Atlas Energy

The Registrar,

National Electric Power Regulatory Authority (NEPRA)
Nepra Tower, Ataturk Avenue (East) G-5/1,
Islamabad.

Subject: **Application of Atlas Energy Limited (AEnL) for grant of Generation License in respect of 4.9278 MWp Solar Power Plant**

I, **Maqsood Ahmad**, being the duly authorized representative of Atlas Energy Limited by virtue of Board Resolution dated November 29, 2021, hereby apply to the National Electric Power Regulatory Authority for the grant of a Generation License to the Atlas Energy 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 (One Original & Three Copies) are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, and undertake to abide by the terms and provisions of the above-said regulations. I further undertake and confirm that the information provided in the attached documents-in-support is true and correct to the best of my knowledge and belief.

A HBL bankers cheque number 25150290 dated November 29, 2021 amounting Rupees 291,886 (Rupees Two Hundred Ninety-One Thousand Eight Hundred and Eighty-Six Only), being the non-refundable license application fee calculated in accordance with Schedule II to the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, is also attached herewith.

We request NEPRA to proceed/ approve our case at the earliest.

For & on behalf of
Atlas Energy limited

Maqsood Ahmad
Chief Executive Officer

CHECK LIST FOR EXAMINATION OF LICENCE APPLICATION
FOR NEW SOLAR POWER PROJECT
(Regulation 3 read with 3(4)(A) of AMECPR-2021)

Name of Company: Atlas Energy Limited Installed Capacity: 4.9278

Regulation #	Information/Documents Required	Information/ Documents Submitted
3(1)*	Application fee (including Indexation)	✓
3(3) *	Application submitted in triplicate	✓
3(4)(a) *	applicable documents-in-support and information set out in Schedule III of these regulations;	✓
3(4)(b) *	a prospectus	✓
3(4)(c)(i)(a) *	certified copies of certificate of incorporation	✓
3(4)(c)(i)(b) *	certified copies of memorandum and articles of association	✓
3(4)(c)(i)(c) *	certified copies of annual reports of the company	✓
3(4)(c)(ii) *	the last annual return of the Company submitted in compliance of section 130 of the Companies Act or, in case of an applicant to whom section 130 of the Companies Act does not apply, a return comprising of all such information and particulars as required by the specified form under section 130 of the Companies Act, as the case may be;	✓
3(4)(c)(iii)	the authorised, issued, subscribed and paid up share capital of the applicant	N/A
3(4)(c)(iv)	the shareholding pattern of the applicant including list of shareholders holding 5% or more shares, number of shares held by each of them and percentage shares of the total paid-up capital	N/A
3(4)(d)(i)	evidence of cash balances held in reserve by the applicant, along with bank certificates;	✓
3(4)(d)(ii)	details of charges or encumbrances attached to the applicant's assets, if any;	N/A
3(4)(d)(iii)	latest audited financial statements of the applicant;	✓
3(4)(d)(iv)	expressions of interest to provide credit or financing along with sources and details thereof;	N/A
3(4)(d)(v)	documents describing the net worth and the equity and debt ratios of the applicant, as on the date of the audited balance sheet accompanying the application;	N/A

Regulation #	Information/Documents Required	Information/ Documents Submitted
3(4)(d)(vi) *	a reasonably detailed profile of the applicant and the applicant's senior management, technical and professional staff;	✓
3(4)(d)(vii)	employment records of engineering and technical staff of the applicant proposed to be employed;	✓
3(4)(d)(vii)	profile of sub-contractors, if any, along with expressions of interest of such sub-contractors;	✓
3(4)(d)(ix)	verifiable references in respect of the experience of the applicant and its proposed sub-contractors;	✓
3(e) *	technical and financial proposals in reasonable detail for the operation, maintenance, planning and development of the facility or system in respect of which the license is being sought;	✓
3(f) *	Feasibility Study	✓
3(g) *	an affidavit stating whether the applicant has been granted any other license under the Act;	✓
3(h) *	a duly authorised statement stating whether the applicant has been refused grant of license under the Act and, if so, the particulars of the refused application, including date of making the application and decision on the application;	✓
3(6) *	Authorization from Board Resolution / Power of Attorney	✓
3(7) *	An affidavit as to the correctness, authenticity and accuracy of the application,	✓
3(8) *	The applicant shall also furnish a bank guarantee equivalent to applicable annual license fee for two year	
Schedule III (Regulation 3(4)(a)(A)(e)		
1.	Interconnection Study	N/A
2.	Environment Impact Assessment Study	✓
3	Information relating to:	
3(i) *	Location (location maps, site map, land)	✓
3(ii) *	Technology, size of the plant, number of units	✓
3(iii) *	Water source at site for maintenance	✓
3(iv) *	Infrastructure: roads, rail, staff colony, amenities	✓

Regulation #	Information/Documents Required	Information/ Documents Submitted
3(v) *	Project commencement and completion schedule with milestones	✓
3(vi)	Safety plans, emergency plans	✓
3(vii) *	Plant characteristics (generation voltage, frequency etc.)	✓
3(viii)	Control, metering, instrumentation and protection	✓
3(ix) *	Estimated Capacity Factor at site	✓
3(x)	Degradation Factors	✓

3(4)(b) Prospectus

Atlas Energy

Atlas Group:

Mr. Yusuf H. Shirazi, laid the foundation of Atlas in 1962 with the establishment of Shirazi Investments (Pvt) Limited. Atlas is a diversified group dealing in engineering, power generation, financial services and trading, embodying the spirit of development as it endeavors to fuel the growth of Pakistan's economy. It comprises of 16 companies, four of which are quoted on the Stock Exchanges of Pakistan (Atlas Honda Limited, Atlas Battery Limited, Atlas Insurance Limited & Honda Atlas Cars (Pakistan) Limited. Atlas shareholders' equity now stands at 200 billion rupees; assets have increased to 250 billion rupees; personnel strength to 10,000 and annual sales have crossed 160 billion rupees.

Atlas Energy Limited

Atlas Energy Limited was incorporated as an unquoted - public limited company on 18 May 2016, under the Companies Ordinance, 1984. The registered office of the Company is situated at Building No. 64/XX, Khayaban-e-Iqbal, Phase III, D.H.A, Lahore. We are providing cost effective Solar solutions for industrial and commercial consumer through sale of electricity.

Atlas Energy has successfully installed Projects of 5 MW on energy sale and EPC model while approximately 7.0 MW projects are in pipeline.

Currently Atlas Energy have Assets of PKR 335.45 Million and being a part of Atlas Group the company has strong relationship with Financial Institutions, as well as ability to execute bigger Projects.

Vision:

A leading Company in Solar industry in all respects – providing cost effective tailored solutions for industrial and commercial consumer through sale of power, Engineering, Procurement and construction (EPC), operation and Maintenance and giving attractive return to investors being responsible corporate citizen and employer of choice.

Mission:

Being Competitive to provide unique, advance and effective solar solutions to industrial and commercial customers in safe, reliable and environment friendly manner acting with integrity following sound practices with a sense of service in a culture that respects and values the satisfaction of our customers.

AtlasEnergy

List of Projects:

Some of our successful completed projects are as follows:

Sr. No.	Category	Project Name/ Location	Nature of Work	Size of Installation (kWp)
1.	Industrial	Honda Atlas Cars Pak Ltd (43 km Multan Rd. Manga, Lahore)	EPC	497.70
2.	Domestic	DHA Phase-V, Karachi	EPC	6.00
3.	Domestic	DHA Phase-V, Karachi	EPC	6.00
4.	Industrial	Engine Plant (Atlas Honda Ltd. 26/27 Km Lahore-Skp. Road, Skp)	EPA	589.05
5.	Industrial	Pakistan Cables (Noorabad, Sindh)	EPA	7.20
6.	Industrial	Parking Sheds (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	405.79
7.	Domestic	Zaman Park Lahore	EPA	12.00
8.	Industrial	Subassembly/ Frame Line (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	769.08
9.	Industrial	Component Parts (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	668.25
10.	Industrial	DCC-2 (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	752.40
11.	Industrial	Atlas Industrial Park Karachi Plot No. 347A, Shed No 2, 15th Miles, National Highway, Landhi, Karachi.	EPC	864.56
12.	Industrial	Atlas Honda Limited Karachi F-36 Estate Avenue, S.I.T.E. Area Karachi.	EPC	96.3

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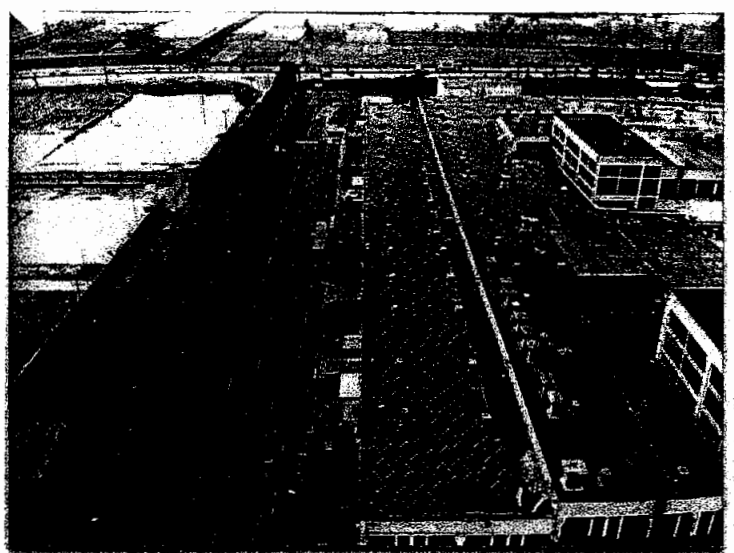
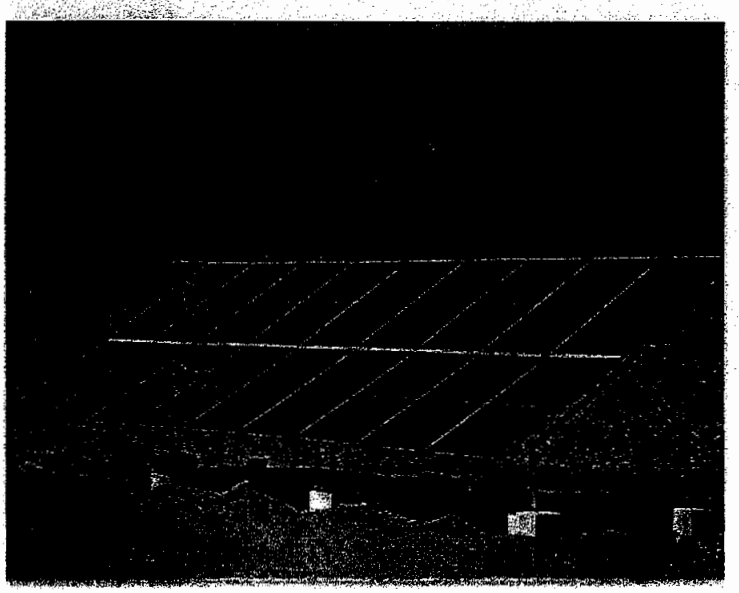
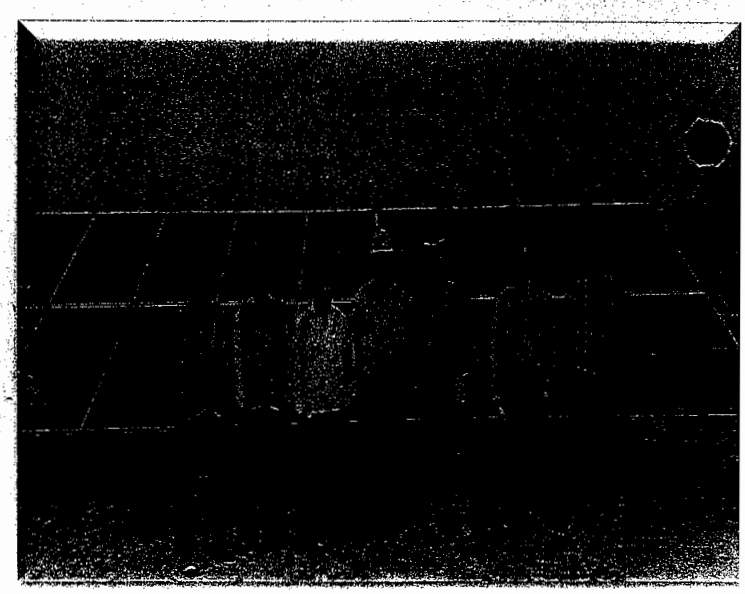
13.	Industrial	Atlas Battery Limited Karachi D-181 Central Avenue, S.I.T.E Area Karachi.	EPC	301.74
14.	Commercial	Atlas Vocational Training Institute Sheikhupura	EPC	72.76

Total Projects Installed: 5,043.83 kWp







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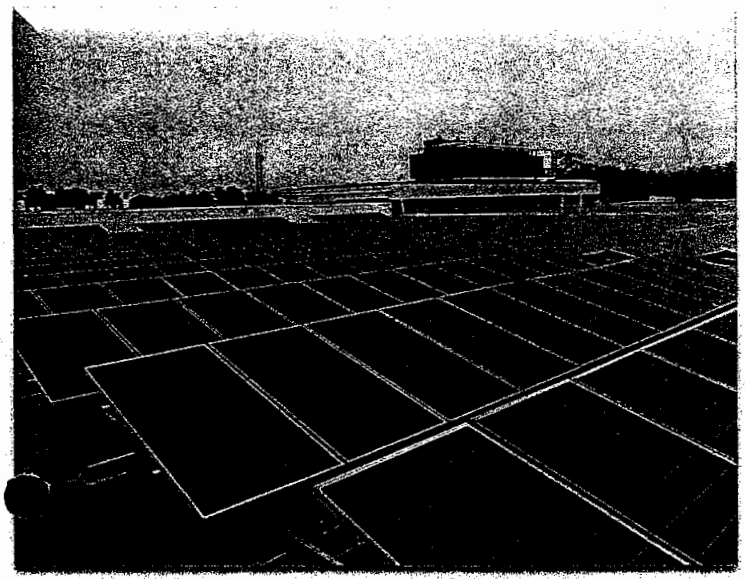

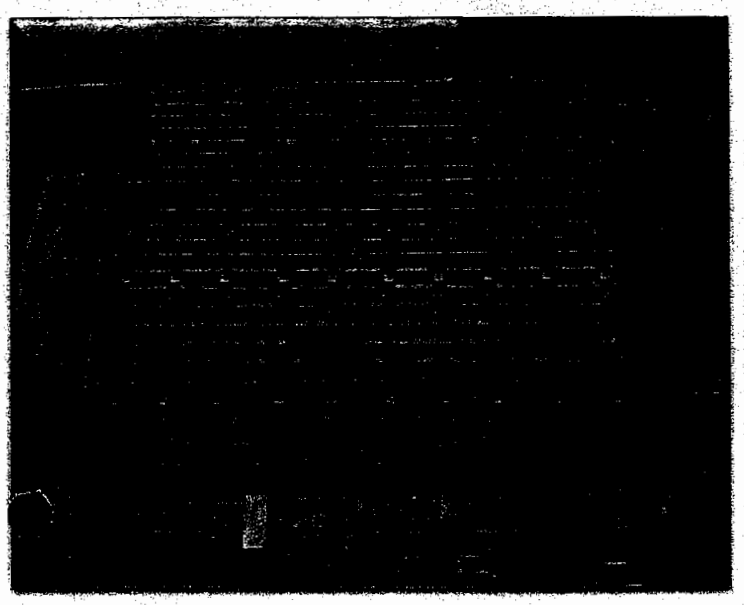

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Purpose

Atlas Energy intends to install **4,927.89 kWp** Solar Power Plants in owner premises to provide electricity under PEPA mode. The installed capacity of plants is proposed by critically analyzing the current load and future load projections of site.

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

The Capital cost shall include the cost borne by the Applicant Company on feasibility studies, planning, designing, material, construction and installation of the Generation Facilities.

The cost of land, step-up transformer, interconnection with distribution system of utility are not included being not required.

The Applicant shall arrange the required funding through 20% Equity, 80% Debt. Debt may be availed under SBP Financing Scheme for Renewable Energy.

Sr. #	Location	System Size (kWp)	Total Project Cost (PKR)	TPC/Wp	Debt 80%	Equity 20%
1	Atlas Honda Limited Sheikhupura	4,927.89	532,212,120	108.0	425,769,696	106,442,424

Environment Assessment/ Conclusion:

The site allocated is private land within the premises of Atlas Honda Limited (Plant) and the applicant has carried out detailed environment assessment of the site for installation of solar PV Plant. Overall findings:

Environment Parameters	Level of Impact	Reasons	Mitigation Measures
Air Impact	Low	Solar Energy is Carbon Free	(No Emissions)
Water	Low	Plant will required a very low quantity of water for cleaning purpose only	RO Plant is already installed at site and water from said source may be used for cleaning of Modules
Land	Low	No impact on Land	As said project is purely roof based which have no impact on Land
Ecosystem	Low	No ecologically sensitive area lies with in premises	There is no significant vegetation cover within the selected area
Socio Eco system	Low	Total area identified for said project is in plant premises and no acquisition is needed	Not Applicable

Safety plans, emergency plans

- Only qualified and authorized electricians will be allowed to undertake servicing or maintenance tasks.
- The authorized personnel will wear appropriate equipment, including a safety harness to restrain from falling off the roof, sturdy shoes that will have thick rubber soles to provide electrical insulation and good grip and appropriate clothing for personal protection, including a hat, sunglasses, gloves and long pants and sleeves.
- Lock out and tag out procedures will be used before commencement of maintenance tasks.
- On-going operation and maintenance concerns for solar power systems will be addressed properly. These systems are exposed to outdoor weather conditions that enhance the aging process, and the infrastructure needs to be in place for the on-going maintenance of these systems to assure their safe operation.
- Properly grounded or double insulated power tools will be used for maintenance tasks.
- Tools will be maintained in good condition.
- Working on electrical equipment and circuits will be carried out in de-energized state.
- Proper pathways will be available for operation, maintenance and firefighting.
- Fire protection and suppression will be placed at site.

Training and Capacity Development:

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

The following components will include in training & development program.

- Collection of Resource Data
- Variability and uncertainty of resource data
- Site evaluation
- Crystalline and thin film technology comparison
- Rooftop solar system components
- Module mounting structure selection
- Inverter selection

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- Design of PV Array
- Shadow Analysis
- DC Cable Layout
- DC Cable Sizing
- Protection and Metering
- Installation and Testing standards for solar PV plants
- Solar Module testing standards
- Economy of Roof Top Solar System
- Detailed Project Report
- Operation and maintenance of rooftop solar system
- Safety and fire-fighting training

3(4)(c)(i)(a) Certified Copies of Certificate of Incorporation

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B007438

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

SECP

LAHORE

CERTIFICATE OF INCORPORATION ON CHANGE OF NAME

[Under section 13 of the Companies Ordinance, 2016 (VI of 2016)]

Corporate Universal Identification No. 0099710

I hereby certify that [illegible] the provisions of section 11 or section 12 of the Companies [illegible] of 2016) the name of

"[illegible] LIMITED"

[illegible]

"ATI[illegible]"

and that the said company [illegible] company limited by shares under the pro[illegible]

This change is [illegible] from the date of issue of [illegible] its former name along with [illegible] outside of its registered office [illegible] carried on and [illegible] of section 22.

Given under my hand at Lahore this [illegible] day of November [illegible] Thousand and Sixteen.

Fee Rs. 1000/-

[illegible]
[illegible]

No. ARL/ [illegible] Dated: [illegible]

CERTIFIED TO BE TRUE COPY

JOINT REGISTRAR OF COMPANIES
COMPANY REGISTRATION OFFICE
LAHORE.

A008945

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 [illegible] No. [illegible]

I hereby certify that [illegible] POWERGEN LIMITED [illegible] incorporated under the Companies [illegible] 1984 (XLVII [illegible] 1984) and that the company is Limited by Shares.

Given under my hand [illegible] Eighteenth day of May, Two Thousand and Sixteen.

Fee Rs. 52,000/-

[illegible]

[illegible] DATED: [illegible]

3(4)(c)(i)(b) Certified Copies of Memorandum and Articles of Association

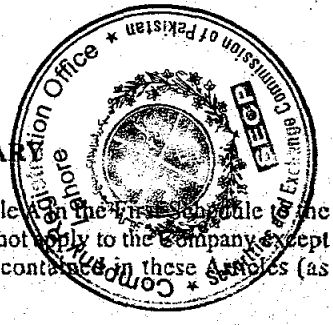
THE COMPANIES ORDINANCE, 1984

(COMPANY LIMITED BY SHARES)

ARTICLES OF ASSOCIATION

OF

ATLAS ENERGY LIMITED



PRELIMINARY

Table 'A' not to apply

1) The Regulations contained in Table 'A' in the First Schedule to the Companies Ordinance, 1984 shall not apply to the Company except in so far as they are repeated or contained in these Articles (as modified and altered).

Definitions

2) In these Articles, the following words and expressions shall have meanings as under, unless excluded by the subject or the context, namely:

Articles means these Articles of Association originally framed or as altered from time to time in accordance with the provisions of the Ordinance and the Articles.

Board of Directors means collectively the Directors of the Company holding office of Directors for the time being and from time to time.

Chairman means the Chairman of the Board of Directors appointed from time to time pursuant to these Articles.

Chief Executive means the Chief Executive for the time being of the Company appointed from time to time pursuant to the Articles.

Commission means the Securities and Exchange Commission of Pakistan constituted under the Securities and Exchange Commission of Pakistan Act, 1997.

Company means **ATLAS ENERGY LIMITED**

Directors mean the Directors of the Company for the time being, including alternate Directors if any appointed by them.

Dividend includes a bonus.

General Meeting means an Annual General Meeting and/or an Extraordinary General Meeting.

Member means a member of the Company within the meaning of clause 21 of Section 2(1).

Memorandum means the Memorandum of Association of the Company as originally framed or as from time to time altered in accordance with the provisions of the Ordinance and the Articles.

Month means a calendar month according to the Gregorian Calendar.

Office means the Registered Office for the time being of the Company.

Ordinance means the Companies Ordinance, 1984 including all statutory modifications thereof for the time being in force and such other law as may from time to time be passed in substitution or amendment thereof.

Proxy means an instrument in writing whereby a Member authorizes another to vote for him at a meeting or meetings and unless the context otherwise requires, includes an attorney duly constituted under a power of attorney.

Register means the Register of Members to be kept pursuant to Section 147.

Section means a section of the Ordinance.

Special Resolution has the meaning assigned thereto by clause (36) of Section 2(1).

Seal means the common seal of the Company.

Secretary means the Secretary for the time being of the Company.

In writing and written include printing, typewriting, lithography, electronic transmission, including but not limited to facsimile, telex and electronic mail or any other mechanical or electronic process, as prescribed by section 3 of the Electronic Transactions Ordinance, 2000 or partly one and partly the other and other modes of representing or reproducing words in a visible form.

Unless the context otherwise requires, words signifying the singular number shall include the plural number and vice versa.

Unless the context otherwise requires, words signifying the masculine gender shall include the feminine gender.

Words importing persons shall include individuals, firms, companies, corporations, government state or agency or any association, trust or partnership (whether or not having a separately legal personality).

The heading and marginal notes are inserted for convenience only and shall not affect the interpretation or construction of these Articles.

PUBLIC COMPANY

Public Company 3) The Company is a public limited company and the Board of Directors shall have regard to the restrictions on the commencement of business imposed under section 146 of the Ordinance, so far as those restrictions are binding upon the Company.

BUSINESS

Business of the Company 4) Any branch or kind of business which the Company is either expressly or by implication authorised to undertake may be undertaken by the Directors at such time or times as they shall think fit, and further may be suffered by them to be in abeyance whether such branch or kind of business may have been actually commenced or not so long as the Directors may deem it expedient not to commence or proceed with such branch or kind of business.

MINIMUM SUBSCRIPTION

Minimum subscription 5) For the purposes of Section 68(8), the minimum subscription on which the Board may proceed to allotment shall be Rs. 2,000,000 (Rupees one million only).

SHARES

Power to issue shares of different classes 6) Subject to Section 90 and any rules in that regard made under the Ordinance, any share in the Company may be issued with such rights and restrictions as may from time to time be determined by the Company in General Meeting.

Redeemable shares and securities 7) Subject to Section 95(4)(a) and any rules in that regard made under the Ordinance, the Company may issue shares which are to be redeemed or any other redeemable security, on such terms and in such manner as may be provided in the said Section and rules.

No partly paid shares to be issued 8) The Company shall not issue partly paid shares. In the case of an issue of shares for cash, the amount payable on application shall be the full nominal amount of the share, except where shares are issued at a discount.

Issue of shares at discount 9) With the previous authority of the Company in General Meeting and the sanction of the Commission and upon otherwise complying with the provisions of Section 84, it shall be lawful for the Board to issue shares in the capital of the Company at a discount.

Issue of shares 10) The shares in the capital of the Company for the time being remaining unissued, including any new shares resulting from an increase in the authorized share capital, shall be under the control of the Board which may allot or otherwise dispose of the same to such persons, on such terms and conditions, with such rights and privileges annexed thereto as the resolution creating the same

shall direct, and if no such direction be given, as the Board shall determine either at par or at premium or subject to Article 8 above at a discount, with power to the Board to give any person the right to call for and be allotted shares of any class of the Company at par or at a premium or subject as aforesaid at a discount such option being exercisable at such times and in such manner and for such consideration, as the Directors think fit.

Allotment of shares

11) As regards any allotment of shares, the Board shall duly comply with the provisions of Sections 68 to 73 as may be applicable.

Shares may be issued for consideration other than cash

12) The Board may allot and issue shares in the capital of the Company as payment or part payment for any property / assets sold or transferred to the Company, or for services rendered to the Company in the ordinary course of its business, and shares so allotted shall be issued as fully paid up shares and if so issued, shall be deemed to be fully paid up shares.

Commission for placing shares.

13) The Company may at any time pay a commission to any person for subscribing or agreeing to subscribe (whether absolutely or conditionally) for any shares or debentures of the Company, or procuring or agreeing to procure subscriptions (whether absolute or conditional) for any shares or debentures of the Company, but so that the amount or rate of commission shall not exceed such amount or rate as is authorized by the Board of Directors (or such other rate as may be prescribed by the Commission under the Ordinance) of the price at which the shares are issued or of the nominal value of the debenture in each case subscribed or to be subscribed. In case any commission is to be paid, the Company shall comply with the provisions of Section 82 of the Ordinance.

Brokerage

14) The Company may pay such brokerage as may be lawful in respect of any issue of shares or debentures.

Registration as shareholders

15) Not more than four persons shall be registered as joint shareholders except in the case of executors or trustees of a deceased member. Shares may be registered in the name of any limited company or other corporate body.

Joint shareholders

16) If any shares stand in the name of two or more persons, the person first named in the Register shall, as regards receipt of Dividend or service of notices and all or any other matters connected with the Company, except voting at the meeting and the transfer of shares, be deemed the sole holder.

Death of joint shareholders

17) In the case of the death of anyone or more of the persons named in the Register as the joint holders of any share, the survivor or survivors shall be the only person or persons recognized by the Company as having any title to or interest in such share.

CERTIFICATES

Members right to certificate

18) Every person whose name is entered as a Member in the Register

shall be entitled to receive after allotment or registration of transfer one certificate for all his shares or several certificates each for one or more of his shares upon payment of such charge, if any, as the Board may determine for every certificate after the first.

Issue of certificates

19) In accordance with the applicable laws, the certificates of title to shares and duplicates thereof, when necessary, shall be issued under the Seal of the Company and signed by one Director and countersigned by the Company Secretary or such officers of the Company as shall from time to time be authorized by the Board for the purpose. Every person whose name is entered as a member in the Register shall, without payment, be entitled to receive within ninety (90) days after allotment, or within forty-five (45) days of the application for registration of transfer, one (1) certificate for all the shares of each class registered in his name, or if the Board so approves to several certificates each for one (1) or more of such shares. However, in respect of each additional certificate, the Board shall be entitled to charge such fee as it may determine, from time to time. Every certificate of shares shall specify the number and denoting numbers of the shares in respect of which it is issued and the amount paid up thereon. The Board may, by resolution, determine either generally or in any particular case, that the signature of any such Director or officer of the Company may be affixed on share certificates by some mechanical or electronic means, or be printed thereon, in the mode and manner specified in such resolution.

Certificates in the case of joint holders

20) The Company shall not be bound to issue more than one certificate in respect of a share or shares held jointly by two or more persons and delivery of a certificate for a share to anyone of the joint holders shall be sufficient delivery to all.

Time for issue of certificates

21) Unless the conditions of issue of any shares, debentures or debenture stock of the Company otherwise provide, the Company shall within ninety days after the allotment and within forty five days after receipt by the Company of the application for transfer of any such shares, debentures or debenture stock, complete and have ready for delivery the certificate of all shares, the debentures and the certificate of all debenture stock allotted or transferred, and unless sent by post or delivered to the person entitled thereto within the period aforesaid the Company shall immediately thereafter give notice to that person in the manner prescribed in these Articles for the giving of notices to Members that the certificate is ready for delivery.

Lost or mutilated certificates

22) If a certificate of shares, debentures or debenture stock is proved to the satisfaction of the Company to have been lost or destroyed or, being defaced or, mutilated or torn, is surrendered to the Company, and the Company is requested to issue a new certificate in replacement thereof, the Company shall, after making such enquiry as it may deem fit, advise the applicant within thirty days from the date of application the terms and conditions (as to indemnity and otherwise and as to payment of the actual expenses

incurred on such enquiry and of a fee not exceeding one rupee) on which the Company is prepared to issue a new certificate and a time for compliance therewith or of the reasons why the Company is unable to issue a new certificate, as the case may be, and in the former case if the applicant shall within the time allowed comply with the terms and conditions specified, the Company shall issue a new certificate to the applicant within forty-five days from the date of application.

TRANSFER OF SHARES

Execution of transfer

23) No transfer shall be registered unless a proper instrument of transfer together with the certificate(s) of shares has been delivered to the Company. The instrument of transfer of any share shall be signed both by the transferor and the transferee and the transferor shall be deemed to remain holder of the share until the name of the transferee is entered in the Register in respect thereof.

Form of transfer

24) (i) The instrument of transfer of any share shall be substantially in the following form or as near thereto as circumstances will admit:

ATLAS ENERGY LIMITED

I _____ of _____ in consideration of the sum of Rupees _____ (Rs. _____ only) paid to me by _____ of _____ (the "Transferee"), do hereby transfer to the Transferee _____ the share(s) numbered _____ to _____ inclusive, in ATLAS ENERGY LIMITED to hold unto the Transferee, his executors, administrators and assigns, subject to the several conditions on which I held the same at the time of the execution hereof, and I, the Transferee, do hereby agree to take the said share(s) subject to the conditions aforesaid.

As witness our hands this _____day of _____ 20____.

WITNESS:

Signature _____
Name _____
CNIC No. _____
Full Address _____
_____

Signature _____
Transferee

WITNESS:

Signature _____
Name _____
CNIC No. _____
Full Address _____
_____
_____

Signature _____
Transferor

CNIC No. / Passport No.
in case of foreigner _____
Full Name _____
Father's/Husband's
Name _____
Nationality _____
Occupation _____
Full Address _____
_____
_____

(ii) Every instrument of transfer shall be left at the office for registration, accompanied by the certificate of the shares to be transferred, and such other evidence as the Board may require to prove the title of the transferor or his right to transfer the shares, and upon payment of the proper fee, the transferee shall be registered as a member in respect of such shares. The Board may waive the production of any certificate upon evidence satisfactory to them of its loss or destruction.

Refusal to register transfer

25) The Directors shall not refuse to register any transfer of fully paid up shares unless the instrument of transfer is defective or invalid or is not accompanied by the certificate of shares to which it relates or due to non-payment of a fee, if any, as prescribed by the Board of Directors. The Directors may also decline to recognize any instrument of transfer unless it is accompanied, in addition to the certificate of shares to which it relates, by such other evidences as the Directors may reasonably require to show the right of transferor to make the transfer. The Directors may, on such terms and subject to such conditions, including without limitation the satisfaction of indemnities, as the Directors may in their absolute discretion determine, waive the requirement for the production of any certificate upon evidence satisfactory to them of its loss or destruction.

If the Board refuses to register a transfer of shares, it shall within 30 (thirty) days or such other period as may be required by the applicable laws, after the date on which the instrument of transfer was lodged with the Company, send to the transferee and the transferor notice in writing of the refusal indicating the defect or invalidity to the transferee, who shall, after removal of such defect or invalidity, be entitled to re-lodge the instrument of transfer with the Company. Furthermore, the Directors shall not incur any liability for, in a bonafide manner, registering or acting upon a transfer of shares, although the same may, by reason of any fraud or other cause not known to the Directors, be legally inoperative or insufficient to pass the property in the shares proposed or professed to be transferred, and although the transfer may, as between the transferor and transferee, be liable to be set aside, and notwithstanding that the Directors may have notice that such instrument of transfer was signed or executed and delivered by the transferor in blank as to the name of the transferee or the particulars of the shares transferred, or otherwise in defective manner.

Register may be closed

26) On giving seven days prior notice, the transfer books and the Register may be closed during such time as the Board of Directors think fit, not exceeding the whole forty-five days in each year but not exceeding thirty days at a time.

TRANSMISSION OF REGISTERED SHARES

Nominees, executor, administrators and heirs

27) The executor or administrator of a deceased member or a person nominated under Section 80 or the holder of a succession certificate shall be the only persons recognized by the Company as having any title to the shares, except in cases of joint-holders, in which case the surviving holder or holders, or the executor or administrator of the last surviving holder shall be the only person entitled to be so recognized. The Company shall not be bound to recognize such executor or administrator unless the executor or administrator shall have obtained probate or letters of administration or other legal representation, as the case may be, from a court of competent jurisdiction provided nevertheless that in special cases as determined by the Board, it shall be lawful for the Board to dispense with the production of probate or letters of administration or such other legal representation, including a succession certificate, upon such terms as to indemnify or otherwise as the Board may deem fit.

Right of person entitled by death or insolvency

28) (a) Any person becoming entitled to shares in consequence of the death or insolvency of the holder of such shares, shall have the right, subject to verification by the Board and on giving such indemnities as may be required, to receive and give a discharge for any Dividend or other moneys payable or other advantages arising in respect of the shares to which he would be entitled if he were the registered holder of the shares, but he shall have no right to receive notice of, attend or vote at any General Meetings or (save as aforesaid) to any one of the right or privileges of Members in respect of the shares, unless and until he is named on the Register as a holder thereof.

(b) The Directors shall have the same right to decline or suspend registration as they would have had in the case of a transfer of the share by that Member before his death or insolvency as the case may be.

ALTERATION OF CAPITAL

Power to increase, consolidate, sub-divide and cancel capital

29) The Company may by ordinary resolution and subject to compliance with the requirements of Section 92:

(a) increase the authorized share capital by such sum, to be divided into shares of such amount, as the resolution shall prescribe;

(b) consolidate and divide its share capital into shares of larger amount than its existing shares;

(c) by sub-division of its existing shares or any of them, divide the whole or any part of its share capital into shares of smaller amount than fixed by the Memorandum; and

(d) 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 and diminish the amount of its share capital by the amount of the shares so cancelled.

Offers of shares to existing Members 30) The Board may from time to time increase the issued share capital by such sum as they think fit. Further issue of shares shall be carried out in accordance with the provisions of the Ordinance. Provided that fractional shares shall not be offered and all fractions less than a share shall be consolidated and disposed of by the Company and the proceeds from such disposition shall be paid to a charitable institution or as decided by the Board of Directors.

Ranking of new shares 31) Except so far as otherwise provided by the conditions of issue, or by these Articles, any capital raised by the creation of new shares shall be considered part of the original capital, ranking pari passu with the existing shares, and shall be subject to the provisions herein contained with reference to transfer and transmission, and otherwise.

Reduction of capital 32) Subject to Section 96, the Company may, by Special Resolution, reduce its share capital in any manner consistent with the law.

Power to modify rights 33) Variations of the shareholders rights may be effected by the Company in accordance with the provisions of section 108.

Share premium account 34) The share premium account maintained pursuant to section 83(1) may, be applied by the Company:

(a) in writing off the preliminary expenses of the Company;

(b) in writing off the expenses of, or the commission paid or discount allowed on, any issue of shares or debentures of the Company;

(c) in providing for the premium payable on the redemption of any redeemable preference shares or debentures of the Company; or

(d) in paying up unissued shares of the Company to be issued as fully paid bonus shares.

GENERAL MEETINGS

Statutory Meeting 35) The statutory general meeting of the Company shall be held within the period required by section 157.

Annual General Meeting 36) A General Meeting, designated as the Annual General Meeting, shall be held in accordance with the provisions of Section 158, within eighteen Months from the date of its incorporation of the Company and thereafter once at least in every calendar year, within a period of four Months following the close of each financial

year of the Company, but in such manner that an Annual General Meeting is held in every calendar year and not more than fifteen Months elapses between any two consecutive Annual General Meetings, and subject to the above, each such Annual General Meeting shall be held at such time as may be determined by the Board. Unless otherwise allowed by the Commission, Annual General Meetings shall be held in the town in which the Office is situated, and each such Annual General Meeting shall be held at such location in that town as the Board may determine.

Other meetings 37) All General Meetings other than Annual General Meetings shall be called Extraordinary General Meetings.

Extraordinary General Meeting 38) The Board may, whenever they think fit, call an Extraordinary General Meeting and Extraordinary General Meetings shall also be called on such requisition, or in default, may be called by such requisitionists, as provided for by Section 159.

NOTICE OF GENERAL MEETINGS

Notice of meetings 39) (a) Notice of a General Meeting shall be sent in the manner hereinafter mentioned at least twenty one days before the date on which the meeting is to be convened to all such persons as are under these Articles or the Ordinance entitled to receive such notices from the Company and shall specify the place, day and hour of the meeting and the nature of the business to be transacted thereat.

(b) In the case of an emergency affecting the business of the Company an Extraordinary General Meeting may be convened by such shorter notice than that specified in Article 39 (a) above and as the Registrar of Companies may authorize.

(c) Where any special business, that is to say business other than consideration of the accounts, balance sheet and the reports of the Directors and Auditors, the declaration of Dividend, the appointment and fixation of the remuneration of Auditors and the election of Directors (all such matters being herein referred to as ordinary business) is to be transacted at a General Meeting, there shall be annexed to the notice of such meeting a statement setting out all such facts as may be material for the consideration of such business including the nature and extent of the interest (whether direct or indirect) of any Director, and where the item of business involves approval of any document, the time and place appointed for inspection thereof, and to the extent applicable such a statement shall be annexed to the notice also in the case of ordinary business to be transacted at the meeting.

(d) Where a resolution is intended to be proposed for consideration at a General Meeting in some special or

particular form, a copy thereof shall be annexed to the notice convening such meeting.

(e) If a Special Resolution is intended to be passed at a General Meeting, the notice convening that meeting shall specify the intention to propose the resolution as a Special Resolution.

(f) A notice for a General Meeting convened for the election of Directors shall state the number of Directors to be elected at that meeting and the names of the retiring Directors.

(g) The notice of every General Meeting shall prominently specify that a proxy may be appointed who shall have the right to attend, demand and join in demanding a poll and vote on a poll and speak at the meeting in place of the Member appointing him and shall be accompanied by a form of proxy acceptable to the Company.

Omission to give notice

40) The accidental omission to give notice of a meeting to, or the non-receipt of notice of a meeting by, any person entitled to receive notice shall not invalidate the proceedings at that meeting.

PROCEEDINGS AT GENERAL MEETINGS

Quorum

41) No business shall be transacted at any General Meeting unless a quorum is present at the time when the meeting proceeds to business; save as herein otherwise provided (unless specified otherwise in the Ordinance) at least two Members present in person or by proxy representing twenty-five per cent (25%) of the total voting power shall be a quorum.

A company being a member of the Company and present by a representative duly appointed in pursuance of Section 162, shall be deemed to be a Member present personally for the purpose of this Article.

Lack of quorum

42) 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, and, if at the adjourned meeting a quorum is not present within half an hour from the time appointed for the meeting the Members present, being not less than two, shall be a quorum.

Chairman of meeting

43) The Chairman, if any, of the Board of Directors shall preside as Chairman at every General Meeting of the Company or if there is no such Chairman or if he shall not be present within fifteen (15) minutes after the time appointed for the holding of the meeting or is unwilling to act, any one of the Directors present may be elected to be Chairman of the meeting, or if no director is present, or if all the Directors present decline to take the chair, the Members present shall choose one of their members to be Chairman of the meeting.

While chair remains vacant

44) No business shall be discussed at any General Meeting except the election of a chairman so long as the chair is vacant.

Decision on resolutions

45) (i) At a General Meeting, a resolution put to the vote of the meeting shall be decided on a show of hands unless a poll is (before or on the declaration of the show of hands) demanded:

(a) by the chairman of the meeting; or

(b) by at least one Member present in person or by proxy if not more than seven such members are personally present, and by two such members present in person or by proxy if more than seven such members are personally present; or

(c) by any Member or Members present in person or by proxy holding not less than one-tenth of the issued capital which carries voting rights.

(ii) Unless a poll be demanded, at any General Meeting a declaration by the Chairman of the meeting that a resolution has on a show of hands been carried, or carried unanimously, or by a particular majority, or lost and an entry to that effect in the book containing the minutes of the proceedings of the Company shall until the contrary is proved be evidence of the fact without proof of the number or proportion of the votes recorded in favour of or against such resolution.

Manner of taking of poll

46) If a poll is demanded, it shall be taken in accordance with the provisions of Section 168, and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was demanded.

Casting vote

47) Every question submitted to a meeting shall be decided in the first instance by a show of hands and in case of equality of votes, the Chairman shall, both on a show of hands and at the poll, have a casting vote in addition to the vote or votes to which he may be entitled as a Member and/or proxy or corporate representative.

Timing of polls

48) A poll demanded on the election of a Chairman or on a question of adjournment shall be taken forthwith. A poll demanded on any other questions shall be taken at such time, not being more than fourteen days from the day on which the poll is demanded, as the Chairman of the meeting directs.

Business may proceed notwithstanding demand of poll

49) The demand of a poll shall not prevent the continuance of the meeting for the transaction of any business other than the question on which a poll has been demanded.

VOTES OF MEMBERS

Right to vote

50) Subject to any special rights or restrictions as to voting upon

which any share may be issued or may for the time being be held, on a show of hands, every Member present in person and being a holder of ordinary shares shall have one (1) vote and every person present as general proxy who is not a Member of the Company or who is a Member not qualified to vote on behalf of a holder or holders of ordinary share shall have one (1) vote and upon a poll every Member present in person or by Proxy shall have one (1) vote for every share held by him in respect of which he is entitled to vote.

In case of an election or removal of a Director, the provisions of Section 178 and Article 68 and 69 respectively shall apply.

Procedure where a company is a Member of the Company

51) Where a company or other corporation is a Member of the Company, a person duly appointed to represent such company at a meeting of the Company in accordance with the provisions of the Ordinance, shall not be deemed to be a proxy and shall be entitled to exercise the same powers on behalf of the Company or corporation which he represents as that company or corporation could exercise if it were an individual Member of the Company, present in person. The production before or at the meeting of a copy of such resolution duly signed by one director or secretary of such company or corporation and certified by him as being a true copy of the resolution shall be accepted by the Company as sufficient evidence of the validity of his appointment. A company or corporation which is a Member of the Company but which is not resident in Pakistan may appoint a representative as aforesaid by facsimile transmission which, if purporting to be sent by such company or corporation, need not be certified as a true copy as aforesaid.

Voting shares in different ways

52) On a poll, a Member entitled to more than one vote need not, if he votes, use all his votes or cast all the votes he uses in the same way.

Joint holders

53) In the case of joint holders, the vote of the senior holder present, 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 their names stand in the Register.

Member of unsound mind

54) 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 a 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.

Objections to Votes

55) No objection shall be raised to the qualification of any voter except at the meeting or adjourned meeting at which the vote objected to is given or tendered, and every vote not disallowed at such meeting shall be valid for all purposes. Any such objection made

in due time shall be referred to the Chairman of the meeting, whose decision shall be final and conclusive.

Votes by proxy 56) On a poll, votes may be given either personally (including without limitation a representative of a company or corporation authorized under Article 51 of these Articles) or by proxy.

Proxy to be in writing 57) The instrument appointing a proxy shall be in writing under the hand of the appointer or of his attorney duly authorized in writing, or, if the appointer is a corporation, either under seal or under the hand of an officer or attorney duly authorized. A proxy need not be a Member of the Company.

Instrument appointing proxy to be deposited 58) The instrument appointing a proxy and the power of attorney or other authority (if any) under which it is signed, or a notarially certified copy of that power or authority, shall be deposited at the Office not less than forty eight hours before the time for holding the meeting at which the person named in the instrument proposes to vote, and in default the instrument of proxy shall not be treated as valid.

Form of proxy 59) An instrument appointing a proxy shall, as nearly as circumstances will admit, be in the following form or in any other form which the Board may approve:

ATLAS ENERGY LIMITED

I/We _____ being a member of ATLAS ENERGY LIMITED and entitled to _____ votes, do hereby appoint _____ of _____, failing him _____ of _____ as my/our proxy to vote for me/us and on my/our behalf, at the Annual or Extraordinary (as the case may be) General Meeting of the Company to be held on the _____ day of _____ 20___ and at any adjournment thereof.

Signed by me this _____ day of _____ 20___.

_____

(Signature of Member)

Witness to the Signature

1.

_____

Full Name & Address

_____

_____

Proxy may demand poll 60) The instrument appointing a proxy shall be deemed to confer authority to demand or join in demanding a poll.

Revocation of authority 61) A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the proxy or of the authority

under which the proxy was executed or the transfer of the shares in respect of which the proxy is given, provided that no intimation in writing of such death, insanity, revocation or transfer as aforesaid shall have been received by the Company at the Office before the commencement of the meeting or adjourned meeting at which the proxy is used.

DIRECTORS

Number of Directors

62) The minimum number of Directors of the Company shall be three. The Board shall fix the number of Directors of the Company not later than thirty five days before convening of the General Meeting at which Directors are to be elected, and the number so fixed shall not be changed except with prior approval of the General Meeting of the Company.

First Directors

63) The first Directors of the Company shall be as follows:

1. Mr. Saquib Hussain Shirazi
2. Mr. Frahim Ali Khan
3. Mr. Maqsood Ahmed

Election of Directors

64) Subject to the provisions of these Articles and the Ordinance, the Directors shall be elected by the Members in General Meeting.

Period of office of elected Directors

65) A Director elected by the Members in General Meeting shall hold office for a period of three years following the date from which his election is effective unless he resigns earlier, becomes disqualified from being a Director or otherwise ceases to hold office.

Casual vacancies

66) Any casual vacancy occurring among the Directors may be filled up by the Directors, and a person so appointed shall only hold office for the remainder of the term of the Director in whose place he is appointed. The Company shall, prior to every such appointment, secure in the form prescribed for this purpose, the consent and certificate of the person concerned consenting to act as a Director and certifying that he is not ineligible to become a Director and shall within fourteen days of his appointment file such consent with the Registrar of Companies as required by Section 184.

Eligibility for election as Director

67) The Members in General Meeting shall elect the Directors from amongst persons who, not being ineligible in accordance with Section 187, offer themselves for election as Directors in accordance with this Article. Any person claiming to be eligible who desires to offer himself for election shall, whether he is a retiring Director or not, file with the Company not later than fourteen days before the date of the General Meeting at which Directors are to be elected, a notice that he, being eligible, intends to offer himself for election as a Director at that meeting and that he consents to act as a Director if elected. If such person is elected a Director,

then the Company shall file his consent to act as a Director with the Registrar of Companies within fourteen days of his election as required by Section 184. A person offering himself for election as a Director may withdraw his candidature at any time before the holding of the election and may do so by withdrawing the notice in which he offered himself for election. Not later than seven days before the date of the meeting, the Company will notify the Members of the persons offering themselves for election as Directors at such meeting.

Procedure for election of Directors

68) The provisions of this Article shall apply for the election of Directors by the Members in General Meeting from amongst the candidates eligible for election, namely:

(a) every Member present in person or by proxy shall have such number of votes as is equal to the product of the number of shares carrying the right to vote held by him and the number of Directors to be elected;

(b) the number of votes calculated in accordance with the preceding clause (a) may be given to a single candidate or may be divided between any two or more candidates in such manner as the person voting may choose; and

(c) 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 and so on until the total number of Directors to be elected has been so elected.

Removal of Directors

69) The Company in General Meeting may remove a Director from office by a resolution passed with the requisite number of votes determined in accordance with the provisions of Section 181.

Qualifying share

70) The qualification of a Director, except for a nominee under Section 183 or a Director covered by the proviso to Section 187(h) shall be holding of a share in the Company of the nominal value of Rs. 10/-. A first Director may act before acquiring his qualification, but shall in any case acquire the same within two months from his appointment and he shall be deemed to have agreed to take the said share from the Company, and the same shall be allotted to him accordingly.

Remuneration of Directors

71) The remuneration of the Directors shall, from time to time, be determined by the Board.

Special remuneration

72) Any Director who is an employee of the Company or who serves on any committee or who devotes special attention to the business of the Company, or who otherwise performs services which in the opinion of the Directors are outside the scope of the ordinary duties of a Director, may be paid such remuneration as the Board may determine.

ALTERNATE DIRECTORS

Alternate Directors

73) A Director who is about to leave or is absent for a period of three Months or more from Pakistan may with the approval of the Directors appoint any person who is eligible under Section 187 for appointment as a Director to be an alternate Director during his absence from Pakistan and such appointment shall have effect and such appointee, whilst he holds office as an alternate Director, shall be entitled to exercise in place of his appointer all the functions of his appointer as a Director of the Company but he shall ipso facto vacate office as and when his appointer returns to Pakistan or vacates office as a Director or removes the appointee from office. Any appointment or removal under this Article shall be effected by notice in writing under the hand of the Director making the same. Such alternate Director may be one of the Directors of the Company, in which case he shall be entitled to act in both capacities. An alternate Director need not hold any share qualification.

POWERS AND DUTIES OF DIRECTORS

Borrowing Powers

Borrowing powers

74) (a) The Directors may exercise all the powers of the Company to raise money otherwise than by the issue of shares and to mortgage or charge its undertaking or property or any part thereof and to issue debentures and other securities whether outright or as security for any obligation or liability or debt of the Company to any third party.

(b) In exercising the aforesaid powers of the Company, the Directors may, from time to time and on such terms and conditions as they think fit, raise money from banks and financial institutions and from other persons under any permitted system of financing, whether providing for payment of interest or some other form of return, and in particular the Directors may raise money on the basis of mark-up on price, musharika, modaraba or any other permitted mode of financing, and without prejudice to the generality of the foregoing, the Directors may exercise all or any of the powers of the Company arising under Section 196(2).

(c) Subject to the provisions of Article 75(a) in regard to the issue of securities, the Directors may exercise all or any of the powers of the Company arising under Sections 19(2), 87, 120 and 196 (2) and in particular the Directors may issue any security as defined in Section 2(1)(34) or may issue any instrument or certificate representing redeemable capital as defined in Section 2(1)(30A) or participatory redeemable capital as defined in Section 2(1)(25).

Other Powers and Duties

General powers of Company vested in Directors

75) (a) The business of the Company shall be managed by the Directors, who may exercise all such powers of the Company as are not by the Ordinance or any statutory modification thereof for the time being in force or by these Articles are required to be exercised by the Company in General Meeting, subject nevertheless to any regulation of these Articles, to the provisions of the Ordinance, and to such regulations being not inconsistent with the aforesaid regulations or 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.

(b) A resolution at a meeting of the Directors duly convened and held shall be necessary for exercising the powers of the Company specified in Section 196(2).

Power of Attorney

76) The Directors may from time to time and at any time by power of attorney appoint any company, firm or person, or body of persons, whether nominated directly or indirectly (including any Director or officer of the Company) by the Directors, to be the attorney or attorneys of the Company for such purposes and with such powers, authorities and discretions (not exceeding those vested in or exercisable by the Directors under these Articles) and for such period and subject to such conditions as they may think fit, and any such powers of attorney may contain such provisions for the protection and convenience of persons dealing with any such attorney as the Directors may think fit and may also authorize any such attorney to delegate all or any of the powers, authorities and discretions vested in him; and without prejudice to the generality of the foregoing any such power of attorney may authorize the attorney to institute, conduct, defend, compound or abandon any legal proceedings by or against the Company, whether generally or any particular case.

Official seal for use abroad

77) The Company may exercise the powers conferred by Section 213 with regard to having an official seal for use abroad, and such powers shall be vested in the Directors.

Office of profit

78) A Director of the Company or a firm of which such Director is a partner or a private company of which such Director is a director may with the consent of the Company in General Meeting hold any office of profit under the Company provided that no such consent is required where the office held is that of Chief Executive or a full time employee or legal or technical adviser or banker.

Contracting with Company

79) Subject to authorization being given by the Directors in accordance with Section 216, a Director shall not be disqualified from

contracting with the Company either as vendor, purchaser or otherwise, nor shall any such contract or arrangement entered into by or on behalf of the Company with any company or partnership of or in which any Director of the Company shall be a member or otherwise interested be avoided nor shall any such Director so contracting or being such member or so interested be liable to account to the Company for any profit realized by any such contract or arrangement by reason of such Director holding that office or of the fiduciary relation thereby established.

Disclosure of interests

80) A Director who, or whose spouse or minor child, is in any way, whether directly or indirectly, concerned or interested in any contract or arrangement or proposed contract or arrangement with the Company shall disclose the nature of such concern or interest at a meeting of the Directors in accordance with Section 214.

Where Director's interest lies in appointment of Chief Executive etc

81) Where by any contract or resolution of the Directors, an appointment or a variation in the terms of an existing appointment is made (whether effective immediately or in the future) of a Chief Executive, whole time Director or Secretary of the Company, in which appointment of any Director of the Company is, or after the contract or resolution becomes, in any way, whether directly or indirectly, concerned or interested, the Company shall inform the Members of such appointment or variation in the manner required by Section 218 and shall comply with the requirements of that Section in regard to the maintaining of such contracts and resolutions open for inspection by Members at the Office, the provision of certified copies thereof and extracts there from and otherwise.

Prohibition of voting by interested Directors

82) Except as provided in Section 216, a Director shall not vote in respect of any contract or arrangement in which he is either directly or indirectly concerned or interested nor shall his presence count for the purpose of forming a quorum at the time of any such vote; and if he does so vote, his vote shall not be counted.

Register of contracts, arrangements and appointments

83) The Company shall comply with the provisions of Section 219 of the Ordinance with regard to the keeping of a register and the entry therein of the particulars of all contracts and arrangements or appointments of the kind referred to in Sections 214, 215, 216 or 218 of the Ordinance separately for each Section, and with regard to maintaining such register open for inspection by Members at the Office, the provision of certified copies thereof and extracts therefrom and otherwise.

Interested directorships

84) A Director of the Company may be or become a director of any other company promoted by the Company or in which the Company may be interested as a vendor, shareholder or otherwise and no such Director shall be accountable for any benefits received as a director or member of such other company.

Signing powers

85) All cheques, promissory notes, drafts, bills of exchange and other negotiable instruments, and all receipts for moneys paid to the Company, shall be signed, drawn, accepted, endorsed, or otherwise executed, as the case may be, in such manner as the Directors shall from time to time by resolution determine.

Minutes of meetings

86) The Directors shall cause minutes of all Board meeting, committee of Directors meeting and General Meeting of the Company to be made in books provided for the purpose and kept at the office:

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

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

(c) of all resolutions and proceedings at all meetings of the Company, and of the Directors and of committee of Directors;

and the Directors present at any meeting of Directors or committee of Directors and all Members and proxies of Members present at any General Meeting shall sign their names in books to be kept for that purpose, and such minutes of such a meeting if purporting to be signed by the chairman thereof, or by chairman of the next succeeding meeting of the same body, shall be sufficient evidence without any further proof of the facts therein stated.

Payment of pensions

87) The Directors on behalf of the Company may pay a gratuity or pension or allowance on retirement to any Director who has held any other salaried office or place of profit with the Company or to his widow or dependents and may make contributions to any fund and pay premiums for the purchase or provision of any such gratuity or pension or allowance.

DISQUALIFICATION OF DIRECTORS

Disqualification of Directors

88) A Director shall ipso facto cease to hold office if:-

(a) he becomes ineligible to be appointed as a Director on any one or more of the grounds specified in Section 187, or

(b) he absents himself from three consecutive meetings of the Directors or from all meetings of the Directors for a continuous period of three Months, whichever is the longer, without leave of absence from the Directors; or

(c) he or any firm of which he is a partner or any private company of which he is a director without the sanction of the Company in General Meeting accepts or holds any office of profit under the Company other than that of a chief executive or a legal or technical adviser or a banker; or

(d) he fails to obtain within two Months from the effective date of his appointment or at any time thereafter ceases to hold, the share qualification necessary for his appointment.

PROCEEDINGS OF DIRECTORS

Meetings of Directors

89) The Directors may meet together for the despatch of business, adjourn and otherwise regulate their meetings as they think fit. Except or otherwise provided herein questions arising at any meeting shall be decided by a majority of votes. In case of an equality of votes, the Chairman shall have a second or casting vote. A Director may, and the Secretary on the requisition of a Director shall, at any time, summon a meeting of Directors. The Board of Directors may determine to hold a meeting through audio or video conferencing or any other technology whereby all the Directors can, simultaneously, communicate to and with each other. A copy of the minutes of Directors meetings shall be furnished to each Director within fourteen days of such meeting. Notice shall be given in writing to every Director or his alternate Director for any meeting of the Directors and such notice shall be given in writing to his address in Pakistan and by facsimile or email transmission to his address outside Pakistan, if duly notified by him to the Company for this purpose.

Quorum of Directors

90) Unless otherwise determined unanimously by the Directors, the quorum necessary for the transaction of the business of the Directors shall be majority of directors holding office for the time being. An alternate Director whose appointment is effective shall be counted in a quorum.

Effect of vacancy

91) The continuing Directors may act notwithstanding any vacancy in their body so long as their number is not reduced below the number fixed by or pursuant to these Articles as the necessary quorum of Directors.

Chairman

92) The Directors may elect a Chairman of their meetings and determine the period for which he is to hold office. If no such Chairman is elected, or if at any meeting the Chairman is not present within thirty minutes after the time appointed for holding the same, the Directors present may choose one of their numbers to be the Chairman of such meeting only.

Powers of meeting

93) A meeting of the Directors at which a quorum is present shall be competent to exercise all or any of the authorities, powers and discretions by or under the Ordinance and these Articles for the time being vested in or exercisable by the Directors generally.

Power to appoint committees and to delegate

94) The Directors may delegate any of their powers to committees consisting of such member or members of their body as they think fit and may from time to time revoke such delegation. Any committee so formed shall, in the exercise of the powers so

delegated, conform to any regulations that may from time to time be imposed upon them by the Directors.

Validity of acts

95) All acts done at any meeting of the Directors, or of a committee of Directors, or by any person acting as a Director shall notwithstanding that it shall afterwards be discovered that there was some defect in the appointment or continuance in office of any such Directors or person acting as aforesaid, or that they or any of them were disqualified or had vacated office, or were not entitled to vote, be as valid as if every such person had been duly appointed or had duly continued in office and was qualified and had continued to be a Director and had been entitled to be a Director and had been entitled to vote.

Resolution in writing

96) Subject to the provisions of Article 75(b) of these Articles, a resolution in writing, signed by all the Directors (or in their absence their alternate Directors) for the time being available (not being less than the requisite quorum of Directors) or by all the members of a committee for the time being available shall be as valid and effectual as if it had been passed at a meeting of the Directors or as the case may be of such committee, duly called and constituted in accordance with the provisions of these Articles. Such resolution be contained in one document or in several documents in like form each signed by one or more of the Directors or members of the committee concerned. A facsimile or email transmission signed by a Director or a member of the committee shall be treated to be a document signed by him for the purposes of this Article.

Meeting by way of electronic communication

97) Subject to any rules framed under or any regulations or directives issued pursuant to the Ordinance, Directors or Members of a committee may take part in a meeting of the Directors or a committee by using any communication equipment which allows everybody participating in the meeting to speak to and hear each other. Taking part in this way will count as being present at the meeting. Meetings will be treated as taking place where the largest group of the participants are or, if there is no such group, where the Chairman of the meeting is present.

CHIEF EXECUTIVE

Appointment of Chief Executive

98) The Company shall have an office of Chief Executive which shall be filled from time to time by the Directors who may appoint a Director or (subject to Section 201) any other person to be the Chief Executive for a period not exceeding three years and on such terms and conditions as the Directors may think fit, and such appointment shall be made within fourteen days from the date on which the office of Chief Executive falls vacant. Upon the expiry of his term of appointment, the Chief Executive shall be eligible for re-appointment. If the Chief Executive at any time is not already a Director he shall be deemed to be a Director of the Company. The Chief Executive may be removed from office in accordance with the provisions of Section 202.

Remuneration of Chief Executive

99) The Chief Executive shall receive such remuneration as the Directors may determine and it may be made a term of his appointment that he be paid a pension and/or gratuity and/or other benefits on retirement from his office.

Powers of Chief Executive

100) The Directors may entrust to and confer upon the Chief Executive any of the powers exercisable by them as they may think fit, and may confer such powers for such time, and to be exercised for such time, and to be exercised for such objects and purposes, and upon such terms and conditions, and with such restrictions as they may think fit and may from time to time revoke, alter or vary all or any of such powers.

OTHER APPOINTMENTS

Appointment of Company Secretary

101) The Company Secretary may be appointed by the Directors from time to time for such term, at such remuneration and upon such conditions as they may think fit. The directors may from time to time remove, dismiss him from office and appoint another in his place.

THE SEAL

Common Seal

102) The Directors shall provide for the safe custody of the Seal which shall only be used by the authority of the Directors or of a committee of the Directors authorized by the Directors on that behalf, and every instrument to which the Seal shall be affixed shall either be signed by one Director and countersigned by the Secretary or by a second Director or by some other person appointed by the Directors for that purpose or be signed by the Chief Executive alone, but so that the Directors may by resolution determine either generally or in any particular case, that the signature of the Chief Executive, any Director and/or Secretary may be affixed by some mechanical means to be specified in such resolution including without limitation by printing, lithography or stamping.

DIVIDENDS AND RESERVES

Declaration of Dividend

103) The Company in General Meeting may declare Dividends, but no Dividends shall exceed the amount recommended by the Directors.

Interim Dividends

104) 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.

Dividends payable out of profits

105) No Dividends shall be paid otherwise than out of profits of the year or any other undistributed profits and in the determination of the profits available for Dividends the Directors shall give due regard to the provisions of the Ordinance, in particular Sections 83, 235 and 248.

Reserve

106) (a) The Directors may, before recommending any Dividend set aside out of the profits of the Company such sums as

they think proper as a reserve or reserves which shall, at the discretion of the Directors, be applicable for meeting contingencies, or for equalizing Dividends, or for any other purpose to which the profits of the Company may be properly applied, and pending such application, at the like discretion, either be employed in the business of the Company or be invested, subject to the provisions of the Ordinance, in such investments (other than shares of the Company) as the Directors may from time to time think fit.

(b) The Directors may also carry forward any profits which they may think prudent not to distribute, without setting them aside as a reserve.

Apportionment of Dividends

107) All Dividends shall be declared and paid according to the amounts paid on the shares. All Dividends shall be apportioned and paid proportionally to the amounts paid or credited as paid on the shares during any portion or portions of the period in respect of which the Dividend is paid. If any share is issued on terms providing that it shall rank for Dividend as from a particular date, such share shall rank for Dividend accordingly.

Effect of transfer

108) A transfer of shares shall not pass the right to any Dividend declared thereon before the registration of the transfer.

Payment by post

109) The Dividend in respect of any share shall be paid to the registered holder of such share or to his banker or to a financial institution (as defined in Section 2(1)(15A)) nominated by him for the purpose. Unless otherwise instructed in writing by the registered holder of a share, any Dividend payable in cash in respect of such share may be paid by cheque or warrant sent through the post by registered mail to the registered address of the holder or, in the case of joint holders, to the registered address of that one of the joint holders who is first named on the Register or to such banker or financial institution as may have been nominated by the registered holder. Every such cheque or warrant shall be made payable to the order of the person to whom it is sent. Anyone of two or more joint holders may give effectual receipts for any Dividends payable in respect of the shares held by them as joint holders.

Time for payment of Dividend

110) All Dividends shall be paid within the periods specified in Section 251 of the Ordinance.

Dividend not to bear interest

111) No Dividend payable in respect of a share shall bear interest against the Company.

Unclaimed Dividends

112) All Dividends unclaimed for one 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 deemed to be a trustee in respect thereof.

Payment of Dividends in specie

113) 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 issue fractional certificates and 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.

ACCOUNTS

Keeping of accounts

114) The Directors shall cause to be kept proper books of account with respect to:-

(a) all sums of money received and expended by the Company and the matters in respect of which the receipts and expenditures take place;

(b) all sales and purchases of goods by the Company;

(c) all assets of the Company;

(d) all liabilities of the Company; and

(e) where the provisions of Section 230(1)(e) of the Ordinance are applicable, such particulars relating to utilization of material or labour or to other inputs or items of cost as may be prescribed.

Location

115) The books of account shall be kept at the Office or at such other place in Pakistan as the Directors may decide and shall be open to inspection by the Directors during business hours. If the Directors decide to keep the books of account at a place other than the Office they shall comply with the directions contained in the proviso to Section 230(1).

Period

116) The Company shall preserve in good order the books of account of the Company in respect of any financial year for such period as is required by law following the close of that year.

Inspection by Members

117) The Directors shall from time to time determine whether and to what extent and at what times and places and under what conditions or regulations the accounts and books of the Company or any of them shall be open to the inspection of Members not being Directors and no Member (not being a Director) shall have any right of inspecting any account or books or papers of the Company except as conferred by the Ordinance or authorized by the Directors or by the Company in General Meeting.

Annual accounts and reports

118) (a) The Directors shall arrange to place before the Annual General Meeting of the Company at some date not later than eighteen Months after the incorporation of the Company and subsequently once in every calendar year, a duly audited balance sheet and profit and loss account, conforming to the requirements of Sections 234, 237, 238 and 240 and prepared by a date not more than four Months before the date of such meeting and having the auditor's report attached thereto, and a report of the Directors, conforming to the requirements of Section 236.

(b) As required by Section 241, the balance sheet and profit and loss account shall first be approved by the Directors and when so approved shall be signed by the Chief Executive and at least one Director, but if on account of his absence from Pakistan or other reason the signature of the Chief Executive cannot be obtained, the balance sheet and profit and loss account shall be signed by at least two Directors for the time being in Pakistan, and in every such case a statement signed by those two Directors shall be joined to the balance sheet and profit and loss account stating the reason why the signature of the Chief Executive was not obtained.

(c) The Directors may authorize the Chairman or the Chief Executive to sign the report of the Directors which may then be signed accordingly, but in the absence of any such authority the report of the Directors shall be signed as required by Section 236(3) in the same manner as the balance sheet and profit and loss account.

Copies of annual accounts and reports

119) (a) A copy of the balance sheet, profit and loss account and the reports of the Directors and auditors shall be sent not less than twenty one days before the date of the Annual General Meeting to the Members and other persons entitled to receive notices of General Meetings in the manner in which notices are to be given hereunder and a copy thereof shall be kept for a period of at least twenty-one days before the meeting at the Office for inspection by the Members.

(b) After the balance sheet, profit and loss account and the reports of the Directors and auditors have been laid before the Annual General Meeting of the Company, such number of copies thereof along with prescribed documents, signed by the signatories thereto shall be filed with the Registrar of Companies within thirty days from the date of the meeting and the Company shall also comply with the provisions of Section 242(2) where applicable.

Compliance with the Ordinance

120) The Directors shall in all respects comply with the provisions of Sections 230 to 247 of the Ordinance, or any statutory modification thereof for the time being in force.

CAPITALIZATION OF PROFITS

Power to capitalize

121) The Company in 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 accounts 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 amongst the Members who would be entitled thereto if distributed by way of Dividend and in the same proportions on condition that the same be not paid in cash but be applied either in or towards paying up any amounts for the time being unpaid on any shares held by such Members respectively or paying up in full unissued shares or debentures of the Company to be allotted and distributed as fully paid up to and amongst such Members in the proportion aforesaid, or partly in the one way and partly in the other, and the Directors shall give effect to such resolution.

Effect of resolution to capitalize

122) Whenever such a resolution as, aforesaid shall have been passed the Directors shall make all appropriations and applications of the undivided profits resolved to be capitalized thereby, and all allotments and issues of fully paid shares or debentures, if any, and generally shall do all acts and things required to give effect thereto, with full power to the Directors to make such provision by the issue of fractional certificates or by payment in cash or otherwise as they think fit for the case of shares or debentures becoming distributable in fractions and also to authorize any person to enter on behalf of all the Members entitled thereto into an agreement with the Company providing for the allotment to them respectively, credited as fully paid up, of any further shares or debentures to which they may be entitled upon such capitalization, or (as the case may require) for the paying up by the Company on their behalf, by the application thereto of their respective proportions of the profits resolved to be capitalized, of the amounts or any part of the amounts remaining unpaid on their existing shares, and any agreement made under such authority shall be effective and binding on all such Members.

AUDIT

Auditors

123) Auditors shall be appointed and their duties regulated in accordance with Sections 252 to 255 of the Ordinance, or any statutory modifications thereof for the time being in force.

NOTICES

Notice to Member

124) (a) A notice may be given by the Company to any Member either personally or by sending it by post to him to his registered address or by courier or (if he has no registered address in Pakistan) to the address, if any, within Pakistan supplied by him to the Company for the giving of notices to them.

3(4)(d)(vi) Detailed Profile of the Applicant and The Applicant's Senior Management, Technical and Professional Staff;

1. Profile of Applicant:

Atlas Energy Limited

1. Introduction

1. Atlas Energy Limited was incorporated as an unquoted - public limited company in Pakistan on 18 May 2016, under the Companies Ordinance, 1984.

2. The registered office of the Company is situated at 64/XX, Khayaban-e-Iqbal, Phase-III, DHA, Lahore.

3. The Company was incorporated to provide cost effective tailored solar solutions for industrial and commercial consumer through sale of power, Engineering, Procurement and construction (EPC), operation and Maintenance and giving attractive return to investors.

4. The Applicant Company has financial strength to meet with the requirements of the Projects through its parent Company Shirazi Investments Private Limited - parent company held 100% ordinary shares of the Company.

5. The Applicant Company has three Directors, besides the Auditor and Legal Advisor named below:

1. **Directors:**

Mr. Frahim Ali Khan

Mr. Saquib H. Shirazi

Mr. Maqsood Ahmad

1. Auditors:

1. ***EY Ford Rhodes***

Charter Accountants

96 B-1, 4thFloor, Pace Mall Building,

M.M. Alam Road Gulberg-II,

Lahore, Pakistan

1. Legal Advisors:

1. Cornelius, Lane & Mufti (CLM)

Nawa-e-Waqt House,

Shahrah-e-Fatima Jinnah, Lahore — 54000, Punjab, Pakistan

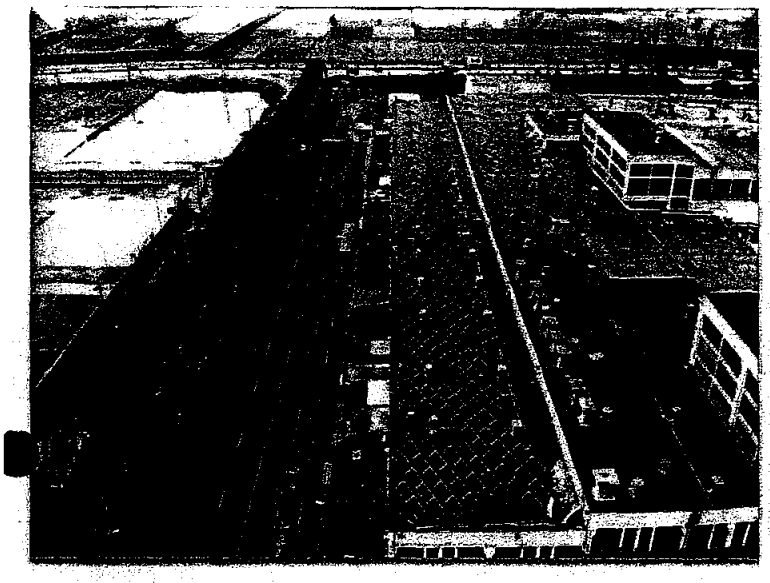
1. Membership of Industry & Associations:

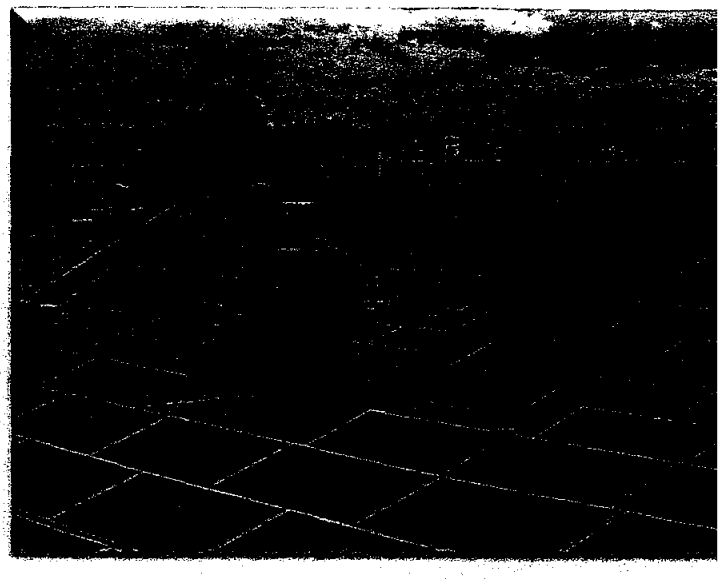
1. Lahore Chamber of Commerce & Industry (LCCI)
2. Pakistan China Joint Chamber of Commerce & Industry (PCJCCI)
3. Pakistan Engineering Council (PEC)
4. Alternative Energy Development Board (AEDB)

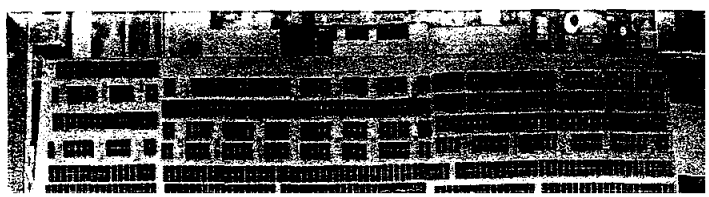
1. List of Projects Completed:

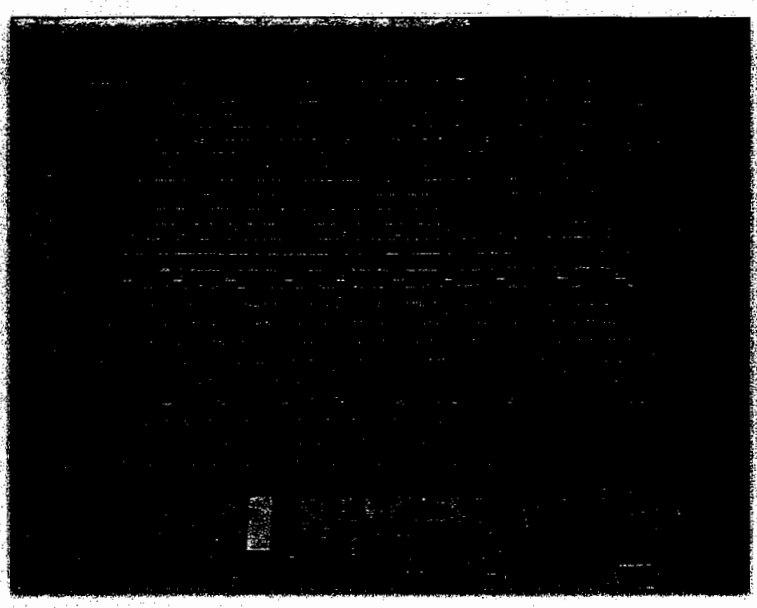
Sr. No.	Category	Project Name/ Location	Nature of Work	Size of Installation (kWp)
1.	Industrial	Honda Atlas Cars Pak Ltd. (43 km Multan Rd, Manga, Lahore)	EPC	497.70

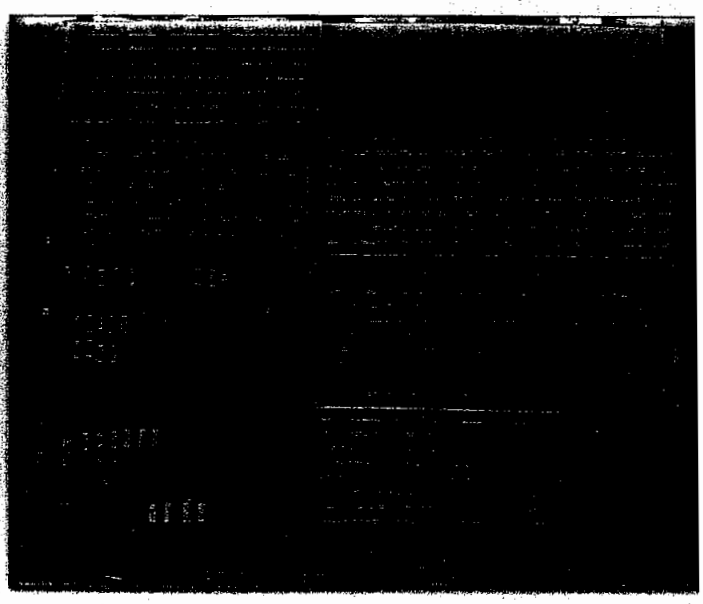
2.	Domestic	DHA Phase-V, Karachi	EPC	6.00
3.	Domestic	DHA Phase-V, Karachi	EPC	6.00
4.	Industrial	Engine Plant (Atlas Honda Ltd. 26/27 Km Lahore-Skp. Road, Skp)	EPA	589.05
5.	Industrial	Pakistan Cables (Noorabad, Sindh)	EPA	7.20
6.	Industrial	Parking Sheds (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	405.79
7.	Domestic	Zaman Park Lahore	EPA	12.00
8.	Industrial	Subassembly/ Frame Line (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	769.08
9.	Industrial	Component Parts (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	663.15
10.	Industrial	DCC-2 (Atlas Honda Ltd. 26/27 Km Lahore-Skp Road, Skp)	EPA	752.40
11.	Industrial	Atlas Industrial Park Karachi Plot No. 347A, Shed No 2, 15th Miles, National Highway, Landhi, Karachi	EPC	864.56
12.	Industrial	Atlas Honda Limited Karachi F-36 Estate Avenue, S.I.T.E. Area Karachi.	EPC	96.3
13.	Industrial	Atlas Battery Limited Karachi D-138 Central Avenue, S.I.T.E Area Karachi	EPC	301.74
14.	Commercial	Atlas Vocational Training Institute Sheikhupura	EPC	72.76

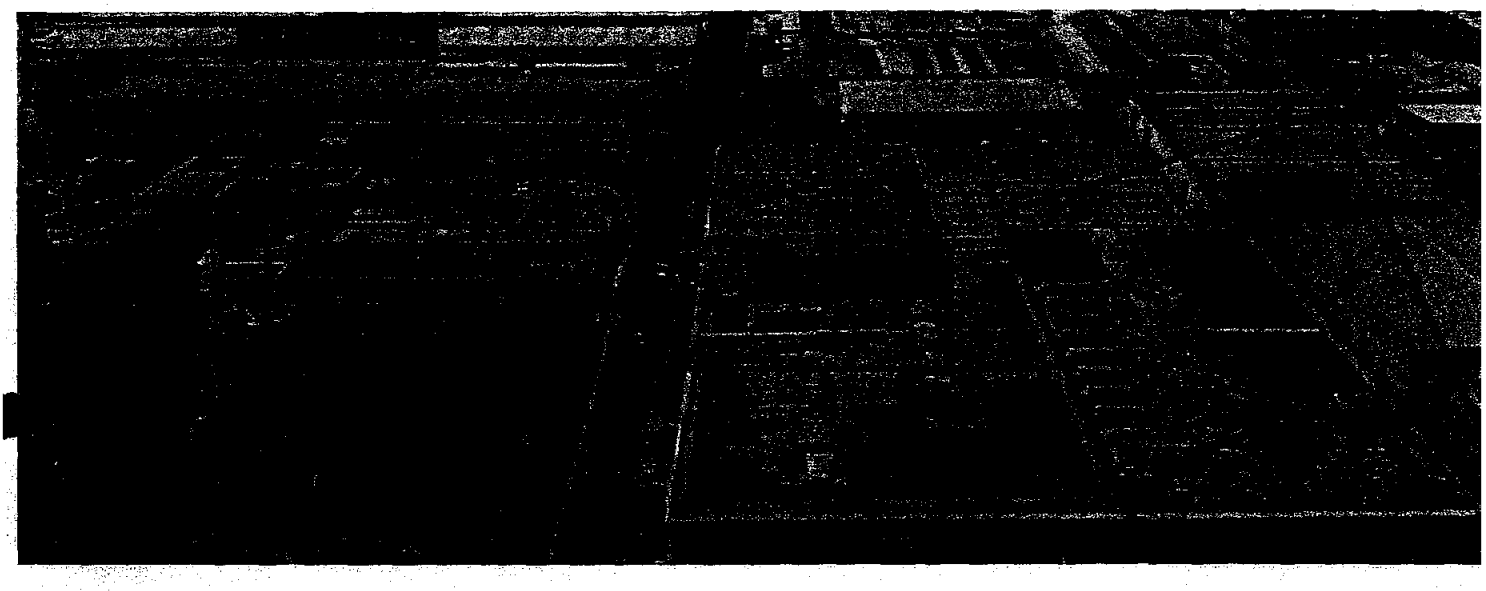












1. Atlas Power Limited

Introduction

Atlas Power was established as a public (unlisted) company in 2007 as a power generation plant / project having gross capacity of 225MW under a 25-year agreement with National Transmission & Dispatch Company Limited ("NTDCL"). The project has been commissioned under 2002 Power Policy of GOP and has been granted a generation license by the National Electric Power Regulatory Authority ("NEPRA") in May 2007. The company started its commercial operations on 18 December 2009.

Status of the Company:

1. Public (Unlisted) Company

Auditors of the company:

1. EY Ford Rhodes
2. Chartered Accountants - Lahore

Legal Advisor of the Company:

1. Mohsin Tayebaly & Co.

Membership of Industry & Associations:

2. Overseas Investors Chamber of Commerce & Industry
3. Pakistan German Business Forum
4. Lahore Chamber of Commerce & Industry
5. Independent Power Producers Advisory Council

Credit Rating by PACRA (Sept-2020)

1. Long Term AA-
2. Short Term A1+

1. Profile of Management

2.1. Mr. Frahim Ali Khan

Director

Mr. Frahim Ali Khan is a Law graduate from Karachi University. He has also attended Senior Managers' Program at Harvard University, USA, Financial Management Program at Stanford University, USA and Board of Director's Program at Insead University, France.

He has over 50 years of experience in General Management, Finance, Investment and Taxation. He joined the Atlas Group in 1967 and has served in different positions. Currently his other directorships include Atlas Battery Limited, Atlas Asset Management Limited, Atlas Engineering (Private) Limited, Atlas Power Limited, Shirazi Investments (Private) Limited, Shirazi Investments (Private) Limited, Shirazi Trading Company (Private) Limited, Atlas Energy (Private) Limited, Atlas Autos (Private) Limited, Atlas Metal (Private) Limited and the Atlas Foundation. Earlier, he has also served on the boards of Atlas Honda Limited and former Atlas Bank Limited and has been CEO of Shirazi Investments (Private) Limited, Shirazi Trading Company (Private) Limited, Atlas Asset Management Limited and former Atlas Investment Bank Limited.

2.2. Mr. Saquib H. Shirazi

Director

Saquib Shirazi is the Chief Executive Officer of Atlas Honda Limited. He is a graduate of the Wharton School of Finance and did his MBA from the Harvard Business School.

In addition to being a member of the Atlas Group, he is currently the Chairman of Pakistan Business Council. In the past, he has served on the Boards of Pakistan Petroleum Limited, National Refinery Limited, Sui Southern Gas Company Limited, Cherat Cement Limited, Cherat Paper Limited, Privatization Commission of Pakistan and as Chairman PAMA. He is at present a member of Prime Minister's Business Council, Engineering Development Board and Pakistan Cables' Board.

He was Harvard Business School's Global Alumni Board President for the years 2006-2008. At present, he is on the Advisory Boards of Harvard Business School, Veon Jazz and CDC Pakistan.

2.3. Mr. Maqsood Ahmad

Director & CEO

Mr. Maqsood A. Basraa has been the Chief Executive Officer of Atlas Energy Limited and Zhenfa Pakistan New Energy Company (Pvt.) Limited since 2019 and Group Director Business Development (GDBD) & Member Group Executive Committee (GEC) since April 2017. He is with the Atlas Group since 1989. He has vast general management experience of working with different Companies of Atlas Group. Prior to this, he served State Bank of Pakistan for ten years. He has been leading the Accounts, Finance, Management Audit, Logistics, Commercial, Human Resource, Administration, Strategy and Government Business Relationship for business development for the Group as Group Director before the appointment at present position.

He is the Fellow Member of Institute of Cost & Management Accountants of Pakistan. He also did his Masters in Islamic Studies from Punjab University, Lahore and Banking Diplomas from Institute of Bankers in Pakistan. He attended Advanced Management Program from INSEAD-France. Before that he attended various advanced courses from LUMS, MAP, Administrative Staff College and British Council etc. on general management and leadership.

1. CVs of applicant's Senior Management and Technical professionals:

1.1. The list of the directors, senior management, of the Applicant Company is as under:

Name	Designation
Mr. Frahim Ali Khan	Director
Mr. Saquib H. Shirazi	Director
Mr. Maqsood Ahmad	Director & CEO

CVs of the above named personal is as follows:

1.1.1. Mr. Frahim Ali Khan
Director

Mr. Frahim Ali Khan is a Law graduate from Karachi University. He has also attended Senior Managers' Program at Harvard University, USA, Financial Management Program at Stanford University, USA and Board of Director's Program at Insead University, France.

He has over 50 years of experience in General Management, Finance, Investment and Taxation. He joined the Atlas Group in 1967 and has served in different positions. Currently his other directorships include Atlas Battery Limited, Atlas Asset Management Limited, Atlas Engineering (Private) Limited, Atlas Power Limited, Shirazi Investments (Private) Limited, Shirazi Investments (Private) Limited, Shirazi Trading Company (Private) Limited, Atlas Energy (Private) Limited, Atlas Autos (Private) Limited, Atlas Metal (Private) Limited and the Atlas Foundation. Earlier, he has also served on the boards of Atlas Honda Limited and former Atlas Bank Limited and has been CEO of Shirazi Investments (Private) Limited, Shirazi Trading Company (Private) Limited, Atlas Asset Management Limited and former Atlas Investment Bank Limited.

1.1.2. Mr. Saquib H. Shirazi
Director

Saquib Shirazi is the Chief Executive Officer of Atlas Honda Limited. He is a graduate of the Wharton School of Finance and did his MBA from the Harvard Business School.

In addition to being a member of the Atlas Group, he is currently the Chairman of Pakistan Business Council. In the past, he has served on the Boards of Pakistan Petroleum Limited, National Refinery Limited, Sui Southern Gas Company Limited, Cherat Cement Limited,

Cherat Paper Limited, Privatization Commission of Pakistan and as Chairman PAMA. He is at present a member of Prime Minister's Business Council, Engineering Development Board and Pakistan Cables' Board.

He was Harvard Business School's Global Alumni Board President for the years 2006-2008. At present, he is on the Advisory Boards of Harvard Business School, Veon Jazz and CDC Pakistan.

1.1.3. Mr. Maqsood A.Basraa
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Mr. Maqsood A. Basraa has been the Chief Executive Officer of Atlas Energy Limited and Zhenfa Pakistan New Energy Company (Pvt.) Limited since 2019 and Group Director Business Development (GDBD) & Member Group Executive Committee (GEC) since April 2017. He is with the Atlas Group since 1989. He has vast general management experience of working with different Companies of Atlas Group. Prior to this, he served State Bank of Pakistan for ten years. He has been leading the Accounts, Finance, Management Audit, Logistics, Commercial, Human Resource, Administration, Strategy and Government Business Relationship for business development for the Group as Group Director before the appointment at present position.

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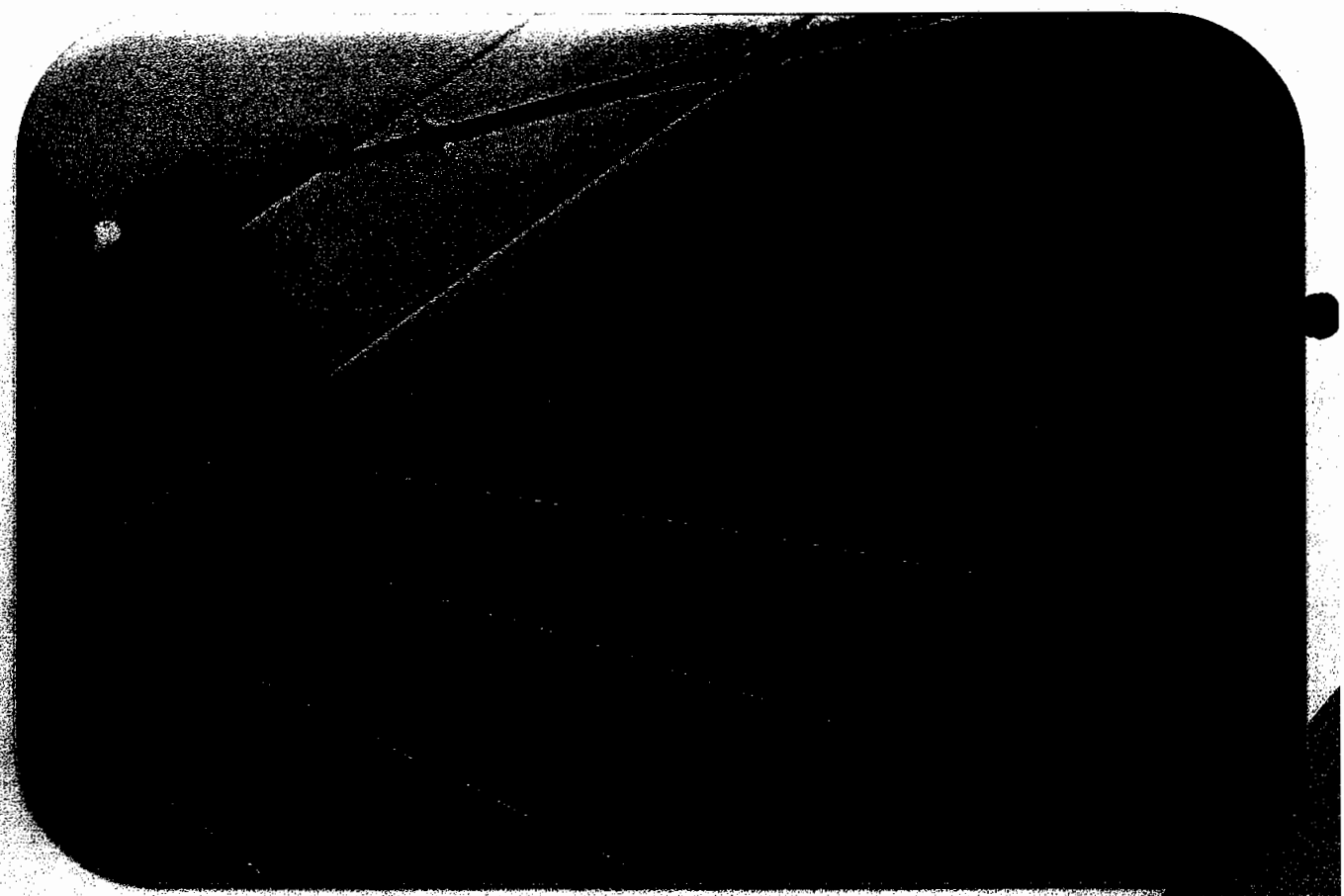
Atlas Energy



Technical & Financial Proposal

Atlas Energy

The project is on Energy Sale mode and Atlas Energy will be responsible for operations and maintenance of Solar PV Plant.

1. Technical Proposal

1.1 Project Description

The proposed PV system will be mounted on four different locations at Atlas Honda Limited Sheikhupra. Anodized Aluminium C-Channel customized structure will be used for mounting solar panels. The Plant would have the PV panels installed with the tilt angle of 15 degree for ground mount system and 5 degree for roof top system. Provision of walkways for performing cleaning and maintenance activities is proposed in PV Layout.

Inverters and Transformer will be installed in a separate room for which space will be required inside the building, somewhere in the middle of installed PV System. Step up transformer will be used to inject solar energy to main powerhouse.

The system could be remotely monitored by using smart data logger.

The main parameters of the designed system are summarized as follows,

- The Proposed system size is 4,927.89 KWp.
- A total of 9,042 solar panels of JA Solar Mono Perc Half Cut Cell 545 Watt each.
- Tilt angle is 15 degree for ground mounted and 5 degree for roof top.
- 9 inverters of HUAWEI 185 KTL.
- Step up transformer of 2.2 MVA will be used to step up solar power from 0.8kV to 11kV.
- Expected Annual Energy Generation is 6,759 MWh / Yearr.
- Capacity Utilization Factor of designed system is 15.7 %.

AtlasEnergy

Brief details of the project are given below,

Project Profile		
Project Size	Location -1:	2,465.580 kWp
	Location -2:	209.280 kWp
	Location -3:	1,091.090 kWp
	Location -4:	1,161.940 kWp
	Total	4,927.89 kWp
Location (s)	**Atlas Honda Limited,** 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.	
Type of Project	Location -1: Ground Mounted Location -2, 3 & 4: Roof Mounted	
Construction Period	5 - 6 Months	

PV Modules		
Type of Module	JAM72S30-545/MR	
No. of Modules	Location-1	4,524 (4524 * 545 = 2,465.58 kWp)
	Location-2	384 (384 * 545 = 209.280 kWp)
	Location-3	2,002 (2,002 * 545 = 1091.09 kWp)
	Location-4	2,132 (2,132 * 545 = 1161.94 kWp)
	Total	9,042 (9,042 * 545 = 4924.89 kWp)
Type of Cell	Mono PERC Half-Cell	
Dimension of each Module	2279 x 1135 x 35mm (89.72 x 44.68 x 1.38 inch)	
Total Module Area	2.586 m2	
Frame of Panel	Anodized aluminium alloy	

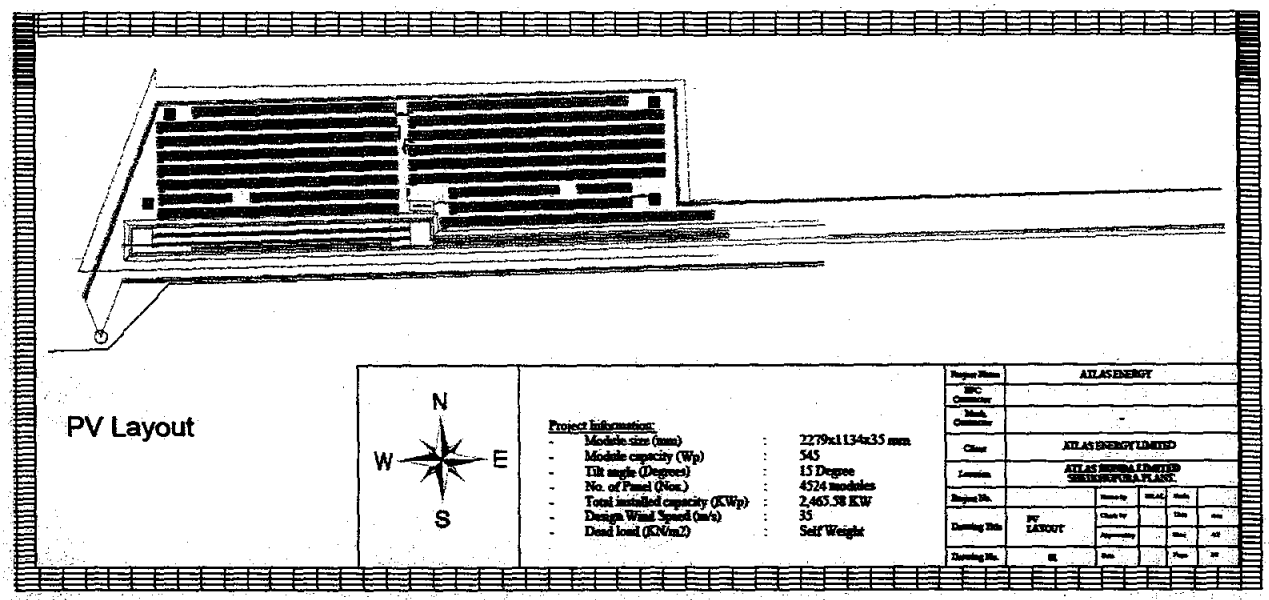
AtlasEnergy

Weight of one Module	28.6 kg
No of Solar Cells in each module	144 (6×24)
Efficiency of module	21.1 %
Maximum Power (P_{max})	545 W_p
Voltage @ P_{max}	41.8 V
Current @ P_{max}	13.04 A
Open circuit voltage (V_{oc})	49.75V
Short circuit current (I_{sc})	13.93 A
Maximum system open Circuit Voltage	1000VDC (IEC)

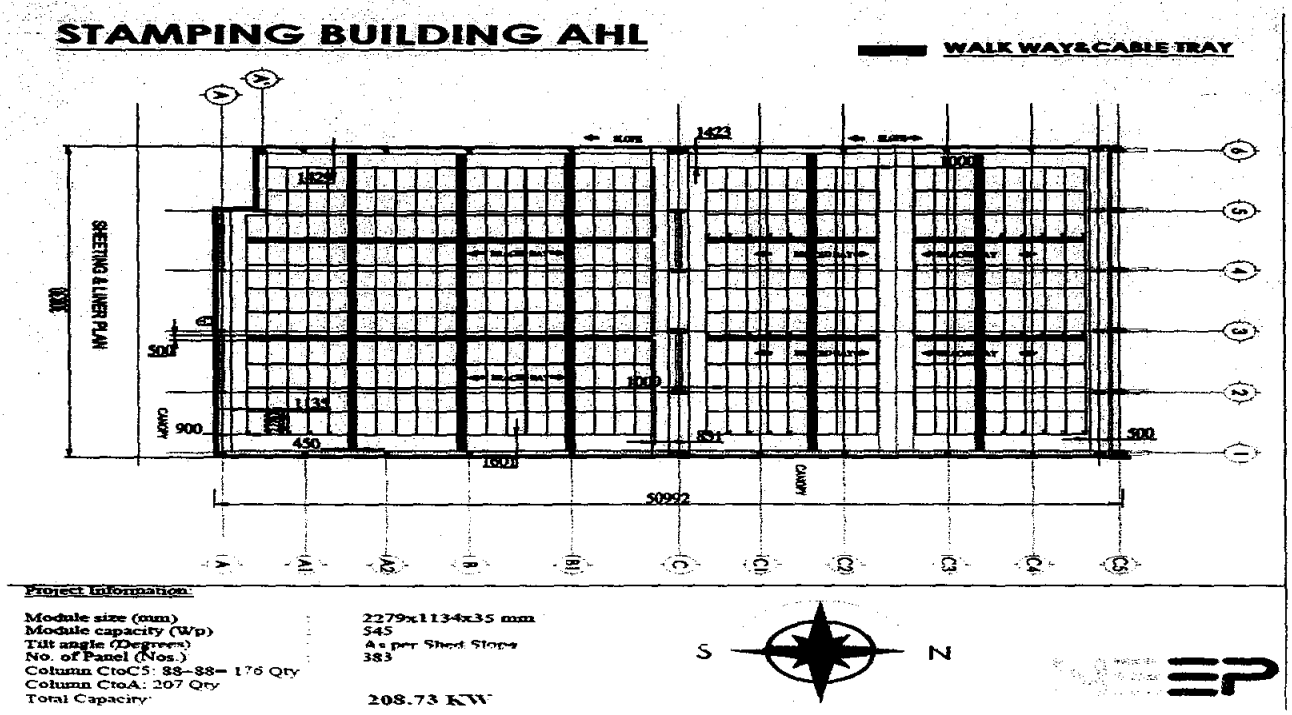
Inverters		
Description	Technical Specification	
Size & Model	200 KW SUN2000-200KTL-H2	60 KW SUN2000-60K-TL-240
No of Inverters	19	3
Input Operating Voltage Range	500 V to 1500 V	200 V to 1000 V
Efficiency of inverter	99.0 %	98.7 %
Max. Allowable Input voltage	1500V	1100V
Max. Current	30 A	22 A
Max. Power Point Tracking Range	500 V to 1500 V	200 V to 1000 V
Output electrical system	3 Phase AC	3 Phase AC
Rated Output Voltage	800 V, 3W + PE	230 V / 400 V, 3W + N + PE
Power Factor (adjustable)	0.8 LG...0.8 LD	0.8 LG...0.8 LD
Power control	MPP Tracker	MPP Tracker
Rated Frequency	50 Hz	50 Hz

AtlasEnergy

1.2 Project PV Layout.



Location 1: Test Track Area



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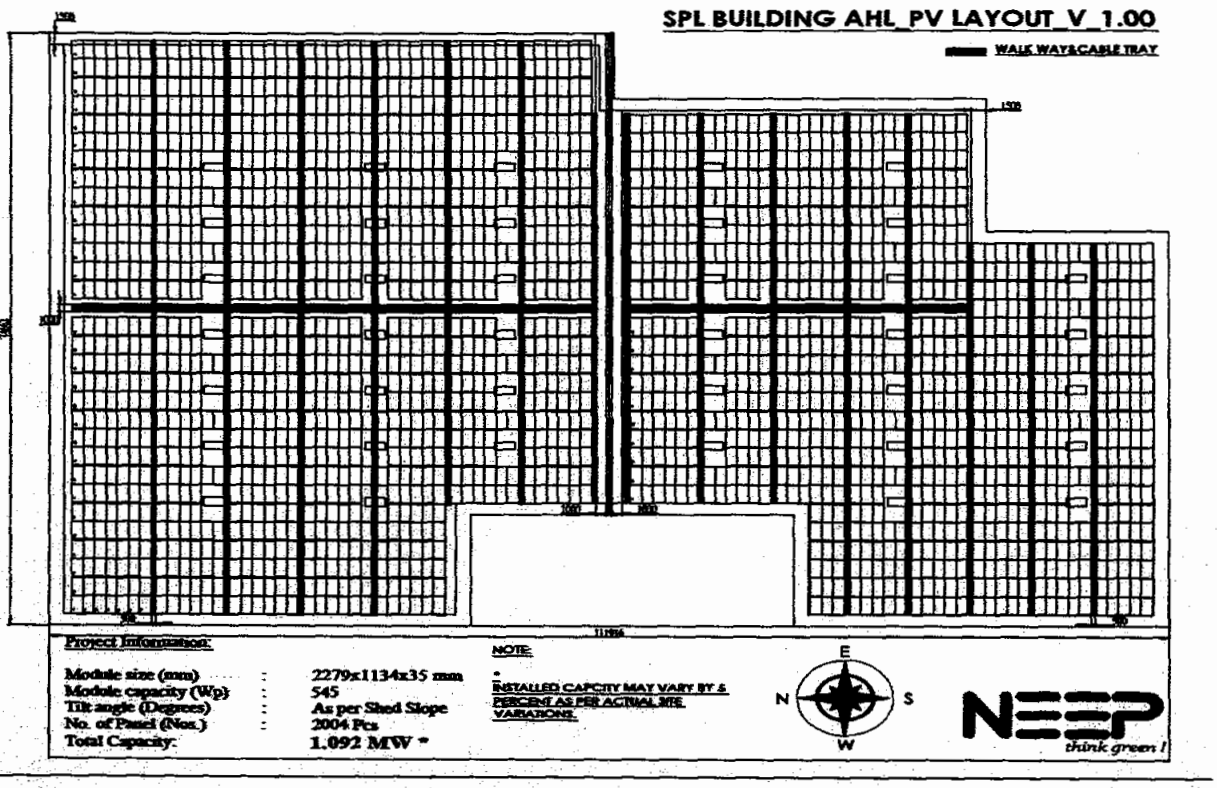
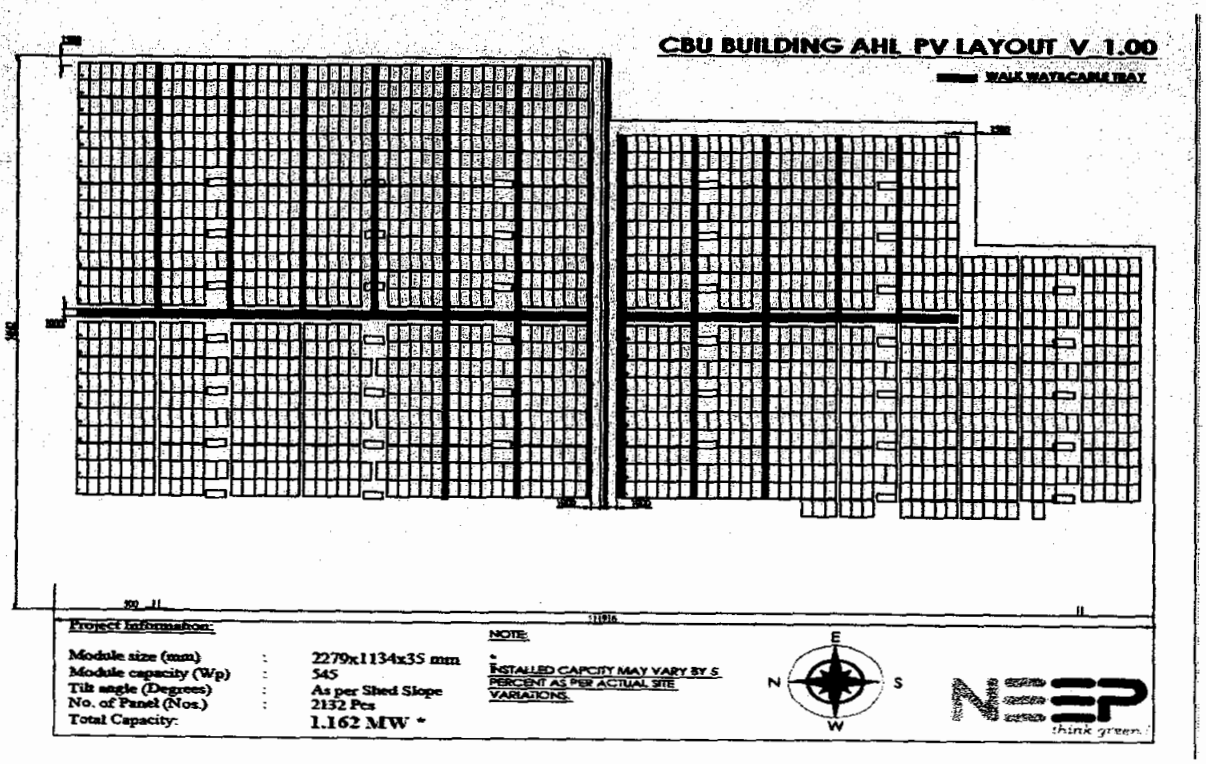
Location 2: Stamping Building

AtlasEnergy



Location 3: SPL Building



Location 4: CBU Building

AtlasEnergy

Project: SPL1.091MWp Solar System PVSyst

Variant: New simulation variant

PVsyst V7.2.8

Atlas Energy Limited (Pakistan)

Main results

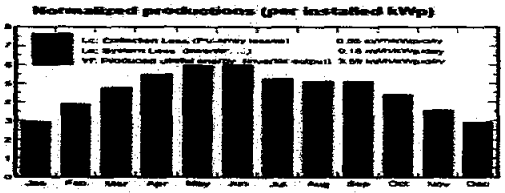
System Production

Produced Energy 1428 MWh/year

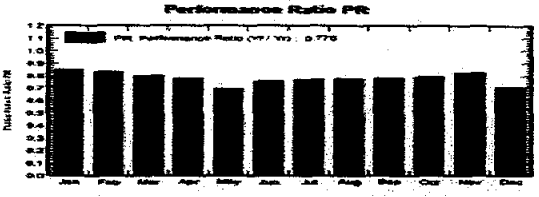
Specific production 1309 kWh/kWp/year

Performance Ratio PR 77.57 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR ratio
January	83.9	39.6	12.09	91.1	87.7	87.1	84.4	0.850
February	102.3	49.7	15.16	106.6	104.6	101.5	98.4	0.830
March	142.6	72.5	22.16	146.1	142.6	133.3	129.3	0.800
April	161.5	83.9	27.05	164.6	158.4	144.1	139.8	0.779
May	184.4	100.1	32.96	185.5	178.7	157.9	148.8	0.696
June	179.8	106.0	32.84	176.9	173.2	153.4	144.7	0.757
July	162.9	101.6	31.57	163.2	157.1	141.8	137.2	0.771
August	156.7	96.9	30.83	158.6	152.6	138.4	134.2	0.775
September	149.9	76.1	29.16	153.7	147.9	134.6	130.9	0.780
October	129.2	68.2	26.01	135.9	130.9	121.8	117.8	0.784
November	99.2	49.4	19.20	107.0	103.0	99.2	96.3	0.823
December	83.3	42.9	14.12	90.8	87.3	85.4	78.2	0.798
Year	1634.9	885.7	24.55	1667.0	1623.9	1499.1	1422.8	0.776

Legends

GlobHor Global horizontal irradiation

DiffHor Horizontal diffuse irradiation

T_Amb Ambient Temperature

GlobInc Global incident in coll. plane

GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array

E_Grid Energy injected into grid

PR Performance Ratio

Location 3: SPL Building

Project: AHL Stamping Building Solar System

Variant: New simulation variant

Atlas Energy Limited (Pakistan)

Main results

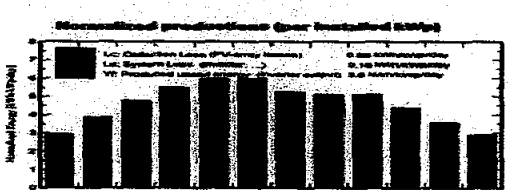
System Production

Produced Energy 274.7 MWh/year

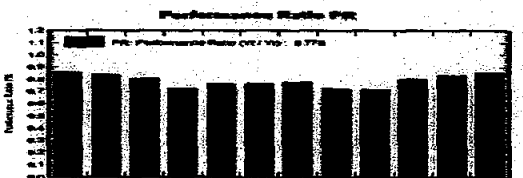
Specific production 1312 kWh/kWp/year

Performance Ratio PR 77.77 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR ratio
January	83.9	39.6	12.09	91.1	87.7	16.63	16.26	0.868
February	102.3	49.7	15.16	106.6	104.7	19.37	19.05	0.837
March	142.6	72.5	22.16	146.1	142.6	25.41	24.87	0.806
April	161.5	83.9	27.05	164.6	158.4	27.47	26.91	0.775
May	184.4	100.1	32.96	185.5	178.7	30.09	29.55	0.709
June	179.8	106.0	32.84	180.0	173.3	29.22	28.66	0.761
July	162.9	101.6	31.57	163.2	157.1	26.97	26.47	0.775
August	156.7	96.9	30.83	158.6	152.7	26.37	24.02	0.734
September	149.9	76.1	29.16	153.7	147.9	25.78	25.05	0.717
October	129.2	68.2	26.01	135.0	131.0	23.17	22.77	0.800
November	99.2	49.4	19.20	107.1	103.0	18.94	18.64	0.832
December	83.3	42.9	14.12	90.9	87.4	16.80	16.24	0.864
Year	1634.9	885.7	24.55	1667.5	1634.4	286.83	274.65	0.778

Legends

GlobHor Global horizontal irradiation

DiffHor Horizontal diffuse irradiation

T_Amb Ambient Temperature

GlobInc Global incident in coll. plane

GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array

E_Grid Energy injected into grid

PR Performance Ratio

Location 4: CBU Building

Atlas Energy

2. Financial Proposal

Total project price for the solar system supply, installation, testing and commissioning of 4927.89 KWp on-Grid Solar PV plant at Atlas Honda Limited is **PKR. 532,212,120/-** only.

Sr. #	Location	System Size (kWp)	Total Project Cost (PKR)	TPC/Wp	Debt 80%	Equity 20%
1	Atlas Honda Limited Sheikhupura	4927.89	532,212,120	108.0	425,769,696	106,442,424

3. Product & Workmanship

Product	Warranty
Complete System Warranty	**01 Year**
Solar Panel	**12 Years Product Warranty (as per Manufacturer warranty conditions)**
Solar Inverter	**05 Years (as per Manufacturer warranty conditions)**

AtlasEnergy

4. Operations and Maintenance of Solar PV Plant

Operations and maintenance of Solar PV Plant will be carried out as per standard O&M practises

PV Operations includes the following five areas:

1. **Administration of Operations**:

   Ensures effective implementation and control of O&M services including curation of as-built drawings, equipment inventories, owners and operating manuals, and warranties. Administration includes keeping records of performance and O&M measures, preparing scopes of work and selection criteria for service providers, contracting with suppliers and service providers, paying invoices, preparing budget, and securing funding and contingency plans for O&M services. Administration includes compliance with regulations by the government or authorities having jurisdiction, as well as mandatory guidelines issued by utilities.

2. **Conducting Operations**:

   Ensures efficient, safe, and reliable process operations including making decisions about maintenance actions based on cost/benefit analysis. This includes serving as a point of contact for personnel regarding operation of the PV system; coordinating with others regarding system operation; power and energy forecasts; scheduling maintenance operations; spare parts inventory (either in-stock on-site or in suppliers' consignment stock); and inspecting work and approving invoices. Meanwhile, operations include any day-to-day operation of the system to maximize power delivery; performance assessment and trends; operation of grid interface; manage curtailments; or adjust settings such as power factor or other ancillary services.

3. **Directions for the Performance of Work**:

   Specifies the rules and provisions to ensure that maintenance is performed safely and efficiently, including the formalization and enforcement of: safety policy (including training for DC and AC safety, rooftop safety, minimum staffing requirements, arc flash, and lock-out tag-out); work hours; site access, laydown areas, and parking; and any other stipulations under which work is performed. This includes confirming and enforcing qualifications of service providers, as well as compliance with any environmental or facility-level policies regarding the handling of controlled materials (e.g., solvents, weed killer, insecticide).

4. **Monitoring:**

   Maintains monitoring system and analysis of resulting data to remain informed on system status; metering for revenue; alarms; diagnostics; and security monitoring. Includes comparing results of system monitoring to benchmark expectation and providing reports

to facility stakeholders. This includes periodically preparing reports as required by O&M contract or as required by the system owner including reports of plant performance; key performance indicators; problems and alarms, and maintenance services performed. Site security is performed both locally and with remote monitoring (cameras, intruder alarms) to protect against theft and vandalism.

5. **Operator Knowledge, Protocols, Documentation**:

Ensures that operator knowledge, training, and performance will support safe and reliable plant operation. Information such as electrical drawings, part specifications, manuals, performance information, and records must be deliberately maintained and properly filed/catalogued.

PV Maintenance includes the following four types of maintenance procedures:

1. **Administration of Maintenance**:

This overlaps with "Administration of Operations" and ensures effective implementation, control, and documentation of maintenance services and results. Administration includes: establishing budgets and securing funds for preventive maintenance; establishing reserves or lines of credit for corrective maintenance: planning services to avoid conflict with system operation or operations at the customer site; correspondence with customers, selection and contracting with service suppliers and equipment manufacturers; record keeping, enforcement of warranties; providing feedback to designers of new systems; and reporting on system performance and the efficacy of the O&M program.

2. **Preventive Maintenance**:

Scheduling and frequency of preventive maintenance is set by the operations function and is influenced by a number of factors, such as equipment type, environmental conditions at the site (e.g., marine, snow, pollen, humidity, dust, wildlife), and warranty terms. Scheduled maintenance is often carried out at intervals to conform to the manufacturer's' recommendations as required by the equipment warranties.

3. **Corrective Maintenance**:

Required to repair damage or replace failed components. It is possible to perform some corrective maintenance such as inverter resets or communications resets remotely. Also, less urgent corrective maintenance tasks can be combined with scheduled, preventive maintenance tasks.

4. **Condition-Based Maintenance**:

Condition-based maintenance is the practice of using real-time information from data loggers to schedule preventive measures such as cleaning, or to head off corrective maintenance problems by anticipating failures or catching them early. Because the measures triggered by condition are the same as preventive and corrective measures, they are not listed separately. Rather, condition-based maintenance affects when these measures occur, with the promise of lowering the frequency of preventive measures and reducing the impacts and costs of corrective measures.

3(f) * Feasibility Study

Introduction

Global warming and climate shift has become a major concern now-a-days. Because of this most of the countries have begun to turn their attention towards the clean green renewable energy sources. This is currently widely used which poses a bright future for the world's raising energy needs. Many researchers have started to focus on this area as these are the sustainable and convenient alternative. With the advancement in technology and innovations we are able to solve energy crises and the best answer is te use of renewable energy sources. The two main reasons for adopting solar photovoltaic technology is that PV arrays are durable, produce no emission and demand minimal maintenance to operate and second one is the diminishing fossil fuels and increasing demand of energy. But the main problem with this alternative is that it is time dependent. Solar energy is not available during night time and cloudy days which are unpredictable. Numbers of efforts are being undertaken by Indian government towards the usage of solar energy for the generation of electricity. Solar Photovoltaic technology is one of the biggest renewable energy sources to generate electrical power and the fastest growing power generation in the world.

1. Executive Summary

The feasibility study examines the costs, practicality, and likely outcome of a solar photovoltaic (PV) installation on the rooftop of below sites:

Location
1. Atlas Honda Limited, 26/27 Km Lahore-Sheikhupura Road, Sheikhupura

2. Project Brief

Atlas Energy intends to install **4,927.89 kWp** Solar Power Plants in owner premises to provide electricity under PEPA mode. The installed capacity of plants is proposed by critically analyzing the current load and future load projections of site.

The main outcomes of the feasibility report are given below:

- **Technical Site Analysis**
- **Financial Analysis**

2.1. Technical Site Analysis: The project site is suitable for a solar PV energy system. For the purpose of estimation of power generation potential, solar insolation is assumed to be "good". Panel azimuth 0°, panel tilt is 15° for ground mounted location and 5° for rooftop, and satisfactory roof condition

and structure are also assumed. Anticipated System Information: The projects in will accommodate **4,927.89 kWp** solar PV system with a projected annual production of **6,759,292 kWh/ year** with use of a JAM72S30-545/MR (545 Wp) PV panel.

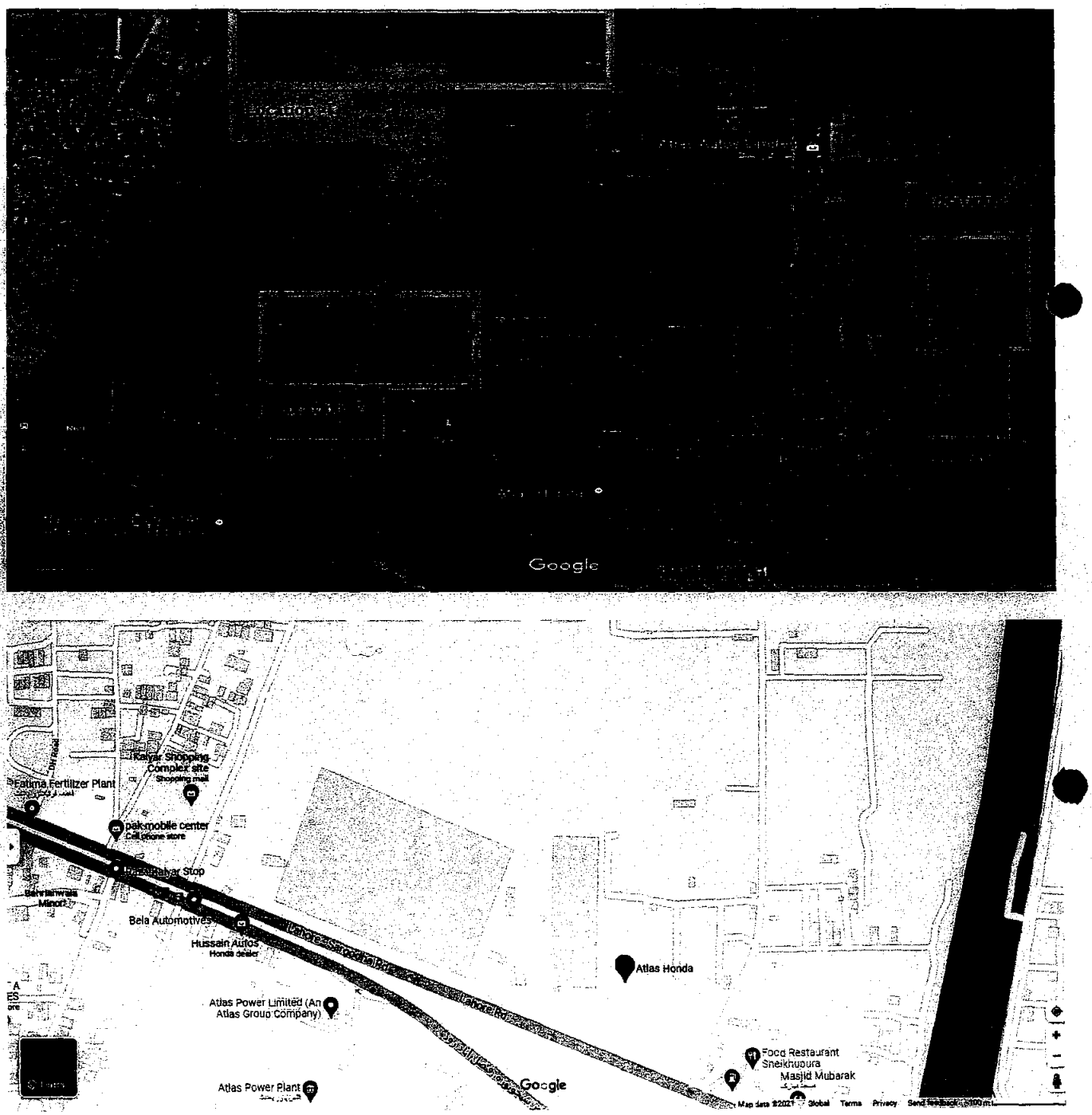
2.1.1. Site Coordinates & Location:

The project site is the rooftop and exact coordinates of the project site are as below:

Location	Area/ Roof Name	Area/ Roof No.	Site Coordinates
Atlas Honda Limited, 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.			
1	Test Track Area	1	Latitude: 31° 41' 08.9" N Longitude: 74° 05' 13.2" E Field Type Fixed tilt plane Field Parameters: Tilt 20° & Azimuth 4°
2	**Stamping Building**	2	Latitude: 31° 40' 55.2" N Longitude: 74° 05' 13.9" E Field Type Fixed tilt plane Field Parameters: Tilt 5° & Azimuth 0°
3	Spare Parts Logistics (SPL)	3	Latitude: 31° 40' 52.7" N Longitude: 74° 05' 37.3" E Field Type Fixed tilt plane Field Parameters: Tilt 5° & Azimuth 0°
4	**Complete Built Unit (CBU)**	4	Latitude: 31° 40' 57.6" N Longitude: 74° 05' 37.5" E Field Type Fixed tilt plane Field Parameters: Tilt 5° & Azimuth 0°

2.1.2. Location Map:

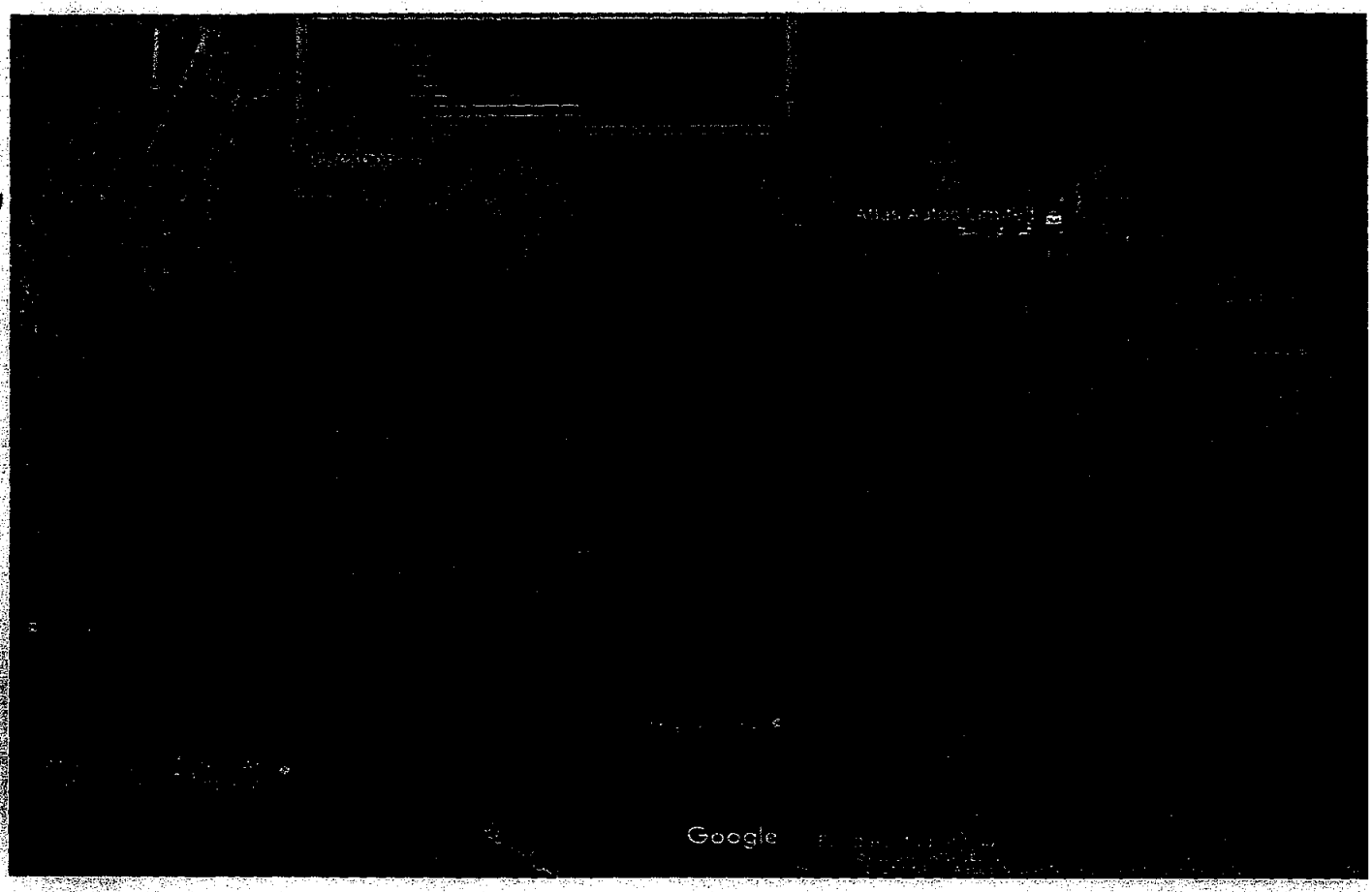
A bird's eye view of the project site is given in the figure below:



Location: Atlas Honda Limited,

Atlas Honda Limited, 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.

2.1.3. Design Layout:



Location: Atlas Honda Limited,

Atlas Honda Limited, 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.

2.1.4. Site Conditions:

The following tasks were carried out:

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

2.1.5. Technology Review & Selection:

Project Profile		
Project Size	Location-1:	2,465.58 kWp
	Location-2:	209.230 kWp
	Location-3:	1,091.09 kWp
	Location-4:	1,161.94 kWp
	Total	4,927.89 kWp

PV Modules		
Type of Module	JAM72S30-545/MR	
No. of Modules	Location-1:	4,524 (4,524 * 545 = 2,465.58 kWp)
	Location-2:	384 (384 * 545 = 209.230 kWp)
	Location-3:	2,002 (2,002 * 545 = 1,091.09 kWp)
	Location-4:	2,132 (2,132 * 545 = 1,161.94 kWp)
	Total	9,042 (9,042 * 545 = 4,927.89 kWp)
Type of Cell	Mono PERC Half-Cell	
Dimension of each Module	2279 x 1135 x 35mm (89.72 x 44.68 x 1.38 inch)	
Total Module Area	2.586,665 m2	
Frame of Panel	Anodized aluminium alloy	
Weight of one Module	28.6 kg	

No of Solar Cells in each module	144 (6×24)
Efficiency of module	21.1 %
Maximum Power (P_{max})	545 W_P
Voltage @ P_{max}	41.8 V
Current @ P_{max}	13.04 A
Open circuit voltage (V_{oc})	49.75V
Short circuit current (I_{sc})	13.93 A
Maximum system open Circuit Voltage	1000VDC (IEC)

Inverters		
Description	Technical Specification	
Size & Mode	200 KW SUN2000-200KTL-H2	60 KW SUN2000-60KTL-M0
No. of Inverters	19	3
Input Operating Voltage Range	500 V to 1500 V	200 V to 1000 V
Efficiency of inverter	99.0 %	98.7 %
Max. Allowable Input voltage	1500V	1100V
Max. Current	30 A	22 A
Max. Power Point Tracking Range	500 V to 1500 V	200 V to 1000 V
Output electrical system	3 Phase AC	3 Phase AC
Rated Output Voltage	800 V, 3W + PE	230 V / 400 V, 3W + N + PE
Power Factor (adjustable)	0.8 LG...0.8 LD	0.8 LG...0.8 LD
Power control	MPP Tracker	MPP Tracker
Rated Frequency	50 Hz	50 Hz

Mounting Structure	
Structure	Mild Steel Hot dip Galvanized/ Aluminum
Tilt Angle	**Location 1** : 15° **Location 2, 3 & 4**: 5°
Degradation Factor	First Year 2.5% & remaining 24 Years 0.6%

Data Collecting System	
System Data	Continuous online logging with data logging software to portal

2.1.6. Solar PV Yield Estimation and Simulation of Site:

The energy yield prediction provides the basis for calculating project revenues. The aim is to predict the average annual energy output for the lifetime of the proposed power plant. To estimate accurately the energy produced from a PV power plant, information is needed on the solar resource and temperature conditions of the site. Also required are the layout and technical specifications of the plant components. A number of solar energy yield prediction software packages are available in the market. These packages use time step simulation to model the performance of a project over the course of a year. PVSyst software has been used for energy yield prediction for this site and its results are given below. Details of the simulation steps are presented in the following sections:

2.1.7. Working Conditions: Zero Grid Export

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

2.1.8. Plant Characteristics

Generation Voltage: 230/400 V three phase four wire system Power Factor at rated power: 1 Frequency: 50 Hz Generation characteristic: Inverter has built-in features of controllable active power ramp following grid disturbance or normal connection, voltage regulation and frequency response. There are no additional control metering and instrumentations.

2.1.9. Design Parameters:

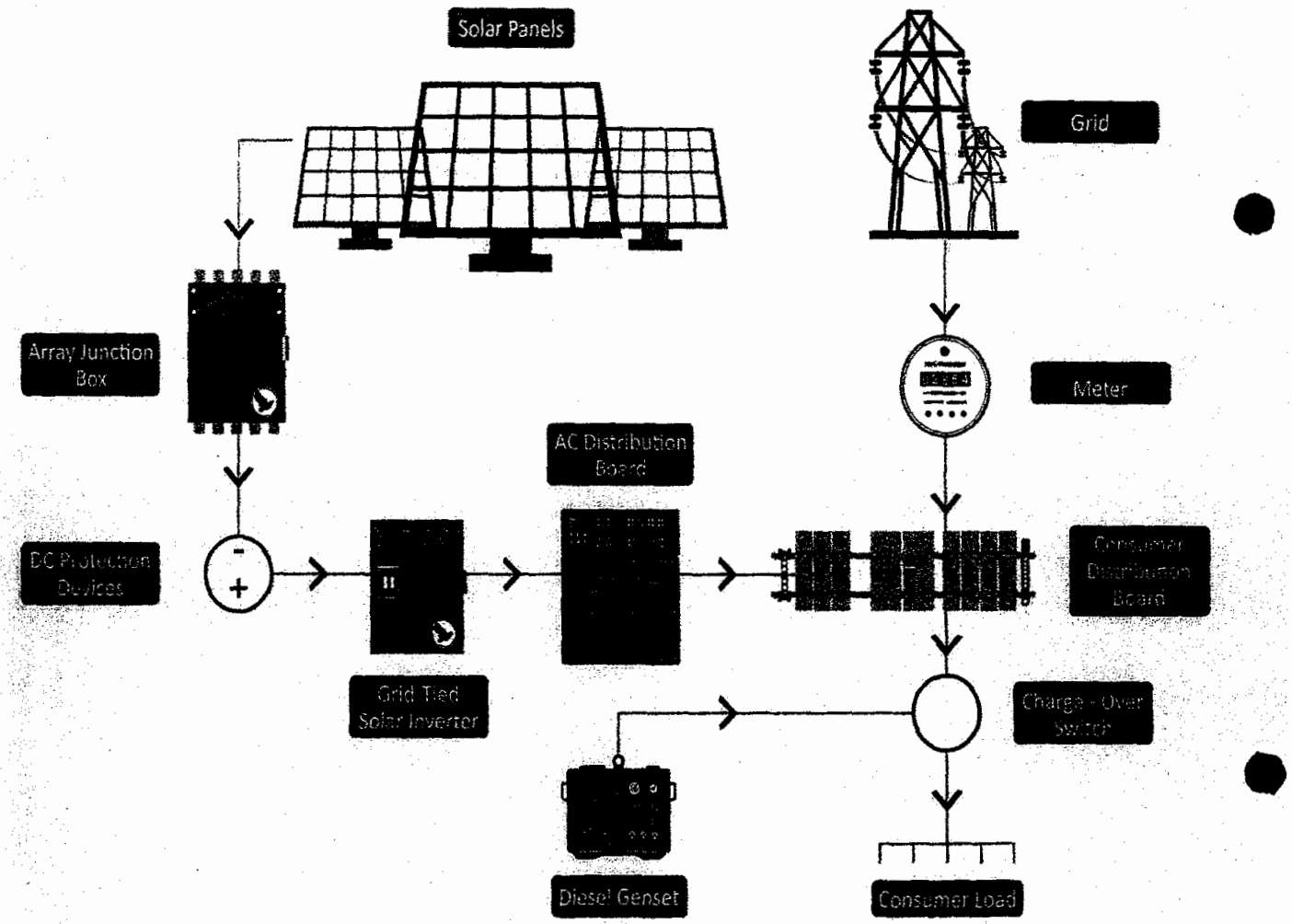
The following tasks were carried out for PV layout and shading.

a) Assessment of shading (horizon and nearby building).
b) Outline layout of area suitable for PV development.
c) Designing row spacing to reduce inter-row shading and associated shading losses.
d) Designing the layout to minimize cable runs and associated electrical losses.
e) Creating access routes and sufficient space to allow movement for maintenance purposes.
f) Choosing a tilt angle that optimizes the annual energy yield according to the latitude of the site and the annual distribution of solar resource.
g) Module cleaning strategy.
h) Simulating the annual energy losses associated with various configurations of tilt angle, orientation and row spacing. The optimized configuration and simulation results are given in section "Energy Yield Prediction"
i) PV layouts of the site are given in view in the following section.

2.1.10. Interconnection of installed Solar Capacity with Consumer:

This is a distributed solar system installed at various roofs and Power Generated through this system will be consumed in-house by the relevant Office/ Plant wherein the system would be installed. Therefore there will be no requirement of separate grid for these solar power plants.

2.1.11. Concept Design:



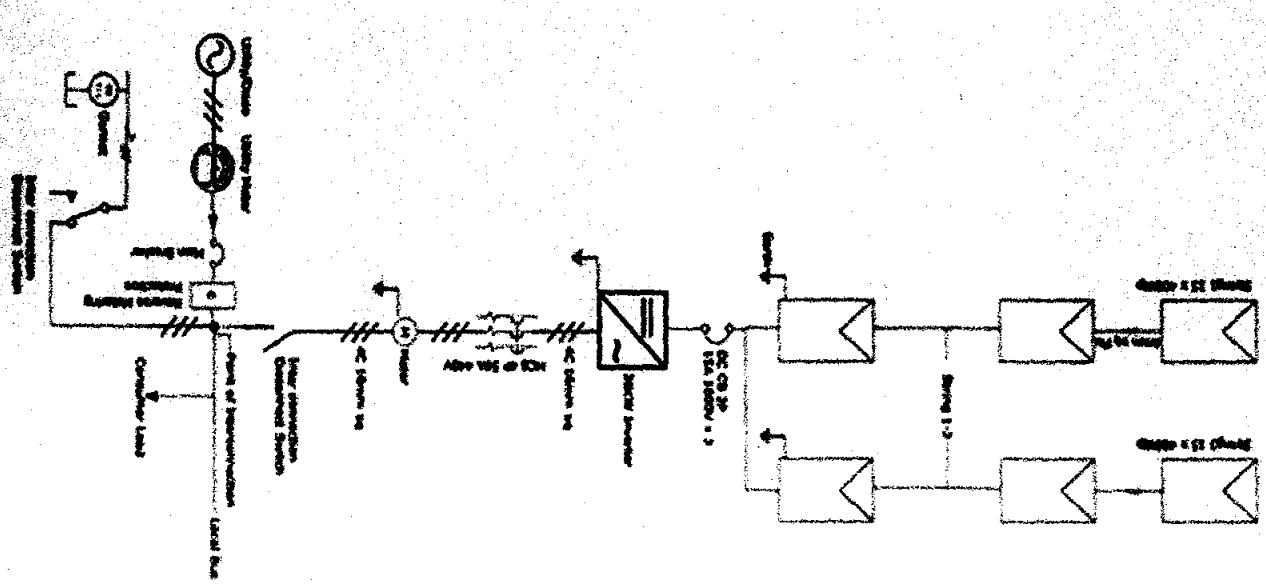
2.1.12. Single Line Diagram:

The electrical system comprises the following components:

- Array(s) of PV modules
- DC/AC cabling (module, string and main cable)
- DC connectors (plugs and sockets)
- Junction boxes and combiners
- Disconnects/switches
- Protection devices e.g. fuses, surge protective devices, beakers
- Energy Metering
- Earthing

The single line diagrams of DC and AC sides are given below. The single line diagram includes the protection devices that will be used for safe and smooth operation of the system.

Protections DC Side: 'String Fuses, Surge Protective Device and DC Disconnect Switches
Protections AC Side: MCBs, Main Breaker



2.2. Financial Analysis: The project will be financed on an 80% debt & 20% equity model. The total estimated project cost is PKR **532.21 Million**. Based on the technical and financial analysis, the installation of **4,927.89 kWp** Solar PV System on the rooftop of various sites as shown in above table.

The Capital cost shall include the cost borne by the Applicant Company on feasibility studies, planning, designing, material, construction and installation of the Generation Facilities. The cost of land, step-up transformer, interconnection with distribution system of utility are not included being not required. The Applicant shall arrange the required funding through 20% Equity, 80% Debt. Debt may be availed under SBP Financing Scheme for Renewable Energy.

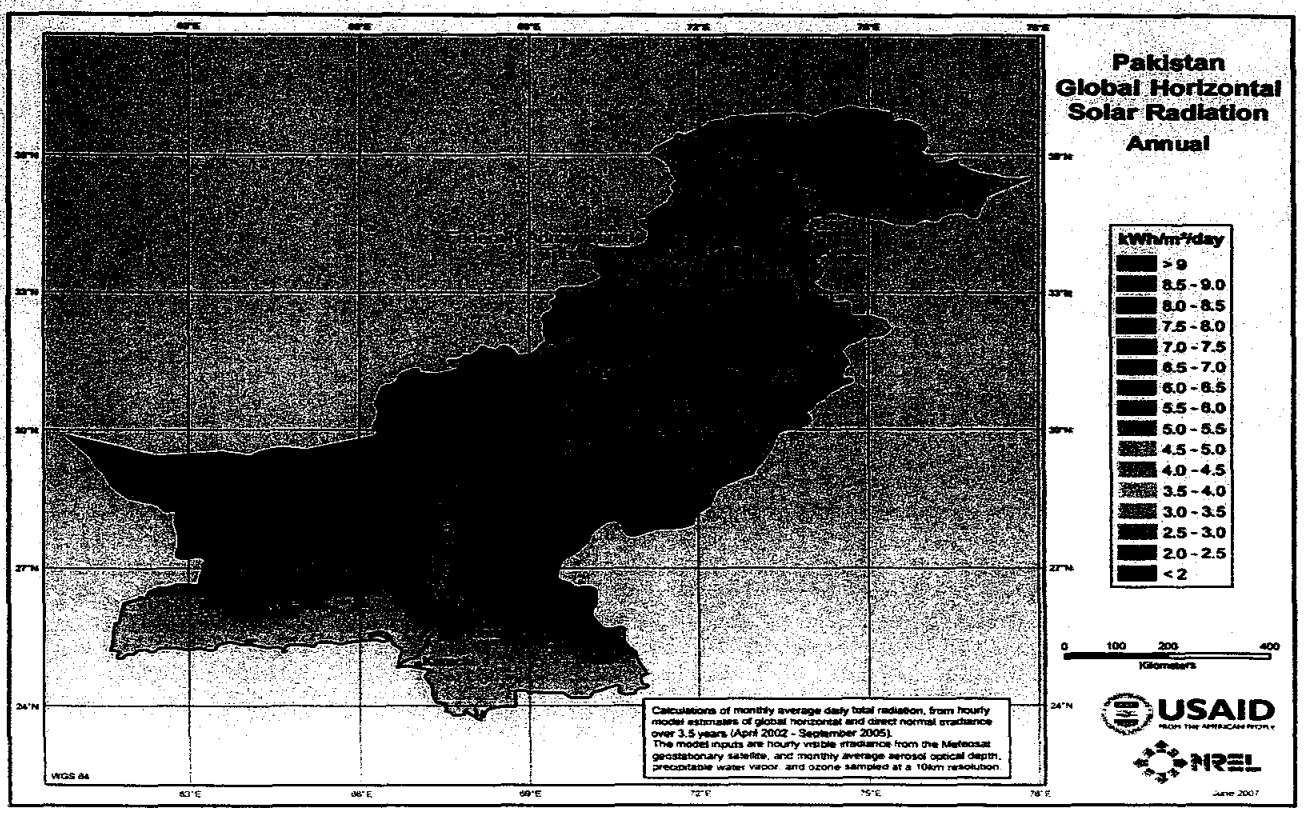
Sr. #	Location	System Size (kWp)	Total Project Cost (PKR)	TPC/Wp	Debt 80%	Equity 20%
1	Atlas Honda Limited, Sheikhupura	4,927.89	532,212,120	108.0	425,769,696	106,442,424

3. Project Rationale

It is a commonly knowledge that availability of electricity in any country that has direct effect on its economy and social factors and therefore, in order to measure the affluence of a society, the per capita energy consumption is used as index. An economy's production and consumption of electricity are basic indicators of its size and level of development. Although a few countries export electric power, most production is for domestic consumption. Expanding the supply of electricity to meet the growing demand of increasingly urbanized and industrialized economies without incurring unacceptable social, economic, and environmental costs is one of the great challenges facing developing countries. Modern societies are becoming increasing dependent on reliable and secure electricity supplies to underpin economic growth and community prosperity. This reliance is set to grow as more efficient and less carbon intensive forms of power are developed and deployed to help decarbonize economies. Maintaining reliable and secure electricity services while seeking to rapidly decarbonize power systems is a key challenge for countries throughout the world. In developing economies growth in energy use is closely related to growth in the modern sectors - industry, motorized transport, and urban areas - but energy use also reflects climatic, geographic, and economic factors (such as the relative price of energy). Energy use has been growing rapidly in low- and middle-income economies, but high-income economies still use almost five times as much energy on a per capita basis. Governments in many countries are increasingly aware of the urgent need to make better use of the world's energy resources. Improved energy efficiency is often the most economic and readily available means of improving energy security and reducing greenhouse gas emissions. Pakistan's per capita energy consumption of Pakistan Generation of electricity in Pakistan is largely on furnace oil whose substantial quantity is imported, prices whereof adversely affect the generation in the country. Although natural gas is a cheaper fuel however its reserves are depleting rapidly. In these circumstances, the use of solar power in Pakistan appears to be quite an attractive mode of generation of electric power. Further, its use does not require refining, transporting and conveying fuels and power over long distances. Moreover, solar

power does not create pollution. Naturally, Pakistan is located in the Sunny Belt and can take advantage of its ideal situation for utilization of solar energy. The country potential for solar generation is beyond doubt as it has high solar irradiation and enough space for installation of generation system those are ideal for PV and other solar energy applications. Villages and other areas which are away from grid or distribution system of utilities can also benefit from solar power generation which will also save the extra cost of laying the system and the losses. Solar energy, on the other hand, has excellent potential in areas of Pakistan that receive high levels of solar radiation throughout the year. Every day, for example, the country receives an average of about 19 Mega Joules per square meter of solar energy Pakistan being in the Sun Belt is ideally located to take advantage of solar energy technologies. This energy source is widely distributed and abundantly available in the country. The mean global irradiation falling on horizontal surface is about 200-250 watt per sq.m in a day. This amounts to about 2500-3000 sun shine hours and 1.9 - 2.3 MWh per sq. meter in a year. It has an average daily global isolation of 19 to 20 MJ/sq. meter per day with annual mean sunshine duration of 8 to 8.5 hours (6-7hrs in cold and 10-12 hrs. in hot season) and these values are among the highest in the world. For daily global radiation up to 23MJ/m2, 24 (80%) consecutive days are available in this area for solar energy. Such conditions are ideal for solar thermal applications. Pakistan receives about 15.5x1014 kWh of solar irradiance each year with most regions receiving approximately 8 to 10 sunlight hours per day. The installed capacity of solar photovoltaic power is estimated to be 1600 GW per year, providing approximately 3.5 PWh of electricity (a figure approximately 41 times that of current power generation in the country). To summarize, the sun shines for 250-300 days per years in Pakistan with average sun shine hours of 8-10 per day. This gives huge amount of energy to be used for electricity generation by solar photovoltaic and 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.

4. Environment Aspect:



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

The use of solar power has additional positive implications such as:

- Reduction of the emissions of the greenhouse gases (mainly CO2, NOx) and prevention of toxic gas emissions (S02, particulates)
- Reduction of the required transmission lines of the electricity grids.

4.1 Introduction:

Extensive fossil fuel consumption in almost all human activities has led to some undesirable phenomena such as atmospheric and environmental pollutions, which have not been experienced before in known human history. Consequently, global warming, green house affect, climate change, ozone layer depletion, and acid rain terminologies started to appear in the literature frequently. Since 1970, it has been understood scientifically by experiments and researches that these phenomena are closely related to fossil fuel uses because they emit greenhouse gases such as carbon dioxide (CO2) and methane (CH4), which hinder the long-wave terrestrial radiation escape into space, and, consequently, the earth troposphere becomes warmer. In order to avoid further impacts of these phenomena, the two concentrative alternatives are either to improve the fossil fuel quality with reductions in their harmful emissions into the atmosphere or, more significantly, to replace fossil fuel usage as much as possible with environmentally friendly, clean, and renewable energy sources. Among these sources, solar energy comes at the top of the list due to its abundance and more even distribution in nature than any other renewable energy type, such as wind, geothermal, hydro, wave, and tidal energies. Solar energy technologies are essential components of a sustainable energy future. Energy from fossil fuels may be inexpensive and assurances may have been given of the plentiful supplies of petroleum and other fossil fuels, but these fuels are finite in nature and a major source of greenhouse gas emissions.

4.2 Rationale:

It is a commonly knowledge that availability of electricity in any country that has direct effect on its economy and social factors and therefore, in order to measure the affluence of a society, the per capita energy consumption is used as index. An economy's production and consumption of electricity are basic indicators of its size and level of development. Although a few countries export electric power, most production is for domestic consumption. Expanding the supply of electricity to meet the growing demand of increasingly urbanized and industrialized economies without incurring unacceptable social, economic, and environmental costs is one of the great challenges facing developing countries.

Modern societies are becoming increasing dependent on reliable and secure electricity supplies to underpin economic growth and community prosperity. This reliance is set to grow as more efficient and less carbon intensive forms of power are developed and deployed to help decarbonize

economies. Maintaining reliable and secure electricity services while seeking to rapidly decarbonize power systems is a key challenge for countries throughout the world. In developing economies growth in energy use is closely related to growth in the modern sectors - industry, motorized transport, and urban areas - but energy use also reflects climatic, geographic, and economic factors (such as the relative price of energy). Energy use has been growing rapidly in low- and middle-income economies, but high-income economies still use almost five times as much energy on a per capita basis. Governments in many countries are increasingly aware of the urgent need to make better use of the world's energy resources. Improved energy efficiency is often the most economic and readily available means of improving energy security and reducing greenhouse gas emissions. Pakistan's per capita energy consumption of Pakistan Generation of electricity in Pakistan is largely on furnace oil whose substantial quantity is imported, prices whereof adversely affect the generation in the country. Although natural gas is a cheaper fuel however its reserves are depleting rapidly. In these circumstances, the use of solar power in Pakistan appears to be quite an attractive mode of generation of electric power. Further, its use does not require refining, transporting and conveying fuels and power over long distances. Moreover, solar power does not create pollution. Naturally, Pakistan is located in the Sunny Belt and can take advantage of its ideal situation for A utilization of solar energy. The country potential for solar generation is beyond doubt as it has high solar irradiation and enough space for installation of generation system those are ideal for PV and other solar energy applications. Villages and other areas which are away from grid or distribution system of utilities can also benefit from solar power generation which will also save the extra cost of laying the system and the losses. Solar energy, on the other hand, has excellent potential in areas of Pakistan that receive high levels of solar radiation throughout the year. Every day, for example, the country receives an average of about 19 Mega Joules per square meter of solar energy Pakistan being in the Sun Belt is ideally located to take advantage of solar energy technologies. This energy source is widely distributed and abundantly available in the country. The mean global irradiation falling on horizontal surface is about 200-250 watt per sq.m in a day. This amounts to about 2500- 3000 sun shine hours and 1.9 - 2.3 MWh per sq. meter in a year. It has an average daily global isolation of 19 to 20 MJ/sq. meter per day with annual mean sunshine duration of 8 to 8.5 hours (6-7hrs in cold and 10-12 hrs. in hot season) and these values are among the highest in the world. For daily global radiation up to 23MJ/m2, 24 (80%) consecutive days are available in this area for solar energy. Such conditions are ideal for solar thermal applications.

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The assessment of the Project has been considered for both positive and negative effects. The proposed photovoltaic Power Project has been located as per international guidelines. Adoption of

green power generation with no emission and effluent discharge with have least impact on the ambient environment and on the host community. However, in the long term the project and related activities in areas may bring about slight change in ambient air quality of area.

The importance of the sustainable development concept has increased in the whole world. As a result, some new regulations enforce that all development projects should be compatible with the environmental criterions. An environmental impact assessment should be carried out to make sure that projects are compatible with the environmental criterions. Environmental Impact Assessment (EIA) can be defined as a process of environmental management, planning, and decision-making with a purpose of keeping and improving the quality of the environment.

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4.4 Study Area:

Pakistan is geographically situated approximately between 24-37 IV latitudes and 62-75 longitudes in the western zone of south Asia. The distribution of rainfall in Pakistan varies on wide ranges, mostly associated with the monsoon winds and the western disturbances, but the rainfall does not occur throughout the year. Like, Khyber Pukhtonkhuwa (northern mountains) and Balochistan provinces receive maximum rainfall in the months of December to March while in Punjab and Sindh receive 50-75% of rainfall during monsoon season (Kaziet al, 1951; FAO, 1987; Khan, 1993 & 2002; Kureshy, 1998; Luo and Lin, 1999). The precipitation received in the country can be divided into two main seasons, summer or monsoon and winter precipitation. The monsoon rainfall enters Pakistan from east and north east during the month of July to September. During this duration a good amount of rainfall is received in the north and northeastern areas of the country. Winter precipitation (December to March) are mainly received from western disturbances entering from Iran and Afghanistan. The weather systems entering from Afghanistan are called the primary western disturbances and cover only the north and north western parts of the country, whereas those approaching from the Iran are secondary and cover a large area of theCountry including Balochistan, Punjab, Khyber Pukhtonkhuwa, Kashmir and northern areas and sometimes Sindh

province. A large amount of snowfall is received in the northern areas, upper Khyber Pukhtonkhuwa, Kashmir and northern Balochistan and is the main source of water supply for water reservoirs of the country in dry season. This water received from the snow melt and from the seasonal rains plays an important role in the agricultural and socioeconomic activities of the country. Agriculture of Pakistan is mainly climate dependent and every area has its own crops and fruits according to its climate. The country's most important crops and fruits are grown in winter season in different areas according to its climate conditions. If there is any abnormality in the usual climate condition the nation suffers for the whole year and there is also a huge loss to the economy.

4.5 Zone Classification:

Detection of rainfall trend is subject to limitations: there is no clear altitudinal trend of rainfall. Therefore, for analysis, a dataset spreads over a period of 30 years (1976-2005) covering the whole country i.e. 30 stations from extreme north to south and east to west have been selected. The stations included in this study were selected on the basis of their latitudinal position, elevation from sea level, length of record, completeness and reliability of data so that a synoptic view of the entire country could be obtained. Further the selected stations have been divided into five different microclimatic zones. These zones were named A, B, C, D and E as shown in Figure 1, along with their latitudinal extent.

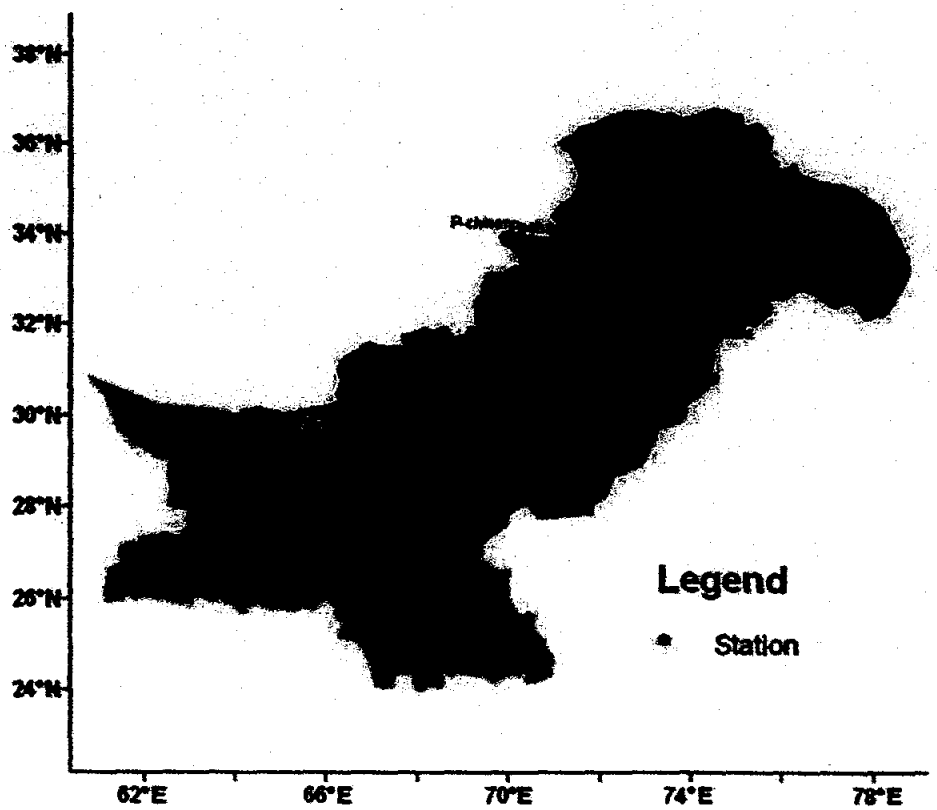

Figure 1: Map showing the climatic zones of the study area

Zone A

Zone A comprises those stations having cold climate and high mountains, situated in the north of Pakistan. These stations are Chitral, Gilgit, Muzaffarabad, Said-u- Sharif, Skardu, Astor, Dir, Chilas Parachinar and Kakul. These are mostly hill stations located between 34 N to 38 N in the Himalaya, Hindukash and Koh-e- Sufaid mountain ranges.

Zone B

This zone has mild cold climate and Sub Mountains, located between 31N to 34 N. The stations are Sialkot, D.I.Khan, Islamabad, Peshawar, Cherat and Lahore.

Zone C

Climate is cold in winters and hot in summers. Most of them are mountainous stations with high elevations from mean sea level and cover an area between 27 N to 32N and 64 E to 70 E. Stations included in this zone are Quetta, Zhob, Kalat and Khuzdar.

Zone D

This is the hottest and dry zone of the country where highest maximum temperatures are recorded in stations of Sibbi and Jacobabad. The area is almost plain with some area included in Thar Desert. Stations included are Sibbi, Jacobabad, Bahawalpure, Khanpur, Multan and Rohri.

Zone E

Zone E is a big zone having many stations and coastal cities, near to Arabian Sea. The coastal Part comprises only a small part of this region and climate above coastal parts in Balochistan as well as in Sindh province is mostly arid to hyper arid. The selected stations from this zone are Hyderabad, Karachi, Nawabshah and Jewani.

4.6 Project Environmental Impacts & Mitigation Measures:

This Section discusses the potential environmental impacts, assesses the significance, recommends mitigation measure to minimize the adverse effect and identifies the residual impacts associated with the proposed activities of the project during the construction and operation phase of the proposed project at the proposed site and of secondary actions like potable, raw water and waste water lines. Solar energy is a lot cleaner when compared with conventional energy sources. Solar energy systems have many significant advantages, like being cheaper and not producing any pollutants during operation, and being almost an infinite energy source when com-pared with fossil fuels. Nevertheless, solar energy systems have some certain negative impacts on the environment just like any other energy system. Some of these impacts will be summarized in this section.

Identification of Potential Impacts:

a) Discharge of Pollutants
b) Visual Impacts
c) Impact on Natural Resources
d) Air Pollution
e) Noise Intrusion
f) Impact on Air
g) Impact on Ground Water/ Surface Water
h) Impact on Solid Waste
i) Impact on Soil
j) Impact on Natural Resources

Discharge of Pollutants: Solar cells do not emit any pollutants during their operations. But solar cell modules contain some toxic substances, and there is a potential risk of releasing these chemicals to the environment during a fire. Necessary precautions should be taken for emergency situations like fire. The possibility of an accidental release of the chemicals of the solar cell modules to soil and groundwater poses a great threat for the environment.

Visual Impacts: There will be some visual impacts depending on the type of the scheme and the surroundings of the solar cells. Especially for applications on the buildings, solar cells can be used as a cladding material that could be integrated into the building during the construction phase. Solar cell applications after the construction phase of the buildings might cause negative visual impacts. Solar cell utilization should be planned at the architectural phase and fitted to the building to minimize visual pollution. For the other application areas, proper sitting and design are important factors, especially for large solar cell applications. Another important factor about the control of the visual impacts is the use of color. Enough care should be taken for the usage of proper colors while assembling the solar cell modules.

Impacts on Natural Resources: Despite being a benign energy system during operation, solar cells have some negative impacts on the environment during their production phase like many other systems. The energy needed for the production of solar energy systems is still produced in conventional methods today. Some toxic chemical substances used during the production phase are produced as a by-product. Especially, the solar cell batteries pose a threat on natural resources by having a short lifespan and containing heavy metals such as cadmium.

Air Pollution: Solar cells do not emit any substances to the air during operation. But there could be some emissions during manufacturing and transport. The emissions associated with the transport

of the modules are insignificant when compared with the emissions associated with the manufacture. Transport emissions are 0.1-1% of the manufacturing emissions.

Noise: Intrusion Solar cells do not make a noise during operation. But during the construction phase, there will be a little noise as usual in other construction activities.

Impact on Air: There would be no hazardous emissions at site as well as during construction phase except Motor Vehicle and Crane. Moreover, there are no objectionable odors as well as alternation of air temperature.

Impact on Ground Water/ Surface Water: There would be no use of water during design phase except curing of civil pads during construction, which have no negative impact on environment.

Impact on Solid Waste: It may only Create litter and trash waste which is recyclable and may be cleared from site after construction.

Impact on Soil: No impacts as all installed systems are roof top.

Impact on Natural Resources: There won't be any increase in the rate of usage of any natural resource like any minerals, additional fuel other than vehicles. But there would be increase in the amount of usage of Paper for mapping, enlisting items etc. However, paper may be recycling by throwing it in ordinary dustbin, further ensure the maximum usage of electronic system e.g. emails.

4.7 Assessment/ Conclusion:

The site allocated is private land within the premises of Atlas Honda Limited (Plant) and the applicant has carried out detailed environment assessment of the site for installation of solar PV Plant. Overall findings:

Environment Parameters	Level of Impact	Reasons	Mitigation Measures
Air Impact	Low	Solar Energy is Carbon Free	No Emissions
Water	Low	Plant will required a very low quantity of water for cleaning purpose only	RO Plant is already installed at site and water from said source may be used for cleaning of Modules
Land	Low	No impact on Land	As said project is purely roof based which have no impact on Land

Ecosystem	Low	No ecologically sensitive area lies with in premises	There is no significant vegetation cover within the selected area
Socio Eco system	Low	Total area identified for said project is in plant premises and no acquisition is needed	Not Applicable

4.8 Safety plans, emergency plans

- Only qualified and authorized electricians will be allowed to undertake servicing or maintenance tasks.
- The authorized personnel will wear appropriate equipment, including a safety harness to restrain from falling off the roof, sturdy shoes that will have thick rubber soles to provide electrical insulation and good grip and appropriate clothing for personal protection, including a hat, sunglasses, gloves and long pants and sleeves.
- Lock out and tag out procedures will be used before commencement of maintenance tasks.
- On-going operation and maintenance concerns for solar power systems will be addressed properly. These systems are exposed to outdoor weather conditions that enhance the aging process, and the infrastructure needs to be in place for the on-going maintenance of these systems to assure their safe operation.
- Properly grounded or double insulated power tools will be used for maintenance tasks.
- Tools will be maintained in good condition.
- Working on electrical equipment and circuits will be carried out in de-energized state.
- Proper pathways will be available for operation, maintenance and firefighting.
- Fire protection and suppression will be placed at site.

5. Socio-Economic Aspects:

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

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

6. Safety & Emergency Plans:

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7. Training and Capacity Development:

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

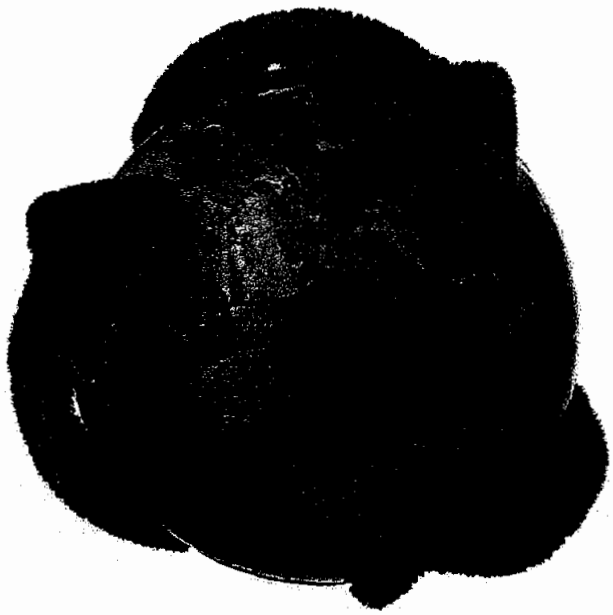
The following components will include in training & development program.

- Collection of Resource Data
- Variability and uncertainty of resource data
- Site evaluation
- Crystalline and thin film technology comparison
- Rooftop solar system components
- Module mounting structure selection

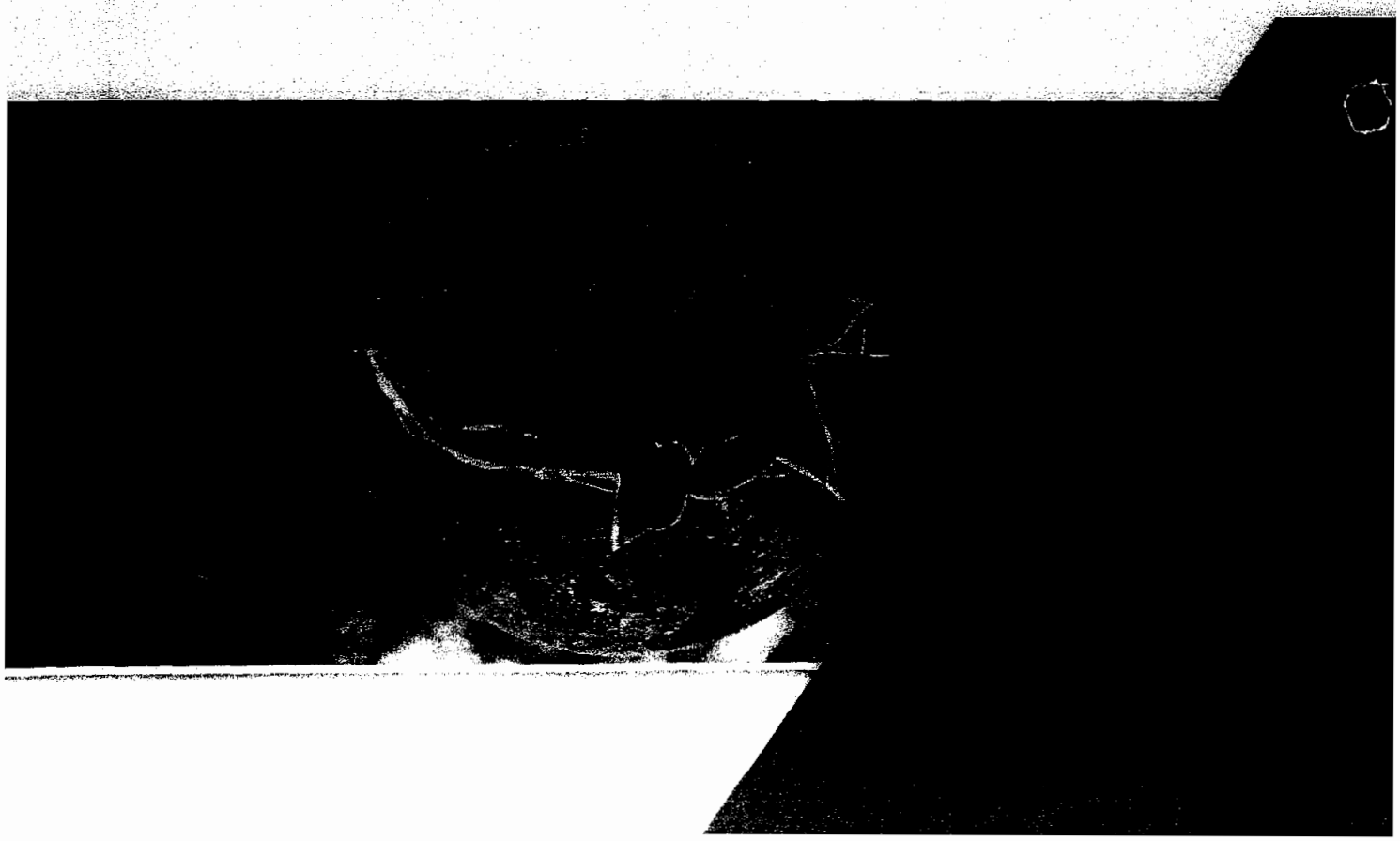
- Inverter selection
- Design of PV Array
- Shadow Analysis
- DC Cable Layout
- DC Cable Sizing
- Protection and Metering
- Installation and Testing standards for solar PV plants
- Solar Module testing standards
- Economy of Roof Top Solar System
- Detailed Project Report
- Operation and maintenance of rooftop solar system
- Safety and fire-fighting training

8. Conclusion:

This feasibility study is conducted to ascertain the technical feasibility and commercial viability of installation of **4,927.89 kWp** at designated location on rooftop. Installation of the PV system will result in annual power generation of approx. **6,759,292 kWh / year**. The results of the financial analysis indicate that the project is feasible. Based on the outcomes of both the technical and financial analysis, the project is deemed to be viable.



ESSA (Environmental and Social Soundness Assessment) Report



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Pakistan is geographically situated approximately between 24-37 IV latitudes and 62-75 longitudes in the western zone of south Asia. The distribution of rainfall in Pakistan varies on wide ranges, mostly associated with the monsoon winds and the western disturbances, but the rainfall does not occur throughout the year. Like, Khyber Pakhtunkhwa (northern mountains) and Baluchistan provinces receive maximum rainfall in the months of December to March while in Punjab and Sindh receive 50-75% of rainfall during monsoon season (Kaziet al, 1951; FAO, 1987; Khan, 1993 & 2002; Kureshy, 1998; Luo and Lin, 1999). The precipitation received in the country can be divided into two main seasons, summer or monsoon and winter precipitation. The monsoon rainfall enters Pakistan from east and north east during the month of July to September. During this duration a good amount of rainfall is received in the north and northeastern areas of the country. Winter precipitation (December to March) are mainly received from western disturbances entering from Iran and Afghanistan. The weather systems entering from Afghanistan are called the primary western disturbances and cover only the north and north western parts of the country, whereas those approaching from the Iran are secondary and cover a large area of the Country including Baluchistan, Punjab, Khyber Pakhtunkhwa, Kashmir and northern areas and sometimes Sindh province. A large amount of snowfall is received in the northern areas, upper Khyber Pakhtunkhwa, Kashmir and northern Baluchistan and is the main source of water supply for water reservoirs of the country in dry season. This water received from the snow melt and from the seasonal rains plays an important role in the agricultural and socioeconomic activities of the country. Agriculture of Pakistan is mainly climate dependent and every area has its own crops and fruits according to its climate. The country's most important crops and fruits are grown in winter season in different areas according to its climate conditions. If there is any abnormality in the usual climate condition the nation suffers for the whole year and there is also a huge loss to the economy.

5. Zone Classification:

Detection of rainfall trend is subject to limitations: there is no clear altitudinal trend of rainfall. Therefore, for analysis, a dataset spreads over a period of 30 years (1976-2005) covering the whole country i.e. 30 stations from extreme north to south and east to west have been selected. The stations included in this study were selected on the basis of their latitudinal position, elevation from sea level, length of record, completeness and reliability of data so that a synoptic view of the entire country could be obtained. Further the selected stations have been divided into five different microclimatic zones. These zones were named A, B, C, D and E as shown in Figure 1, along with their latitudinal extent.

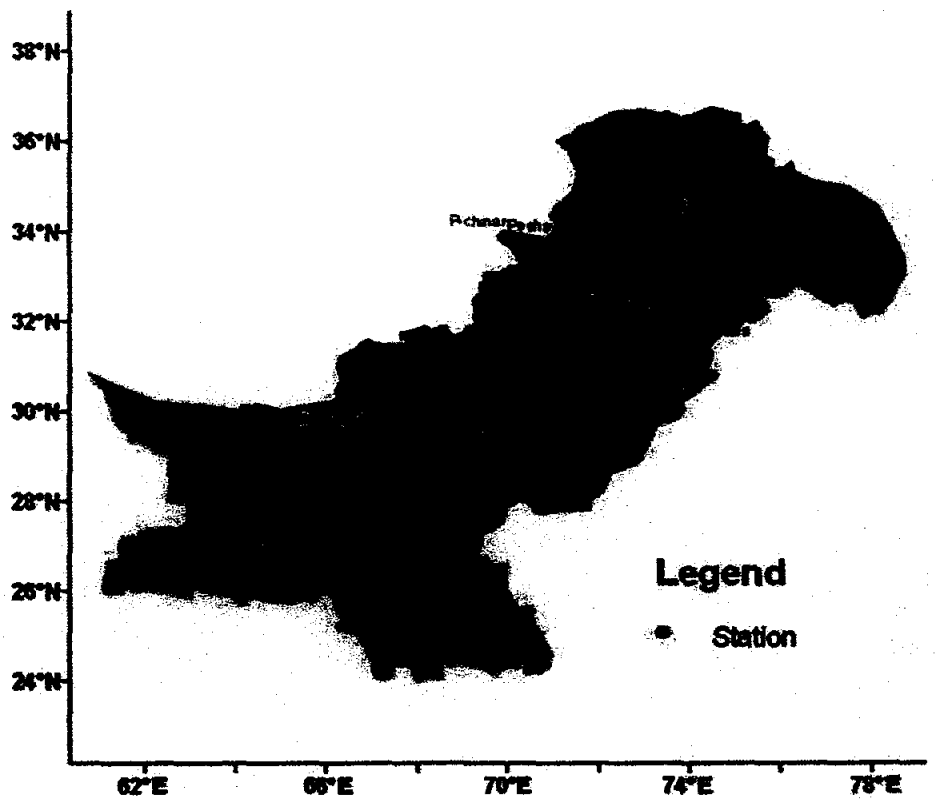


Figure 1: Map showing the climatic zones of the study area

Zone A

Zone A comprises those stations having cold climate and high mountains, situated in the north of Pakistan. These stations are Chitral, Gilgit, Muzaffarabad, Said-u- Sharif, Skardu, Astor, Dir, Chilas Parachinar and Kakul. These are mostly hill stations located between 34 N to 38 N in the Himalaya, Hindukush and Koh-e- Sufaid mountain ranges.

Zone B

This zone has mild cold climate and Sub Mountains, located between 31N to 34 N. The stations are Sialkot, D.I.Khan, Islamabad, Peshawar, Cherat and Lahore.

Zone C

Climate is cold in winters and hot in summers. Most of them are mountainous stations with high elevations from mean sea level and cover an area between 27 N to 32N and 64 E to 70 E. Stations included in this zone are Quetta, Zhob, Kalat and Khuzdar.

Zone D

This is the hottest and dry zone of the country where highest maximum temperatures are recorded in stations of Sibbi and Jacobabad. The area is almost plain with some area included in Thar Desert. Stations included are Sibbi, Jacobabad, Bahawalpur, Khanpur, Multan and Rohri.

Zone E

Zone E is a big zone having many stations and coastal cities, near to Arabian Sea. The coastal Part comprises only a small part of this region and climate above coastal parts in Baluchistan as well as in Sindh province is mostly arid to hyper arid. The selected stations from this zone are Hyderabad, Karachi, Nawabshah and Jewani.

6. Project Environmental Impacts & Mitigation Measures:

This Section discusses the potential environmental impacts, assesses the significance, recommends mitigation measure to minimize the adverse effect and identifies the residual impacts associated with the proposed activities of the project during the construction and operation phase of the proposed project at the proposed site and of secondary actions like potable, raw water and waste water lines. Solar energy is a lot cleaner when compared with conventional energy sources. Solar energy systems have many significant advantages, like being cheaper and not producing any pollutants during operation, and being almost an infinite energy source when com-pared with fossil fuels. Nevertheless, solar energy systems have some certain negative impacts on the environment just like any other energy system. Some of these impacts will be summarized in this section.

Identification of Potential Impacts:

a) Discharge of Pollutants

b) Visual Impacts

c) Impact on Natural Resources

d) Air Pollution

e) Noise Intrusion

f) Impact on Air

g) Impact on Ground Water/ Surface Water

h) Impact on Solid Waste

i) Impact on Soil

j) Impact on Natural Resources

Discharge of Pollutants: Solar cells do not emit any pollutants during their operations. But solar cell modules contain some toxic substances, and there is a potential risk of releasing these chemicals to the environment during a fire. Necessary precautions should be taken for emergency situations like fire. The possibility of an accidental release of the chemicals of the solar cell modules to soil and groundwater poses a great threat for the environment.

Visual Impacts: There will be some visual impacts depending on the type of the scheme and the surroundings of the solar cells. Especially for applications on the buildings, solar cells can be used as a cladding material that could be integrated into the building during the construction phase. Solar cell applications after the construction phase of the buildings might cause negative visual impacts. Solar cell utilization should be planned at the architectural phase and fitted to the building to minimize visual pollution. For the other application areas, proper sitting and design are important factors, especially for large solar cell applications. Another important factor about the control of the visual impacts is the use of color. Enough care should be taken for the usage of proper colors while assembling the solar cell modules.

Impacts on Natural Resources: Despite being a benign energy system during operation, solar cells have some negative impacts on the environment during their production phase like many other systems. The energy needed for the production of solar energy systems is still produced in conventional methods today. Some toxic chemical substances used during the production phase are produced as a by-product. Especially, the solar cell batteries pose a threat on natural resources by having a short lifespan and containing heavy metals such as cadmium.

Air Pollution: Solar cells do not emit any substances to the air during operation. But there could be some emissions during manufacturing and transport. The emissions associated with the transport of the modules are insignificant when compared with the emissions associated with the manufacture. Transport emissions are 0.1-1% of the manufacturing emissions.

Noise: Intrusion Solar cells do not make a noise during operation. But during the construction phase, there will be a little noise as usual in other construction activities.

Impact on Air: There would be no hazardous emissions at site as well as during construction phase except Motor Vehicle and Crane. Moreover, there are no objectionable odors as well as alternation of air temperature.

Impact on Ground Water/ Surface Water: There would be no use of water during design phase except curing of civil pads during construction, which have no negative impact on environment.

Impact on Solid Waste: It may only Create litter and trash waste which is recyclable and may be cleared from site after construction.

Impact on Soil: No impacts as all installed systems are roof top.

Impact on Natural Resources: There won't be any increase in the rate of usage of any natural resource like any minerals, additional fuel other than vehicles. But there would be increase in the amount of usage of Paper for mapping, enlisting items etc. However, paper may be recycling by throwing it in ordinary dustbin, further ensure the maximum usage of electronic system e.g. emails.

7. Environment Assessment/ Conclusion:

The site allocated is private land within the premises of Atlas Honda Limited (Plant) and the applicant has carried out detailed environment assessment of the site for installation of solar PV Plant. Overall findings:

Environment Parameters	Level of Impact	Reasons	Mitigation Measures
Air Pollution	Low	Solar Energy is Carbon Free	No Emissions
Water	Low	Plant will required a very low quantity of water for cleaning purpose only	RO Plant is already installed at site and water from said source may be used for cleaning of Modules
Land	Low	No impact on Land	As said project is purely roof based which have no impact on Land
Ecosystem	Low	No ecologically sensitive area lies with in premises	There is no significant vegetation cover within the selected area
Socio Eco system	Low	Total area identified for said project is roof based and in plant premises so no acquisition is needed	Not Applicable

3(g) an affidavit stating whether the applicant has been granted any other license under the Act;

Details of Other Generation Licenses Issued to Atlas Energy Limited

[redacted]	
Plant Detail	2074 x 400 W Monocrystalline PV Modules.
Plant Type	Solar
Gross Capacity	829.60 kW
Licence No.	SGC/132/2020
[redacted]	
Plant Detail	2147 x 400 W Monocrystalline PV Modules.
Plant Type	Solar
Gross Capacity	858.80 kW
Licence No.	SGC/145/2020
[redacted]	
Plant Detail	1520 x 400 W Monocrystalline PV Modules.
Plant Type	Solar
Gross Capacity	608.00 kW
Licence No.	SGC/146/2020
[redacted]	
Plant Detail	1254 x 400 W Monocrystalline PV Modules.
Plant Type	Solar
Gross Capacity	501.60 kW
Licence No.	SGC/147/2020
[redacted]	
Plant Detail	1596 x 400 W Monocrystalline PV Modules.
Plant Type	Solar
Gross Capacity	638.40 kW
Licence No.	SGC/148/2020
[redacted]	
Plant Detail	2489 x 400 W Monocrystalline PV Modules.
Plant Type	Solar
Gross Capacity	995.60 kW
Licence No.	SGC/149/2020

Atlas Energy

Certified True Copy of resolutions of the Board of Directors passed by circulation on November 29, 2021

Resolved:

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

Further Resolved:

that Mr. Maqsood Ahmed, Chief Executive Officer of the Company may further delegate the aforesaid powers, in writing, to one or more persons, as deemed expedient from time to time."

Further Resolved:

"that these resolutions duly certified by one of the Directors of the Company or the Company Secretary be communicated to the concerned parties which shall constitute the Company's mandate to the concerned parties and shall remain in force until revoked/changed by notice in writing to the concerned parties."

Certified True Copy

Khalid Mahmood
Company Secretary

Company Secretary
Atlas Energy Limited

Atlas Energy

AFFIDAVIT

I, **Maqsood Ahmad** S/o **Chaudhry Muhammad Sadiq** adult resident of **397/B DHA EME, Thokar Niaz Baig, Lahore** do hereby solemnly affirm on oath as under: -

1. That I am CEO of **"M/s. ATLAS ENERGY LIMITED"**.
2. That the contents of the above mentioned affidavit are true to the best of my knowledge, belief and information and nothing has been concealed by me.

DEPONENT

Signature: _____

Name: Maqsood Ahmad

CNIC No: 35202-2632390-1

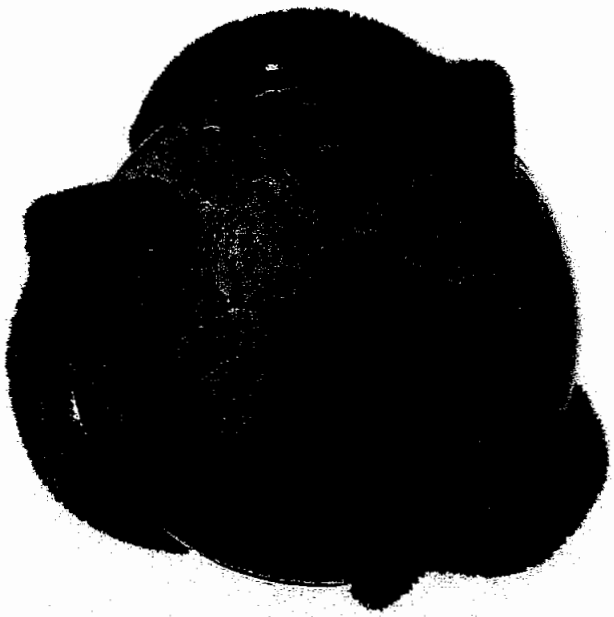
Dated: Nov 29, 2021

1. Interconnection Study

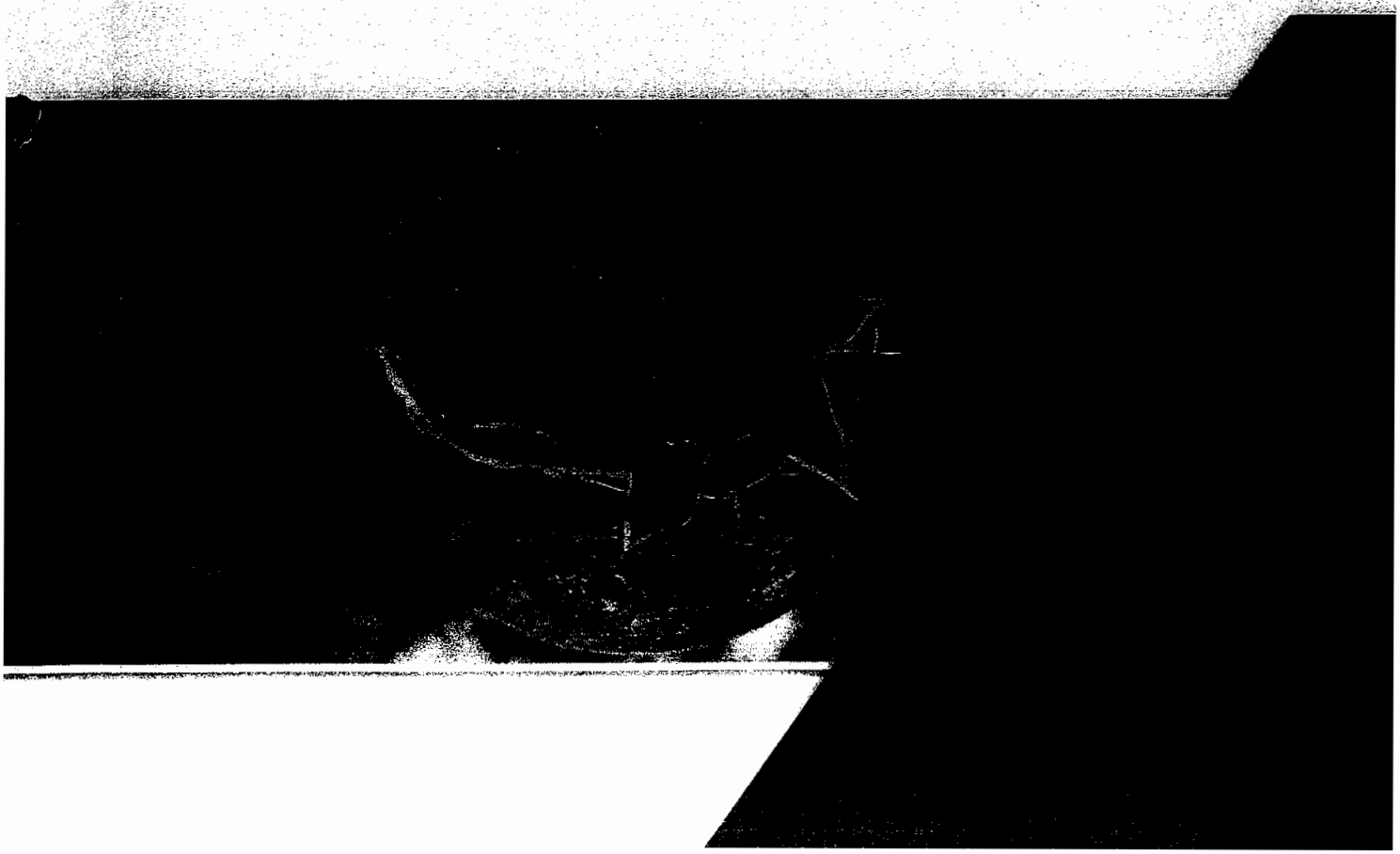
Not Applicable: It is a distributed solar system and Power Generated through this system will be consumed in-house by the relevant Office/ Plant wherein the system would be installed.

2. Environment Impact Assessment Study

AtlasEnergy



ESSA (Environmental and Social Soundness Assessment) Report



1. Introduction:

Extensive fossil fuel consumption in almost all human activities has led to some undesirable phenomena such as atmospheric and environmental pollutions, which have not been experienced before in known human history. Consequently, global warming, green house affect, climate change, ozone layer depletion, and acid rain terminologies started to appear in the literature frequently. Since 1970, it has been understood scientifically by experiments and researches that these phenomena are closely related to fossil fuel uses because they emit greenhouse gases such as carbon dioxide (CO2) and methane (CH4), which hinder the long-wave terrestrial radiation escape into space, and, consequently, the earth troposphere becomes warmer. In order to avoid further impacts of these phenomena, the two concentrative alternatives are either to improve the fossil fuel quality with reductions in their harmful emissions into the atmosphere or, more significantly, to replace fossil fuel usage as much as possible with environmentally friendly, clean, and renewable energy sources. Among these sources, solar energy comes at the top of the list due to its abundance and more even distribution in nature than any other renewable energy type, such as wind, geothermal, hydro, wave, and tidal energies. Solar energy technologies are essential components of a sustainable energy future. Energy from fossil fuels may be inexpensive and assurances may have been given of the plentiful supplies of petroleum and other fossil fuels, but these fuels are finite in nature and a major source of greenhouse gas emissions.

2. Rationale:

It is a commonly knowledge that availability of electricity in any country that has direct effect on its economy and social factors and therefore, in order to measure the affluence of a society, the per capita energy consumption is used as index. An economy's production and consumption of electricity are basic indicators of its size and level of development. Although a few countries export electric power, most production is for domestic consumption. Expanding the supply of electricity to meet the growing demand of increasingly urbanized and industrialized economies without incurring unacceptable social, economic, and environmental costs is one of the great challenges facing developing countries.

Modern societies are becoming increasing dependent on reliable and secure electricity supplies to underpin economic growth and community prosperity. This reliance is set to grow as more efficient and less carbon intensive forms of power are developed and deployed to help decarbonize economies. Maintaining reliable and secure electricity services while seeking to rapidly decarbonize power systems is a key challenge for countries throughout the world. In developing economies growth in energy use is closely related to growth in the modern sectors - industry, motorized transport, and urban areas - but energy use also reflects climatic, geographic, and economic factors (such as the relative price of energy). Energy use has been growing rapidly in low- and middle-income economies, but high-income economies still use almost five times as much energy on a per capita basis. Governments in many countries are increasingly aware of the urgent need to make better use of the world's energy resources. Improved energy efficiency is often the most economic and readily available means of improving energy security and reducing greenhouse gas emissions. Pakistan's per capita energy consumption of Pakistan Generation of electricity in Pakistan is largely on furnace oil whose substantial quantity is imported, prices whereof adversely affect the generation in the country. Although natural gas is a cheaper fuel however its reserves are depleting rapidly. In these circumstances, the use of solar power in Pakistan appears to be quite an

3(VIII) Control, Metering, Instrumentation and Protection

Control, metering, instrumentation and protection

The Distributed Generator will furnish and install a manual disconnect device along with smart meter that has a visual break to isolate and avoid any reverse feeding to Grid.

The grid connected inverters and generators shall comply with Underwriter Laboratories UL 1741 standard (Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources) which addresses the electrical interconnection design of various forms of generating equipment, IEEE 1547 2003, IEC 61215, EN or other international standards.

3(ix) Estimated Capacity Factor at site

Estimated Annual Capacity Factor	**15.3%**

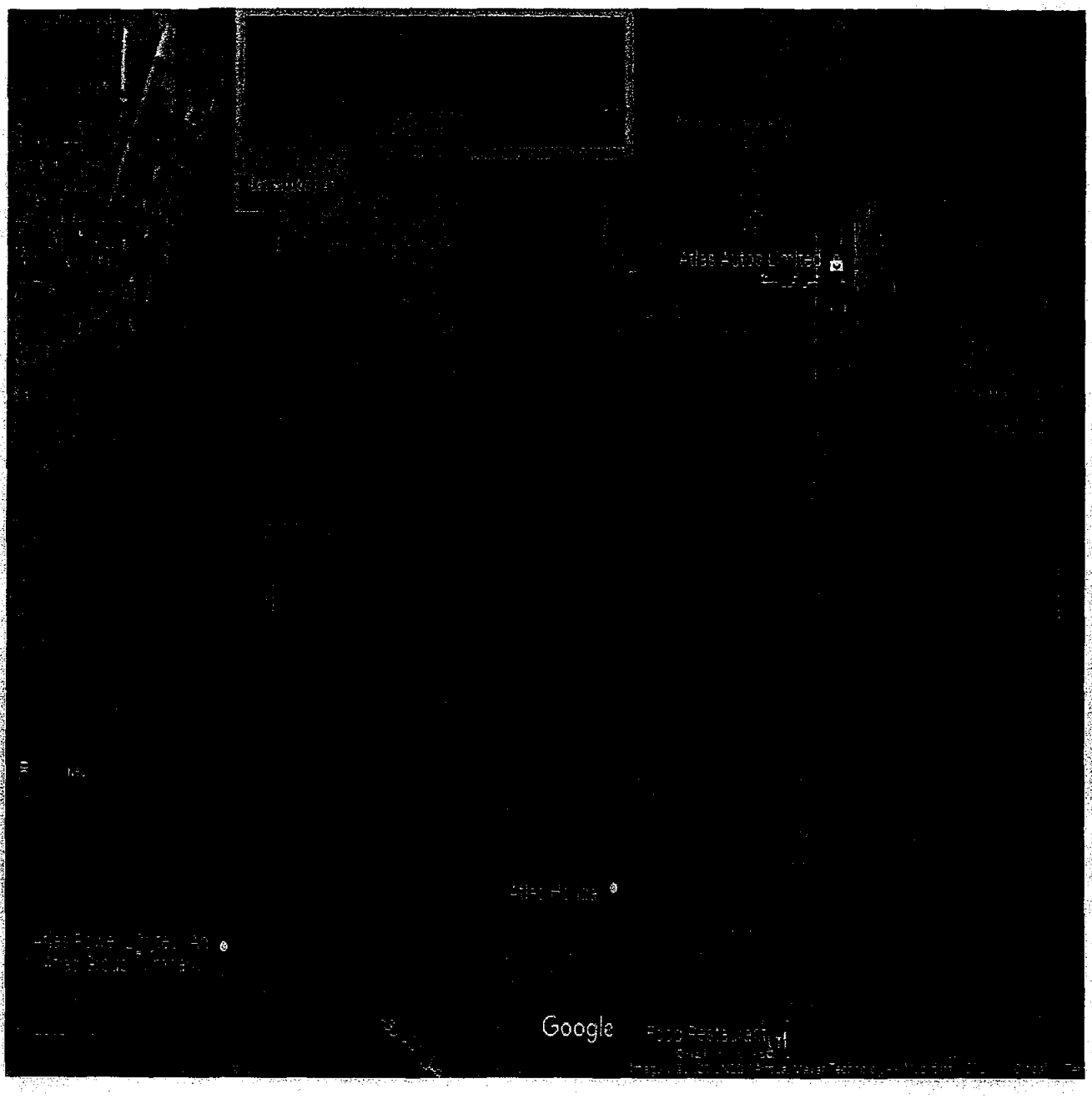
3(x) Degradation Factors

Degradation Factor	**0.6%**

SCHEDULE-I

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

Location of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee

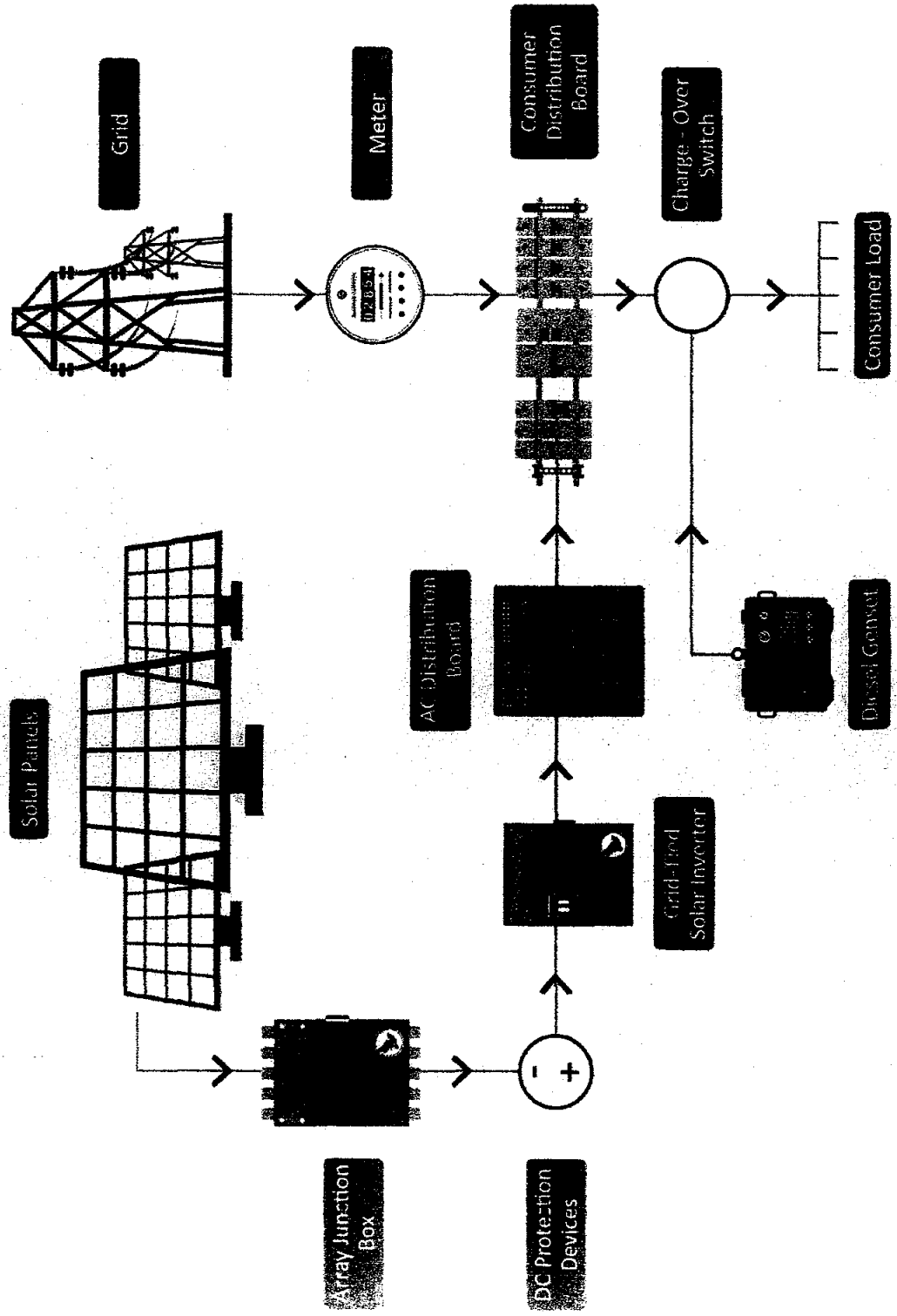


Location: Atlas Honda Limited,
Atlas Honda Limited, 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.

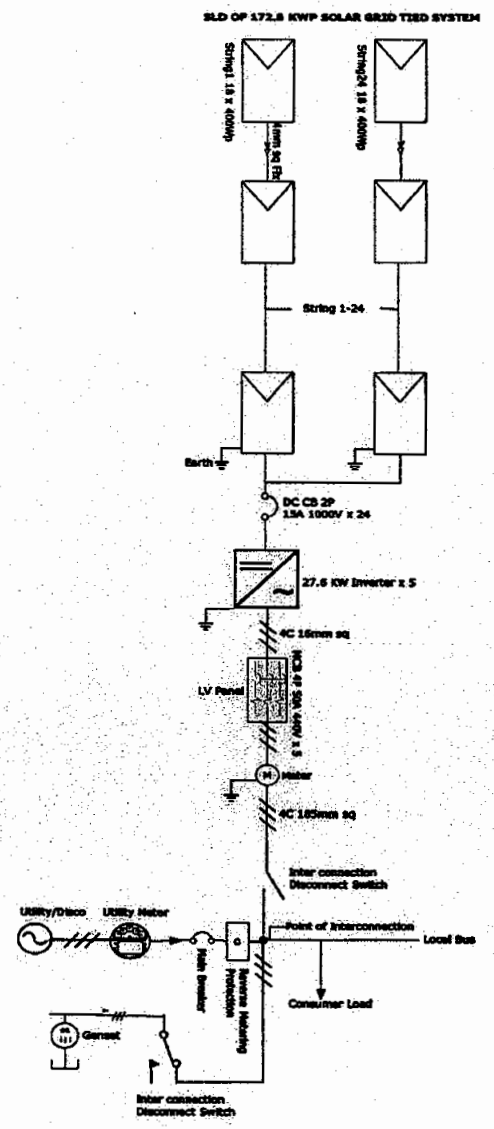
Land Coordinates of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee

Location	Area/ Roof	Site Coordinates
Atlas Honda Limited 26-27 Km Lahore-Sheikhupura Road, Sheikhupura.		
1	Test Track Area	Latitude: 31° 41' 08.9" N Longitude: 74° 05' 13.2" E Field Type Fixed tilt plane Field Parameters: Tilt 20° & Azimuth 4°
2	**Stamping Building**	Latitude: 31° 40' 55.2" N Longitude: 74° 05' 13.9" E Field Type Fixed tilt plane Field Parameters: Tilt 5° & Azimuth 0°
3	Spare Parts Logistics (SPL)	Latitude: 31° 40' 52.7" N Longitude: 74° 05' 37.5" E Field Type Fixed tilt plane Field Parameters: Tilt 5° & Azimuth 0°
4	**Complete Built Unit (CBU)**	Latitude: 31° 40' 57.6" N Longitude: 74° 05' 37.5" E Field Type Fixed tilt plane Field Parameters: Tilt 5° & Azimuth 0°

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



Generic Single Line Diagram of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



Interconnection Arrangement/Transmission Facilities for Dispersal of Power from the Generation Facility/Solar Power Plant/Solar Farm of the Licensee

1) The electric power generated from the different/ distinctly located generation facilities/Solar Power Plants/Solar Farms/ Roof Top Solar of Atlas Energy Limited-AEnL/ Licensee will be delivered/supplied to Atlas Honda Limited 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.

2) The details pertaining to different BPCs their respective supply arrangements and other relating information are provided in the subsequent description of this Schedule. Any change in the said, shall be communicated to the Authority in due course of time.

Details of
Generation Facility/Solar Power Plant/ Solar Farm

(A). General Information

(i).	Name of the Company/Licensee	Atlas Energy Limited	
(ii).	Registered/ Business office of the Company/Licensee	64/XX, Kahayaban-e-Iqbal, DHA Phase-III, Lahore.	
(iii).	Type of the generation facility/ Solar Power Plant/ Solar Farm	Solar Photovoltaic (PV)	
(iv)	Location(s) of the generation facility Solar Power Plant/ Solar Farm	**Atlas Honda Limited,** 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.	
		Location- 1	Test Track Area
		Location- 2	Stamping Building
		Location- 3	Spare Parts Logistics Building
		Location- 4	Complete Built Unit Building

(B). Solar Power Generation Technology & Capacity

(i).	Type of Technology	Photovoltaic (PV) Cell	
(ii).	System Type	On Grid	
(iii)	Installed Capacity of the generation facility Solar Power Plant/ Solar Farm (kW)	**Location 1:**	2,465.58 kWp
		Location 2:	209.28 kWp
		Location 3:	1,091.09 kWp
		Location 4:	1,161.94 kWp
		Total	**4,927.89 kWp**

(iv).	No. of Panels/ Modules	**Location 1:**	4,524	
		Location 2:	384	
		Location 3:	2,002	
		Location 4:	2,132	
		Total:	**9,042**	
(v)	PV Arrays	**Location 1:**	No. of Strings	174
			Modules in Strings	26
		Location 2:	No. of Strings	24
			Modules in Strings	16
		Location 3:	No. of Strings	77
			Modules in Strings	26
		Location 4:	No. of Strings	82
			Modules in Strings	26
(vi).	Invertor(s)	**Location 1:**	Quantity	10
			Make	HUAWEI
			Capacity of each Unit	200 KW
		Location 2:	Quantity	3
			Make	HUAWEI
			Capacity of each Unit	60 KW
		Location 3:	Quantity	4
			Make	HUAWEI
			Capacity of each Unit	200 KW
		Location 4:	Quantity	5
			Make	HUAWEI
			Capacity of each Unit	200 KW

(C). Technical Details of Equipment

(a).	**Solar Panels – PV Modules**	
(i).	Type of Module	JAM72S30-545/MR
(ii).	Type of Cell	Mono crystalline
(iii).	Dimension of each Module	2279 x 1135 x 35mm (89.72 x 44.68 x 1.38 inch)
(iv).	Total Module Area	2.586,665 m2
(v).	Frame of Panel	Anodized aluminium alloy
(vi).	Weight of one Module	28.6 kg
(vii).	No of Solar Cells in each module	144 (6×24)
(viii).	Efficiency of module	21.1 %
(ix).	Maximum Power (P_{max})	545 W_P
(x).	Voltage @ P_{max}	41.8 V
(xi).	Current @ P_{max}	13.04 A
(xii).	Open circuit voltage (V_{oc})	49.75V
(xiii).	Short circuit current (I_{sc})	13.93 A
(xiv).	Maximum system open Circuit Voltage	1000VDC (IEC)
(b).	**Inverters (200 KW-SUN2000-200KTL-H2)**	
(i).	Size/Rating	200 KW
(ii).	Input Operating Voltage Range	500 V to 1500 V

(iii).	Number of Inverters	19	
(iv).	Efficiency of inverter	99 %	
(v).	Max. Allowable Input voltage	1500V	
(vi).	Max. Current	30 A	
(vii).	Max. Power Point Tracking Range	500 V to 1500 V	
(viii).	Output electrical system	3 Phase AC	
(ix).	Rated Output Voltage	800 V, 3W + PE	
(x).	Power Factor (adjustable)	0.8 LG...0.8 LD	
(xi).	Power control	MPP tracker	
(xii).	Rated Frequency	50 Hz	
(xiii).	Environmental Enclosures	Relative Humidity	4-100%, condensing
		Audible Noise	68 dB(A) @ 1m
		Operating Elevation	2000 m
		Operating temperature	-25 to +60°C
(xiv).	Grid Operating protection	A	DC circuit breaker
		B	AC circuit breaker
		C	DC overload protection (Type 2)

		D	Overheat protection
		E	Grid monitoring
		F	Insulation monitoring
		G	Ground fault monitoring
(C).	**Inverters (60kW-SUN2000-60KTL-M0)**		
(i).	Size/Rating	60 KW	
(ii).	Input Operating Voltage Range	200 V to 1000 V	
(iii).	Number of Inverters	3	
(iv).	Efficiency of inverter	98.7 %	
(v).	Max. Allowable Input voltage	1100V	
(vi).	Max. Current	22 A	
(vii).	Max. Power Point Tracking Range	200 V to 1000 V	
(viii).	Output electrical system	3 Phase AC	
(ix).	Rated Output Voltage	230 V / 400 V, 3W + N + PE	
(x).	Power Factor (adjustable)	0.8 LG...0.8 LD	
(xi).	Power control	MPP tracker	
(xii).	Rated Frequency	50 Hz	

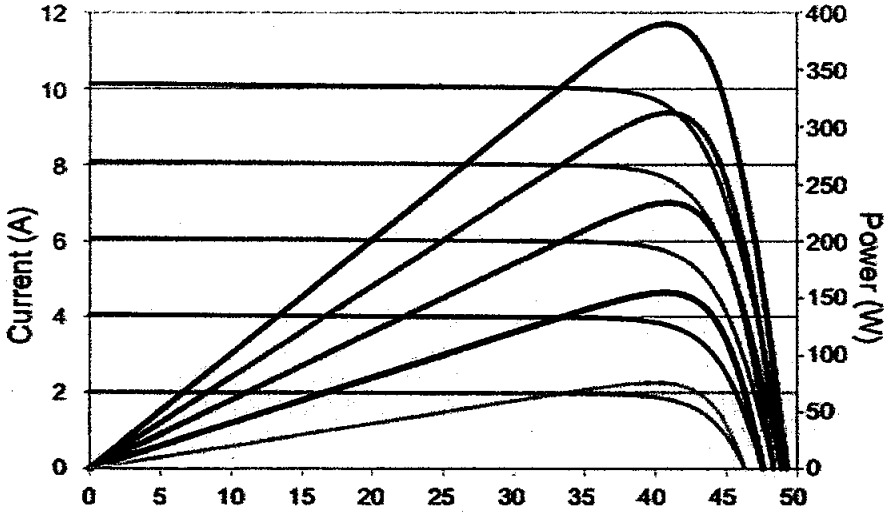
(xiii).	Environmental Enclosures	Relative Humidity	4-100%, condensing
		Audible Noise	68 dB(A) @ 1m
		Operating Elevation	2000 m
		Operating temperature	-25 to +60°C
(xiv).	Grid Operating protection	A	DC circuit breaker
		B	AC circuit breaker
		C	DC overload protection (Type 2)
		D	Overheat protection
		E	Grid monitoring
		F	Insulation monitoring
		G	Ground fault monitoring
(d).	**Data Collecting System**		
(i).	System Data	Continuous online logging with data logging software to portal.	
(f).	**Unit Transformer**		
(i)	Rated Power [kVA]		2200
(ii)	Rated High Voltage [V]		11000
(iii)	Rated Low Voltage [V]		800
(iv)	Number of Phases [ϕ]		3

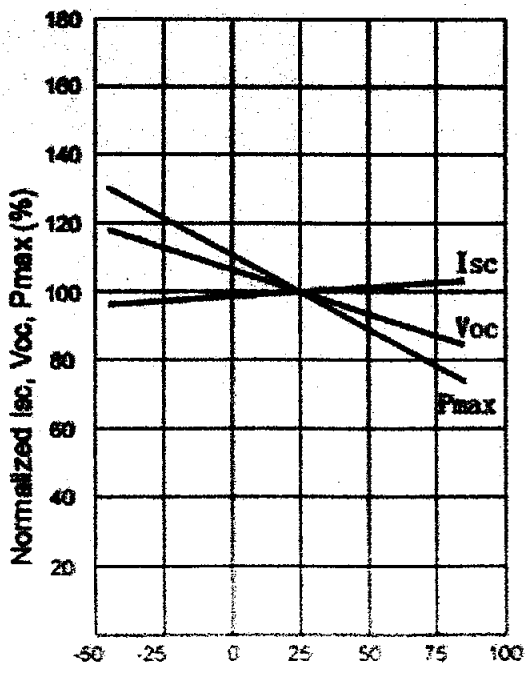
(v)	Insulation Class	A
(vi)	No. of HV Taps	6
(vii)	Type of Cooling	ONAN
(viii)	No-Load Loss [kW]	3.1
(ix)	Load Loss at Principal Tap [kW]	22.0
(x)	Impedance [%]	6.0
(xi)	HV Line Current [A]	115.47
(xii)	LV Line Current [A]	1587.71
(xiii)	Frequency [Hz]	50 HZ

(D). Other Details

(i).	Expected COD of the generation facility Solar Power Plant/ Solar Farm	30-June-2022
(ii).	Expected useful Life of the generation facility Solar Power Plant/ Solar Farm from the COD	25 years

V-I Curve
of Solar Cell of Generation Facility/Solar Power Plant/ Solar Farm





Cell Temperature (°C)

Information
Regarding Consumer(s)

(i).	No. of Consumers		01 (One)
(ii).	Location of consumers (distance and/or identity of premises)		**Atlas Honda Limited,** 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.
(iii).	Contracted Capacity and Load Factor for consumer		4,927.89 KWp/ 10 - 15%
(iv).	Specify Whether		
	(a).	The consumer is an Associate undertaking of The Licensee-If yes, specify percentage ownership of equity;	• AEnL does not have direct association with Atlas Honda Limited. • (Directorship is Common & Holding Company is same)
	(b).	There are common directorships:	Yes
	(c).	Either can exercise influence or control over the other.	Yes
(v).	Specify nature of contractual Relationship		
	(a).	Between each consumer and Atlas Energy Limited	AEnL will construct and operate solar plant and provide electricity for Atlas Honda Limited operation.
	(b).	Consumer and DISCO.	LESCO
(vi)	Any other network information deemed relevant for disclosure to or consideration of the Authority.		N/A

Information
Regarding Distribution Network for Supply of Electric Power Consumer in the name of AAL

(i).	No. of Feeders		N/A	
(ii).	** Length of Each Feeder (Meter)		**Location 1:**	500
			Location 2:	15
			Location 3:	150
			Location 4:	150
(iii).	Length of Each Feeder to each Consumer		**Location -1:**	30
			Location -2:	30
			Location -3:	40
			Location -4:	30
(iv).	In respect of all the Feeders, describe the property (streets, farms, Agri land, etc.) through, under or over which they pass right up to the premises of customer, whether they cross-over.		N/A.	
(v).	Whether owned by AEnL, Consumer or DISCO-(deal with each Feeder Separately)		N/A.	
	(a).	If owned by DISCO, particulars of contractual arrangement	N/A.	
	(b).	Operation and maintenance responsibility for each feeder	Atlas Energy Limited	

(vi).	Whether connection with network of DISCO exists (whether active or not)- If yes, provide details of connection arrangements (both technical and contractual)	Yes as Explained above
(vii).	Any other network information deemed relevant for disclosure to or consideration of the Authority.	N/A.

** Length of Cable from Solar LV Panel to Consumer LV Panel (Termination Point)

SCHEDULE-II

The Total Installed Gross ISO Capacity of the Generation Facility/Power Plant/Solar Plant (MW), Total Annual Full Load (Hours), Average Sun Availability, Total Gross Generation of the Generation Facility/Solar Farm (in kWh), Annual Energy Generation (25 years Equivalent Net Annual Production-AEP) KWh and Net Capacity Factor of the Generation Facility/Solar Farm of Licensee are given in this Schedule.

SCHEDULE-II

(1).	**Total Installed Capacity of the Generation Facility/Solar Power Plant/Solar Farm**	**Location -1:**	2,465.58 kWp
		Location -2:	209.28 kWp
		Location -3:	1,091.09 kWp
		Location -4:	1,161.94 KWp
		Total	**4,927.89 KWp**
(2).	**Average Sun Hour Availability/Day (Irradiation on Inclined Surface)**	8 to 8.5 Hours	
(3).	**No. of days per year**	365	
(4).	**Annual generating capacity of Generation Facility/Solar Power Plant/Solar Farm (As Per Simulation)**	**Location-1**	3,533 MWh
		Location-2	274 MWh
		Location-3	1,428 MWh
		Location-4	1,523 MWh
		Total	**6,759 MWh**
(5).	**Total expected generation of the Generation Facility/Solar Power Plant/Solar Farm during the twenty five (25) years term of this license**	**Location-1**	82,260 MWh
		Location-2	6,393 MWh
		Location-3	33,243 MWh
		Location-4	35,473 MWh
		Total	**157,369 MWh**
(6).	**Annual generation of Generation Facility/Solar Power Plant/Solar Farm based on 24 hours working**	**Location-1**	21,598 MWh
		Location-2	1,833 MWh
		Location-3	9,558 MWh
		Location-4	10,179 MWh
		Total	**43,168 MWh**

(7).	**Net Capacity Factor of Generation Facility/Solar Power Plant/Solar Farm**	**Location-1**	16.36 %
		Location-2	14.98 %
		Location-3	14.94 %
		Location-4	14.97 %

Note All the above figures are indicative as provided by the Licensee. The Net Delivered Energy available to Power Purchaser for dispatch will be determined through procedures contained in the Power Purchase Agreement (PPA) or the Applicable Document(s).

attractive mode of generation of electric power. Further, its use does not require refining, transporting and conveying fuels and power over long distances. Moreover, solar power does not create pollution. Naturally, Pakistan is located in the Sunny Belt and can take advantage of its ideal situation for A utilization of solar energy. The country potential for solar generation is beyond doubt as it has high solar irradiation and enough space for installation of generation system those are ideal for PV and other solar energy applications. Villages and other areas which are away from grid or distribution system of utilities can also benefit from solar power generation which will also save the extra cost of laying the system and the losses. Solar energy, on the other hand, has excellent potential in areas of Pakistan that receive high levels of solar radiation throughout the year. Every day, for example, the country receives an average of about 19 Mega Joules per square meter of solar energy Pakistan being in the Sun Belt is ideally located to take advantage of solar energy technologies. This energy source is widely distributed and abundantly available in the country. The mean global irradiation falling on horizontal surface is about 200-250 watt per sq.m in a day. This amounts to about 2500- 3000 sun shine hours and 1.9 - 2.3 MWh per sq. meter in a year. It has an average daily global isolation of 19 to 20 MJ/sq. meter per day with annual mean sunshine duration of 8 to 8.5 hours (6-7hrs in cold and 10-12 hrs. in hot season) and these values are among the highest in the world. For daily global radiation up to 23MJ/m2, 24 (80%) consecutive days are available in this area for solar energy. Such conditions are ideal for solar thermal applications.

Pakistan receives about 15.5x1014 kWh of solar irradiance each year with most regions receiving approximately 8 to 10 sunlight hours per day. The installed capacity of solar photovoltaic power is estimated to be 1600 GW per year, providing approximately 3.5 PWh of electricity (a figure approximately 41 times that of current power generation in the country). To summarize, the sun shines for 250-300 days per years in Pakistan with average sun shine hours of 8- 10 per day. This gives huge amount of energy to be used for electricity generation by solar photovoltaic and 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.

3. Environment Assessment Report:

The sites are allocated in private land (Roof Top and Ground) within the premises of Customer, and the applicant has carried out a detailed environment assessment of the sites in preparation of the Solar PV Plant.

The assessment of the Project has been considered for both positive and negative effects. The proposed photovoltaic Power Project has been located as per international guidelines. Adoption of green power generation with no emission and effluent discharge with have least impact on the ambient environment and on the host community. However, in the long term the project and related activities in areas may bring about slight change in ambient air quality of area.

The importance of the sustainable development concept has increased in the whole world. As a result, some new regulations enforce that all development projects should be compatible with the environmental criterions. An environmental impact assessment should be carried out to make sure that projects are compatible with the environmental criterions. Environmental Impact Assessment (EIA) can be defined as a process of environmental management, planning, and decision-making with a purpose of keeping and improving the quality of the environment.

The main goal is to develop environmentally friendly industrialization. With this kind of environmentally friendly industrialization, "sustainable development" can be a possibility in the

future by keeping the usage/protection balance between economic development and the environmental protection.

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

The use of solar power has additional positive implications such as:

- Reduction of the emissions of the greenhouse gases (mainly CO2, NOx) and prevention of toxic gas emissions (S02, particulates)
- Reduction of the required transmission lines of the electricity grids.

4. Study Area:

Pakistan is geographically situated approximately between 24-37 IV latitudes and 62-75 longitudes in the western zone of south Asia. The distribution of rainfall in Pakistan varies on wide ranges, mostly associated with the monsoon winds and the western disturbances, but the rainfall does not occur throughout the year. Like, Khyber Pakhtunkhwa (northern mountains) and Baluchistan provinces receive maximum rainfall in the months of December to March while in Punjab and Sindh receive 50-75% of rainfall during monsoon season (Kaziet al, 1951; FAO, 1987; Khan, 1993 & 2002; Kureshy, 1998; Luo and Lin, 1999). The precipitation received in the country can be divided into two main seasons, summer or monsoon and winter precipitation. The monsoon rainfall enters Pakistan from east and north east during the month of July to September. During this duration a good amount of rainfall is received in the north and northeastern areas of the country. Winter precipitation (December to March) are mainly received from western disturbances entering from Iran and Afghanistan. The weather systems entering from Afghanistan are called the primary western disturbances and cover only the north and north western parts of the country, whereas those approaching from the Iran are secondary and cover a large area of the Country including Baluchistan, Punjab, Khyber Pakhtunkhwa, Kashmir and northern areas and sometimes Sindh province. A large amount of snowfall is received in the northern areas, upper Khyber Pakhtunkhwa, Kashmir and northern Baluchistan and is the main source of water supply for water reservoirs of the country in dry season. This water received from the snow melt and from the seasonal rains plays an important role in the agricultural and socioeconomic activities of the country. Agriculture of Pakistan is mainly climate dependent and every area has its own crops and fruits according to its climate. The country's most important crops and fruits are grown in winter season in different areas according to its climate conditions. If there is any abnormality in the usual climate condition the nation suffers for the whole year and there is also a huge loss to the economy.

5. Zone Classification:

Detection of rainfall trend is subject to limitations: there is no clear altitudinal trend of rainfall. Therefore, for analysis, a dataset spreads over a period of 30 years (1976-2005) covering the whole country i.e. 30 stations from extreme north to south and east to west have been selected. The stations included in this study were selected on the basis of their latitudinal position, elevation from sea level, length of record, completeness and reliability of data so that a synoptic view of the entire country could be obtained. Further the selected stations have been divided into five different microclimatic zones. These zones were named A, B, C, D and E as shown in Figure 1, along with their latitudinal extent.

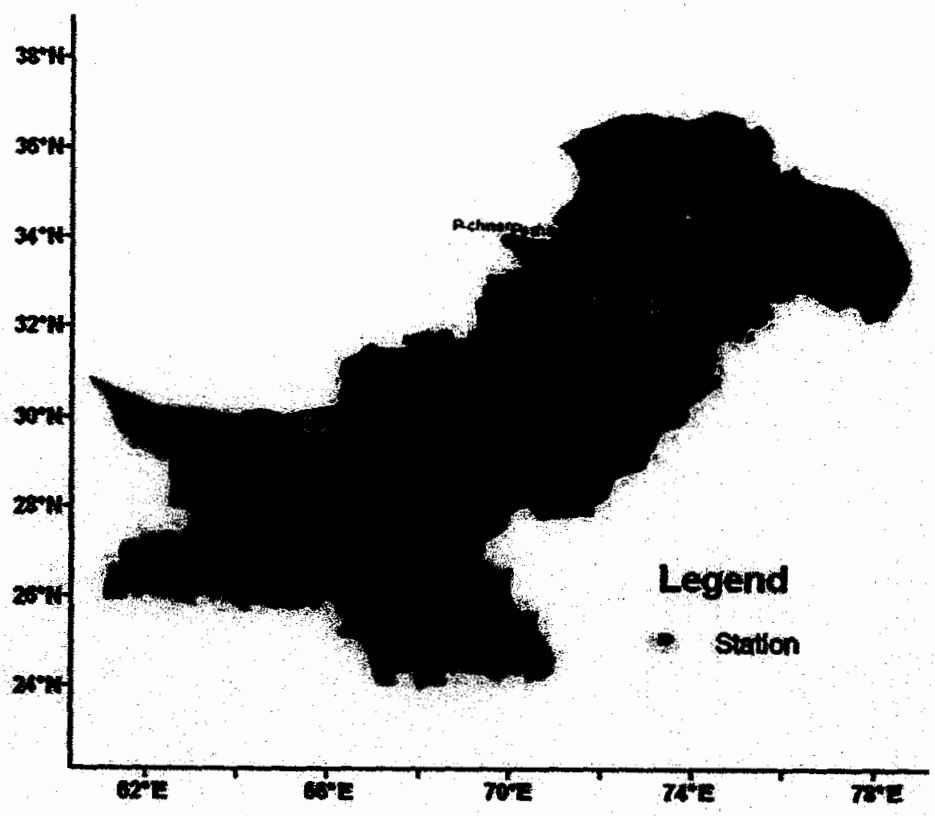


Figure 1: Map showing the climatic zones of the study area

Zone A

Zone A comprises those stations having cold climate and high mountains, situated in the north of Pakistan. These stations are Chitral, Gilgit, Muzaffarabad, Said-u- Sharif, Skardu, Astor, Dir, Chilas Parachinar and Kakul. These are mostly hill stations located between 34 N to 38 N in the Himalaya, Hindukush and Koh-e- Sufaid mountain ranges.

Zone B

This zone has mild cold climate and Sub Mountains, located between 31N to 34 N. The stations are Sialkot, D.I.Khan, Islamabad, Peshawar, Cherat and Lahore.

Zone C

Climate is cold in winters and hot in summers. Most of them are mountainous stations with high elevations from mean sea level and cover an area between 27 N to 32N and 64 E to 70 E. Stations included in this zone are Quetta, Zhob, Kalat and Khuzdar.

Zone D

This is the hottest and dry zone of the country where highest maximum temperatures are recorded in stations of Sibbi and Jacobabad. The area is almost plain with some area included in Thar Desert. Stations included are Sibbi, Jacobabad, Bahawalpur, Khanpur, Multan and Rohri.

Zone E

Zone E is a big zone having many stations and coastal cities, near to Arabian Sea. The coastal Part comprises only a small part of this region and climate above coastal parts in Baluchistan as well as in Sindh province is mostly arid to hyper arid. The selected stations from this zone are Hyderabad, Karachi, Nawabshah and Jewani.

6. Project Environmental Impacts & Mitigation Measures:

This Section discusses the potential environmental impacts, assesses the significance, recommends mitigation measure to minimize the adverse effect and identifies the residual impacts associated with the proposed activities of the project during the construction and operation phase of the proposed project at the proposed site and of secondary actions like potable, raw water and waste water lines. Solar energy is a lot cleaner when compared with conventional energy sources. Solar energy systems have many significant advantages, like being cheaper and not producing any pollutants during operation, and being almost an infinite energy source when com-pared with fossil fuels. Nevertheless, solar energy systems have some certain negative impacts on the environment just like any other energy system. Some of these impacts will be summarized in this section.

Identification of Potential Impacts:

a) Discharge of Pollutants
b) Visual Impacts
c) Impact on Natural Resources
d) Air Pollution
e) Noise Intrusion
f) Impact on Air
g) Impact on Ground Water/ Surface Water

h) Impact on Solid Waste

i) Impact on Soil

j) Impact on Natural Resources

Discharge of Pollutants: Solar cells do not emit any pollutants during their operations. But solar cell modules contain some toxic substances, and there is a potential risk of releasing these chemicals to the environment during a fire. Necessary precautions should be taken for emergency situations like fire. The possibility of an accidental release of the chemicals of the solar cell modules to soil and groundwater poses a great threat for the environment.

Visual Impacts: There will be some visual impacts depending on the type of the scheme and the surroundings of the solar cells. Especially for applications on the buildings, solar cells can be used as a cladding material that could be integrated into the building during the construction phase. Solar cell applications after the construction phase of the buildings might cause negative visual impacts. Solar cell utilization should be planned at the architectural phase and fitted to the building to minimize visual pollution. For the other application areas, proper sitting and design are important factors, especially for large solar cell applications. Another important factor about the control of the visual impacts is the use of color. Enough care should be taken for the usage of proper colors while assembling the solar cell modules.

Impacts on Natural Resources: Despite being a benign energy system during operation, solar cells have some negative impacts on the environment during their production phase like many other systems. The energy needed for the production of solar energy systems is still produced in conventional methods today. Some toxic chemical substances used during the production phase are produced as a by-product. Especially, the solar cell batteries pose a threat on natural resources by having a short lifespan and containing heavy metals such as cadmium.

Air Pollution: Solar cells do not emit any substances to the air during operation. But there could be some emissions during manufacturing and transport. The emissions associated with the transport of the modules are insignificant when compared with the emissions associated with the manufacture. Transport emissions are 0.1-1% of the manufacturing emissions.

Noise: Intrusion Solar cells do not make a noise during operation. But during the construction phase, there will be a little noise as usual in other construction activities.

Impact on Air: There would be no hazardous emissions at site as well as during construction phase except Motor Vehicle and Crane. Moreover, there are no objectionable odors as well as alternation of air temperature.

Impact on Ground Water/ Surface Water: There would be no use of water during design phase except curing of civil pads during construction, which have no negative impact on environment.

Impact on Solid Waste: It may only Create litter and trash waste which is recyclable and may be cleared from site after construction.

Impact on Soil: No impacts as all installed systems are roof top.

Impact on Natural Resources: There won't be any increase in the rate of usage of any natural resource like any minerals, additional fuel other than vehicles. But there would be increase in the amount of usage of Paper for mapping, enlisting items etc. However, paper may be recycling by throwing it in ordinary dustbin, further ensure the maximum usage of electronic system e.g. emails.

7. Environment Assessment/ Conclusion:

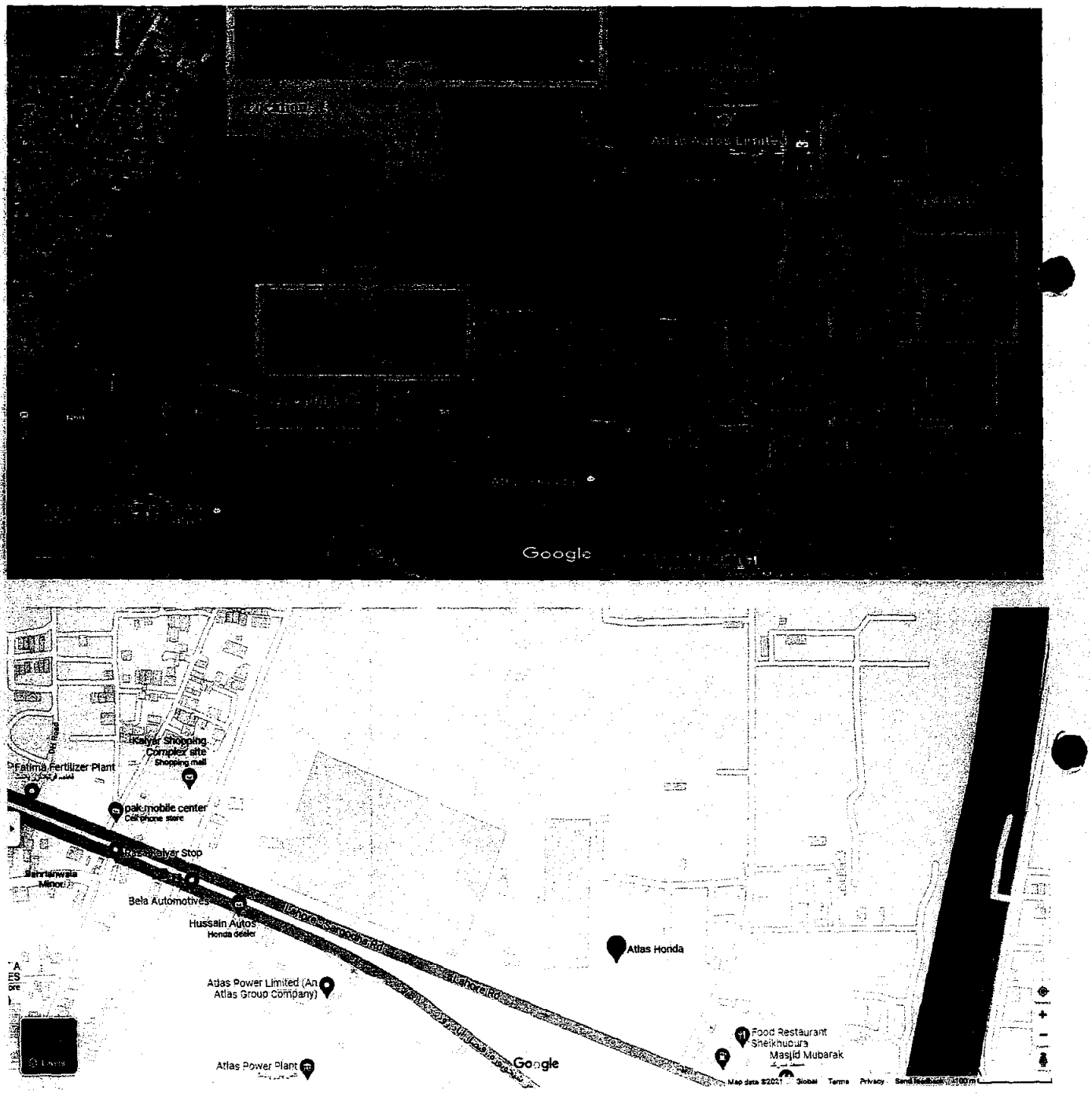
The site allocated is private land within the premises of Atlas Honda Limited (Plant) and the applicant has carried out detailed environment assessment of the site for installation of solar PV Plant. Overall findings:

Environment Parameters	Level of Impact	Reasons	Mitigation Measures
Air Impact	Low	Solar Energy is Carbon Free	(No Emissions)
Water	Low	Plant will required a very low quantity of water for cleaning purpose only	RO Plant is already installed at site and water from said source may be used for cleaning of Modules
Land	Low	No impact on Land	As said project is purely roof based which have no impact on Land
Ecosystem	Low	No ecologically sensitive area lies with in premises	There is no significant vegetation cover within the selected area
Socio Eco system	Low	Total area identified for said project is roof based and in plant premises so no acquisition is needed	Not Applicable

3(i) Location (location maps, site map, land)

1. Location maps, site maps, land

A bird's eye view of the project site is given in the figure below



Location: Atlas Honda Limited,

Atlas Honda Limited, 26/27 Km Lahore-Sheikhupura Road, Sheikhupura

3(ii) Technology, size of the plant, number of units

2. Technology, size of plant, number of units

PV Modules		
Type of Module	JAM72S30-545/MR	
No. of Modules	Location-1	4,524 (4,524 * 545 = 2,465.58 kWp)
	Location-2	384 (384 * 545 = 209.280 kWp)
	Location-3	2,002 (2,002 * 545 = 1,091.09 kWp)
	Location-4	2,132 (2,132 * 545 = 1,161.94 kWp)
	Total	9,042 (9,042 * 545) = 4,927.89 kWp
Type of Cell	Mono PERC Half-Cell	
Dimension of each Module	2279 x 1135 x 35mm (89.72 x 44.68 x 1.38 inch)	
Total Module Area	2.586 m2	
Frame of Pane	Anodized aluminium alloy	
Weight of one Module	28.6 kg	
No of Solar Cells in each module	144 (6×24)	
Efficiency of module	21.1 %	
Maximum Power (P_{max})	545 Wp	
Voltage @ P_{max}	41.8 V	
Current @ P_{max}	13.04A	
Open circuit voltage (V_{oc})	49.75V	
Short circuit current (I_{sc})	13.93 A	
Maximum system open Circuit Voltage	1000VDC (IEC)	

Inverters		
Description	Technical Specification	
Size & Model	200 KW SUN2000-200KTL-H2	60 KW SUN2000-60KTL-M0
No. of Inverters	19	3
Input Operating Voltage Range	500 V to 1500 V	200 V to 1000 V
Efficiency of inverter	99.0 %	98.7 %
Max. Allowable Input voltage	1500 V	1100 V
Max. Current	30 A	22 A
Max. Power Point Tracking Range	500 V to 1500 V	200 V to 1000 V
Output electrical system	3 Phase AC	3 Phase AC
Rated Output Voltage	800 V, 3W + PE	230 V / 400 V, 3W + N + PE
Power Factor (adjustable)	0.8 LG..0.8 LD	0.8 LG..0.8 LD
Power control	MPP Tracker	MPP Tracker
Rated Frequency	50 Hz	50 Hz

Mounting Structure	
Structure	Mild Steel Hot dip Galvanized / Aluminum
Tilt Angle	Location 1 : 15° Location 2, 3 & 4: 5°
Degradation Factor	First Year 2.5% & remaining 24 Years 0.6%

Data Collecting System	
System Data	Continuous online logging with data logging software to portal

3(iii) Water source at site for maintenance

Ground Water is available at Site which can be used during Construction and Operation Phase

3(iv) Infrastructure: roads, rail, staff colony, amenities

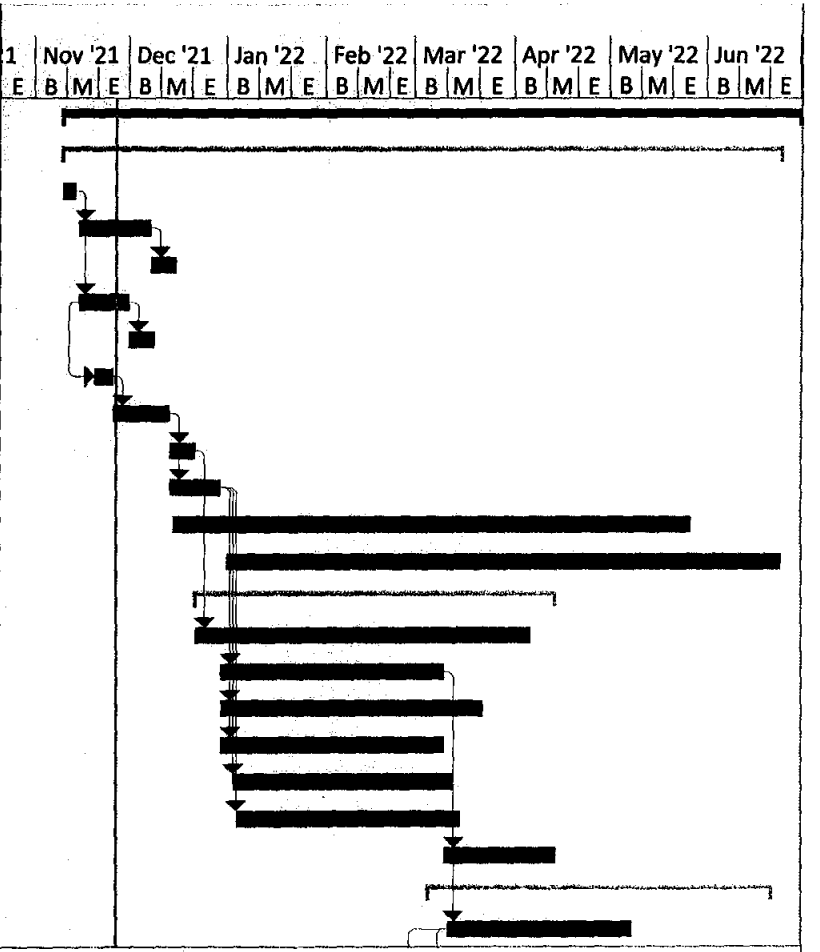
The Locations of Solar Plant is:

Atlas Honda Limited, 26/27 Km Lahore-Sheikhupura Road, Sheikhupura.

The Site is adjacent to existing roads network and is accessible by all means of Transportation.

3(v) Project commencement and completion schedule with milestones

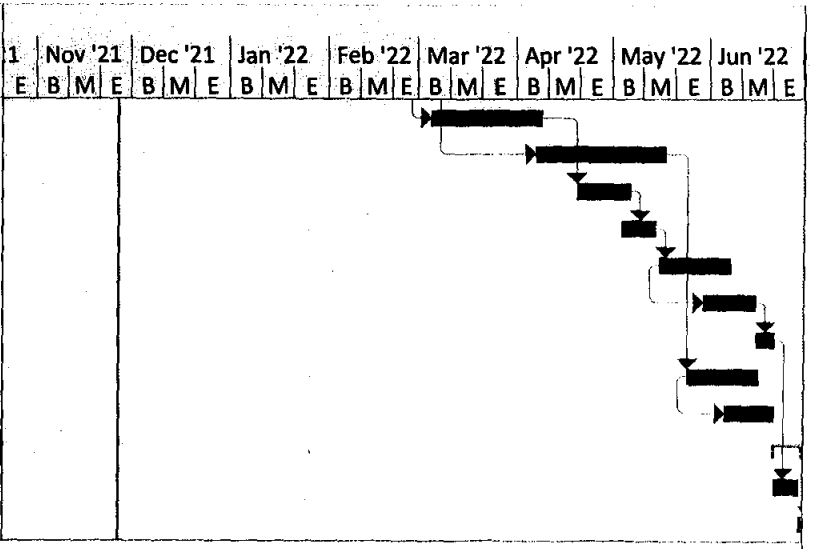
ID	Task Mode	Task Name	Duration	Start	Finish
1		Project Commencement and Completion Schedule	200 days	Wed 10/11/21	Thu 30/06/22
2		Project Flow			
3		Site Survey	4 days	Wed 10/11/21	Sat 13/11/21
4		Layout and Structure Design	20 days	Mon 15/11/21	Tue 07/12/21
5		Structure Design Approval	7 days	Wed 08/12/21	Wed 15/12/21
6		LV Panel and Cables Design	14 days	Mon 15/11/21	Tue 30/11/21
7		Inverter Room Layout and Design	7 days	Wed 01/12/21	Wed 08/12/21
8		PVSyst Design Simulation	5 days	Sat 20/11/21	Thu 25/11/21
9		Identification and Finalization of suppliers for equipmen	15 days	Fri 26/11/21	Mon 13/12/21
10		Ordering of Imported Equipment	7 days	Tue 14/12/21	Tue 21/12/21
11		Ordering of Local Equipment	14 days	Tue 14/12/21	Wed 29/12/21
12		GL Application Submission and Approval	140 days	Wed 15/12/21	Thu 26/05/22
13		SBP Financing Application Submission and Approval	150 days	Sat 01/01/22	Fri 24/06/22
14		Procurement			
15		Solar Panels Arrival	90 days	Wed 22/12/21	Tue 05/04/22
16		Mounting Structure Arrival	60 days	Thu 30/12/21	Wed 09/03/22
17		Inverters & Transformer Arrival	70 days	Thu 30/12/21	Mon 21/03/22
18		AC/DC/Earthing Cables Arrival	60 days	Thu 30/12/21	Wed 09/03/22
19		Cable Trays Arrival	60 days	Mon 03/01/22	Sat 12/03/22
20		LV / MV Panels Arrival	60 days	Tue 04/01/22	Mon 14/03/22
21		Cosumables Arrival	30 days	Thu 10/03/22	Wed 13/04/22
22		Project Execution			
23		Mounting Structure Installation	50 days	Fri 11/03/22	Sat 07/05/22



Project: AHL SKP Project 5 MWp P
Date: Sat 27/11/21

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

ID	Task Mode	Task Name	Duration	Start	Finish
24		Inverter Room Construction	30 days	Sat 05/03/22	Fri 08/04/22
25		Solar Panels Mounting	35 days	Thu 07/04/22	Tue 17/05/22
26		Inverters/LV Panel/Transformer Mounting	15 days	Wed 20/04/22	Fri 06/05/22
27		AC/DC Cable Tray Laying	10 days	Wed 04/05/22	Sat 14/05/22
28		AC/DC Cables Laying	20 days	Mon 16/05/22	Tue 07/06/22
29		DC Cables Interlooping/Termination	15 days	Mon 30/05/22	Wed 15/06/22
30		Main AC Cables (LV/MV) Termination	5 days	Thu 16/06/22	Tue 21/06/22
31		Solar Panels/Inverters/LV/MV Panels Earthing	20 days	Wed 25/05/22	Thu 16/06/22
32		Earth Boring and Lightning Arrestors Installation	14 days	Mon 06/06/22	Tue 21/06/22
33		**Testing and Commissioning**			
34		Pre-Commissioning Testing of Inverters	7 days	Wed 22/06/22	Wed 29/06/22
35		Project Commissioning	1 day	Thu 30/06/22	Thu 30/06/22



Project: AHL SKP Project 5 MWp P
Date: Sat 27/11/21

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

3(vi) Safety plans, emergency plans

Safety plans, emergency plans

- Only qualified and authorized electricians will be allowed to undertake servicing or maintenance tasks.
- The authorized personnel will wear appropriate equipment, including a safety harness to restrain from falling off the roof, sturdy shoes that will have thick rubber soles to provide electrical insulation and good grip and appropriate clothing for personal protection, including a hat, sunglasses, gloves and long pants and sleeves.
- Lock out and tag out procedures will be used before commencement of maintenance tasks.
- On-going operation and maintenance concerns for solar power systems will be addressed properly. These systems are exposed to outdoor weather conditions that enhance the aging process, and the infrastructure needs to be in place for the on-going maintenance of these systems to assure their safe operation.
- Properly grounded or double insulated power tools will be used for maintenance tasks.
- Tools will be maintained in good condition.
- Working on electrical equipment and circuits will be carried out in de-energized state.
- Proper pathways will be available for operation, maintenance and firefighting.
- Fire protection and suppression will be placed at site.

3(vii) Plant characteristics (generation voltage, frequency etc.)

Plant characteristics: generation voltage, power factor, frequency, automatic generation.

Generation Voltage	380 to 480
Power Factor	0.8 LG...0.8 LD
Frequency	50 Hz
Automatic Generation Control	Included
Ramping Rate	N/A
Control Metering And Instrumentation	DC circuit breaker AC circuit breaker DC overload protection (Type 2) Overheat protection Grid monitoring Insulation monitoring Ground fault monitoring