they think fit. At least two (2) Directors personally present shall constitute a quorum, however where the Directors consider that one or more Directors may not be personally present at the designated venue, meeting of the Directors may be duly convened through audio and/or video conference or other modern technologies acceptable to the Board; provided that the secretary shall secure audio or video, as the case may be, recording of the proceedings of such meeting and keep in custody together with other relevant record. Questions arising at any meeting shall be decided by a majority of votes. A Director may and the secretary on the requisition of a Director shall at any time summon a meeting of the Directors. At least four (4) clear days notice must be given to all Directors to summon a meeting of the Board and such notice shall set forth the purpose or purposes of which such meeting is summoned. However, with the consent of all Directors entitled to receive notice of a meeting or to attend and vote at any such meeting, a meeting of the Board

may be convened by shorter notice than specified in this Article. Any Director may waive notice in writing of the time, place and purpose of any meeting, either before at or after such meeting.

63.2 A meeting of the Board for the time being at which the quorum is present shall be competent to exercise all or any of the authorities, powers and discretion by or under the Articles or by or, under any law vested in or exercisable by the Board generally. The quorum for a meeting of Directors shall not be less than two (2) Directors. The Board may by unanimous consent determine that a larger number of Directors shall constitute a quorum for deliberating on specified matters and further that such matters shall be decided upon the affirmative votes of more than a simple majority as may be specified by the Board.

63.3. The directors may hold their meetings through tele/video conferencing in emergent situation where it is not possible for them to be physically present at the venue of the meeting, provided that the minutes of such meeting are approved by all directors who participated in such meeting, requirements of the requisite quorum and other legal formalities relating to holding of such meetings have been observed.

64. **Chairman of Directors Meetings**

The Chairman of the Board who shall be Director representing share holding interest of the Company shall preside at all meetings of the Board but if at any meeting the Chairman is not present within ten (10) minutes after the time appointed for holding the same or is unwilling to act as Chairman, the Chief Executive shall preside but if at any meeting the Chief Executive is not present within ten (10) 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. In case of an equality of votes, the Chairman shall have and exercise a second or casting vote.

65. **Committees**

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 committee so formed shall in the exercise of the powers so delegated, conform to any restrictions that may be imposed on it by the Directors.

66. **Chairman of committee meetings**

A committee may elect a Chairman of its meeting but if no such Chairman is elected or if at any meeting the Chairman is not present within ten (10) 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.

67. **Proceedings of committee members**

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.

68. **Validity of Directors acts**

All acts done by any meeting of the Directors or of a committee of Directors or by any other person acting as a Director shall notwithstanding that it be afterwards discovered that there were some defect in the appointment of 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. Provided that as soon as any such defect has come to notice, the director or other person concerned shall not exercise the right of his office till the defect has been rectified.

69. **Resolution by circulation**

A resolution in writing circulated to all the Directors and signed by all the Directors or affirmed by them through facsimile, telex, telegram, email or other means of communication acceptable to the Board shall be as valid and effectual as if it had been passed at meeting of the Directors duly convened and held.

L. ELECTION AND REMOVAL OF DIRECTORS

70. **First election of Directors**

At the first annual general meeting of the Company, all the Directors shall stand retired from the office and Directors shall be elected in their place in accordance with Section 178 for a term of three (3) years

71. **Eligibility for re-election**

A retiring Director shall be eligible for re-election provided he serves a notice of his candidature for election in writing at the Office not less than fourteen (14) days before the date of the meeting at which the election of Directors is to take place.

72. **Election in accordance with the Ordinance**

The Director shall comply with the provisions of Section 174 to 178 and Section 180 and 184 relating to the election of Director and matters ancillary thereto. Unless the number of candidates is not more than the number of Directors to be elected, the number of Directors as determined by the Board shall be elected to office by the members in general meetings in the following manner:
(i) a member shall have such number of votes as is equal to the product of voting shares held by him and the number of Directors to be elected;
(ii) a member may give all his votes to a single candidate or divide them between more than one (1) of the candidates in such manner as he may choose;
(iii) the candidate who gets the highest number of votes shall be declared elected as Director and then the candidate who gets the next highest number of votes shall be so declared elected and so on until the total number of Directors to be elected has been so elected.

73. **Filing the casual vacancy**

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.

74. **Removal of Director**

The Company may' remove a Director but only in accordance with the provisions of the Ordinance. The Company may by resolution in a general meeting remove a director appointed under Article 75 or elected in the manner provided for in Article 72 provided that a resolution for removing a Director shall not be deemed to have been passed unless the number of votes cast in favor of such resolution is not less than:

(i) the minimum number of votes that were cast for the election of a Director at the immediately preceding election of Directors, if the resolution relates to removal of a Director elected in the manner provided in or under Article 72; or

(ii) the total number of votes for the time being computed in the manner laid down in Article 72 divided by the number of Directors for the time being, if the resolution relates to removal of a Director appointed under Article 75.

75. **Alternate Directors**

Any Director not permanently resident in Pakistan and 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 by writing under the hand of the Director making the appointment. An Alternate Director so appointed shall not be entitled to appoint another Alternate Director, but shall otherwise be subject to the provisions of the Ordinance and these Articles with regard to Directors. An Alternate Director shall be entitled to receive notice of all the meetings of the Board and to attend and vote as a Director at any such meeting at which the Director appointing him is not personally present and generally to perform all the functions of his appointer as Director in the absence of such appointer. An Alternate Director shall ipso facto cease to be Alternate Director if his appointer for any reason ceases to be a Director or if and when his appointer returns to the district where meetings of the Directors are ordinarily held or removes the appointee from office by notice in writing under the hand of the appointer.

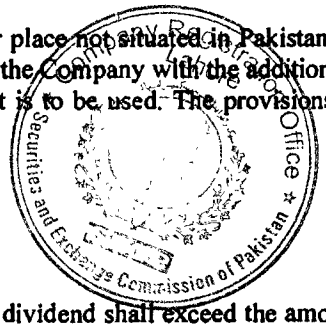
V. THE SEAL

76. **Common Seal**

The Directors shall provide a common seal of the Company which shall not be fixed to any instrument except by the authority of a resolution of the Board or by a committee of Directors authorized in that behalf by the Directors and two (2) Directors or one (1) Director and the secretary of the Company shall sign every instrument to which the common seal is affixed.

77. **Official Seal**

The Director may provide for the use in any territory, district or place not situated in Pakistan, of an official seal which shall be a facsimile of the common seal of the Company with the addition on its face of the name of every territory, district or place where it is to be used. The provisions of Section 213 shall apply to the use of the official seal.



VI. DIVIDENDS AND RESERVE

78. **Declaration of dividends**

The Company in general meeting may declare dividends but no dividend shall exceed the amount recommended by the Directors.

79. **Interim dividend**

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.

80. **Dividends payable out of profits**

No dividends shall be paid otherwise than out of the profits of the year or any other undistributed profits from prior years. Also Dividend shall not be paid out of unrealized gain on investment property credited to profit and loss account. No unpaid dividend shall bear interest against the Company.

81. **Dividends payable on amount on shares**

Subject to the rights of the persons (if any) entitled to share with special rights as to dividends, all dividends shall be declared and paid according to the amounts paid on the shares, but if and so long nothing is paid upon any of the shares in the Company, dividends may be declared and paid according to the amounts of the shares.

82. **Reserve fund**

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 direction 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, either be employed in the business of the Company or be invested in such investments (other than shares of the Company) as the Directors may subject to the provisions of the Ordinance from time to time think fit.

83. **Profit carried forward**

The Directors may carry forward any profits which they may think prudent not to distribute without setting them aside as reserve.

84. **Payment of dividend in specie**

With the sanction of a general meeting any dividend may be paid wholly or in part by the distribution of specific assets and in particular of paid-up shares or debentures of any other company or in any one or more of such ways. Where any difficulty arises in regard to such distribution, the Directors may settle the same as they think expedient and in particular may fix the value for distribution of such specific assets or any part thereof and may determine that cash payments shall be made to any members upon the footing of the value so fixed, in order to adjust the rights of all members and may vest any such specific assets in trustees upon trust for the members entitled to the dividend as may seem expedient to the Directors.

85. **Dividends to joint holders**

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.

86. **Period for payment of dividend**

The dividend shall be paid within the period laid down in Section 251.

87. **Non-Forfeiture of dividends**

The non-forfeiture of dividends is hereby secured provided that all dividends unclaimed for one (1) year after having been declared may be invested or otherwise made use of by the Directors for the benefit of the Company until claimed and the Company shall not be constituted a trustee in respect thereof. All dividends unclaimed for a period of six (6) years after having been declared may be forfeited and shall in such cases revert to the Company.

88. **Mode of payment**

Any dividend may be paid by cheque sent through the post to the registered address of the members or person entitled thereto.

VII. ACCOUNTS

89. **Books of account**

The Directors shall cause to be kept proper books of account as required under Section 230.

90. **Place where accounts kept**

The books of account shall be kept at the Office or at such other place as the Directors shall think fit and shall be open to inspection by the Directors during the business hours.

91. **Inspection by members**

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 account and book or papers of the Company except as conferred by law or authorized by the Directors or by the Company in general meeting.

92. **Annual accounts**

The Directors shall as required by Sections 233 and 236 cause to be prepared and to be laid before the Company in a general meeting such profit and loss accounts and balance sheets duly audited and reports as are referred to in those sections.

93. **Balance sheet and profit and loss account**

A balance sheet, profit and loss account and other reports referred to in the preceding Article shall be made out in every year and laid before the Company in the annual general meeting made up to a date not more than four (4) months before such meeting. The balance sheet, profit and loss account shall be accompanied by a report of the auditors of the Company and the report of Directors. The balance sheet shall include inter alia, the following details of all its investments:

(a) Particulars of investment;
(b) Date of investment;
(c) Purchase price;

(d) Market Value.

94. **Copy of accounts to be sent to members**

A copy of the balance sheet, profit and loss account and reports of Directors and auditors shall at least twenty-one (21) days preceding the meeting to be sent to the persons entitled to receive notices of general meetings in the manner in which notices are to be given as hereinafter provided.

95. **Compliance with the Ordinance**

The Directors shall in all respect comply with the provisions of Section 230 to 236.

96. **Capitalization of profits**

The Company in a general meeting may upon the recommendation of the Directors resolve that it is desirable to capitalize any part of the amount for the time being standing to the credit of any of the Company's reserve amounts or to the credit of the profit and loss account or otherwise available for distribution and accordingly that such sum be set free for distribution among the members who would have been entitled thereto if distributed by way of dividend and in the same proportions, on conditions that the same be not paid in cash but be applied in or towards paying up to full un-issued shares or debentures of the Company to be allotted and distributed, credit as fully paid up to and amongst such members in the proportion aforesaid and the Directors shall give effect to such resolution.

97. **Audit**

Auditors shall be appointed and their duties regulated in accordance with Section 252 to 255.

98. **Notice to members**

Notice shall be given by the Company to members and auditors of the Company and other persons entitled to receive notice in accordance with Section 50.

VIII. SECRECY

99. **Secrecy**

Every Director, manager, adviser, auditor, trustee, member of a committee, officer, servant, agent, accountant or other person employed in the business of the Company shall if so required by the Directors before entering upon his duties, sign a declaration pledging himself to observe strict secrecy respecting all transactions of the Company with its customers and the state of accounts with individuals and in matters relating thereto and shall by such declaration pledge himself not to reveal any of the matters which may come to his knowledge in the discharge of his duties except when required to do so by the Directors or by any general meeting or by any court of law and except so far as may be necessary in order to comply with any of the provisions in these presents.

100. **Members' access to Company premises**

No member or other person (not being a Director) shall be entitled to enter upon the property of the company or examine the Company's premises or properties without the permission of a Director subject to Article 91, to require discovery of or any information respecting any detail of

the Company's trading or any matter which is or may be in the nature of a trade secret, mystery of trade, secret process or of any matter whatsoever which may relate to the conduct of the business of the Company and which in the opinion of the Directors will be inexpedient in the interest of the members of the Company to communicate.

IX. RECONSTRUCTION

101. **Reconstruction**

On any sale of the undertaking of the Company, the Directors or the liquidators on a winding up may if authorized by a Special Resolution, accept fully paid shares, debentures or securities of any other company either then existing or to be formed for the purchase in whole or in part of the property of the Company, and the Directors (if the profits of the Company permit), or the liquidators (in a winding up) may distribute such shares or securities or any other properties of the Company amongst the members without realization or vest the same in trust for them and any Special Resolution may provide for the distribution or appropriation of the cash, shares or other securities, benefits or property, otherwise than in accordance with the strict legal rights of the members or contributories of the Company and for the valuation of any such securities or property at such price and in such manner as the meeting may approve and all holders of shares shall be bound to accept and shall be bound by any valuation or distribution so authorized and waive all rights in relation thereto save only such statutory rights (if any) as are, in case the Company is proposed to be or is in the course or being wound up, incapable of being varied or excluded by these presents.

X. WINDING UP

102. **Division and distribution of assets upon dissolution**

If the Company is wound up, the liquidator may with the sanction of a Special Resolution of the Company and any other sanction required by law, divide amongst the members in specie or kind the whole or any part of the assets of the Company (whether they shall consist of property of same kind or not) and may for such purpose set such value as be deemed fair upon any property to be divided its aforesaid and may determine how such division shall be carried out as between the members or different classes of members.

XI. INDEMNITY

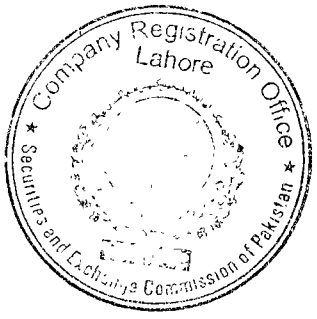
103. **Indemnity**

103.1 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 favor or in which he is acquitted, or in connection with any application under Section 488 in which relief is granted to him by the court.

103.2 No Director, Chairman, Chief Executive, Managing Director or other officer of the Company will be liable for the acts, receipts, neglects or defaults of any other Director or officer or for any loss or expenses happening to the Company through the inefficiency or deficiency of title to any property acquired by order of the Board, or other officer for or on behalf of the Company, or for the insufficiency or deficiency of any security in or upon which any of moneys of the Company

shall be invested, or for any loss or damage arising from the bankruptcy, insolvency or tortuous acts of any person with whom any money, securities or effects shall be deposited or for any loss occasioned by any error of judgment or oversight on his part or for any other loss, damage or misfortune whatever which shall happen in the execution of the duties of his office or in relation thereto, unless the same happens through his own willful act, neglect, default or dishonesty.

103.3 If the Directors or any of them or any other person shall become personally liable for the payment of any sum primarily due from the Company, the Board may execute or cause to be executed any mortgage, charge or security over or affecting the whole or any part of the assets of the Company by way of indemnity to secure the Directors or persons so becoming liable as aforesaid from any loss in respect of such liability.



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 as set opposite to our respective names.

Sr. No.	Name and Surname (present and former) in full (in block letters) and CNIC #	Father's / Husband's Name in full	Nationality with any former Nationality	Occupation	Residential Address (in full)	Number of Shares taken by each subscriber	Signatures
1	Zia Hyder Naqi 35202-6813779-7	Sheikh Muhamad Naqi	Pakistani	Business	130-M Gulberg III, Lahore	25 (twenty - five)	
2	Almas Hyder 35202-2420438-3	Sheikh Muhamad Naqi	Pakistani	Business	9/94-K Sarwar Road, Lahore, Cantt., Lahore	75 (seventy-five)	
					Total Number of Shares	**100** (one hundred)	

Dated this 27th day of October, 2014

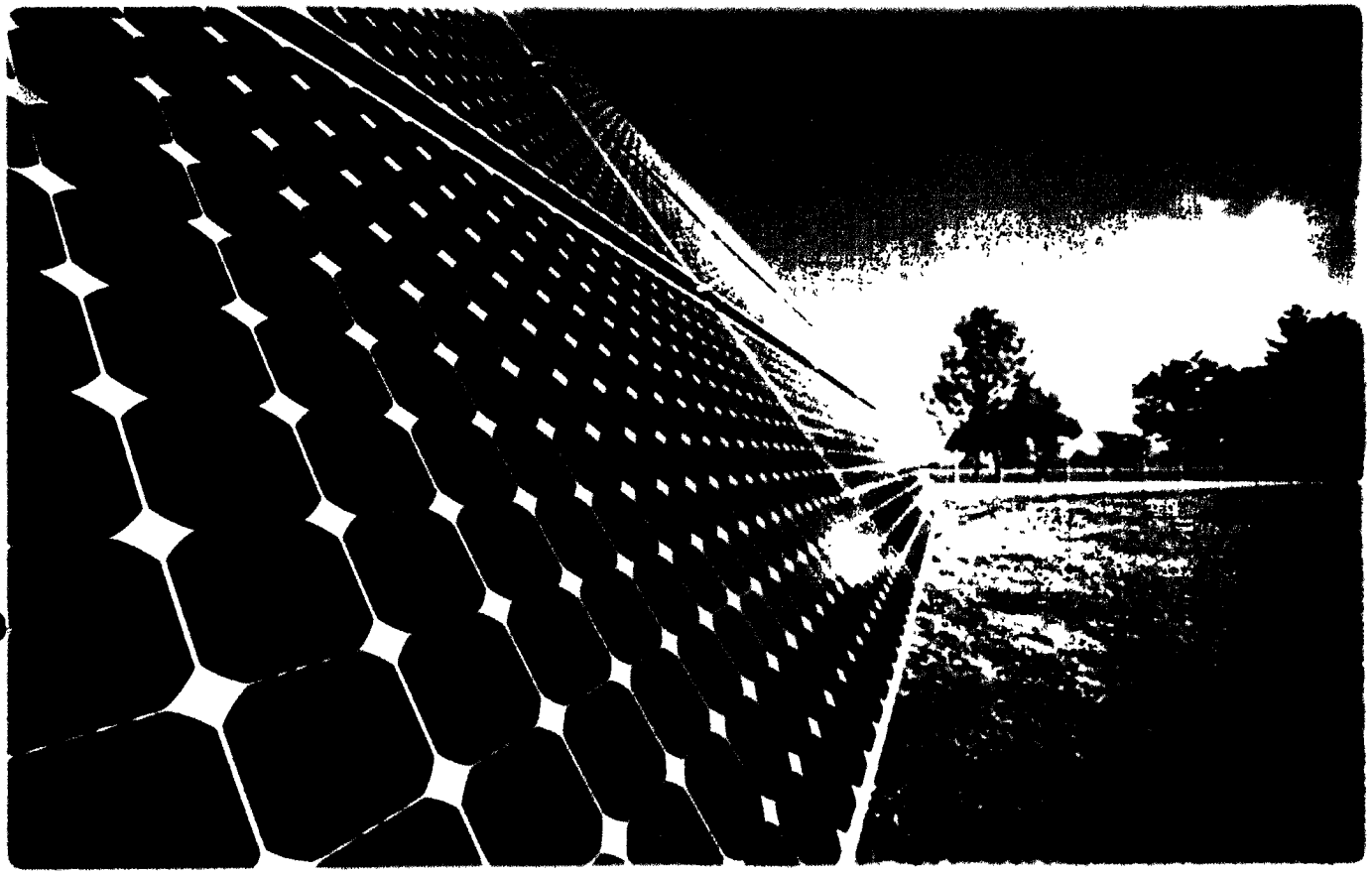
Witness to the above signatures:
Full Name: Muhammad Imran Jahangir
Occupation: Private Job
CNIC # 35202-6562771-7
Father's Full Name: Jahangir Khan

Signature .....
Nationality: Pakistani

Full Address: House #5 Henry-K Gulberg III Lahore

Company Registration Office Lahore Securities and Exchange Commission of Pakistan

27/05/2015



Technical Details and Design of the Project

10MW$_{AC}$ PV Power Plant

(AJ Solar Farm)

AJ Power (Private) Limited

Certified True Copy
Sign.....
Company Secretary

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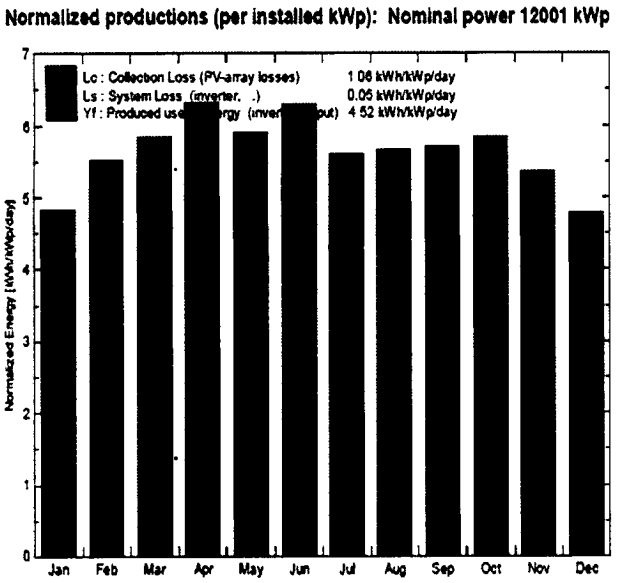
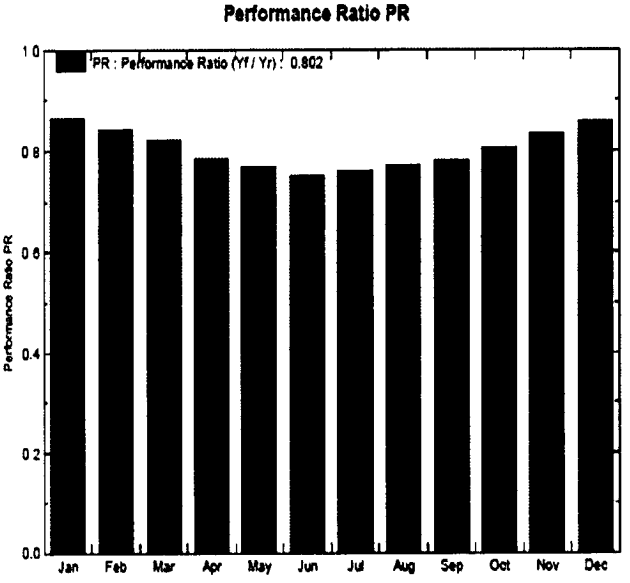
Overview of the Power Plant System

Key Facts of the 10 MW Solar PV Power Plant:

PV Technology/Modules:	Polycrystalline/ 250Wp or 305Wp
Inverters:	Tier-1 String inverters of 20KWp or above
Mounting Structure:	Galvanized mounting Structure
Plant Capacity:	12 MWp
Performance Projection:	80.2%
Module Area:	76,195m^2
Estimated Installation Area:	175,000 m^2
Simulated Power Output:	19,799MWh for 1st year
Simulated Specific Output:	1,650 kWh/kWp/year





Design criteria

Electrical components and design;

The system is designed using a renowned sophisticated sizing program to provide a reliable source of DC electricity at the precise location where the power is required. The proprietary software PVSYST, intellectual property, has been proven for more than 10 years of successful installations in several worldwide countries.

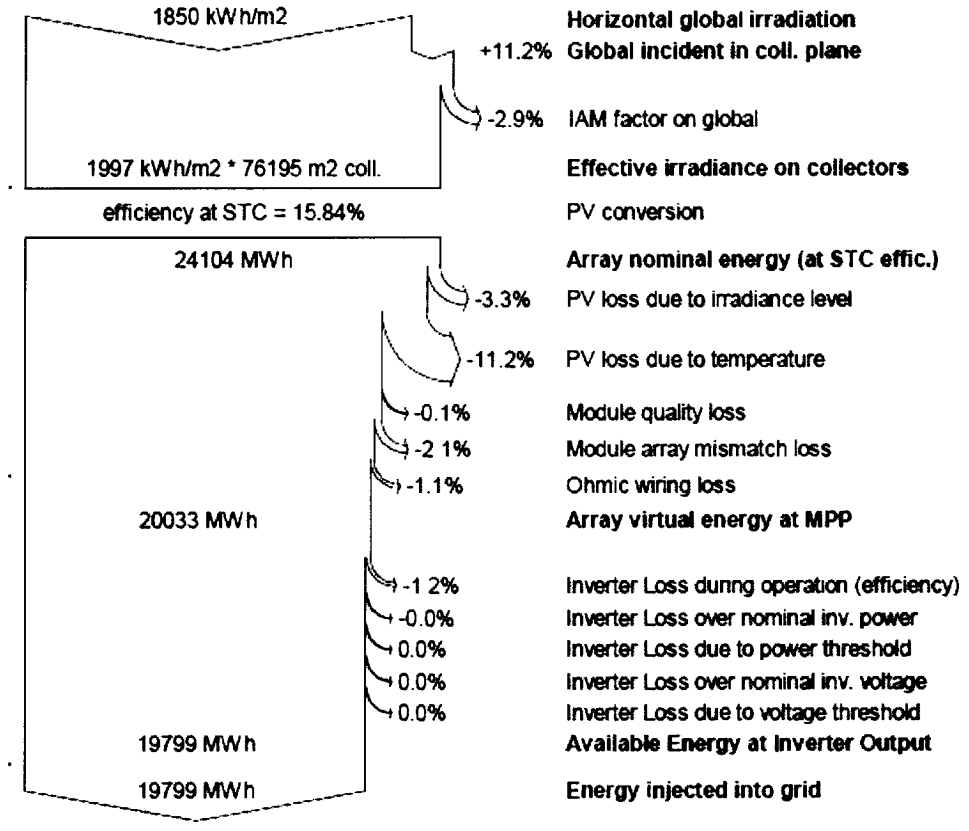
The components have been selected and designed in accordance to the following design guidelines:

DC Loss Criteria

Components	Criteria	Typical	AJ Power's
DC Cables	DC Losses	2%	<2%

Loss Diagram

Loss diagram over the whole year



Besides, the system components are selected for;

- Long life and high reliability.
- Good visual impact & aesthetics.
- Ease of installation without the need for specialized tools.
- Minimum maintenance (normally limited to one or two visits per year, by semi-skilled personnel)
- Installation in a wide range of climatic conditions with humidity up to 95%.

Energy Output Simulation

System/Technology	Description	Specific Produced Energy kWh/kWp/year	Produced Energy MWh/year	Expected Performance Ratio
Polycrystalline with fixed mounting structure	**Modules:** 250Wp~305Wp: Polycrystalline **Inverters:** Tier-1 String Inverter 20KWp or above **Module Mounting Structure**: Hot dipped Galvanized with Fixed tilt	**1,650**	**19,799**	**80.2%**

The system yields are simulated by using PVSyst (proprietary software of EPC) with custom designed parameters. Proven complex algorithm and up-to-date weather data is used in software to generate a yield simulation at project site.

The yield simulation is estimated up to the output of the inverter. Distance to the grid connection point etc. are unknown factors at this stage but with careful design of the ac cable, transformer and switchgear power loss to the metering point will be minimized.

Above mentioned performance ratio is only for the DC solar system, AC distribution not included.

Meteorological Data

The PVSyst software package includes meteorological data of irradiation, temperature, precipitation and wind velocity for many locations around the world. We prefer to utilize the latest available Meteonorm data which as a Global Meteorological Database for Engineers, Planners and Education is a comprehensive meteorological reference, incorporating a catalogue of meteorological data and calculation procedures for solar applications and system design at any desired location in the world. It is based on over 25 years of experience in the development of meteorological databases for energy applications.

This data provides a realistic yield for any given location that can be relied upon when performing financial modeling and investment analysis.

PV Technology

Being it predominant & cost-effective technology with simple maintenance requirements, ***poly crystalline modules*** with fixed tilt arrangement are considered most suitable for this plant.

Manual seasonal tilt arrangement is also under consideration.

System Components

The main components of solar PV Plant are;

1- PV Modules
2- ·Inverters
3- Module mounting Structure
4- Switchyard/substation
5- Weather monitoring system

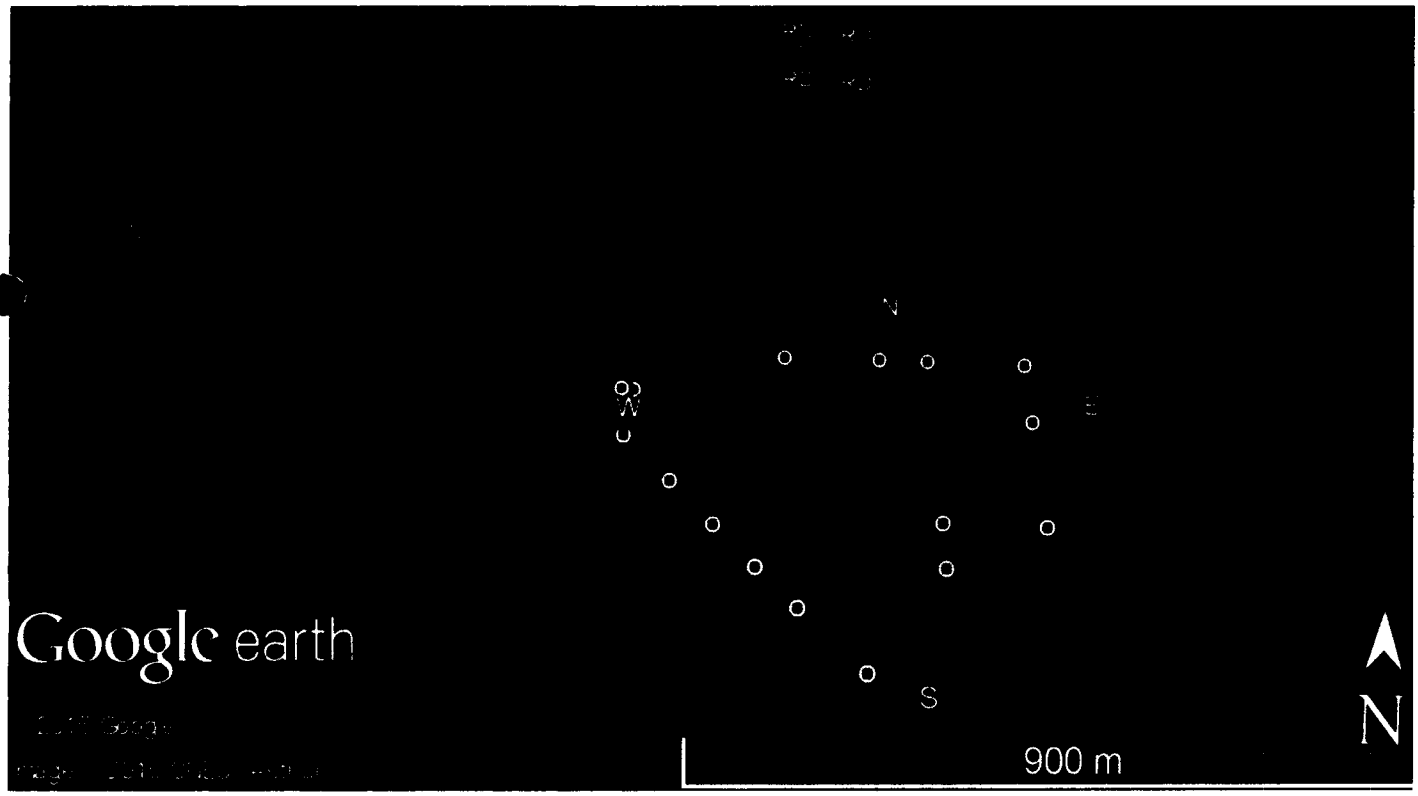
Topographical and Geographical Aspects

The entire land available is almost flat and not much undulation.

Location

The proposed plant is located at Adhi Kot District Khushab Punjab, and available area is about 175,000 m^2. The site's latitude and longitude are respectively **32.09°** and **71.82°.**

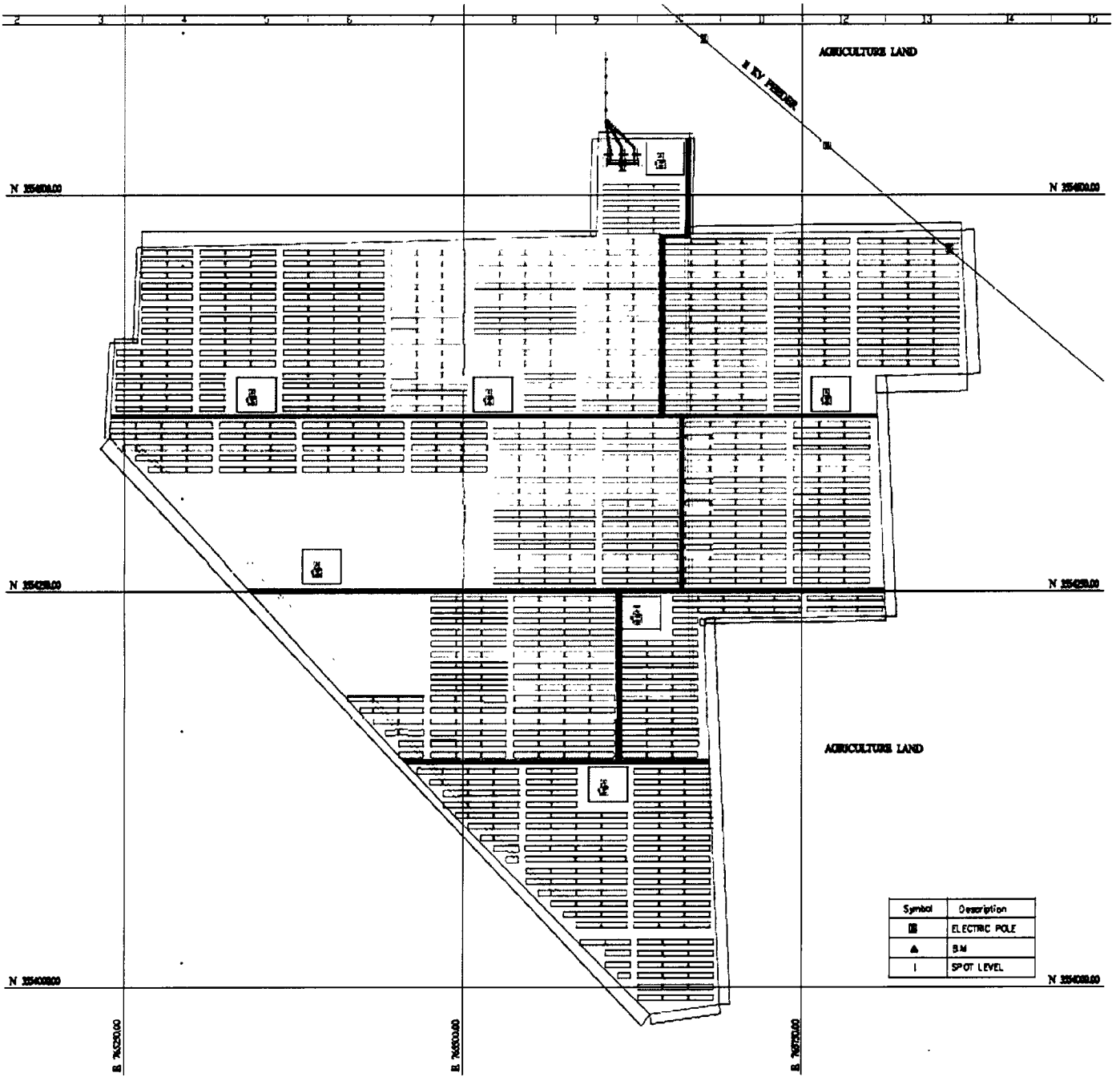
The weather is characterized by heavy sun shine, together with hot climate and moderate rain. There are no hills / tall structures (that could cause shadow) near the site.



Water Availability

Raw water for the plant is required for meeting the module cleaning requirements that will be drawn from Bore wells.

General Layout of the plant



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Sign.....
Company Secretary

Proposed Scheme

A- It is proposed to install 10 MW_{AC} capacity Solar PV plant with polycrystalline solar PV modules in fixed tilt and Central Grid Tied Solar Inverters. Generated power shall be stepped-up to 11 kV through inverter transformers, as shown in the attached Single Line Diagram in **Annexure-A.**

B- Power evacuation to DISCO grid is planned at 11 kV voltage level and shall be carried out as per Grid interconnectivity study and approved evacuation scheme. Main & Check metering shall be planned at the 11 kV level.

C- AJ Power is going use ***250Wp*** or ***305Wp polycrystalline modules***, from Tier-1 Chinese PV module manufacturer. The modules shall be protected by high transmission tempered glass covered with anodized aluminum alloy frames. Serially connected cells shall be terminated to IP65 junction boxes at back side of modules. Positive & Negative terminals are terminated with MC4 and Y- connectors, for module interconnections.

D- Inverters are the critical equipment in the Solar PV plant. The reliability & performance of the inverters have great influence on the plant overall performance & availability. It is proposed to use high efficient String Inverters from Tier-1 inverter suppliers of China, ranging from 20kWp or above. Negative earthling in inverters shall be planned to counter PID effect for the modules.

E- It is proposed to use oil filled transformers for stepping up the power generated from PV system. The intended transformers shall confirm to IEC: 60076 standard.

F- The solar farm will be designed as 10 blocks, each block will be hooked up to 11 KV output. All the 11 KV output will reach to the control building 11 KV bus switchboard. The will be one 11 KV output for the whole solar farm connected to the DISCO grid.

G- PV modules shall be fixed on the Module Mounting Structures (MMS) in two rows in portrait arrangement. Structural materials foundation bolts, fastening bolts, screws, nuts, washers shall conform to the relevant International Standards.

H- Soil Investigation has been conducted and the soil includes brownish loose Silty sand and grey loose sand having concretion and Mica in traces. To help faster construction, pile foundations are better and are recommended as they have long lasting life than direct ramming of the structure.

I- Main control building, inverter rooms and security buildings shall be single story buildings with brick work. Alternatively, prefabricated rooms may also be planned.

Inverter & control rooms shall be envisaged with pressurized ventilation arrangement.

J- Non-current carrying parts of all electrical equipment viz. distribution boards, control panels, HT switchgears, and all lighting fittings will be earthed rigidly, to ensure safety. Building lightning protection system will be provided as per relevant IEC standards.

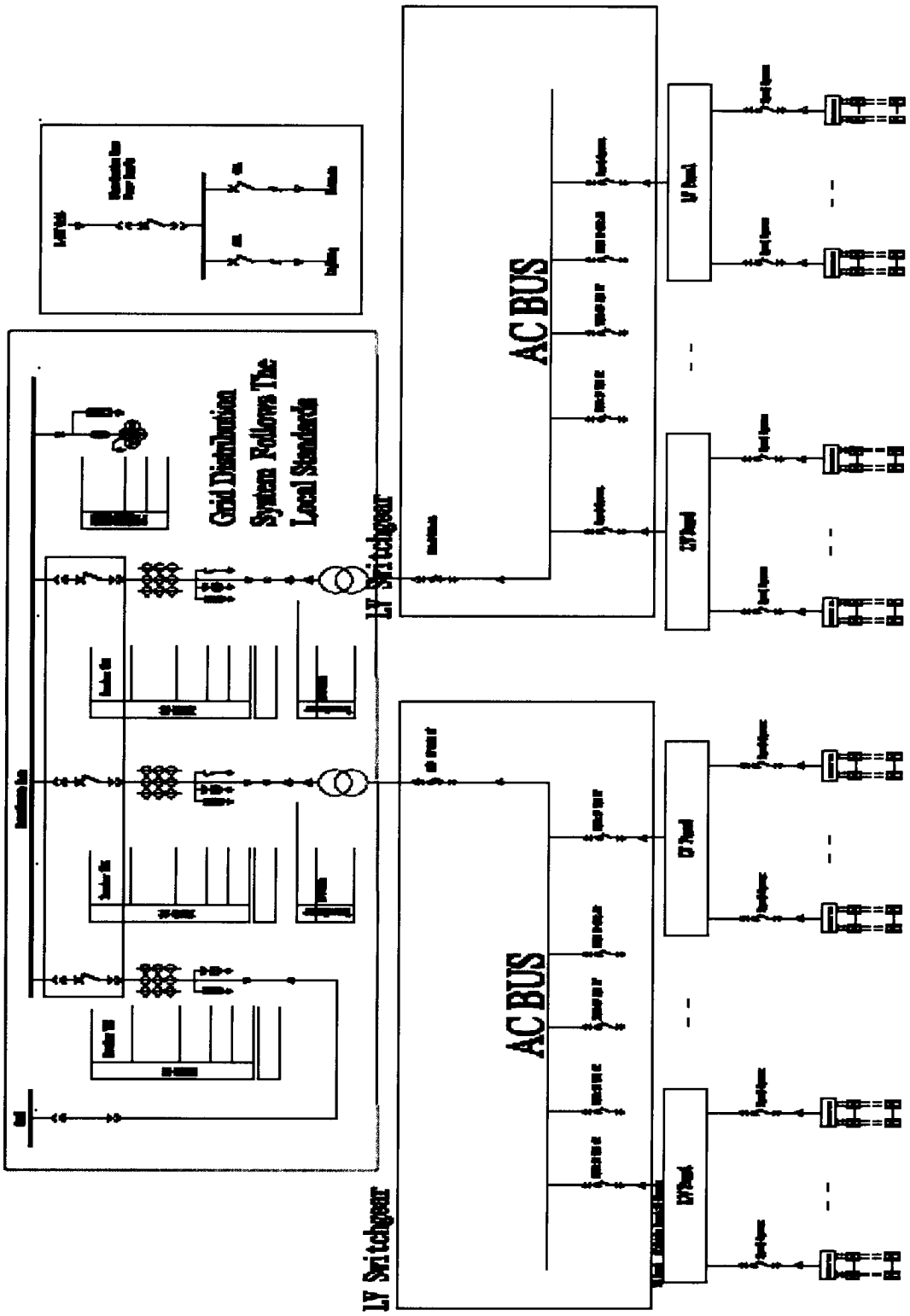
K- AC supplies of single / three phase, required for internal usage for several functions such as Illumination through lighting inverters, SCADA supply through UPS, Battery Chargers, Transformer tap-changer drives, Power supplies for communication equipment / surveillance system, Breakers / Disconnect switch motors, etc.

L- Good lighting in the plant will be ensured for maintenance requirement in control buildings and security / surveillances of the boundaries. Fence lighting shall be envisaged with low wattage LED lamps. Portable emergency lights shall be planned for security personnel.

M- Monitoring of system operation parameters will be monitored locally and also from remote locations through internet.

N- Weather and other plant parameters monitoring system will be installed at project site. Monitoring of system operation parameters will be monitored locally and also from remote locations through internet.

Annexure-A



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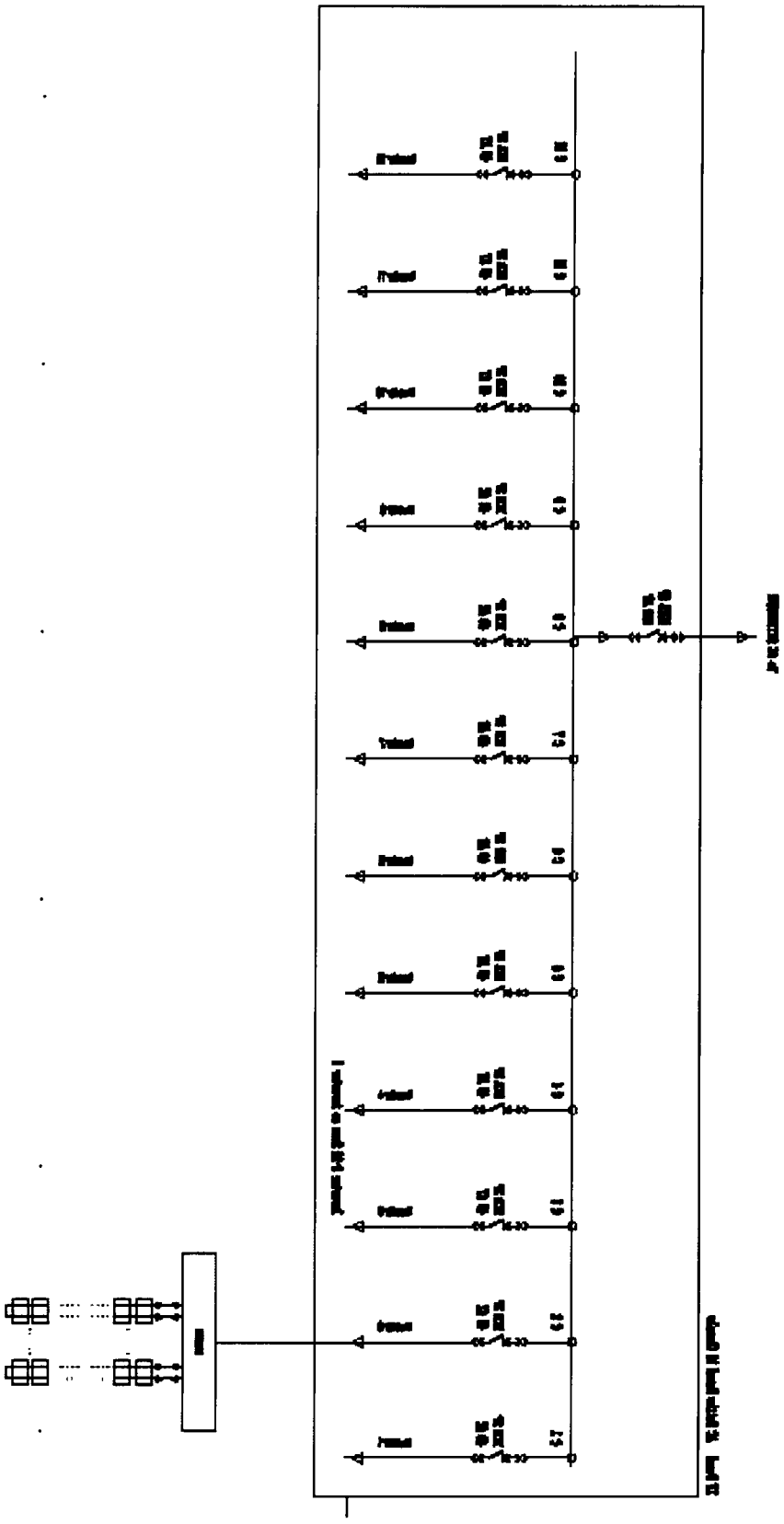
Company Secretary



FEASIBILITY

Abstract

Feasibility as required for filing generation license as per set guidelines in S.R.O. 142 (I)/99.— In exercise of the powers conferred by section 47 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (XL of 1997.

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1 Preface

Pakistan is currently facing acute shortage of electricity and it being emphasized to have energy mix to produce cost effective energy while protecting environment for sustainable development.

The Government of Pakistan and provinces especially Punjab have placed the generation of energy especially alternate energy on high priority.

A Renewable Energy Policy 2006 encourage the private sector to invest in the renewable energy projects. The Alternative Energy Development Board (AEDB) is the one window facilitator and NEPRA has been playing its active and positive role as the Regulator to attract investment in renewable energy sector.

In view of the Government priorities and investor friendly initiatives in this sector, AJ Power (Private) Limited a Special Purpose Vehicle (SPV) has decided to make an investment in the renewable energy projects to overcome energy shortage and be part of sustainable economic development.

"AJPPL" has obtained LOI to build a 10MWac Photovoltaic solar power plant "AJ Solar Farm" in Punjab with debt/equity ratio 75/25.

2 Rational for Solar Power in Pakistan

The country's unsustainable electricity generation mix, that has heavy reliance on imported fuels, requires urgent diversification. Both hydro power and coal power generation need to be accorded high priority; however, there are numerous issues and challenges in development of these two indigenous resources.

The development of solar power generation projects could reduce dependence on fuels for thermal power generation, increase diversity in Pakistan's electricity generation mix, and reduce greenhouse gas (GHG) emissions avoiding thermal power generation.

Solar energy has excellent potential in areas of Pakistan that receive high levels of solar radiation throughout the year. Pakistan being in the Sun Belt is ideally located to take

advantage of solar energy technologies. The country receives an average of about 19 Mega Joules per square meter of solar energy on a daily basis. This energy source is widely distributed and abundantly available in the country.

Pakistan is exposed to strong solar radiation, long hours of sunshine, and abundant solar energy resources. The annual sunshine hours are up to 2900h - 3300h, and the average daily sunshine hours are 8h - 9.h. This gives huge amount of energy to be used for electricity generation by solar power plants.

Pakistan is a net importer of energy and oil imports place a heavy burden on foreign exchange reserves. This is further compounded by the volatile oil prices and rising energy consumption.

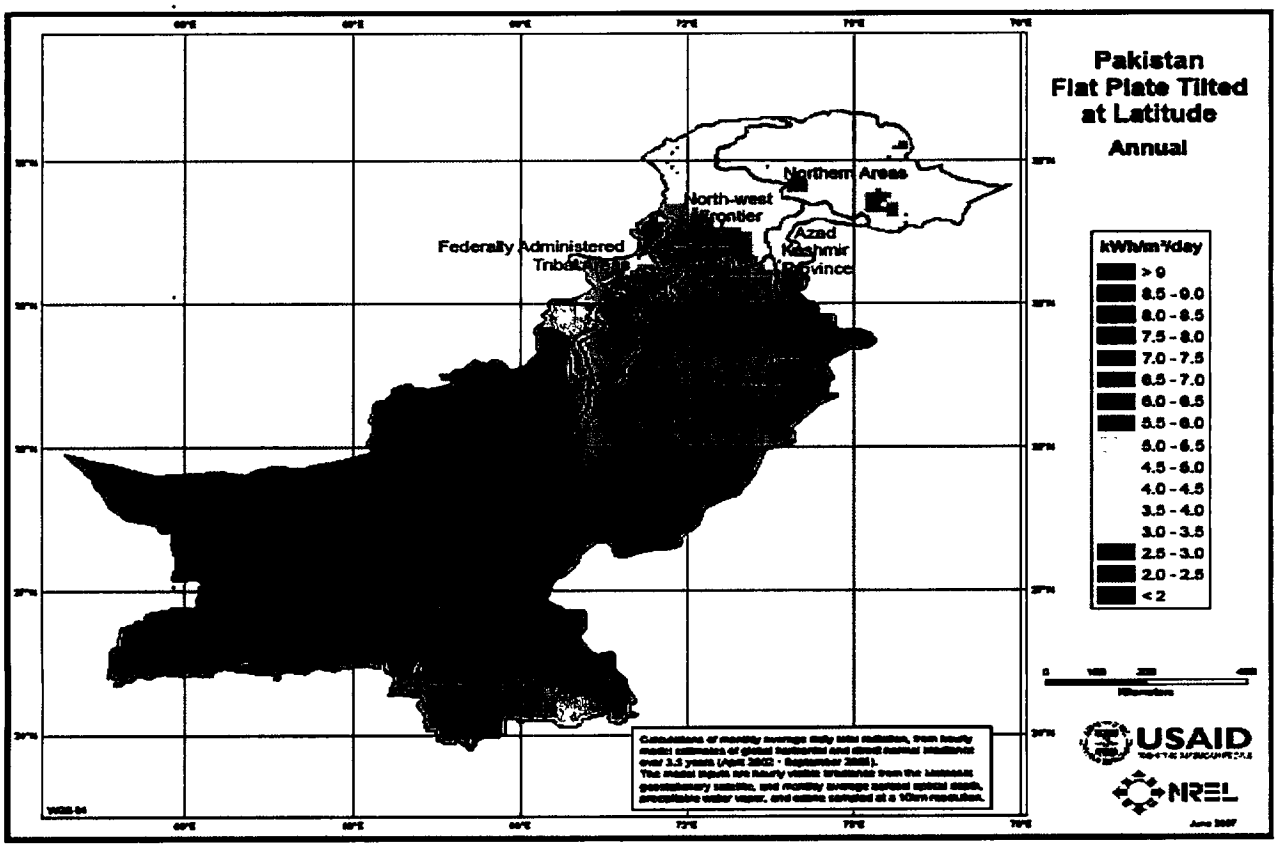
The development of solar power generation projects could reduce dependence on fuels for thermal power generation, increase diversity in Pakistan's electricity generation mix, and reduce greenhouse gas (GHG) emissions avoiding thermal power generation. We will soon be in the list of nations which are caring environment through more reliance on renewable energy sources.

The major benefits of solar power generation are:

- ✓ Savings of substantial fuel cost, foreign exchange environment and infrastructure Stable cost of production as no inflationary impact of fuel price.
- ✓ Minimum Construction & Commissioning Period — approximately 10-12 months.
- ✓ Flexible project configuration — Given the land resource capacity can be increased.
- ✓ Environmental Benefits — Emissions to land, sea and air are negligible.
- ✓ Reduction in Transmission Losses — Can use ON or OFF grid designs (straight into local communities).

To summarize, the sun shines for 250-300 days per years in Pakistan with an average sunshine hours of 8-10 per day. This gives huge amount of energy to be used for electricity generation by solar thermal power plants.

A quick idea for the potential of solar energy in Pakistan can be obtained from the satellite map of solar radiation released by National Renewable Energy Lab (NREL) of USA shown in Figure.



3 Government Policy

Government of Pakistan has developed an investor friendly Policy "Policy for Development of Renewable Energy for Power Generation Year-2006"

The specific goals of the renewable energy policy regime is to Increase the deployment of renewable energy technologies (RETs) in Pakistan so that RE provides a higher targeted proportion of the national energy supply mix, i.e., a minimum of 9,700 MW by 2030 as per the Medium Term Development Framework (MTDF), and helps ensure universal access to electricity in all regions of the country.

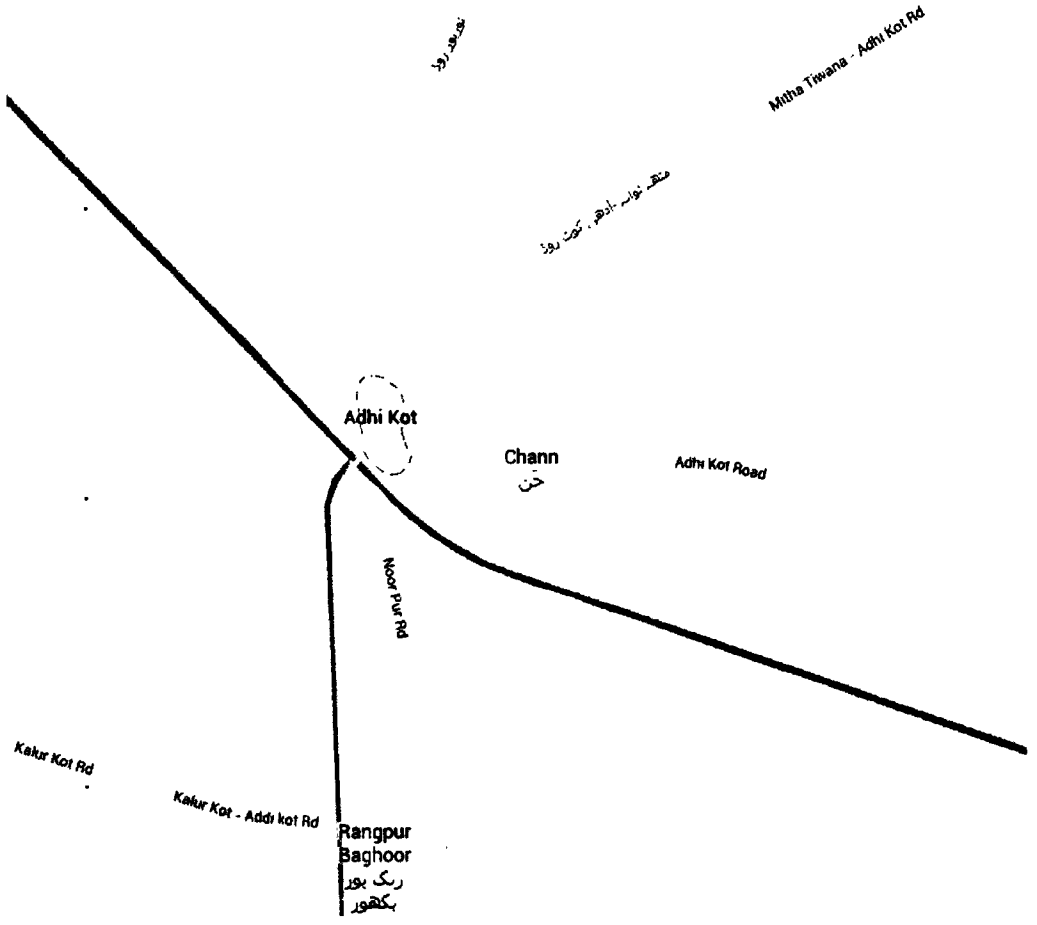
4 The Site and Geographic conditions

4.1 The Location of the Proposed Site

Punjab province of Pakistan covers an area of 205,334 km^2 and is Pakistan's second largest province in terms of area. Most parts of the province are fertile river valleys, with deserts in the eastern and the western parts, and sub-systems of Himalayan Mountains in the north.

The project will be located about 38kM at main Adhi Kot road from Chowk Girot, district Khushab, Punjab, having desert landscape.

The following satellite image gives overview of the wide area surrounding the planned site of the PV power plant.



The proposed site is about ¾ KM away towards North of main Adhi Kot road. It is proposed that the PV project site will be connected by graveled road to main Adhi Kot road.

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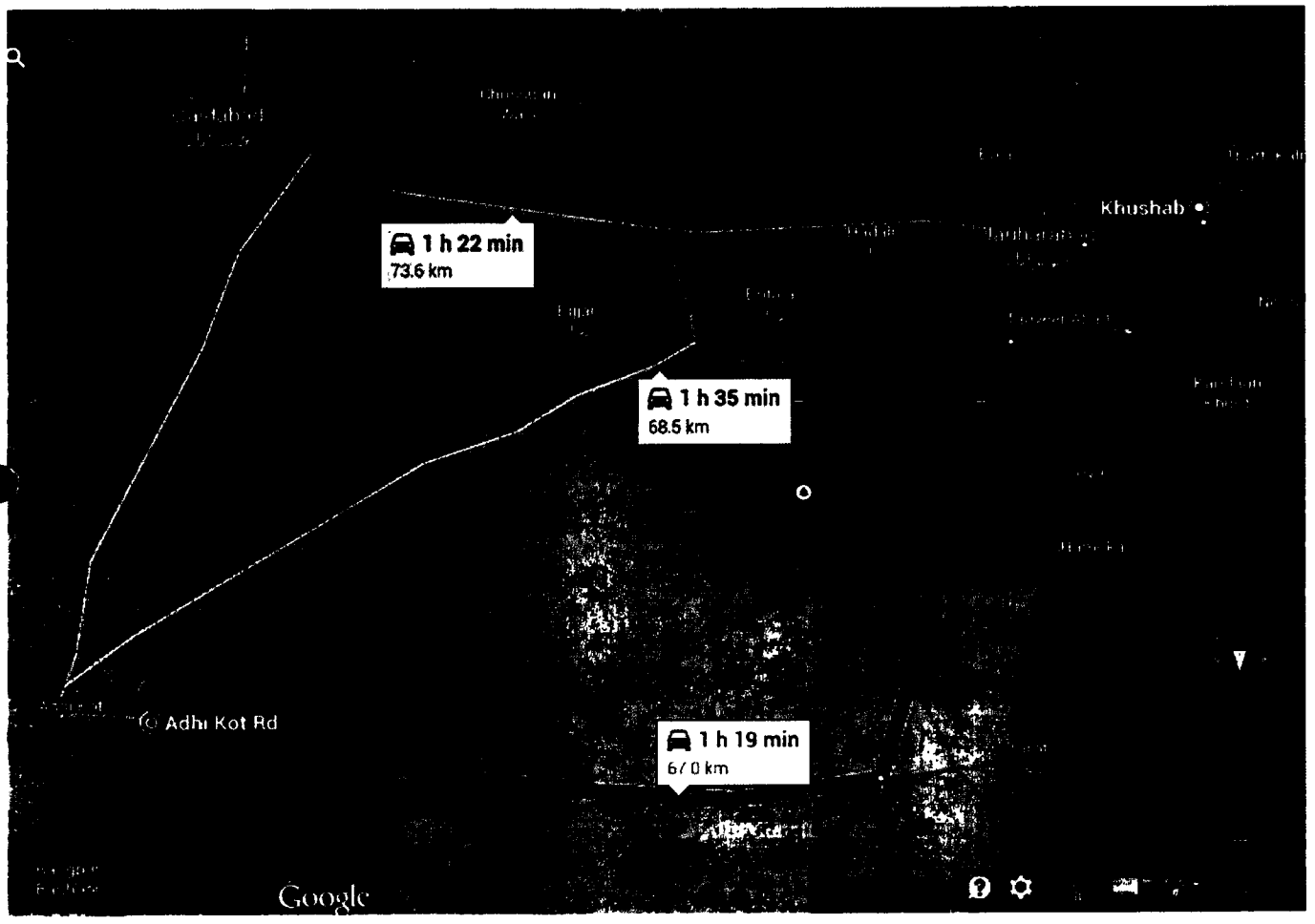
The site can be easily accessed by Motorway M2 and Khushab City as shown in Figure.



4.2 Site Information

Adhi Kot is a town and one of the 51 Union Councils of Khushab District in the Punjab Province . The area is notable for the Adhi Kot meteorite which landed on 1 May 1919. The meteorite, known as the Adhi Kot stone, fell at 32°16'N 71°49'E at 12PM, 15 miles (24 km) north of station Nurpur, Shahpur District (the area was part of the old Shahpur District during British Rule).

Site Name: Adhi Kot, District Khushab- Punjab.

Site Coordinates: 32°06'33.0"N 71°49'45.9"E

Elevation a.s.l.: 190 m

5 Type Technology, Model, Technical Details and Design of the proposed Facility

5.1 PV Technology

Being it predominant & cost-effective technology with simple maintenance requirements, ***poly crystalline modules*** with fixed tilt arrangement are considered most suitable for this plant. Manual seasonal tilt arrangement is also under consideration.

5.2 System Components

The main components of solar PV Plant are;

1- PV Modules
2- Inverters
3- Module mounting Structure
4- Switchyard/substation
5- Weather monitoring system

5.3 Key Facts of the 10 MW Solar Power Plant:

PV Technology/Modules:	Polycrystalline/250Wp or 305Wp
Inverters:	Tier-1String inverters of 20KWp or above
Mounting Structure:	Galvanized mounting Structure
Plant Capacity:	12 MWp
Performance Projection:	80.2%
Module Area:	76,195m^2
Estimated Installation Area:	175,000 m^2
Simulated Power Output:	19,799MWh for 1styear
Simulated Specific Output:	1,650 kWh/kWp/year

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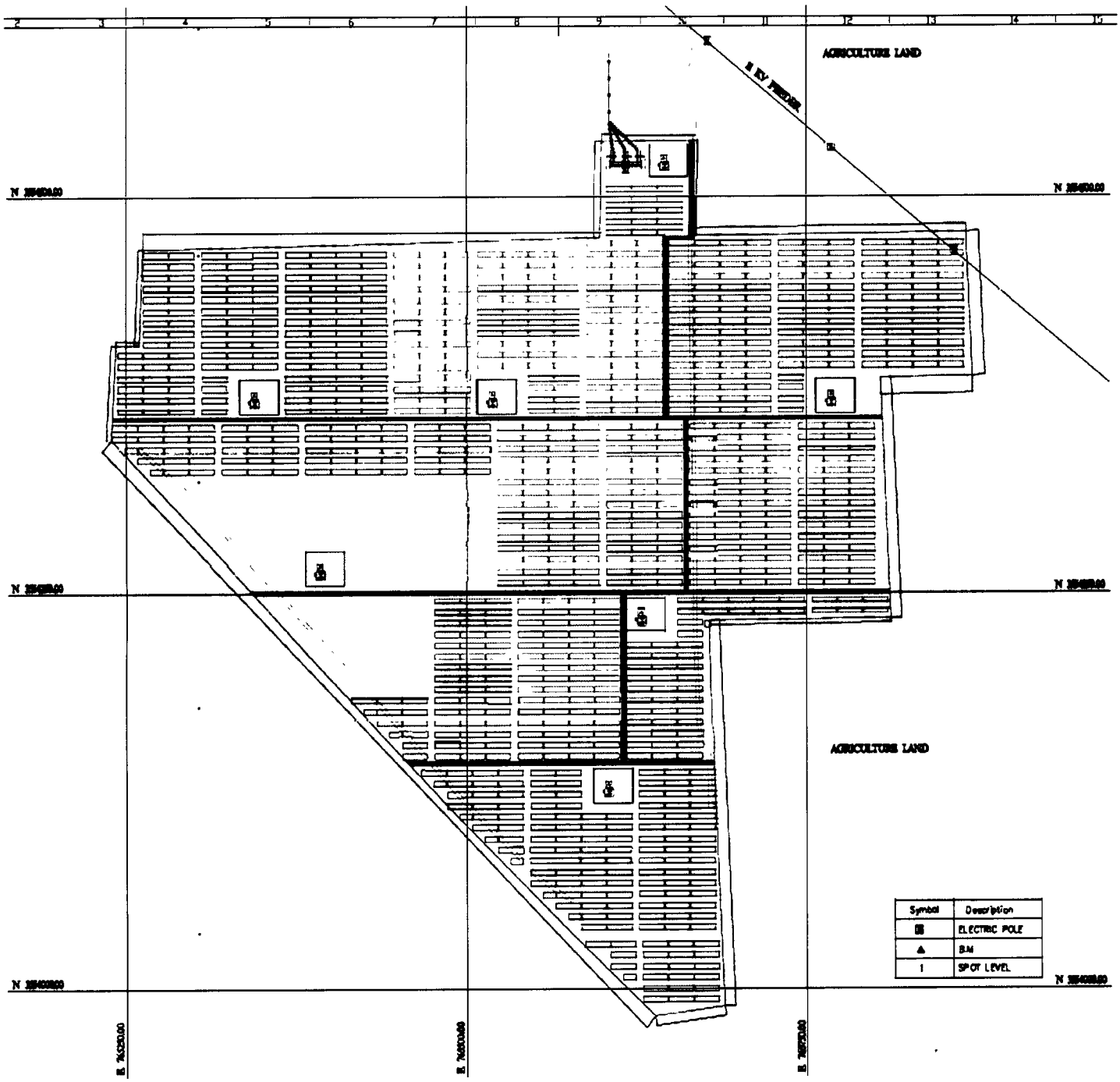
5.4 General Layout of the plant



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5.5 Proposed Scheme

A- It is proposed to install 10 MW_{AC} capacity Solar PV plant with polycrystalline solar PV modules in fixed tilt and Central Grid Tied Solar Inverters. Generated power shall be stepped-up to 11 kV through inverter transformers.

B- Power evacuation to DISCO grid is planned at 11 kV voltage level and shall be carried out as per Grid interconnectivity study and approved evacuation scheme.Main & Check metering shall be planned at the 11 kV level.

C- AJ Power is going use ***250Wp*** or ***305Wp polycrystalline modules***, from Tier-1 Chinese PV module manufacturer. The modules shall be protected by high transmission tempered glass covered with anodized aluminum alloy frames. Serially connected cells shall be terminated to IP65 junction boxes at back side of modules. Positive & Negative terminals are terminated with MC4 and Y- connectors, for module interconnections.

D- Inverters are the critical equipment in the Solar PV plant. The reliability & performance of the inverters have great influenceon the plant overall performance & availability. It is proposed touse high efficient String Inverters from Tier-1 inverter suppliers of China, ranging from 20kWp or above. Negative earthling in inverters shall be planned to counter PID effect for the modules.

E- It is proposed to use oil filled transformers for stepping up the power generated from PVsystem. Theintended transformers shall confirm to IEC: 60076 standard.

F- The solar farm will be designed as 10 blocks, each block will be hooked up to 11 KV output. All the 11 KV output will reach to the control building 11 KV bus switchboard. The will be one 11 KV output for the whole solar farm connected to the DISCO grid.

G- PV modules shall be fixed on the Module Mounting Structures (MMS) in two rows in portrait arrangement. Structural materialsfoundation bolts, fastening bolts, screws, nuts, washers shall conformto the relevant International Standards.

H- Soil Investigation has been conducted and the soil includes brownish loose Silty sand and grey loosesand having concretion and Mica in traces.To help faster construction, pile foundations are better and are recommended as they have long lasting life than direct ramming of the structure.

I- Main control building, inverter rooms and security buildings shall be single story buildings with brick work. Alternatively, prefabricated roomsmay also be planned. Inverter & control rooms shall beenvisaged with pressurized ventilation arrangement.

J- Non-current carrying parts of all electrical equipment viz. distribution boards, control panels, HT switchgears, and all lighting fittings will be earthed rigidly, to ensure safety. Building lightning protection system will be provided as per relevant IEC standards.

K- AC supplies of single / three phase, required for internal usage for several functions such as Illumination through lighting inverters, SCADA supply through UPS, Battery Chargers, Transformer tap-changer drives, Power supplies for communication equipment / surveillance system, Breakers / Disconnect switch motors, etc.

L- Good lighting in the plant will be ensured for maintenance requirement in control buildings and security / surveillances of theboundaries. Fence lighting shall be envisaged with low wattage LEDlamps. Portable emergency lights shall be planned for securitypersonnel.

M- Monitoring of system operation parameters will be monitored locallyand also from remote locations through internet.

N- Weather and other plant parameters monitoring system will be installed at project site. Monitoring of system operation parameters will be monitored locally and also from remote locationsthrough internet.

6 Type and Details of Services Proposed to be provided

The power generated in the proposed Cogeneration plant is meant to fetch to FESCO and ultimately to National Transmission and Distribution system.

7 Expected Life of the Proposed Facility

The initial estimated and expected life of the proposed is twenty five (25) years from the commercial operation date.

PROSPECTUS

Generation License

Abstract

Information is prepared as per NEPRA guidelines.

Table of Contents

PROSPECTUS

1. Introduction of the Applicant

AJ Power (Private) Limited ("AJPPL") is a private limited company incorporated and registered under the Companies Ordinance 1984 as a special purpose vehicle (SPV) to establish power projects especially in in renewable energy sector.

The vision behind establishing "AJPPL" is to create a dedicated and independent power generation company which will design, develop, operate and maintain a power project operating in line with international prudent utility standards in an economic and environmental friendly manner within shortest possible time.

"AJPPL" has put together a professional & competent team of local and international development Techno-Legal-Commercial advisors, Managers and Engineers who will assist the company in completion of the 10MWAC "AJ Solar Farm" within proposed timeline.

2. Salient Features of the Proposed Facility

The broad parameters of the project are as under:

Project Capacity	10 MW_{AC}
Project Location	Adhi kot, Distract Khushab.
Land Area	43.2 acres approx.
Construction Period	8 months
Power Purchaser	FESCO
PV Modules	Polycrystalline 305-72P
Total Project Cost	US $ ***18.252*** M
Capital Structure	Debit: 75% Equity:25%

3. Project Cost

The Project cost has been budgeted at USD 18.252 million (including interest during construction) for a gross capacity of 10 MWAC as per initial estimates.

The project will be financed on a non-recourse project finance basis under a 75:25 % debt to equity ratio.

4. Proposed Investment

The total cost for the project is USD 18.252 Million approx., which is to be financed on 75% Debit and 25% equity.

The sponsors have the financial strength to contribute the required equity for the project. The Sponsor's and their affiliate's long standing relationships with local and international financial institutions is testament to their capability to raise the required debt financing.

5. Social and Environmental Impact of the Proposed Facility

PV systems are renewable and environment friendly means of augmenting generation capacity, the fuel is free of cost and has indefinite supply. Given the vast potential and the severe shortage of electricity in the country, the Group intends to invest substantially in renewable energy and contribute towards the eradication of electricity shortage.

6. Grid Interconnection study

An interconnection study for the project has already been completed for this purpose to make the project operate in sync with the power purchaser's grid that is "FESCO".

The Project is expected to be connected at a voltage of 11kV to the existing network of power purchaser. The interconnection study provides information on load flows, short circuits, transients' stability and power quality. Detailed "Grid Interconnection Studies" are attached in Annexure-"X".

7. Capacity/Generation

It is expected that in first full year of operation, the 10MWac, design shall deliver net 19200 MWh of electricity to the Grid after taking into account first year degradation and losses.

Over the twenty-five years planned operation the power plant is expected to generate 464,642.93MWh energy.

These are estimates and the numbers shall be confirmed through a renowned international independent consultant prior to Financial Close.

8. Technology & Conceptual Design

The plant will consist of a number of poly-crystalline photovoltaic modules installed in arrays in a number of strings. The number of modules will be added up to enough capacity to yield 10MWac maximum at peak generation interval.

The output from modules will be fed into string inverters. Number of inverters and their capacities will be in accordance with the expected AC (10MW) output after losses, which will be simulated, based on satellite irradiation data.

The AC output from inverters at 315 volts will be stepped up through MV step up transformers to 11kV.

Thereafter, this output will be fed up to 66KV/11KV grid station. For this purpose, a complete 11kV substation will be established at the plant site as per the power purchaser's specification for interconnection of the grid system.

9. Project-Technical Brief Details

9.1 General information

Name of Licensee	AJ Power (Private) Limited
Registered Office	127-S Q.I.E Kotlakhpat Township, Lahore- Pakistan.
Type of Technology	Solar Power Based Plant, Photovoltaic modules installed on ground.
Plant Location	Adhikot, District Khushab-Punjab/Pakistan

9.2 Solar Power Generation Technology and Capacity

Type of Technology	Polycrystalline Photovoltaic (PV) Cells
System Type	Grid Connected
Maximum Generation Capacity	10 MW_{AC}

9.3 Photovoltaic System on Ground

Location: Adhikot District Khushab-Punjab/ Pakistan

Latitude: 32° 5'37.17"N

Longitude: 71°48'55.14"E

Modules: 39348 pieces of CSUN 305-72P or Equivalent

Inverter: 536 pieces of CSUN 20000 UE or Equivalent Tier-1 equipment

Module -Technology: Polycrystalline

PV-Generator: Total installed 12001kWp

Specific Annual Yield: 1650 kWh/kWp/year

Effect. PV-Surface: 76195 m^2

Monitoring: Online portal

9.4 Technical Details of Poly Crystalline Panels

Poly

PowerGuard

Powerguard insurance global coverage

NEW

CSUN
energy for today

CSUN305-72P

Higher efficiency Poly Module: Waratah™

WARATAH™

CSUN295-72P CSUN300-72P
CSUN305-72P CSUN310-72P

16.01%
Module Efficiency

310W
Highest power output

10year
Material & Workmanship warranty

25year
Linear power output warranty

- Innovated cell and module processing technology
- Positive tolerance offer
- Unique 5 busbar design improves the reliability performance of module
- Load certificates wind to 2400 Pa and snow to 5400Pa
- Certified for salt/ammonia corrosion resistance
- Excellent performance under low light conditions
- Good Temperature Coefficient enables higher output in high temperature regions

- China Sunergy (Nanjing) Co., Ltd (NASDAQ:CSUN) established in 2004, is a hi-tech corporation with its core business in R&D, manufacturing, and sale of high efficiency silicon based solar cells and modules
- As one of the leading PV enterprises in the world, CSUN has delivered more than 1GW solar products, for residential, commercial, utility and off-grid projects all around the world
- Through strict selection of raw materials, stringent quality control and rigorous test in state-of-the-art facilities in Nanjing and Shanghai, CSUN has always committed to higher efficiency, more stable and better cost performance products

WARATAH is the trade mark owned by CSUN, It's the brand name of poltcrystalline solar module produced by CSUN

All information and data are subject to change without notice

D140420EN

www.csun-solar.com

Electrical characteristics at Standard Test Conditions(STC)

Module type	CSUN 310-72P	CSUN 305-72P	CSUN 300-72P	CSUN 295-72P
Module name	Waratah	Waratah	Waratah	Waratah
Pmpp [W]	310	305	300	295
Voc [V]	44.8	44	44	44.4
Isc [A]	9.04	8.97	8.91	8.83
Vmpp [V]	36.1	35.9	35.8	35.7
Impp [A]	8.55	8.50	8.37	8.26
Module efficiency	16.0%	15.7%	15.4%	15.2%

Standard Test Conditions(STC) irradiance 1000W/m² AM 1.5 photovoltaic temperature 25°C Measuring uncertainty of power is within ±3% Tolerance of Pmpp 0~+3% Certified in accordance with IEC 61215 (Ed.2) IEC 61730 (Ed.1) and UL1703

Electrical characteristics at Nominal Operating Cell Temperature(NOCT)

Module type	CSUN 310-72P	CSUN 305-72P	CSUN 300-72P	CSUN 295-72P
Module name	Waratah	Waratah	Waratah	Waratah
Maximum Power-Pmax	228	225	220	217
Open Circuit Voltage(V) Voc(V)	41.4	41.3	41.1	41.0
Short Circuit Current(A)-Isc(A)	7.29	7.24	7.19	7.01
Maximum Power Voltage Vmpp(V)	33.4	33.2	33.0	32.5
Maximum Power Current Impp(A)	6.83	6.77	6.71	6.67

Nominal Operating Module Temperature(NOCT) Irradiance 800W/m² wind speed 1m/s ambient temperature 45°C ambient temperature 20°C Measuring uncertainty of power is within ±3% Certified in accordance with IEC61215 (Ed.2) IEC61730 (Ed.1) and UL1703

Temperature Characteristics

Voltage Temperature Coefficient	-0.32%/°C
Current Temperature Coefficient	+0.04%/°C
Power Temperature Coefficient	-0.40%/°C

Maximum Ratings

Maximum system voltage(V)	1000
Series fuse rating(A)	20
Reverse current overload(A)	27

Mechanical Characteristics

Dimensions	1956×990×50mm(L×W×H)
Weight	22.8kg
Frame	Anodized aluminum profile
Front glass	White tempered anti-reflective glass 3.2mm
Cell Encapsulation	EVA(Ethylene Vinyl Acetate)
Back Sheet	Tedlar white
Cells	6×12 pieces, polycrystalline solar cells series strings (156mm×156mm)
Junction Box	Rated current 12A IP67
Cable&Connector	length 900mm 4×4mm² compatible with MC4

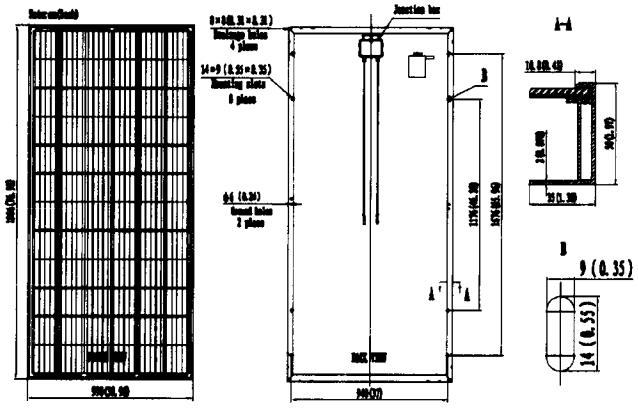
Packaging

Dimensions(L×W×H)	2015×1140×1137mm
Container20	700
Container40	480
Container40 HC	576

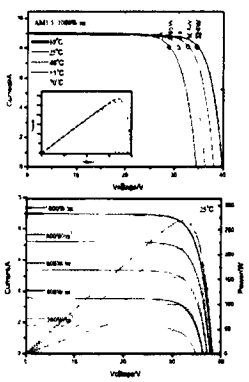
System Design

Temperature range	-40°C to+85°C
Hail	maximum diameter of 25mm with impact speed of 23m/s
Maximum surface load capacity	5400Pa
Application class	Class A
Safety class	class II

Dimensions



IV-Curves

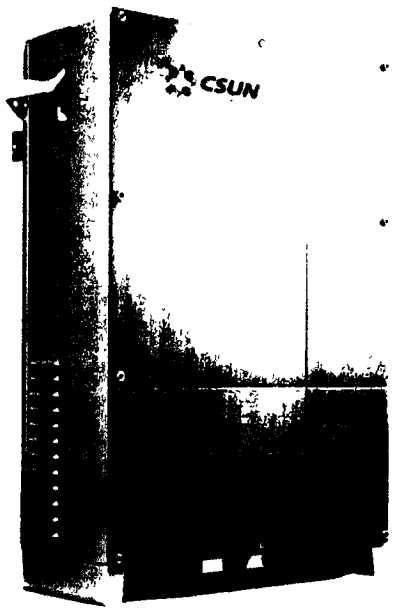


Excellent performance under weak light condition

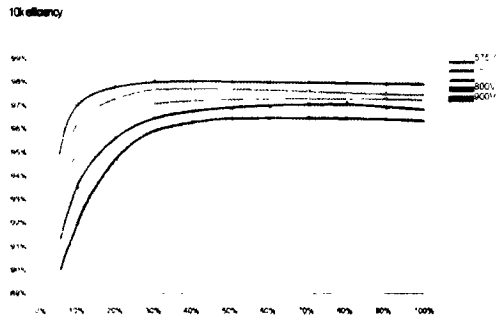
9.5 Technical Details of Solar String Inverters

CSUN 10000UE/12000UE/18000UE/20000UE

CSUN
energy for the future



Leading - edge Technology



- DC input voltage up to 1000V
- Maximum efficiency of 98%
- Internal DC switch
- Transformerless
- Compact design
- Multi MPP controller
- MTL - String
- Bluetooth / RF technology / WI-FI
- Sound control
- Easy installation
- Comprehensive CSUN warranty program

China Sunergy(Nanjing) Co.,Ltd
A: No.123 Focheng West Road, Jiangning Economic&technical Development Zone,Nanjing,211100,China
Tel:+86-25 5276 6701

Datasheet

	CSUN 10000UE	CSUN 12000UE	CSUN 18000UE	CSUN 20000UE
Input Data				
Max. DC power	10500W	12500W	18700W	20800W
Max DC voltage	1000V	1000V	1000V	1000V
Start Voltage	350V	350V	350V	350V
PV voltage range	180V - 1000V	180V - 1000V	180V - 1000V	180V - 1000V
MPP voltage range / DC nominal voltage	300V - 1000V / 600V	300V - 1000V / 600V	300V - 1000V / 600V	300V - 1000V / 600V
Full load voltage range	400V - 800V	400V - 800V	400V - 800V	400V - 800V
Number of independent MPP trackers/strings per MPP tracker	2/2	2/2	2/3	2/3
Max. input current	15A / 15A	17A / 17A	23A / 23A	26A / 26A
Max. input current per string	20A	20A	20A	20A
Output (AC)				
Rated AC output power	10KW	12KW	18KW	20KW
Max. AC power	10KVA	12KVA	18KVA	20KVA
Max. output current	16A	19A	28.6A	32A
AC voltage range; range	3/N/PE, 230V/400V 184 - 275V	3/N/PE, 230V/400V 184 - 275V	3/N/PE, 230V/400V 184 - 275V	3/N/PE, 230V/400V 184 - 275V
AC grid frequency ; range	50/60Hz; 44-55Hz/54-65Hz	50/60Hz; 44-55Hz/54-65Hz	50/60Hz; 44-55Hz/54-65Hz	50/60Hz; 44-55Hz/54-65Hz
Adjustable displacement power factor	0.8 leading -0.8lagging	0.8 leading -0.8lagging	0.8 leading -0.8lagging	0.8 leading -0.8lagging
THDI	<3%	<3%	<3%	<3%
AC connection	Three phase	Three phase	Three phase	Three phase
Efficiency				
Max.efficiency	98%	98%	98%	98%
Euro - eta	97.5%	97.5%	97.5%	97.5%
MPPT efficiency	99.5%	99.5%	99.5%	99.5%
Protection Devices				
DC reverse polarity protection	yes	yes	yes	yes
DC switch for each MPPT	yes	yes	yes	yes
Output AC overcurrent protection	yes	yes	yes	yes
Output AC overvoltage Protection - Varistor	yes	yes	yes	yes
Ground fault monitoring	yes	yes	yes	yes
Grid monitoring	yes	yes	yes	yes
Integrated all-pole sensitive leakage current monitoring unit	yes	yes	yes	yes
General Data				
Dimensions (W / H / D) in mm	740/440/235	740/440/235	740/520/235	740/520/235
Weight	41KG	41KG	60KG	60KG
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	55 dB(A)	55 dB(A)	55 dB(A)	55 dB(A)
Self-consumption night	< 0.5W	< 0.5W	< 0.5W	< 0.5W
Topology	Transformerless	Transformerless	Transformerless	Transformerless
Cooling concept	Smart cooling	Smart cooling	Smart cooling	Smart cooling
Environmental Protection Rating	IP 65	IP 65	IP 65	IP 65
Altitude	2000m without derating	2000m without derating	2000m without derating	2000m without derating
Relative Humidity	0~95%	0~95%	0~95%	0~95%
Features				
DC connection	H4/MC4(opt)	H4/MC4(opt)	H4/MC4(opt)	H4/MC4(opt)
AC connection	Screw terminal	Screw terminal	Screw terminal	Screw terminal
Display	LCD	LCD	LCD	LCD
Interfaces: RS232/R485/ Bluetooth/RF/Wi-Fi	yes / yes / opt / opt / opt	yes / yes / opt / opt / opt	yes / yes / opt / opt / opt	yes / yes / opt / opt / opt
Warranty:5 years / 10 years	yes / opt	yes / opt	yes / opt	yes / opt
Certificates and Approvals	VDE-AR-N4105, CEI 0-21, CE, VDE 0126-1-1, IEC 62109, RD 1663/2000, G59/2, EN50438, AS4777, AS/NZS 3100			

9.6 System Schema

Location:	Adhi Kot District khushab Punjab
Climate Data Record:	Adhi Kot (Meteonorm 1981-2000)
Annual Horizontal global irradiation	1850.4 kWh/m^2
Array nominal energy (at STC effic.)	24104 MWh
Energy injected into grid	19799 MWh for 1st Year
Expected Performance Ratio:	80.2 %
Inverter Efficiency:	98.0 %

The results are determined by a mathematical model calculation. The actual yields of the photovoltaic system can deviate from these values due to fluctuations in the weather, the efficiency of modules and inverters, and other factors.

10 Construction Period

The estimated construction period for the Project by the EPC Contractor including detailed design, engineering and procurement/delivery of all materials is eight months.

11 Other Studies

As part of development of project and its feasibility, sponsors have conducted number of essential studies such as;

A- Topographic
B- Geotechnical
C- Initial Environmental Examination
D- Grid Interconnection Studies

12 O&M Management

The O&M will consist of routine operational checks via remote and local monitoring; check calibration and maintenance of electrical equipment, module cleaning and general groundwork and repairs. The majority of maintenance shall be planned but a strategy, along with the ability to respond effectively, will be in place to quickly turn around Forced Outages.

13 Social Benefits

The installation of the Power Plant is expected to increase the prospects by bringing in direct and indirect employment opportunities. The Project and consequent activities are expected to generate additional employment and income opportunities for the local population and market expansion supported by infrastructural development will foster economic growth in the area in particular.

The flow of reliable and adequate power from the proposed plant will enhance growth prospects in the area and will bring about a change in energy consumption pattern by switching over from other sources of energy.

14 Key Milestones

The Sponsors' primary focus is to complete all activities to start construction in the time provided by the AEDB under their policies and a tentative schedule/timeline is attached for your perusal.

Activities/Milestone	Timelines
Generation License	May 2015
Upfront Tariff Approval	May 2015
Letter of Support	June 2015
Signing of EPA/IA	July 2015
Financial Close	November 2015
Project COD	March 2016

15 Expected Life of the Proposed Facility

The initial estimated and expected life of the proposed is twenty five (25) years from the commercial operation date.

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SCHEDULE III

Generation License

Abstract

Information is attached as per NEPRA's guidelines and requirements for Generation License for Grid connected Renewable energy Projects

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Company Secretary

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Schedule III- Information

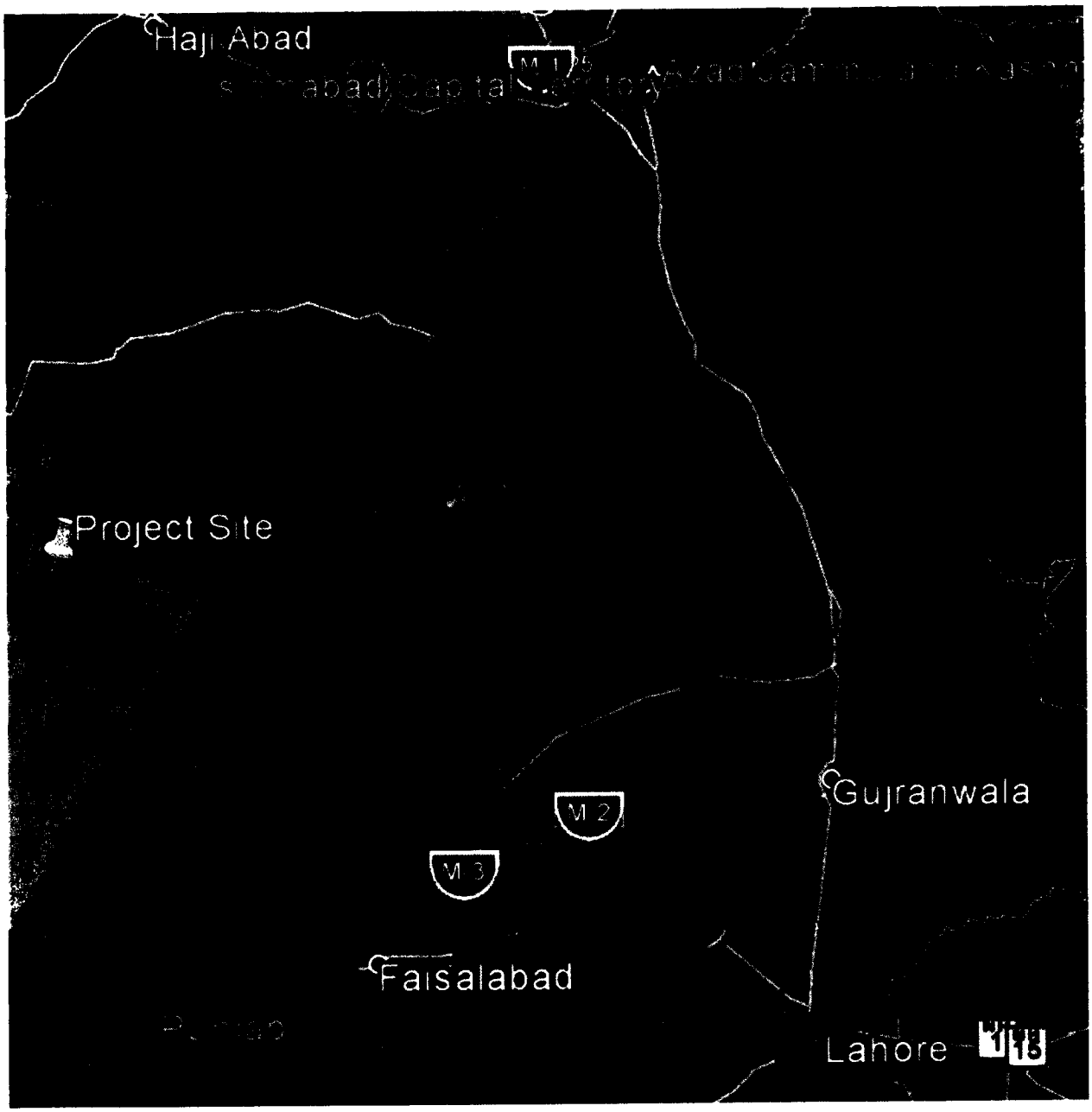
1. Location

AJ Power Private Limited "AJ Solar Farm" will be located in Adhi Kot; a village and one of the 51 Union Councils (administrative sub-divisions) of Khushab District in the Punjab Province of Pakistan. It is located at 32°6'13N 71°48'24E with an altitude of 177 meters. Project is expected to occupy approximately 43 acres of land, which is already purchased and owned by the developer.

Coordinates of the project site are;

Latitude: **32° 5'37.17"N** Longitude: **71°48'55.14"E**

1.1 Location Map



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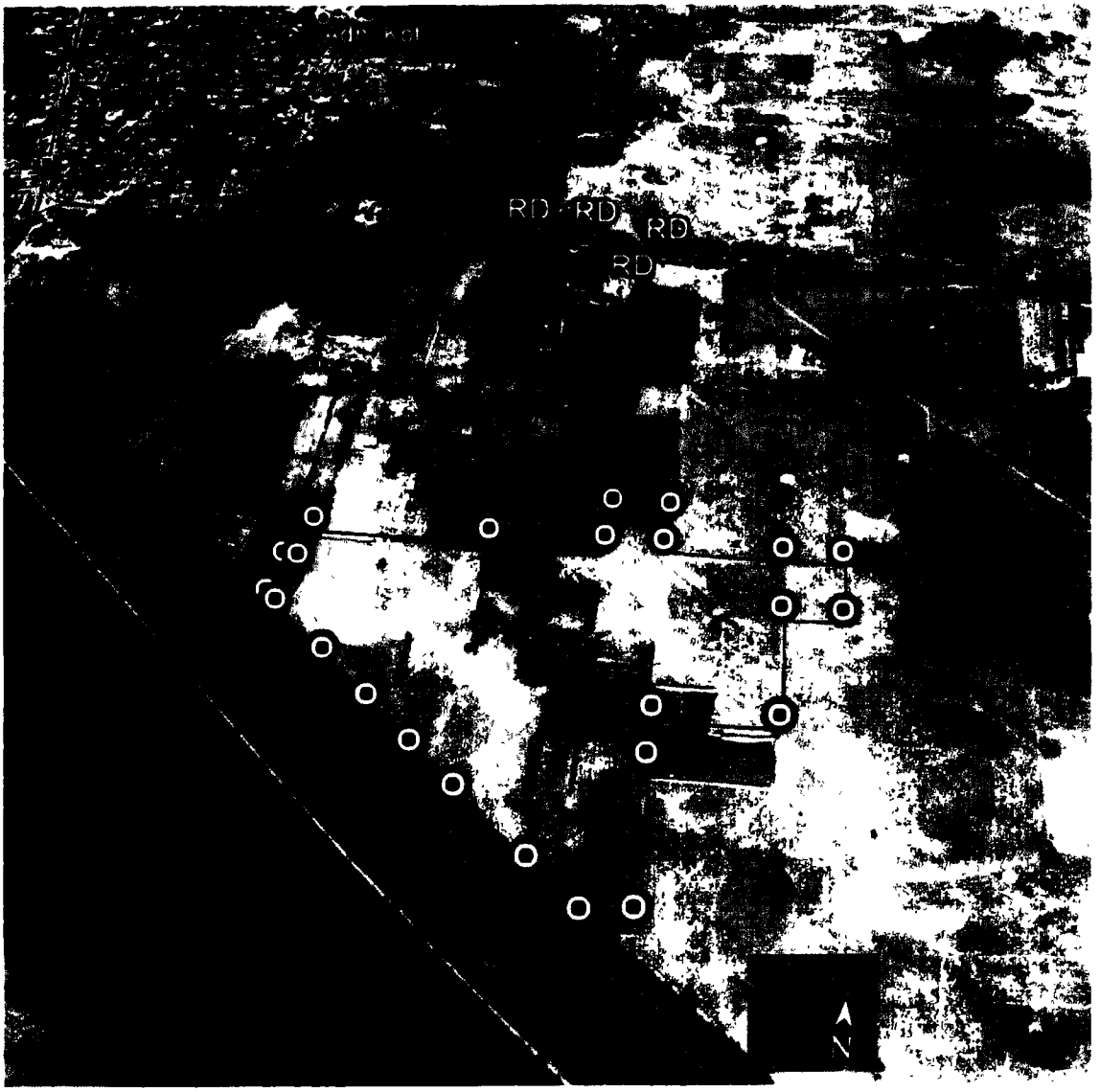
1.2 Site Map

Project site is at about 38kM at main Adhi Kot road from Chowk Girot, District Khushab, Punjab, having desert landscape.



2. Type Technology, Model, Technical Details and Design of the proposed Facility

AJ Power (Private) Limited is opting the most feasible technology, Photovoltaics modules that offer the most favorable output in the prevailing conditions at the desired location. The annual insolation level and the availability over the course of a year make solar energy the ideal energy source.

AJPPL is going to select polycrystalline modules from Tier-1 module suppliers with a nominal power rating of 250Wp or 305Wp. The selected modules are good combination of high-quality and highly efficient polycrystalline modules with the competitive costs associated with polycrystalline technology.

Further, three-phase "Tier-1" string inverters of 20kW or above, are ideally suited for ground-mounted systems. Both the equipment (Modules and Inverters) are of outdoor technology and fulfill all the requirements of the IP65 protection classification — their housings protect them reliably against dust and water, including water jets. The system is easy to operate & monitor and can achieve efficiencies of up to 98.0%, even under low irradiation conditions.

3. Fuel/Raw Material Details

Since the Project is a Solar PV power plant, there is no fuel/logistics involved.

Primary Fuel	SUN: Solar Energy
Alternate Fuel	Nil
Fuel Source (Imported/Indigenous)	Indigenous
Fuel Supplier	Nature

4. Emission Values

The Project will conform to the environmental protection laws, regulations and standards prescribed by Punjab Environmental Protection Agency. Since the Project is a Solar PV power plant, there are no emissions involved.

5. Cooling Water Source

Since the Project is a Solar PV power plant, this is not applicable.

6. Interconnection with National Grid Company, Distance & Name of nearest Grid, Voltage Level (single line diagram).

An interconnection study for the Project has being conducted by a renowned consultant in its field, "Power Planners International Ltd. (PPI)" and it has been submitted to relevant Disco (FESCO) on 09-APRIL-2015 for final vetting.

The report has investigated the grid connection scheme for the Project and it is revealed that Grid has enough capacity to evacuate generated power of project safely without any adverse impact.

Relevant DISCO	Faisalabad Electric Supply Company (FESCO).
Name of Nearest Grid Station	66Kv/11Kv- Adhi kot Grid station
Distance between project site and grid station	1 KM
Interconnection Voltage Level	11 KV

Detailed Grid interconnection scheme including suggested scheme of interconnection along with FESCO receiving letter; is attached in Annexure "X".

7. Infrastructure: Road, Rail, Staff Colony, amenities.

Project is located at about 38 KM at main Adhi Kot road from Chowk Girot, District Khushab-Punjab.

Project site has good access by surrounding roads and can be reached by car and lorry. Sea freight may be shipped to Karachi harbor and then be transported to site via road network. The Boundary wall, firefighting system and flood warnings systems are planned to be in place during project execution phase.

All the basic infrastructure like roads; transport; water; repair and maintenance workshops and technicians; communication facilities like telephone, fax and email; utilities required to run the plant smoothly, site office, medical facilities, security etc., already planned for the Project site.

8. Project Cost, Sources and amounts of Equity and Debt

8.1 Project Cost

The total Project cost is expected in the range of USD 18.252 million with an Engineering, Procurement & Construction Cost (EPC) cost of USD 16.680 million. The cost is budgetary in nature at this stage and can be changed upon final receipt of EPC proposal. The breakup of the Project Cost is summarized as follows:

Sr.#		USD Million
1	***Total EPC Cost***	16.680
2	***Other Costs (Development, Non-EPC, Insurance, Financing)***	0.887
3	***Interest during Construction***	0.685
4	***Total Project Cost***	**18.252**

8.2 Financial Plan:

The total Project cost of approximately USD 18.252 million is to be financed with a combination of 75% debt and 25% equity. Based on initial discussions with the financial institutions, the company is likely to finance the Project on the basis of a Debt: Equity ratio of 75:25 %.

The debt amount is expected to be in Local currency with interest payable quarterly on the basis of 3-Month prevailing KIBOR plus 350 basis points. The term of the loan is expected to be 10 years including construction period.

Principal repayment and interest payment is expected to be on the basis of 32 quarterly installments starting after scheduled commercial operations.

All equity injection required for the Project will be arranged by the Main Sponsors. A summary of the financial plan is provided below:

		USD Million
	Total Equity: 25%	4.563
	Total Debt: 75%	13.689
	Total Project Cost	18.252

Bank of Punjab ("BOP") will act as the Lead Financer for the arrangement of all funded and non-funded banking facility.

9. Project Schedule with Milestones

Activities/Milestone	Timelines
Generation License	June 2015
Upfront Tariff Approval	June 2015
Letter of Support	July 2015
Signing of EPA/IA	August 2015
Financial Close	September 2015
Project COD	March 2016

10. ESSA (Environmental and Social Soundness Assessment)

10.1 Environmental impact

The energy sector of Pakistan is relying heavily on imported fuels for generation of electricity. The development of solar power generation projects could reduce dependence on fuels for thermal power generation and increase diversity in Pakistan's electricity generation mix thereby reducing greenhouse gas (GHG) emissions.

The operational environmental impacts of solar power generation are almost zero.

The emissions to land, water or air are nil and use of solar power, in comparison of a plant that emits pollutants, Pakistan can reduce its C02 production levels, move closer to agreed emission levels and contribute to the global effort to reduce C02.

We would opt for CDM programmer provided it is cost effective and beneficial for a project of this size and including our future projects.

An Initial Environmental Examination (IEE) has been conducted for "AJ Solar Farm". The IEE demonstrates that such solar projects will have number of positive impacts and no negative impacts to the existing environment.

The detailed IEE was submitted to the Environmental Protection Agency (EPA) and it has already been recommended/approved from DOE of relevant district (Khushab) that the project has no adverse impact on environment and awaiting final approval from EPA. Detailed study and Site Inspection Report (S.I.R) clearance is attached in Annexure: "Y"

10.2 Social Impact

The installation of the Power Plant is expected to increase the prospects by bringing in direct and indirect employment opportunities. The Project and consequent activities are expected to generate additional employment and income opportunities for the local population and market expansion supported by infrastructural development will foster economic growth in the area in particular. "AJ Power" will give priority to the skilled and un-skilled labor of the nearby community provided they meet the criteria and merit. .

The flow of reliable and adequate power from the proposed plant will enhance growth prospects in the area and will bring about a change in energy consumption pattern by switching over from other sources of energy.

Overall, it is anticipated there will be a positive impact on "Socio-economic" conditions of the locality.

11. Safety and Emergency Plans

The Company is committed to ensure the appropriate standards when it comes to the health, safety of people and protection of the environment.

This shall apply to all locations of the office space as well as the construction site. Commitment will remain in place to continuously improve HSE at the workplace, and contractors will be required to follow practices by adopting the Company's policy or developing their own equivalent.

Key features of safety plan are given below:

11.1 Safety Awareness

All the staff working at the facilities will be given detail briefings regarding different types of safety measures in respect of the following matters to enable them to identify the risks and take necessary measures of safety and protection during their working:

- Moral Obligation
- Hazard Recognition
- Importance of Personnel Protective Equipment (PPEs)
- Accident Prevention
- Importance of House Keeping
- Machine Guarding
- Fire Prevention
- Fire Protection
- Fire Fighting
- Emergency Rapid Response
- First Aid

11.2 Training for Use of Safety Gears and Equipment

All the staff working at the facility will be provided necessary trainings regarding how to use the PPEs like safety helmet, safety shoes, uniform, dust mask, ear plugs, ear muff, leather apron, leather sleeves, face shield, gloves, for better safety.

11.3 Assurance of Use of Safety Gears and Equipment

The staff working at the facility will be provided all necessary safety gears and protection equipment mentioned above for use during working at the facility.

11.4 Safety Procedures and Practices

Safety procedures regarding all operational and maintenance jobs will be developed to avoid accidents on and off the job and use of proper safety gears and protections equipment shall be mandatory for all the staff of the facility.

11.5 Emergency Alarm & Fire Suppressions System

Automatic Fire Emergency Alarm system will be installed along with fire suppression system at all fire hazardous locations of the plant site especially at transformers, lube oil, monitoring systems etc.

11.6 Emergency Help Call Numbers

Internal extension system will be provided at all floors and level of the facility and emergency call numbers for example fire brigade, medical Centre, ambulance services, transport, police will be displayed in bold on prominent locations in the facility for immediate emergency response.

11.7 Shutdown of Operating Systems or equipment

The emergency control team shall be responsible to ensure immediate shutdown of operation system and equipment if required in the emergency situation in accordance with an agreed procedure with the Power Purchaser. Necessary equipment will also be installed for the emergency shutdown of the operating systems and equipment.

11.8 First Aid Facilities and Staff

The availability of first aid facilities and training of core staff to provide urgent and immediate first aid facilities at the facility will be arranged.

11.9 Ambulances

The availability of ambulance service at the facility will be ensured for quick shifting of staff members to hospital in case of any accident and health hazard emergency.

11.10 Fire Fighting System

The fire protection system will be provided for early detection, alarm, containment and suppression of fire. A comprehensive fire protection system has been planned to meet the above objective. A multipurpose system shall be provided to combat various types of fires in different areas of the plant and all such systems for various areas shall form a part of a centralized protection system for the entire plant.

12. System Studies: Load Flow, Short Circuit, Stability, Reliability

An interconnection study for the project has already been completed to ensure that the project operate in sync with the power purchaser's grid that FESCO.

The Project is expected to be connected at a voltage of 11kV to the existing network of power purchaser. The interconnection study provides information on load flows, short circuits, transients' stability and power quality and reliability. Detailed "Grid Interconnection Studies" are attached in Annexure-"X".

13. Plant Characteristics: Generation Voltage, Frequency, Power Factor, Automatic Generation Control, Ramping Rate, Time(S) Required To Synchronize To Grid.

(i) Generation Voltage	230V/400V
(ii) Frequency	50Hz
(iii) Power Factor (Lead and Lag)	0.8
(iv) Automatic Generation Control	Yes
(v) Ramping Rate	NA
(vi) Alternative Fuel	NA
(vii) Auxiliary Consumption	NA
(viii) Time Required to Synchronize with Grid	NA

14. Control, Metering, Instrumentation & Protection

The plant will have an internal monitoring system to monitor the operation of the plant. In addition to this, equipment will be installed for collection of irradiation and temperature data at regular intervals.

The SCADA system will be available for the control of the plant as a part of 11KV network. The protections at plant and other equipment will match the utility standards.

15. Training & Development

The major objectives of the operational training shall be to acquaint the operators of the following:

a) The nature, purpose and limitations of all plant and equipment.

b) The detailed operating instructions on each section and equipment of the plant.

c) Normal start up and shutdown program for the unit.

d) The emergency procedures.

The basis, for the training shall be the Plant's operating and Maintenance Manual Particulars

Book, which is compiled from the manufacturers' instructions, the contract documents and the drawings. In addition, the information gathered from the visits to the other operating plants and to the manufacturers works shall also be included in the training.

Supervision and co-ordination of the training program requires full time attention of a senior executive of the plant, and also the consultant's assistance may be taken.

The training program shall include lectures, expositions by experienced plant operators and maintenance personnel, informal discussions and visits to operating plants and manufacturer's works and exposure to the courses conducted by Institutions like Power Plant Training Institute or any other Institution to be given to the operating & maintenance staff.

The maintenance training program should be based on the requirements of the individual maintenance functions, like mechanical, electrical, instrumentation etc.

The Engineers and the Technicians should be sent to the manufacturers' works to witness the production and be associated with the erection of plant and equipment.

The Power plant should be equipped with proper measuring/testing instrument for periodic cross checking of parameters shown in the control room and power plant area local gauges. Logging of data and periodic review of the plant operation, review of failures, break downs, etc. should be done to improve the availability of the plant.

16. Feasibility Report

Attached as Annexture_16.

Executive Summary

- The study objective, approach and methodology have been described and the plant's data received from the client M/s AJ Power (Pvt.) Limited is validated.
- The expected COD of the project is January 2016. Therefore the month of June 2016 has been selected to carry out the study as it will allow the maximum impact of the project to be judged.
- The net output will be 10 MW after deducting the losses inside the solar park such as inverter loss, cables loss etc.
- The FESCO system data as available with PPI for other studies have been used.
- The nearest substation of FESCO is Adhikot 66/11 kV. The following scheme of interconnection of Solar Power Plant by AJ Power to evacuate its maximum power of 10 MW is envisaged and studied in detail:
  - Three direct 11 kV circuits (one double circuit and one single circuit) each of 1 km length using Osprey conductor to be laid from the switching station of AJ Solar-PP till Adhikot 66/11 kV substation. The double circuit to be connected to T-2 and single circuit to be connected toT-1 of Adhikot 66/11 kV substation.
  - In this context three 11 kV breaker/line bays need to be added in the 11 kV switchgear hall of Adhikot 66/11 kV Substation
- Detailed load flow studies have been carried out for the peak load conditions of June 2016 for the proposed scheme under normal and N-1 contingency conditions to meet the reliability criteria.
- Steady state analysis by load flow reveals that proposed scheme is adequate to evacuate the maximum output power of 10 MW of the plant under normal and contingency conditions with the proposed reinforcements.
- It is also revealed that the interconnection of AJ solar power plant at Adhikot has helped to boost the voltage and resolved the issue of voltage sag under some outages in the network feeding into this area.
- The short circuit analysis has been carried out to calculate maximum fault levels at the AJ Solar Power Plant at 11 kV, and the substations of 66/11kV and 132/11 kV in its vicinity. We find that the fault currents for the proposed scheme are much less than the rated short circuit capacities of switchgear installed at these

substations. There are no violations of exceeding the rating of the equipment due to contribution of fault current from the AJ Solar Power Plant.

The maximum short circuit level of 11 kV bus bar of AJ Solar Power Plant 11 kV is 5.3 kA and 5.16 kA for 3-phase and 1-phase faults respectively. Therefore an industry standard switchgear of the short circuit rating of 12.5 kA is considered adequate with enough margin for future increase in fault levels due to future reinforcements in this area.

- The dynamic stability analysis of proposed scheme of interconnection has been carried out. The stability check for the worst case of three phase fault right on the 11 kV bus bar of the AJ solar power plant substation followed by the final trip of 11 kV circuits emanating from this substation, has been performed for fault clearing of 10 cycles (200 ms) as understood to be the maximum fault clearing time of 11 kV protection system. The system is found strong enough to stay stable and recovered with fast damping. The proposed scheme successfully passed the dynamic stability checks for system disturbances.
- The proposed scheme of interconnection has no technical constraints or problems, it fulfills all the criteria of reliability and stability under steady state load flow, contingency load flows, short circuit currents and dynamic/transient conditions; and is therefore recommended to be adopted.

Report Contents

1. Introduction

1.1 Background

The site of proposed project is near Adhikot a town close to Khushab and Qaidabad in Punjab located in the concession area of Faisalabad Electricity Supply Company (FESCO). The installed capacity of the plant is 12 MWp and the net output after deduction of losses in the solar park is about 10 MW of electrical power which will start commercial operation by January 2016. The electricity generated from this project would be supplied locally to the Adhikot 66/11 kV Grid and to the FESCO network through Adhikot 66/11 kV grid located in the vicinity of this project.

1.2 Objectives

The overall objective of the Study is to evolve an interconnection scheme between AJ Solar Power Project and FESCO network, for stable and reliable evacuation of 10 MW of electrical power generated from this plant, fulfilling N-1 reliability criteria. The specific objectives are:

i. To develop scheme of interconnections at 11 kV for which right of way (ROW) and space at the terminal substations would be available.

ii. To determine the performance of interconnection scheme during steady state conditions of system, normal and N-1 contingency, through load-flow analysis.

iii. To check if the contribution of fault current from this new plant increases the fault levels at the adjoining substations at 11 kV, 66 kV and 132 kV voltage levels to be within the rating of equipment of these substations, and also determine the short circuit ratings of the proposed equipment of the substation at the AJ Solar Power Plant.

iv. To check if the interconnection withstands dynamic stability criteria of post fault recovery with good damping after 3-phase faults on the system.

1.3 Planning Criteria

The planning criteria as per Grid Code required to be fulfilled by the proposed interconnection is as follows:

Steady State:

Voltage	± 5 %, Normal Operating Condition
	± 10 %, Contingency Conditions
Frequency	50 Hz, Continuous, ± 1% variation steady state
	49.2 - 50.5 Hz, Short Time
Power Factor	0.80 Lagging; 0.9 Leading (for conventional synchronous generators but would not be applicable to solar PP)

Dynamic/Transient:

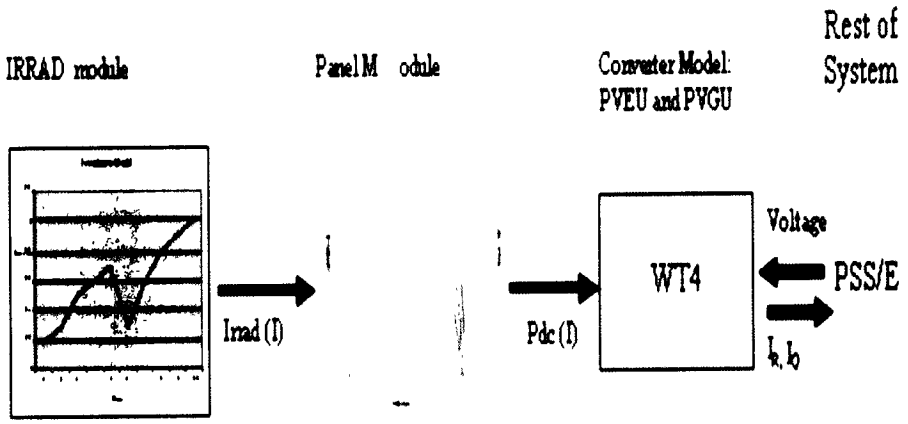
- The system should revert back to normal condition after dying out of transients without loosing synchronism with good damping. For 11 kV the total maximum fault clearing time from the instant of initiation of fault current to the complete interruption of current, including the relay time and breaker interruption time to isolate the faulted element, is equal to 200 ms (10 cycles).
- For the systems of 132 kV and above the total normal fault clearing time from the instant of initiation of fault current to the complete interruption of current, including the relay time and breaker interruption time to isolate the faulted element, is equal to 100 ms (5 cycles).
- For the systems of 132 kV and above, in case of failure of primary protection (stuck breaker case), the total fault clearing time from the instant of initiation of fault current to the complete interruption of current to isolate the faulted element, including the primary protection plus the backup protection to operate and isolate the fault, is equal to 180 ms (9 cycles).

2. Assumptions of Data

The detailed electrical parameters would be designed at the EPC stage. However for the purposes of this study, following assumptions have been made:

2.1 Solar Power Plant data

The Solar Power plant has been modeled according to the following block diagram



The way this works is that the irradiance profile from the sun is used as an input to the panel module which then calculates the DC power at that value of the irradiance. This value is then input to the electrical model of the solar power plant (inverter module) which then goes on to calculate the AC power supplied by the solar power plant.

Due to the presence of the inverter module, from the point of view of the network, the solar power plant is considered a voltage source convertor.

Dynamic Data:

Converter time constant for IQcmd seconds = 0.02 s

Converter time constant for IQcmd seconds = 0.02 s

Voltage sensor for LVACR time constants = 0.02 s

Voltage sensor time constant = 1.1 s

2.2 Network data

The 11 kV, 66 kV and 132 kV networks available for interconnection to AJ Solar Power Plant are as shown in SLD I and II in Appendix-A.

The PEPCO/FESCO system data of National Grid have been assumed in the study as already available with PPI.

3. Study Approach and Methodology

3.1 Understanding of the Problem

The 10 MW (AC) Solar Power Plant by AJ Solar is going to be a Photovoltaic (PV) based solar project embedded in the 11 kV distribution network of Adhikot. It would run almost all the months of the year though with some variation in its output due to variation in the strength of light in winter and in rainy season.

The existing nearest grid station available for interconnection is Adhikot 66/11 kV Substation. The addition of this source of power generation embedded in local distribution network of this area shall provide relief to Adhikot 66 / 11 kV substation feeding the local network and also helps 11 kV network in terms of improving line losses and voltage profile. The 11 kV network surrounding Adhikot and Qaidabad has significant load demand, therefore most of the power from the AJ Solar Power Plant will be utilized locally in meeting this load demand.

The adequacy of FESCO network of 66kV and 132 kV in and around the proposed site of AJ Solar Plant would be investigated in this study for absorbing and transmitting this power fulfilling the reliability criteria.

3.2 Approach to the problem

The consultant has applied the following approaches to the problem:

- A base case network model has been prepared for June 2016, which is the next peak load case after the installation of solar plant by AJ Power Ltd. The case comprises of all 500kV, 220kV, 132 kV and 66 kV system, envisaging the load forecast, the generation additions and transmission expansions for that year particularly in FESCO.
- The project is expected to be completed by January 2016. Therefore the month of June 2016 has been selected to carry out the study as it will allow the maximum impact of the project to be judged.
- Interconnection scheme without any physical constraints, like right of way or availability of space in the terminal substations, have been identified.
- Performed technical system studies for peak load conditions to confirm technical feasibility of the interconnections. The scheme has been subjected to

standard analysis like load flow and short circuit, and transient stability study to check the strength of the plant and the proposed interconnection scheme under disturbed conditions.

- Determine the relevant equipment for the proposed technically feasible scheme.
- Recommend the technically most feasible scheme of interconnection.

4. Development of Scheme of Interconnection

4.1 The Existing Network

The nearest existing FESCO interconnection facilities at the time of commissioning of AJ Solar Power Project would be as follows:

- Adhikot 66/11 kV Substation
- Quaidabad 132/66/11 kV Substation

The existing 66 kV and 132 kV network available around these grid stations is shown in SLD-I in Appendix-A.

Given the physical proximity of Adhikot to AJ Solar Power plant and the fact that the other facilities are at a considerable distance from the plant, the most feasible interconnection of the AJ Solar Power Plant will be with Adhikot 66/11 kV substation which is connected with Quaidabad 132/66 kV substation. There are two 66/11 kV transformers with 10/13 MVA capacity at Adhikot Substation.

Quaidabad 132 kV grid station is connected to a strong 132 kV network in the vicinity via Jauhrabad with its interconnection with Ludewala 220/132 kV substation. A strong system helps in stable operation of a power plant.

4.2 The Scheme of Interconnection of Solar Power Plant

Keeping in view of the above mentioned 66 kV and 132 kV network available in the vicinity of the site of the AJ Solar Power Plant, the interconnection scheme has been developed as shown in SLD-II in Appendix A by laying down three direct 11 kV circuits (one double circuit and one single circuit) each of 1 km length using Osprey conductor from the switching station of AJ Solar-PP till Adhikot 66/11 kV substation. The double circuit to be connected to T-2 and single circuit to be connected toT-1 of Adhikot 66/11 kV substation. Even though two 11 kV circuits using Osprey conductor would be sufficient to evacuate power from AJ Solar-PP, an additional circuit has been added to fulfill N-1 contingency criteria.

4.3 Proposed additions at 11 kV in Adhikot 66/11 kV Substation

Three breaker/panels of 11 kV along with respective protection equipment would be required to be added in 11 kV switchgear hall of Adhikot 66/11 kV substation to provide connection to direct 11 kV circuits from this Solar Power Plant.

5. Detailed Load Flow Studies

5.1 Base Case 2016, Without Solar Power Plant

A base case has been developed for the peak load of June 2016, using the network data of AJ Solar-PP and FESCO network.

The results of load flow for this base case are plotted in Exhibit 0.0 of Appendix-B. The system plotted in this Exhibit shows 66 kV and 132 kV network feeding Adhikot connected to its surrounding substations through Quaidabad, Jauhrabad and Wan Bhuchran.

The load flow results show that the power flows on all circuits are within their specified normal current carrying rating. The voltages are also within the permissible limits. We see that about 14.8 MW flows from Quaidabad to Adhikot through 66 kV S/C which feeds the loads at the 11 kV bus bars of Adhikot 66/11 kV Substation. There exists two 66/11 kV transformers at Adhikot who share 7.1 MW each to meet the total peak load of 14.2 MW.

For N-1 contingency conditions we have performed the following cases

Exhibit-0.1	Wanbuchan to Quaidabad 132kV Single Circuit Out
Exhibit-0.2	Quaidabad to Jauharabad 132kV Single Circuit Out
Exhibit-0.3	Wanbuchan to Piplan 132kV Single Circuit Out
Exhibit-0.4	Chasmah to Wanbuchan 132kV Single Circuit Out

In Exhibit 0.1 we see that the voltage at Adhikot 66 falls very low due to outage of Wanbuchan to Quaidabad 132kV Single Circuit. The interconnection of proposed solar power plant at Adhikot will help to boost the voltage and resolve this issue. However in all other cases the power flows on all circuits remain within their ratings and voltage profile are also within permissible limits. Thus we find that there are no capacity constraints in terms of MW or MVA flow in the 66 kV or 132 kV network available in the vicinity of AJ Solar Power Plant for its connectivity under normal and contingency conditions prior to its connection.

5.2 Load Flow with AJ Solar Power Plant

We have considered the scenario of June 2016 so that we can judge the maximum impact of the project on the system.

The scheme of interconnection modeled in the load flow for AJ Solar Power Plant is developed by laying down three direct 11 kV circuits (one double circuit and one single circuit) each of 1 km length using Osprey conductor from the switching station of AJ Solar-PP till Adhikot 66/11 kV substation. The double circuit to be connected to T-2 and single circuit to be connected toT-1 of Adhikot 66/11 kV substation. The results of load flow with AJ Solar Power Plant interconnected as per proposed scheme are shown in Exhibit 1.0 in Appendix-B. The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 5 % off the nominal.

We find no capacity constraints on 11 kV, 66 kV or 132 kV circuits under normal conditions i.e. without any outages of circuits.

With part of the load at Adhikot fed by the Solar-PP locally, the loading of 66/11 kV transformers at Adhikot is reduced significantly i.e. for T-2 it is 1.8 MW with 1.8 MVAR (i.e. 2.54 MVA) and for T-1 it is 2.4 MW and 1.8 MVAR (3 MVA) which means the proposed solar power plant relieves the transformer from overloading during the day time when output of solar PP will be available. The flow from Quaidabad to Adhikot is also reduced to 4.2 MW accordingly.

N-1 contingency analysis has been carried out and the plotted results are attached in Appendix – B as follows;

Exhibit-1.1	AJ-Solar to T-1 AdhiKot 11kV Single Circuit Out
Exhibit-1.2	AdhiKot 66/11kV Transformer Out
Exhibit-1.3	Wanbuchan to Quaidabad 132kV Single Circuit Out
Exhibit-1.4	Quaidabad to Jauharabad 132kV Single Circuit Out
Exhibit-1.5	Wanbuchan to Piplan 132kV Single Circuit Out
Exhibit-1.6	Chasmah to Wanbuchan 132kV Single Circuit Out

We had observed in the case of Exhibit-0.1 of ""Without AJ Solar PP" that the voltage at Adhikot 66 fell very low due to outage of Wanbuchan to Quaidabad 132kV Single Circuit. But now we see that the interconnection of AJ solar power plant at Adhikot has helped to boost the voltage and resolved this issue.

In all the above contingency cases, we find that in the event of outage of any circuit, the intact circuits remain within the rated capacity.

Also the bus bar voltages are well within the rated limits in all the contingency events. Thus there are no constraints in this scheme.

5.3 Conclusion of Load Flow Analysis

From the analysis discussed above, we conclude that the proposed interconnection scheme of a three direct 11 kV circuits of 1.0 km length using Osprey conductor to be laid from 11 kV switching station of AJ Solar-PP to Adhikot 66/11 kV substation is adequate in normal and contingency conditions. The power flows on all circuits remain within their ratings. Also we see that the interconnection of AJ solar power plant at Adhikot has helped to boost the voltage and resolved the issue of voltage sag under some outages in the network feeding into this area.

Thus we find that there are no capacity constraints in terms of MW or MVA flow in the 11 kV, 66 kV or 132 kV network available in the vicinity of AJ Solar Power Plant for its connectivity under normal and contingency conditions. The interconnection of AJ solar PP provides overall relief to the network.

6. Short Circuit Analysis

6.1 Methodology and Assumptions

The methodology of IEC 909 has been applied in all short circuit analysis in this report for which provision is available in the PSS/E software used for these studies. .

The maximum fault currents have been calculated with the following assumptions under IEC 909:

- Set tap ratios to unity
- Set line charging to zero
- Set shunts to zero in positive sequence
- Desired voltage magnitude at bus bars set equal to 1.10 P.U. i.e. 10 % higher than nominal, which is the maximum permissible voltage under contingency condition.

For evaluation of maximum short circuit levels we have assumed contribution in the fault currents from all the installed generation capacity of hydel, thermal and nuclear plants in the system in the year 2015 i.e. all the generating units have been assumed on-bar in fault calculation's simulations.

6.2 Fault Current Calculations without AJ Solar Power Plant

In order to assess the short circuit strength of the network of 11 kV and 132 kV without AJ Solar Power Plant for the grid of FESCO in the vicinity of the site of the Plant near Adhikot, fault currents have been calculated for balanced three-phase and unbalanced single-phase short circuit conditions. These levels will not only give us the idea of the fault levels without AJ Solar Power Plant and later on how much the contribution of fault current from the Solar Power Plant may add to the existing levels, but also we get a feel of the strength of the proposed node to connect this Power Plant depending on its relative short circuit strength.

The results are attached in Appendix – C.

The short circuit levels have been represented graphically on the bus bars of 11 kV, 66 kV and 132 kV along with fault current contributions from the incoming circuits, which are shown in the Exhibit 2.0 attached in Appendix-C.

Both 3-phase and 1-phase fault currents are indicated in the Exhibit which are given in polar coordinates i.e. the magnitude and the angle of the current. The total fault currents are shown below the bus bar.

The tabular output of the short circuit calculations is also attached in Appendix-C for the.11 kV and 132 kV bus bars of our interest i.e. 11 kV, 66 kV and 132 kV circuits lying close to Adhikot. The tabular output is the detailed output showing the contribution to the fault current from the adjoining sources i.e. the lines and transformers connected to that bus. The phase currents, the sequence currents and the sequence impedances are shown in detail for each faulted bus bar.

The total maximum fault currents for 3-phase and 1-phase short circuit at these substations are summarized in Table 6.1. We see that the maximum fault currents do not exceed the short circuit ratings of the equipment at these 11 kV, 66 kV and 132 kV substations which normally are 20 kA, 25 kA.

Table - 6.1
Maximum Short Circuit Levels without AJ Solar PP 2016

Substation	3-Phase fault current, kA	1-Phase fault current, kA
AdhiKot T-1 11kV	3.91	3.84
AdhiKot T-2 11kV	3.91	3.84
AdhiKot 66kV	1.51	1.44
Saikasar 66kV	1.33	1.28
Quaidabad 66kV	3.08	2.81
Quaidabad 132kV	6.09	4.45
Jahurabad 132kV	5.58	3.71
Piplan 132kV	6.11	5.14

6.3 Fault Current Calculations with Solar Power Plant interconnected

Fault currents have been calculated for the electrical interconnection of proposed scheme. Fault types applied are three phase and single-phase at 11 kV bus bars of AJ Solar Power Plant itself and other bus bars of the 66 kV and 132 kV substations in the electrical vicinity of Adhikot. The graphic results are indicated in Exhibit 2.1.

The tabulated results of short circuit analysis showing all the fault current contributions with short circuit impedances on 132 kV and 11 kV bus bars of the network in the electrical vicinity of AJ Solar Power Plant are placed in Appendix-C. Brief summary of fault currents at significant bus bars of our interest are tabulated in Table 6.2.

Table-6.2
Maximum Short Circuit Levels with AJ Solar PP 2016

Substation	3-Phase fault current, kA	1-Phase fault current, kA
AJ-Solar 11kV	5.30	5.16
AdhiKot T-1 11kV	5.33	5.19
AdhiKot T-2 11kV	5.31	5.18
AdhiKot 66kV	1.54	1.48
Saikasar 66kV	1.33	1.28
Quaidabad 66kV	3.09	2.82
Quaidabad 132kV	6.10	4.46
Jahurabad 132kV	5.58	3.71
Piplan 132kV	6.11	5.14

Comparison of Tables 6.1 and 6.2 shows slight increase in short circuit levels for three-phase and single – phase faults due to connection of Solar Power Plant on the 132 kV and 11 kV bus bars in its vicinity. This increase is limited from the point of view of the fact that the Solar Power Plant is a voltage source convertor. We find that even after some increase, these fault levels are much below the rated short circuit values of the equipment installed on these substations.

The maximum short circuit level of 11 kV bus bar of AJ Solar Power Plant 11 kV is 5.30 kA and 5.16 kA for 3-phase and 1-phase faults respectively. Therefore an industry standard switchgear of the short circuit rating of 12.5 kA should be installed at 11 kV switching station of the Solar Power Plant leaving enough margin to accommodate fault current contribution from any future reinforcements taking place in that area.

6.4 Conclusion of Short Circuit Analysis

The short circuit analysis results show that for the proposed scheme of interconnection of AJ Solar Power Plant with the Dandot 11 kV distribution network, we don't find any problem of violations of short circuit ratings of the already installed equipment on the 132 kV and 11 kV equipment of substations in the vicinity of the Solar Power Plant due to fault current contributions from this plant due to three-phase faults as well as single phase faults.

The maximum short circuit level of 11 kV bus bar of AJ Solar Power Plant 11 kV is 5.13 kA and 5.16 kA for 3-phase and 1-phase faults respectively. Therefore an industry standard switchgear of the short circuit rating of 12.5 kA should be installed at 11 kV switching station of AJ Solar Power Plant leaving enough margin to accommodate fault current contribution from any future reinforcements taking place in that area.

7. Transient Stability Analysis

7.1 Assumptions & Methodology

7.1.1 Stability Models

The assumptions about the generator and its parameters are the same as mentioned in Ch.2 of this report.

We have employed the generic stability models available in the PSS/E model library for dynamic modelling of the PV-Solar power generator, its electrical model and the panel as follows;

Generator	PVGU1
Electrical Model	PVEU1
Solar Panel Model	PANELU1

We have done studies with the inverter which has reactive support capability of ± 0.95 PF.

7.1.2 System Conditions

We have used the system conditions of June 2016 because in this season the irradiance from the sun is at its peak and hence the maximum impact of the Solar Power Plant can be judged.

The proposed scheme of by laying down three direct 11 kV circuits (one double circuit and one single circuit) each of 1 km length using Osprey conductor from the switching station of AJ Solar-PP till Adhikot 66/11 kV substation has been modeled in the stability analysis.

All the power plants of WAPDA/NTDC from Tarbela to HUBCO have been dynamically represented in the simulation model.

7.1.3 Presentation of Results

The plotted results of the simulations runs are placed in Appendix - D. Each simulation is run for its first one second for the steady state conditions of the system prior to fault or disturbance. This is to establish the pre fault/disturbance conditions of the network under study were smooth and steady. Post fault recovery has been

monitored for nine seconds. Usually all the transients due to non-linearity die out within 2-3 seconds after disturbance is cleared in the system.

7.1.4 Worst Fault Cases

Three phase faults are considered as the worst disturbance in the system. We have considered 3-phase fault in the closest vicinity of the Solar Power Plant i.e. right at the 11 kV bus bar of the solar power plant substation, cleared in 10 cycles, as normal clearing time for 11 kV i.e. 200 ms, followed by permanent trip of 11 kV single circuit emanating from this substation.

7.2 Transient Stability Simulations' Results

7.2.1 Fault at 11 kV Near Solar Power Plant

We applied three-phase fault on the AJ Solar Power Plant 11 kV bus bar, cleared fault in 10 cycles (200 ms) followed by trip of 11 kV circuit between the AJ Solar Power Plant and Adhikot T-1. We monitored different quantities for one second pre-fault and nine seconds after clearance of fault (post-fault) conditions and plotted the results attached in Appendix – D and discussed as follows;

Fig. 1.1 Bus Voltages

The bus voltages of 11 kV bus bars of AJ Solar-PP, Adhikot T-1 and T-2, 66 kV bus bars of Adhikot and Quaidabad, and 132 kV Bus Bars of Piplan and Daudkhel are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 1.2 Frequency

We see the system frequency recovers back to normal quickly after fault clearance.

Fig. 1.3 MW/MVAR Output of Solar Power Plant

The pre-fault output of Solar Power Plant was 10 MW and it gets back to the same output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a new value.

Fig. 1.4 Voltage Sensor for LVACR

The value for LVACR is restored to its pre-fault value after the fault clears.

Fig. 1.5 MW /MVAR Flow from AJ Solar Power Plant to Adhikot T-2, 11 kV

Followed by clearing of fault, the trip of 11 kV circuit between the power plant and Adhikot T-2 circuit caused the load of that circuit to flow through the other two intact 11 kV circuit between the Solar-PP and Adhikot T-1 and T-2 respectively. We plotted

the flows of MW and MVAR on the intact circuit for T-2 and see that the power flows on this circuit attains to steady state level with power swings damping down fast.

Fig. 1.6 Rotor Angles

The rotor angles of the generators of Chashma-Hydel, Mangla and Tarbela have been plotted. The results show that the rotor angles face very little swings which damp down quickly. The system is strongly stable and very strong in damping the post fault oscillations.

7.3 Conclusion of Dynamic Stability Analysis

The results of dynamic stability show that the system is very strong and stable for the proposed scheme for the severest possible faults of 11 kV system near AJ Solar Power Plant. Therefore there is no problem of dynamic stability for interconnection of this Solar Power Plant; it fulfils all the criteria of transient stability. The reactive support from the inverter also helps the system stability.

8. Conclusions

- The nearest substation of FESCO is Adhikot 66/11 kV. The following scheme of interconnection of Solar Power Plant by AJ Power to evacuate its maximum power of 10 MW is envisaged and studied in detail:
  - Three direct 11 kV circuits (one double circuit and one single circuit) each of 1 km length using Osprey conductor to be laid from the switching station of AJ Solar-PP till Adhikot 66/11 kV substation. The double circuit to be connected to T-2 and single circuit to be connected toT-1 of Adhikot 66/11 kV substation.
  - In this context three 11 kV breaker/line bays need to be added in the 11 kV switchgear hall of Adhikot 66/11 kV Substation
- Detailed load flow studies have been carried out for the peak load conditions of June 2016 for the proposed scheme under normal and N-1 contingency conditions to meet the reliability criteria.
- Steady state analysis by load flow reveals that proposed scheme is adequate to evacuate the maximum output power of 10 MW of the plant under normal and contingency conditions with the proposed reinforcements.
- It is also revealed that the interconnection of AJ solar power plant at Adhikot has helped to boost the voltage and resolved the issue of voltage sag under some outages in the network feeding into this area.
- The short circuit analysis has been carried out to calculate maximum fault levels at the AJ Solar Power Plant at 11 kV, and the substations of 66/11kV and 132/11 kV in its vicinity. We find that the fault currents for the proposed scheme are much less than the rated short circuit capacities of switchgear installed at these substations. There are no violations of exceeding the rating of the equipment due to contribution of fault current from the AJ Solar Power Plant.

  The maximum short circuit level of 11 kV bus bar of AJ Solar Power Plant 11 kV is 5.3 kA and 5.16 kA for 3-phase and 1-phase faults respectively. Therefore an industry standard switchgear of the short circuit rating of 12.5 kA is considered adequate with enough margin for future increase in fault levels due to future reinforcements in this area.

- The dynamic stability analysis of proposed scheme of interconnection has been carried out. The stability check for the worst case of three phase fault right on the 11 kV bus bar of the AJ solar power plant substation followed by the final trip of 11 kV circuits emanating from this substation, has been performed for fault clearing of 10 cycles (200 ms) as understood to be the maximum fault clearing time of 11 kV protection system. The system is found strong enough to stay stable and recovered with fast damping. The proposed scheme successfully passed the dynamic stability checks for system disturbances.
- The proposed scheme of interconnection has no technical constraints or problems, it fulfills all the criteria of reliability and stability under steady state load flow, contingency load flows, short circuit currents and dynamic/transient conditions; and is therefore recommended to be adopted.