



# Ittefaq Power Limited

Head Office : 40-B-II, Gulberg-III, Lahore - Pakistan  
Ph: (042) 35765021-26 Fax: (042) 35759546  
E-mail: info@alshafigroup.com E-mail: ittefaq.power@gmail.com

Ref. No. IPL/HO-16/00109

**The Registrar**  
**National Electric Power Regulatory Authority (NEPRA)**  
NEPRA Office Building,  
Sector G-5/1,  
Ataturk Avenue (East),  
Islamabad

**Subject: Application for a Generation License**

I, Mr. Usman Javed, Chief Executive Officer, being the duly authorized representative of *IttefaqPowerLimited* (IPL) by virtue of Resolution of Board of Directors dated 10<sup>th</sup> November 2016, hereby apply to the National Electric Power Regulatory Authority for the grant of a Generation License to IPL pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

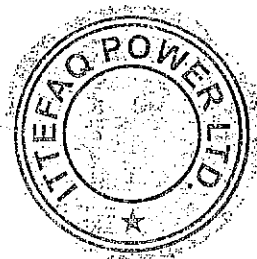
I certify that the documents-in-support attached with this application are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, and undertake to abide by the terms and provisions of the above-said regulations. I further undertake and confirm that the information provided in the attached documents-in-support is true and correct to the best of my knowledge and belief.

ABank Draft (No. 02728568) dated 10<sup>th</sup> November 2016 drawn on Meezan Bank, Ghalib Market Branch, Lahore in the sum of Rupees Two Hundred Ninety Three Thousand and Seven Hundred Seventy Six only (PKR 293,776), 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.

Date: 29-11-2016

Yours faithfully

Usman Javed  
Chief Executive Officer



# **RESOLUTION OF BOARD OF DIRECTORS**



# Ittefaq Power Limited

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Ph: (042) 35765021-26 Fax: (042) 35759546  
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**EXTRACTS OF THE RESOLUTIONS OF BOARD OF DIRECTORS OF  
ITTEFAQ POWER LIMITED  
PASSED IN THEIR MEETING HELD ON 10<sup>th</sup> November 2016  
AT 40 -B-II Gulberg III, LAHORE**

The Board of Directors of ITTEFAQ POWER LIMITED a public company duly formed and registered in the Islamic Republic of Pakistan having incorporation No. 0093809(the "**Company**") and having its registered office at 40-B-II, Gulberg III, Lahore, in their meeting held on 10<sup>th</sup> November 2016, passed the following resolutions:

**UNANIMOUSLY RESOLVED** that the Company should approach National Electric Power Regulatory Authority (NEPRA) for Generation License under the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

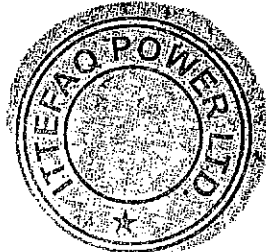
**Further Resolved**, that Mr. Usman Javed, Chief Executive Officer, Mr. Ahsan-Ul-Haq Abid, Group General Manager Finance & Accounts, and Mr. ShehzadBazmi, Company Secretary, of the Company be and are hereby jointly and singly authorized to do any or all of the following acts, deeds and things, on behalf of the Company, in connection with this application to be filed with NEPRA under the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 and the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999:

- Represent the Company before NEPRA, and in doing so perform all lawful acts, deeds and things, including but not limited to filing, signing, presenting, modifying, amending, withdrawing applications and other documents, responding to any queries and meeting any objections, receiving notices and documents; and
- Do all acts, deeds and things, which are ancillary and incidental to the afore-said purposes.

**Further Resolved**, that extracts of this resolution be provided to the NEPRA with the seal/stamp duly affixed thereon.

Shahzad Bazmi

Company Secretary

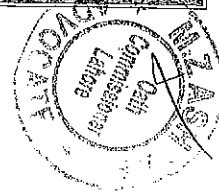


Usman Javed

Chief Executive Officer

# **AFFIDAVIT**





**AFFIDAVIT**

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**CHIEF EXECUTIVE**

CNIC # 35200-1525704-3

ATTESTED  
M.Z. Ashraf Advocate  
Oath Commissioner Lhr

# LETTER OF INTENT



Government of Pakistan  
Alternative Energy Development Board  
Ministry of Water & Power  
2<sup>nd</sup> Floor, OPF Building, Sector G-5/2, Islamabad  
Tele: 051-9222360, Fax: 051-9222364



Ref: B/3/21/2016/Bagasse-Biomass/IPPL

October 04, 2016

Mr. Ahsan-UI-Haq Abid  
Group General Manager Finance,  
M/s Ittefaq Power Private Limited  
Ittefaq Sugar Mills Limited,  
40-B-II, Gulberg-III,

Lahore.

Ph: 042-35765021-26

Fax: 042-35759546

Subject: LETTER OF INTENT (LOI) TO M/S ITTEFAQ POWER PRIVATE LTD FOR DEVELOPMENT OF 31.20MW (GROSS) HIGH PRESSURE CO-GENERATION POWER PROJECT AT ITTEFAQ SUGAR MILLS LIMITED, SHAFIABAD, CHANNI GOTH, DISTRICT BAHAWALPUR, PUNJAB.

Reference: This refers to your proposal No. 'Nil' dated August 15 and August 22, 2016 on the subject cited above.

Alternative Energy Development Board ("AEDB") hereby confirms its interest in your proposal for establishing a 31.20 MW (Gross) Bagasse /Biomass based High Pressure Co-generation Power Plant under SPV i.e. M/s Ittefaq Power Private Limited (IPPL) for development of 31.20MW (Gross) Cogeneration Power Project at its Mill located at Shafiabad, Channi Goth, District Bahawalpur, Punjab, ("Project") under the Framework for Power Co-Generation 2013 Bagasse/Biomass. AEDB acknowledges receipt of the Bank Guarantee No. SBL-2016-0042 furnished by the Sponsor(s) dated September 21, 2016 to the tune of PKR 1,712,000/- with validity period up to March 20, 2018.

2. The Sponsor(s) is required to achieve the milestones listed at the Annex to this LOI ("LOI Milestones") for the subject project, at no risk and at no cost to, and without any obligation on the part of the AEDB, the Government of Pakistan, any Provincial Government or their respective agencies, within a period of 12 calendar months from the date of issuance of this Letter of Intent ("LOI").

3. The Sponsor(s) is required to carry out grid interconnection studies and environmental study. The Sponsor is also advised to liaise with the power purchaser while determining the sub-station design and layout, the transmission line, interconnection arrangements, and other related matters.

4. The validity of this LOI is 12 calendar months from the date of its issue, where after it will automatically lapse immediately.(unless extended pursuant to clauses 5 or 6), being the **October 04, 2017** (the "Expiry Date"). Issuance of this LOI or the lapsing of its validity, cannot form the basis of any claim for compensation or damages by the Sponsor(s) or the project company or any party claiming through or under them against the Government of Pakistan, the Provincial Government, AEDB or any of their agencies, employees or consultants on any grounds whatsoever, during or after the expiry of the validity of the LOI.

5. The Sponsor(s) is therefore required to achieve the LOI Milestones for the subject project within the validity of this LOI. The Sponsor(s) is also required to submit monthly progress reports. Provided the Sponsor(s) continues to pursue the project diligently, the Expiry Date of this LOI shall be extended on a day-for-day basis for the number of days of delay by which the approval or review by the relevant public sector entity listed in the LOI Milestones is delayed beyond the corresponding period stated in the LOI Milestones. In case there is a delay in achieving milestones within the validity of this LOI for reasons not attributable to a public sector entity, a one-time extension may be granted up to a maximum period of 90 days if AEDB is satisfied with the progress, provided that the Sponsor(s) enhance the amount of the bank guarantee to twice its original amount and extend its validity for a period of 06 months beyond the extended Expiry Date.

6. The Sponsor(s) shall apply to NEPRA for award of Upfront tariff within the period of validity of this LOI. Upon Upfront tariff being given, the Sponsor(s) shall forthwith submit a new Performance Guarantee in the sum of US\$ 78,000/- (US Dollars Seventy Eight Thousands Only) and obtain the Letter of Support ("LOS") from AEDB within the validity period of this LOI, provided, if the award of the Upfront tariff is delayed beyond the initial validity of the LOI, the Sponsor(s) shall extend the bank guarantee for a further period of 06 months and the Expiry Date shall be extended *ipso facto* for a further period of 03 months, and the Sponsor(s) shall obtain the LOS and submit the Performance Guarantee within the extended period afore-said.

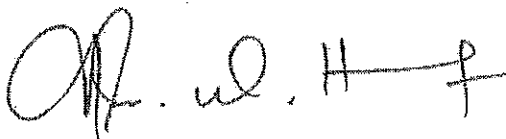
7. In case the Sponsor(s) fails to meet the LOI Milestones or perform any other obligations set forth in the Policy and this LOI, including the extension of the date of expiry of bank guarantee as provided herein, AEDB will terminate this LOI and encash the bank guarantee.

8. M/s Ittefaq Power Private Limited and its majority shareholders as of the date of this LOI shall be the Main Sponsors of the Project.

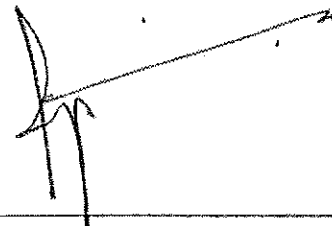
9. Arrangement of land and fuel (Biomass/Bagasse) will be the responsibility of Sponsor.

10. This LOI is not assignable and non-transferable. This LOI shall be void upon any actual or purported assignment or transfer hereof without the prior written consent of AEDB.

11. This LOI is issued in duplicate on the date hereof, and it shall come into effect when one copy is received by AEDB after being duly countersigned by you. Nevertheless, this LOI shall lapse if the countersigned copy is not received at AEDB within 07 days of its issuance.



(Mr. Ahsan-Ul-Haq Abid  
Group General Manager Finance,  
M/s Ittefaq Power (Pvt.) Limited



(Mr. Amjad A. Awan)  
Chief Executive Officer  
Alternative Energy Development Board

S.No.	Activity	Maximum Time
1	Power Producers to submit request for Letter of Intent (LOI) with Standard proposal document and Bank Guarantee to AEDB.	
2	Issuance of Standard LOI by AEDB.	i) 7 days for sugar mills ii) 30 days for other entities as per procedure described in Renewable Energy Policy 2006.
3	Generation License to be issued by NEPRA.	10 days
4	Acceptance of Upfront tariff to the project.	10 days
5	Power Purchaser to approve Grid Interconnection Study.	30 days after submission of Grid Interconnection Study to the relevant agency by the Power Producer.
6	Issuance of LOS by AEDB upon submission of Performance Guarantee by Power Producer.	15 days
7	Energy Purchase Agreement finalization.	30 days
8	Signing of Implementation Agreement.	15 days

A

OF

**CERTIFIED TRUE COPY OF  
CERTIFICATE OF  
INCORPORATION**



A009436

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN  
COMPANY REGISTRATION OFFICE, LAHORE

CERTIFICATE OF INCORPORATION

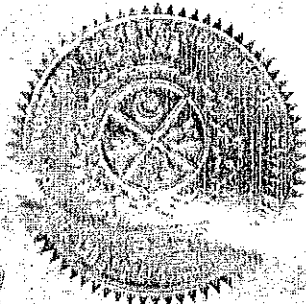
[Under section 32 of the Companies Ordinance, 1984 (XLVII of 1984)]

Corporate Universal Identification No. 0093809

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

Given under my hand at Lahore this Fourth day of June, Two Thousand  
and Fifteen.

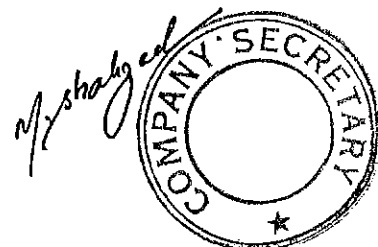
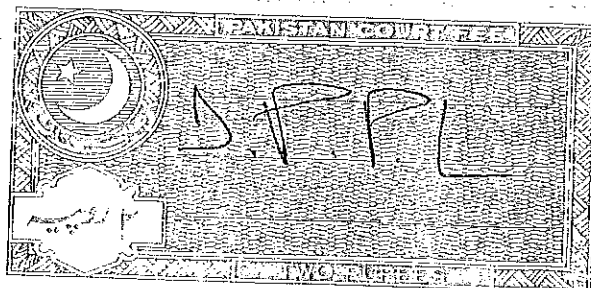
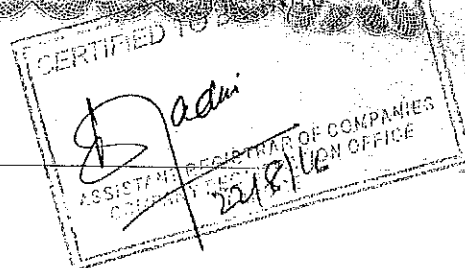
Fee Rs. 14,000/-



  
(LIAQAT ALI DULLA)  
Additional Registrar

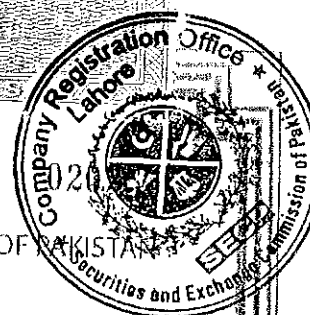
No: ARI/20283

DATED: 4-6-2015





SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN  
LAHORE



CERTIFICATE ON CONVERSION OF PRIVATE COMPANY INTO  
PUBLIC COMPANY

[See regulation 6(c)]

[Under Section 41 (3) of the Companies Ordinance, 1984 (XLVII of 1984)]

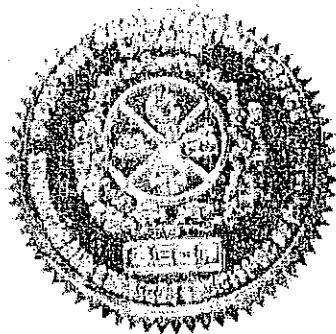
Corporate Universal Identification No 0093809

I hereby certify that pursuant to the provisions of Section 45 read with sub-section (3) of Section 41 of the Companies Ordinance, 1984 (XLVII of 1984), "ITTEFAQ POWER (PRIVATE) LIMITED" has complied with the requirements precedent and incidental to the conversion of a Private Company into a Public Company. The said company stands converted into a Public Company with effect from 22-09-2016.

Given under my hand at Lahore this 2<sup>nd</sup> day of November, Two Thousand and Sixteen.

Fee Rs.1,500/-


  
(LIAQAT ALI DOLLA)  
Additional Registrar



No. ARL/ 8039

Dated: 2/11/16

CERTIFIED TO BE TRUE COPY

  
JOINT REGISTRAR OF COMPANIES  
COMPANY REGISTRATION OFFICE  
LAHORE



**CERTIFIED TRUE COPY OF  
MEMORANDUM OF  
ASSOCIATION**

## THE COMPANIES ORDINANCE, 1984

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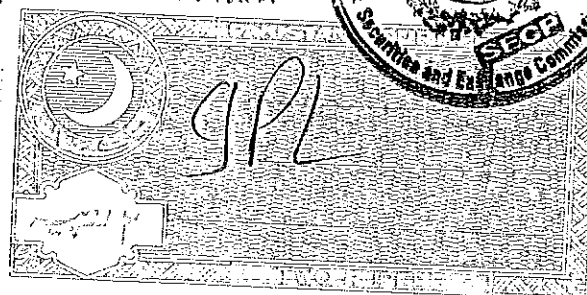
(PUBLIC COMPANY LIMITED BY SHARES)

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Memorandum of Association  
of

## ITTEFAQ POWER LIMITED

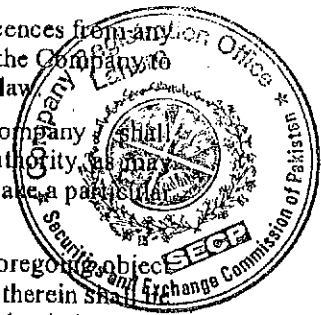
1. The name of the Company is "ITTEFAQ POWER LIMITED".
- II. The Registered Office of the Company will be situated in the Province of Punjab.
- III. The objects for which the Company established, are all or any of the following:-
  1. To design, insure, construct, acquire, own, operate and maintain power generation complexes and to carry on the business of electricity generation, power transmission, power transmission lines and distribution services, over hauling and re-powering of power plants and to deal in electrical and other appliances cables, dry cells accumulators, lamps and to work, generate, accumulate, distribute and supply electricity for the purpose of light, heat, motive power and for all other purposes for which electrical energy can be employed and to manufacture and deal in all apparatuses and things required for or capable of being used in connection with the generation, distribution, supply, accumulation and employment of electricity, including in the term electricity all power that may be incidentally hereafter discovered in dealing with electricity.
  2. To carry out the business of manufacturers and suppliers of power generation plants and distribution systems of power, steam, gas, diesel, hydro thermal power, solar, transfer of technology, manufacturing of solar cell / biogas / windmills and any other new technology, gasgenerators, farmers, carriers and merchants, and to buy, sell, manufacturer, repair, convent, alter, let on hire, and deal in machinery including workshops and field services.
  3. To manufacture and deal in all apparatuses and things required for or capable of being used in connection with the generation, distribution, supply, accumulation and employment of electricity, including in the term electricity all power that may be incidentally hereafter discovered in dealing with electricity and also to deal in sale of spares and equipments required for the above purposes whether, as manufacturers, importer and / or as indenter / trader.
  4. To provide consultancy services and to enter into and perform any plant / power plant operation and maintenance (O&M) agreement as contractor or subcontractor or any other engineering, construction erection, and supervision contract with regard to the plants / power plants and to enter negotiation and agreements with governments authorities / agencies semi government bodies or any other private associations, persons, corporations and companies for the sale of fuel supply or other inputs, sale of electricity in any mode.
  5. To carry on the business of hydro electric sites, operation and maintenance, services of power generation plants and distribution systems of power, steam, gas, diesel, solar, gas-generators, farmers, carriers and merchants, and to buy, sell, manufacturer, repair, convent, alter, let on hire, and deal in machinery including workshops and field services.



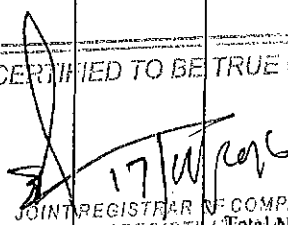
6. ✓ To register the company with National and International bodies for availing carbon credit against emission reduction and to market carbon credit in local and international market for the benefit of the company.
7. ✓ To carry on business of agricultural farming, dairy farming, poultry farming, sheep farming and fish farming in all perspectives and to sell, process, store or deal in any manner with the products and by-products derived from all such farms and for that purpose to undertake do all such acts, deeds, and things which would be required to carry on the above said functions effectively and efficiently.
8. ✓ To make use of the by-products derived from the agricultural farming, dairy farming, fish farming, poultry farming, animal keeping, slaughter house and other operations mentioned in these presents in any profitable manner including preparation of manure, fertilizer, bio-fuels and any other feasible use thereof and to do all such acts, deeds and things as would be required to derive maximum benefit of the products and byproducts.
9. ✓ To carry on and undertake trading business and to act as indentors, importers, exporters, traders, suppliers, manufacturers and commission agents of general item products and materials in any form or shape manufactured or supplied by any company, firm, association of persons, body, whether incorporated or not, individuals, Government, SemiGovernment or any local authority.
10. ✓ To acquire, own, construct, establish, install, maintain, work, manage, operate, control or aid in or contribute or subscriber to the construction, erection and maintenance of recreational water games park, equipment and machinery for amusement, swimming pools, fountains, pleasure grounds and parks.
11. ✓ To apply for tender, offer, accept, purchase or otherwise acquire any contracts and concessions for or in relation to the projection, execution, carrying out improvements, management, administrations or control of works and conveniences and undertake, execute, carry out, dispose of or otherwise turn to account the same.
12. ✓ To purchase, take on lease or in exchange, hire, apply for or otherwise acquire and hold for any interest, any rights, privileges, lands, building, easements, trade marks, patents, patent rights, copyrights, licences, machinery, plants, stock-in-trade and any movable and immovable property of any kind necessary or convenient for the purposes of or in connection with the Company's business or any branch or department thereof and to use, exercise, in respect of or otherwise turn to account any property, rights and information so acquired, subject to any permission required under the law.
13. To acquire by concession, grant, purchase, barter, licence either absolutely or conditionally and either solely or jointly with others any lands, buildings, machinery, plants, equipments, privileges, rights, licences, trade marks, patents, and other movable and immovable property of any description which the Company may deem necessary or which may seem to the Company capable of being turned to account, subject to any permission as required under the law.
14. To enter into arrangements with the government or authority (supreme, municipal, local or otherwise) or any corporation, company or persons that may seem conducive to the Company's objects or any of them and to obtain from any such government, authority, corporation, company or person any charters, contracts, rights, privileges and commission which the Company may think desirable and to carry on exercise and comply with any such charters, contracts, decrees, rights, privileges and concessions.



15. To open accounts with any Bank or Banks and to draw, make, accept, endorse, execute, issue, negotiate and discount cheques, promissory notes, bills of exchange, bills of lading, warrants, deposit notes, debentures, letter of credit and other negotiable instruments and securities legally permissible.
  16. To arrange local and foreign currency loans from scheduled banks, industrial banks and financial institutions for the purpose of purchase, manufacture, market, supply, export and import of machinery, construction of factory, building and for the purpose of working capital or for any other purpose.
  17. To sell or otherwise dispose of the whole or any part of the undertaking of the Company, either together or in portions for such consideration as the Company may think fit and in particular, for shares, debenture-stock or securities of any Company purchasing the same.
  18. To distribute any of the Company's property and assets among the members in specie or in any manner whatsoever in case of winding up of the Company.
  19. To guarantee the performance of contract and obligations of the Company in relation to the payment of any loan, debenture-stock, bonds, obligations or securities issued by or in favour of the Company and to guarantee the payment or return on such investments.
  20. To carry out joint venture agreements with other companies or countries within the scope of the objects of the Company.
  21. To cause the Company to be registered or recognised in any foreign country.
  22. To do and perform all other acts and things as are incidental or conducive to the attainment of the above objects or any of them.
  23. To apply for and obtain necessary consents, permissions and licences from any Government, State, Local and other Authorities for enabling the Company to carry on any of its objects into effect as and when required by law.
  24. Notwithstanding anything stated in any object clause, the Company shall obtain such other approval or licence from the competent authority as may be required under any law for the time being in force, to undertake a particular business.
  25. It is declared that notwithstanding anything contained in the foregoing object clauses of this Memorandum of Association nothing contained therein shall be construed as empowering the Company to undertake or to indulge in business of payment systems, Electronic funds transfers in and outside Pakistan, deposit taking from general public, network marketing, referral marketing & direct selling banking company, leasing, investment, managing agency, insurance business, any of the NBFC business, multi-level marketing (MLM), Pyramid and Ponzi Scheme, commodity, future contract or share trading business locally or internationally, directly or indirectly as restricted under the law or any unlawful operation.
- IV. The liability of the members is limited.
- V. The Authorised Capital of the Company is Rs. 1,000,000/- (Rupees One Million only) divided into 100,000 ordinary shares of Rs. 10/- (Rupees Ten only) each with powers to the company from time to time to increase and reduce its capital subject to any permission required under the law.



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

Name and Surname (Present & Former) in Full (in Block Letters)	C.N.I.C. No. (in case of foreigner, Passport No.)	Father's / Husband's Name (in Full)	Nationality with any former Nationality	Occupation	Residential Address (in Full)	Number of shares taken by subscriber	Signatures
1. USMAN JAVED	35200- 1525704-3	S/o Muhammad Javed Shafi	Pakistani	Business	179 - H, Model Town, Lahore.	2,000 Two Thousand	
2. YOUSAF ZAHID	35200- 3235698-1	S/o Zahid Shafi	Pakistani	Business	179 - 182 H, Model Town, Lahore.	2,000 Two Thousand	
<div style="border: 1px solid black; padding: 5px; text-align: center;">           CERTIFIED TO BE TRUE COPY              17/11/2016            JOINT REGISTRAR OF COMPANIES            COMPANY REGISTRATION            LAHORE         </div>						4,000 Four Thousand	

Dated this .....day of .....

Witness to the above signatures :

Full Name : Muhammad Shahzad

C.N.I.C. # 34502-4743721-3

Father's

Full Name : Muhammad Abdul Majeed

Signature .....

Nationality : Pakistani

Occupation : Business

Full Address : 158 - Jade Park View Housing  
Society, Multan Road, Lahore.

**CERTIFIED TRUE COPY OF  
ARTICLES OF ASSOCIATION**

## THE COMPANIES ORDINANCE, 1984

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(PUBLIC COMPANY LIMITED BY SHARES)

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# Articles of Association of ITTEFAQ POWER LIMITED

## PRELIMINARY

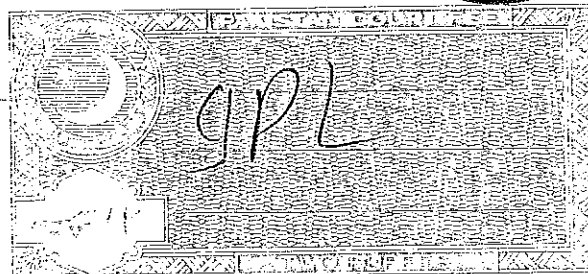
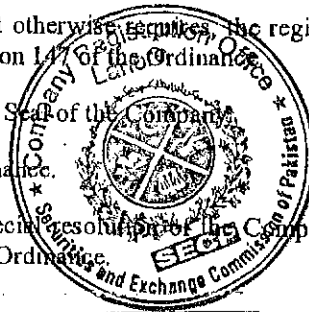
1. The regulations in Table "A" in the First Schedule to the Companies Ordinance, 1984 shall not apply to the Company except as reproduced herein :

Table 'A' Not to  
apply.

2. In these Articles, unless the context or the subject matter otherwise requires :

Interpretation

- (a) "Articles" means these Articles as originally framed or as from time to time altered in accordance with law.
- (b) "Board" means a meeting of the Directors duly called and constituted or as the case may be, the Directors assembled at a Board.
- (c) "Company" means "ITTEFAQ POWER LIMITED".
- (d) "Directors" means the Directors for the time being of the Company or as the case may be, the Directors assembled at a Board.
- (e) "Month" means calendar month according to the English Calendar.
- (f) "Office" means the Registered Office for the time being of the Company.
- (g) "Ordinance" means the Companies Ordinance, 1984 or any modification or re-enactment thereof for the time being in force.
- (h) "Register" means, unless the context otherwise requires, the register of members to be kept pursuant to Section 147 of the Ordinance.
- (i) "Seal" means the common or official Seal of the Company.
- (j) "Section" means Section of the Ordinance.
- (k) "Special Resolution" means the special resolution of the Company as defined in Section (2)(1)(36) of the Ordinance.



- (l) Words importing masculine gender include the feminine gender.
- (m) Words importing singular number include the plural number and vice versa.
- (n) Expression referring to writing shall, unless the contrary intention appears, be construed as including references to printing, lithography, photography and other modes of representing or reproducing words in a visible form.
- (o) Words importing persons shall include bodies corporate.
- (p) The head notes are inserted for convenience and shall not affect the construction of these Articles.
- (q) Unless the context otherwise requires words or expressions contained in these Articles shall bear the same meaning as in the Ordinance.

### PUBLIC COMPANY

Public Company

3. The Company is a Public Company within the meanings of Section 2(1)(30) of the Companies Ordinance, 1984.

### CAPITAL

Capital

4. The Authorised Capital of the Company is Rs. 1,000,000/- (Rupees One Million only) divided into 100,000 ordinary shares of Rs. 10/- (Rupees Ten only) each with powers to increase and reduce the Capital of the Company and to divide the shares in the Capital for the time being into several classes in accordance with the provisions of the Companies Ordinance, 1984.

Allotment of Shares

5. The Directors shall, as regards any allotment of shares, comply with such of the Provisions of Section 68 to 73 as may be applicable to the Company. The minimum subscription upon which the Directors may proceed to make the first allotment has been fixed as Rs. 100,000/-.

Shares Certificates

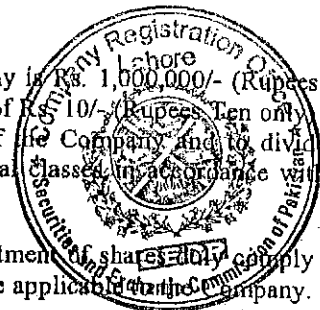
6. Every person whose name is entered as a member in the Register shall, without payment, be entitled to receive within ninety days after allotment or within forty-five days of the application for registration of transfer, a certificate under the Seal specifying the share or shares held by him and the amount paid up thereon. Provided that, in respect of a share or shares held jointly by several persons, the Company shall not be bound to issue more than one certificate, and delivery of a certificate for a share to one of several joint holders shall be sufficient delivery to all.

Issuance of new Certificates

7. If a Share Certificate is defaced, lost or destroyed, it may be renewed on payment of such fee, if any, not exceeding one rupee, and on such terms, if any, as to evidence and indemnity any payment of expenses incurred by the Company in investigating title as the Directors think fit.

Bar on use of Company Funds

8. Except to the extent and in the manner allowed by Section 95, no part of the funds of the Company shall be employed in the purchase of, or in loans upon the security of, the Company's shares.





### TRANSFER OF SHARES

9. The instrument of transfer of any share in the Company shall be executed both by the transferor and transferee and the transferor shall be deemed to remain holder of the share until the name of the transferee is entered in the Register in respect thereof.

Transfer

10. Shares in the Company shall be transferred, without fee, in the following form, or in any usual or common form which the Directors shall approve ;

Form of Transfer

I.....of..... in consideration of the sum of Rs..... Paid to me by..... of.....(hereinafter called the "Transferee") do hereby transfer to the Transferee.....the share(s) numbered..... to .....inclusive, in **ITTEFAQ POWER LIMITED** to hold into 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 (or shares) subject to the conditions aforesaid.

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

Transferor

Transferee

Signature

Signature

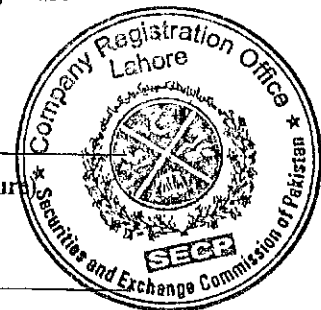
WITNESSES :

1. \_\_\_\_\_  
(Signature)

2. \_\_\_\_\_  
(Signature)

Full Address : \_\_\_\_\_

Full Address of \_\_\_\_\_



11. The Directors shall not refuse to transfer any fully paid shares unless the transfer deed is defective or invalid. The Directors may also suspend the registration of transfer prior to the determination of entitlement or rights of the shareholders by giving seven days previous notice in the manner provided in the Ordinance. The Directors may decline to recognize any instrument of transfer unless the duly stamped instrument of transfer is accompanied by the certificate of the shares to which it relates, and such other evidence as the Directors may reasonably require to show the right of the transferor to make the transfer.

Non-refusal of  
Transfer of Shares

Notice in case of  
Refusal

12. If the Directors refuse to register a transfer of shares, they shall within thirty (30) days after the date on which the transfer deed was lodged with the Company send to the transferee and the transferor notice 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 transfer deed with the Company. The transferor or transferee or the person who gave intimation of the transmission by operation of law, as the case may be, may appeal to the commission against any refusal of the Company to register the transfer or transmission or against any failure on its parts within period as specified in Section 78 for which Section 78/A will be applicable.

### TRANSMISSION OF SHARES

Transmission

13. The executors, administrators, heirs, or nominees as the case may be, of a deceased sole holder of a share shall be the only persons recognized by the Company as having any title to the shares. In the case of a share registered in the names of two or more holders, the survivor or survivors, or executors or administrators of the deceased survivor shall be the only persons recognized by the Company as having any title to the share.

Election to  
Register or  
Transfer

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

Rights of Person  
entitled by  
Transmission

15. A person becoming entitled to a share by reason of the death or insolvency of the holder shall be entitled to the same dividends and other advantages to which he would be entitled if he were the registered holder of the share, except that he shall not before being registered as a member in respect of the share be entitled in respect of it to exercise any right conferred by membership in relation to meetings of the Company.

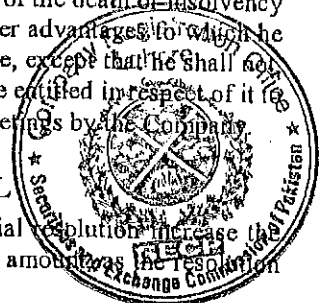
### ALTERATION OF CAPITAL

Power to  
Increase Capital

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

Offer to existing  
Members

17. Subject to the Provisions of the Ordinance, all new shares shall, before issue be offered to such persons as at the date of the offer are entitled to receive notices from the Company of General Meetings in proportion, as nearly as the circumstances admit, to the amount of the existing shares to which they are entitled. The offer shall be made by notice specifying the number of shares offered, and limiting a time within which the offer if not accepted, will be deemed to be declined and after the expiration of that time, or on the receipt of an intimation from the person to whom the offer is made that he declines to accept the shares offered, the Directors may dispose of the same in such manner as they think most beneficial to the Company. The Directors may likewise so dispose of any new shares which (by reason of the ratio which the new shares bear to shares held by persons entitled to an offer of new shares) cannot, in the opinion of the Directors, be conveniently offered under this regulation.



18. Subject to the provisions of Section 87 of the Ordinance, the Company may issue ordinary shares or grant option to convert into ordinary shares the outstanding balance of any loans advances or credit or other non-interest bearing securities and obligations or having a term of not less than three years in the manner provided in any contract with any scheduled bank or financial institution to the extent of twenty per cent (20%) of such balance.

Conversion of Loan  
to Ordinary shares

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

Provisions  
applicable to new  
Shares

20. The Company may, by ordinary resolution :

Consolidation and  
Subdivision

(a) Consolidate and divide its share capital into shares of larger amount than its existing shares ;

(b) sub-divide its existing shares or any of them into shares of smaller amount than is fixed by the Company's Memorandum of Association, subject, nevertheless, to the provisions to clause (d) of sub-section (1) of Section (92).

(c) Cancel any shares which at the date of passing of the resolution have not been taken or agreed to be taken by any person.

21. The Company may, by Special Resolution, reduce its share capital in any manner and with, and subject to any incident authorized and consent required by law

Reduction of Share  
Capital

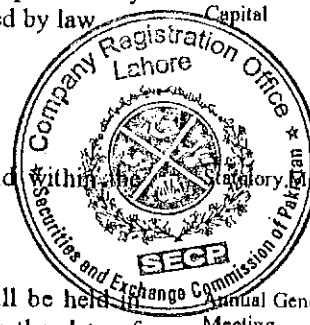
### GENERAL MEETINGS

22. The Statutory General Meeting of the Company shall be held within the period required by Section 157.

23. A General Meeting to be called Annual General Meeting, shall be held in accordance with provisions of Section 158, within eighteen months from the date of incorporation of the Company thereafter once at least in every calendar year within a period of four months following the close of its financial year and not more than fifteen months after the holding of its last preceding Annual General Meeting as may be determined by the Directors.

24. All General Meetings of the Company other than the Annual General Meeting shall be called Extraordinary General Meetings.

Other Meetings



## Extraordinary Meeting

25. The Directors 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 is provided by Section 159. If at any time there are not within Pakistan sufficient Directors capable of acting to form a quorum, any Director of the Company may call an Extraordinary General Meeting in the same manner as nearly as possible as that in which Meetings may be called by the Directors.

## Notice of Meeting

## NOTICE AND PROCEEDINGS OF GENERAL MEETINGS

26. Twenty one days notice at least (exclusive of the day on which the notice is served or deemed to be served, but inclusive of the day for which notice is given) specifying the place, the day and the hour of Meeting and, in case of special business, the general nature of that business, shall be given in the manner provided by the Ordinance for the General Meeting, to such persons as are, under the Ordinance or the regulations of the Company, entitled to receive such notices from the Company; but the accidental omission to give notice to, or the non-receipt of notice by, any member shall not invalidate the proceedings at any General Meeting.

## Special Business

27. All business shall be deemed special that is transacted at an Extraordinary General Meeting, and also all that is transacted at an Annual General Meeting, with the exception of declaring a dividend, the consideration of the accounts, balance sheet and the reports of the Directors and auditors, the election of Directors, the appointment of and the fixing, of the remuneration of the auditors.

## Quorum

28. No business shall be transacted at any General Meeting unless a Quorum of members is present at that time when the meeting proceeds to business. Two members present personally who represent not less than twenty five per cent of the total voting power, either on their own account or as proxies shall be a quorum.

## Effect of Quorum Not being present

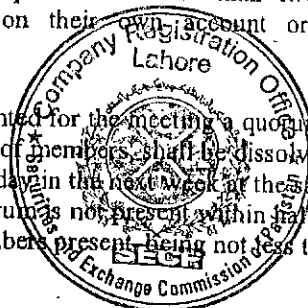
29. If within half an hour from the time appointed for the meeting a quorum is not present, the meeting, if called upon the requisition of members, shall be dissolved; in any other case, it shall stand adjourned to the same day in the next week at the same time and place, and, if at the adjourned meeting 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

30. The Chairman of the Board of Directors, if any, shall preside as Chairman at every General Meeting of the Company, but if there is no such Chairman, or if at any meeting he is not present within fifteen minutes after the time appointed for the meeting, or is unwilling to act as Chairman, any one of the Directors present may be elected to be Chairman, and if none of the Directors is present, or willing to act as Chairman, the members present shall choose one of their member to be Chairman.

## Adjournment

31. The Chairman may, with the consent of any meeting at which a Quorum is present (and shall if so directed by the meeting), adjourn the meeting from time to time but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting.



32. At any 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 result of the show of hands) demanded. Unless a poll is so demanded, a declaration by the Chairman 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 of the proceedings of the Company shall be conclusive evidence of the fact, without proof of the number or proportion or the votes recorded in favour of, or against, that resolution.

Voting

33. A Poll may be demanded only in accordance with the provisions of Section 167.

Demand for Poll

34. If a Poll is duly demanded it shall be taken in accordance with the manner laid down in Section 168 and the result of the Poll shall be deemed to be the resolution of the meeting at which the Poll was demanded.

Manner of taking Poll

35. A Poll demanded on the election of Chairman or on a question of adjournment shall be taken at once.

Time of taking Poll

36. In the case of an equality of Votes, whether on a show of hands or on a poll, the Chairman of the meeting at which the show of hands takes place, or at which the Poll is demanded, shall have and exercise a second or Casting Vote.

Casting Vote

### VOTES OF MEMBERS

37. On a show of hands every member present in person shall have one Vote except for election of Directors in which case the provisions of Section 178 shall apply. On a Poll every member shall have voting rights as laid down in Section 160.

38. In case of Jointholders, the Vote of the senior who tenders a Vote, whether in person or by proxy, shall be accepted to the exclusion of the Votes of the other Jointholders; and for this purpose seniority shall be determined by the order in which the names stand in the register.

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

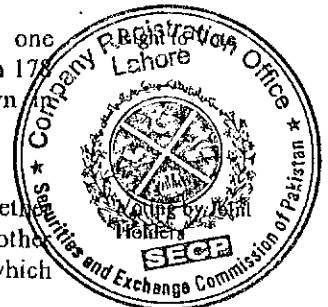
Member of Unsound Mind

40. On a poll vote may be given either personally or by proxy. Provided that nobody corporate shall vote by proxy as long as a resolution of its Directors in accordance with the provisions of Section 162 is in force.

Voting by Corporation Representations

41. The instrument appointing a Proxy shall be in writing under the hand of the appointer or of his attorney duly authorized in writing. A Proxy must be a member of the Company.

Proxy to be in Writing



Instrument  
appointing  
Proxy to be  
deposited

42. 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 Registered 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.

43. An instrument appointing a proxy may be in the following form, or a form as near thereto as may be.

### ITTEFAQ POWER LIMITED

Form of Proxy

44 I/We ..... of .....  
(full address) being the member(s) of **ITTEFAQ POWER LIMITED** hereby  
appoint Mr. / Mrs. / Miss ..... of  
..... (who is also member of the  
Company vide Registered Folio No. .... (being  
member of Company) as my / our Proxy to attend at and vote for my / us and on my /  
our behalf at the ..... Annual / Extra Ordinary General  
Meeting of the Company to be held at ..... on  
..... at ..... and at any adjournment thereof.

Revocation of  
Authority

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

### DIRECTORS

Number of  
Directors

46. Unless otherwise determined by the Company, the number of Directors shall not be less than three and if the Company applies for listing on Stock Exchanges, then the number of Directors shall not be less than seven.

First Directors

47. The following are the First Directors of the Company who shall hold office till the first Annual General Meeting.

1. USMAN JAVED
2. YOUSAF ZAHID

Qualification of  
Directors

48. Save as provided in Section 187, no person shall be appointed as a Director unless he is a member of the Company and holds shares of the minimum value of Rs. 10,000/- in his own name relaxable in the case of Directors representing interest holding shares.



49. The remuneration of a Director for performing extra services, including holding of the office of Chairman, and the remuneration to be paid to any Director for attending the meetings of the Directors or a committee of Directors shall from time to time be determined by the Board of Directors in accordance with law.

Remuneration of  
Directors

### CHAIRMAN

50. The Directors may from time to time appoint one of their members to be the Chairman of the Company for a period not exceeding three years on such terms and conditions as they deem fit. The Chairman shall preside over the meetings of the Board of Directors and members of the Company. In his absence, the Directors may elect one of them to preside over the Board Meeting. The questions arising at the meeting of the Directors shall be decided by a majority of votes. In the case of equality of votes, the Chairman, or the Director presiding over the meeting, as the case may be, shall have a casting vote.

Chairman

### CHIEF EXECUTIVE

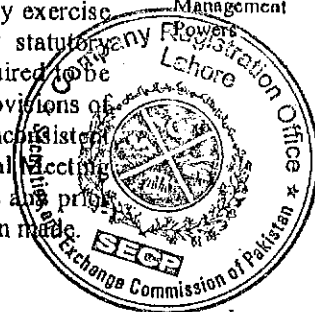
51. The first Chief Executive of the Company will be appointed by the Board of Directors within fifteen days from the date of incorporation of the Company who shall hold office till the first Annual General Meeting.

Chief Executive

### POWERS AND DUTIES OF DIRECTORS

52. The business of the Company shall be managed by the Directors, who may pay all expenses incurred in promoting and registering the Company, and may exercise all such powers of the Company as are not by the Ordinance or any statutory modification thereof for the time being in force, or by these regulations, required to be exercised by the Company in General Meeting, subject nevertheless to the provisions of the Ordinance or to any of these regulations, and such regulations being not inconsistent with the aforesaid provisions, as may be prescribed by the Company in General Meeting but no regulation made by the Company in General Meeting shall invalidate any prior act of the Directors which would have been valid if that regulation had not been made.

General  
Management



### BORROWING POWERS

53. The Board may from time to time borrow any money for the purposes of the Company from its members or from any other person, firms, companies, corporations, Government Agencies, institutions or the Directors may themselves lend moneys to the Company.

Borrowing Powers  
and giving of  
Securities

54. The Board may raise and secure payment of such sums of money in such manner and upon such terms and conditions in all respects as it may think fit, and in particular by the issue of TFC's bonds, perpetual or redeemable debentures or by mortgage or charge or other security on the whole or any part of the property, assets and rights of the Company (both present and future), of the Company.

Raising Moneys

Condition of  
Bond/Securities

55. Any TFC's, bonds, debentures or other securities issued or to be issued by the Company shall be under the control of the Board which may issue them upon such terms and conditions and in such manner and for such consideration as shall be considered to be for the benefit of the Company.

Special Powers  
to Issue  
Securities

56. Any TFC's, bonds, debentures or other securities may be issued with any special privileges as to redemption, surrender, drawing, convertibility into shares, attending and voting at General Meetings of the Company, appointment of Directors, and otherwise, provided that debentures with the right to vote or to be converted into shares shall be issued with the consent of the Company in General Meeting in terms of Section 114 of the Ordinance.

Power to  
appoint  
Attorney

57. The Directors may from time to time, by Power of Attorney under the Company's seal, appoint any person or persons to be the 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 presents) and for such period and subject to such conditions as the Directors may from time to time think fit. Any such attorney(s) may, if authorised by the Directors, delegate all or any of the powers vested in him/them.

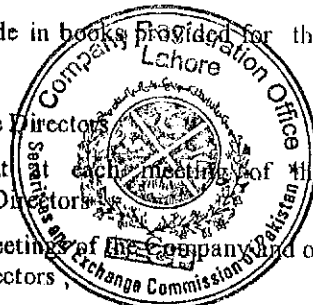
Duties of  
Directors

58. The Directors shall duly comply with the provisions of the Ordinance and in particular with the provisions in regard to the registration of the particulars of mortgages and charges affecting the property of the Company or created by it, to the keeping of a register of the Directors, and to the sending to the Registrar of an annual list of members and a summary of particulars relating thereto and notice of any consolidation or increase of share capital, or sub-division of shares, and copies of Special Resolutions and a copy of the register of Directors and notifications of any changes therein.

## Minutes Books

59. The Director shall cause minutes to be made in books provided for the purpose of :

- (a) all appointments of officers made by the Directors
- (b) the names of the Directors present at each meeting of the Directors and of any Committee of the Directors
- (c) all resolutions and proceedings at all meetings of the Company and of the Directors and of Committees of Directors
- (d) and every Director present at any meeting or Directors of Committee of Directors shall sign his name in a book to be kept for that purpose.



### DISQUALIFICATION OF DIRECTORS

Disqualification  
of Directors

60. No person shall become a Director of the Company if he suffers from any of the disabilities or disqualifications mentioned in Section 187 and, if already a Director, shall cease to hold such office from the date he so becomes disqualified or disabled or provided, however, that no Director shall vacate his office by reason only of his being a member of any company which has entered into contracts with, or done any work for the Company but such Director shall not vote in respect of any such contract or work, and if he does so his vote shall not be counted.



## PROCEEDINGS OF DIRECTORS

61. The Directors may meet together for the despatch of business, adjourn and otherwise regulate their meetings, as they think fit. The quorum for a meeting of Directors shall not be less than one-third or two, whichever is greater. Questions arising at any meeting shall be decided by a majority of votes. In case of an equality of votes, the Chairman shall have and exercise 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. It shall not be necessary to give notice of a meeting of Directors to any Director for the time being absent from Pakistan.

Meeting of  
Directors

62. The Directors may elect a Chairman of their meetings and determine the period for which he is to hold office but, if no such Chairman is elected, or if at any meeting the Chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as Chairman, the Directors present may choose one of their number to be Chairman of the meeting.

Chairman of  
Directors Meetings

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

Committee

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

Chairman of  
Committee  
Members

65. A Committee may meet and adjourn as it thinks proper. Questions arising at any meetings shall be determined by a majority of votes of the members present. In case of an equality of votes, the Chairman shall have and exercise a second or casting vote.

Proceedings of  
Committee  
Members

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



67. A resolution in writing circulated to all the Directors signed by all the Directors or affirmed by them through telex or telegram shall be as valid and effectual as if it had been passed at a meeting of the Directors duly convened and held.

Resolution in  
Writing

## ELECTION AND REMOVAL OF DIRECTORS

68. At the first Annual General Meeting of the Company, all the Directors shall stand retired from office, and thereafter shall be re-elected in their place in accordance with Section 178 for a term of three years.

Election & Term of  
Directors

Eligibility for  
Re-election

69. A retiring Director shall be eligible for re-election.

Mode of  
Election

70. The Directors of the Company, unless the number of persons who offer themselves to be elected is not more than the number of Directors fixed by the Board of Directors, shall be elected to office by the members in General Meeting in the following manner :

- (a) A member shall have such number of votes as is equal to the product of the number of voting shares or securities held by him and the number of Directors to be elected.
- (b) A member may give all his votes to a single candidate or divide them between more than one of the candidates in such manner as he may choose.
- (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.

Change in  
number of  
Directors

71. Subject to the provisions of the Ordinance, the Company may from time to time in General Meeting increase or decrease the number of Directors.

Filling of Casual  
Vacancy

72. Any Casual vacancy occurring on the Board of Directors may be filled up by the Directors, but the person so chosen shall be subject to retirement at the same time as if he had become a Director on the day on which the Director in whose place he is chosen was last elected as Director.

Removal of  
Director

73. The Company may remove a Director but only in accordance with the provisions of the Ordinance.



### NOMINEE DIRECTOR

74. In addition to the elected Directors, the Financial Institutions shall be entitled, during the currency of their respective loan(s) to the Company, to appoint one person on the Board of Directors of the Company to be called Nominee Director and to recall and/or replace such a person from time to time. Such Nominee Director on the Board of Directors of the Company may not be holder of Share(s) in the Capital of the Company and the Articles 67 to 72 and other regulations and or rules pertaining to the election, retirement, qualification and/or disqualification of the Director shall not apply to him.

### THE SEAL

Common Seal

75. The Directors shall provide a Common Seal of the Company which shall not be affixed to any instrument except by the authority of a resolution of the Board or by a committee of Directors authorised in that behalf by the Directors, and two Directors of one Director and the secretary of the Company shall sign every instrument to which the Common Seal is affixed.

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

Official Seal

### DIVIDENDS AND RESERVES

77. The Company in General Meeting may declare dividends but no dividend shall exceed the amount recommended by the Directors.

Declaration of Dividends

78. 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.

Interim Dividends

79. No dividend shall be paid otherwise than out of profits of the year or any other undistributed profits.

Dividends Payable out of Profits

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

Dividends Payable on Amount Paid on Shares

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

Reserve Fund

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

83. Any General Meeting may resolve that any moneys, investments, or other assets forming part of the undivided profits of the Company standing to the credit of any reserve or other fund or in the hands of the Company and available for dividend (or representing premiums received on the issue of shares and standing to the credit of the shares premium account) be capitalized and distributed amongst such of the shareholders as would be entitled to receive the same if distributed by way of dividend and in the same proportions on the footing that they become entitled thereto as capital and that all or any part of such capitalized fund be applied on behalf of such shareholders in paying up in full, any unissued shares, debentures or debenture-stock of the Company which shall be distributed accordingly and that such distribution or payment shall be accepted by such shareholders in full satisfaction of their interest in the said capitalized sum.



Effect of  
Transfer

84. A transfer of shares shall not pass the right to any dividend declared thereon before the registration of the transfer.

Dividends to  
Joint Holders

85. If several persons are registered as jointholders of any share, any one of them may give effectual receipt for any dividend payable on the shares.

Notice of  
Dividend

86. Notice of any dividend that may have been declared shall be given in the manner hereinafter mentioned to the persons entitled to share therein.

Period for  
Payment of  
Dividend

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

Unclaimed  
Dividends

88. All dividends unclaimed for six years after having been declared shall be kept in trust by the Company but may be invested or otherwise made use of by the Directors for the benefit of the Company until claimed.

### ACCOUNTS

Books of  
Account

89. The Directors shall cause to be kept proper Books of Account as required under Section 230.

Place where  
Books kept

90. The Books of Account shall be kept at the Registered Office of the Company or at such other place as the Directors shall think fit and shall be open to inspection by the Directors during business hours.

Inspection by  
Members

91. The Directors shall from time to time determine whether and to what extent and at what time and places and under what conditions of regulations the accounts and books or papers of the Company or any of them shall be open to the inspection of members not being Directors, and no member (not being a Director) shall have any right of inspecting any Account and Book or papers of the Company except as conferred by law or authorised by the Directors or by the Company in General Meeting.

Annual  
Accounts

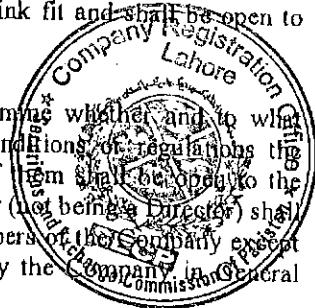
92. The Directors shall as required by Sections 233 and 236 cause to be prepared and to be laid before the Company in General Meeting such Profit and Loss Accounts and Balance Sheets and reports as are referred to in those sections.

Balance Sheet  
and Profit and  
Loss Account

93. A Balance Sheet, Profit and Loss Account, and other reports referred to in the preceding Article shall be made out in every year and laid before the Company in the Annual General Meeting made up to a date not more than four months before such meeting. The Balance Sheet and Profit and Loss Account shall be accompanied by a report of the auditors of the Company and the report of Directors.

Copy of  
Accounts to be  
sent to Members

94. A copy of the Balance Sheet and Profit and Loss Account and reports of Directors and auditors shall, at least twenty one days preceding the meeting, be sent to the persons entitled to receive notices of General Meetings in the manner in which notices are to be given as hereinafter provided.



95. Every Account of the Directors when audited and approved by a General Meeting shall be conclusive except as regards any errors discovered therein within three months next after the approval thereof. Whenever any such error is discovered within that period the account shall forthwith be corrected and thenceforth shall be conclusive.

When Accounts  
Settled

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

Compliance with  
Ordinance

### AUDIT

97. Once at least every year the accounts of the Company shall be audited and the correctness of Profit and Loss Account and Balance Sheet ascertained by one or more Auditors. The Auditors shall be appointed and their duties regulated in accordance with Sections 252 to 255 of the Companies Ordinance 1984.

Audits

### SECRETARY

98. The Board may appoint a Secretary of the Company who shall perform such functions and duties as are required in these Articles, or as may be directed by the Board.

Secretary

### NOTICES

99. Notices shall be given by the Company to Members and Auditors of the Company and other persons entitled to receive notices in accordance with Section

### SECRECY

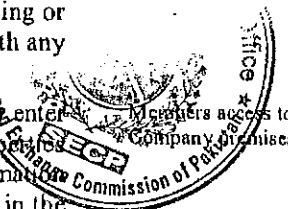
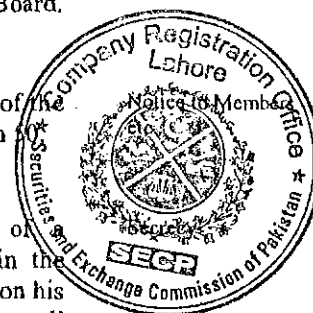
100. Every Director, Manager, Adviser, Auditor, Trustee, Member of Committee, Officer, Servant, Agent, Accountant or other person employed in the business of the Company shall, if so, required by the Directors, before entering upon his duties, sign a declaration pledging himself to observe a strict secrecy respecting all transactions of the Company with its customers and the state of accounts with individuals and in matters relating thereto, and shall by such declaration pledge himself not to reveal any of the matters which may come to his knowledge in the discharge of his duties except when required to do so by the Directors or by any General Meeting or by any Court of Law and except so far as may be necessary in order to comply with any of the provisions in these presents.

101. No member or other person (not being a Director) shall be entitled to enter upon the property of the Company or examine the Company's premises or properties without the permission of the Directors, and to require discovery of or any information respecting any detail of the Company's trading or any matter which is or may be in the nature of a trade secret, mystery of trade, or secret process or of any matter whatsoever which may relate to the conduct of the business of the Company and which in the opinion of the Directors will be inexpedient, in the interest of the members of the Company to communicate.

### RECONSTRUCTION

102. On any sale of the undertakings of the Company the Directors or the liquidators on a winding up may, if authorised by a Special Resolution, accept fully paid shares, debentures or securities of any other company, either then existing or to be formed for the purchase in whole or in part of the property of the Company, and the Directors (if the profits of the Company permit), or the liquidators (in a winding up), may distribute such shares or securities, or any other properties of the Company

Reconstruction



amongst the members without realization, or vest the same in trustees for them and any Special Resolution may provide for the distribution or appropriation of the cash, shares or other securities, benefits or property, otherwise than in accordance with the strict legal rights of the members or contributories of the Company for the valuation of any such securities or property at such price and in such manner as the meeting may approve and all holders of shares shall be bound to accept and shall be bound by any valuation or distribution so authorised and waive all rights in relation thereto save only such statutory rights (if any) as are, in case the Company is proposed to be or in the course of being wound up, incapable of being varied or excluded by these presents.

#### WINDING UP

Division and  
Distribution of  
Assets upon  
Dissolution

103. If the Company is wound up, the liquidator may, with the sanction of a Special Resolution of the Company and any other sanction required by Ordinance, divide amongst the members in specie or kind the whole or any part of the assets of the Company (whether they consist of property of same kind or not) and may, for such purpose, set such value as he deems fair upon any property to be divided as aforesaid and may determine how such division shall be carried out as between the members or different classes of members. The liquidator may, with the like sanction, vest the whole or any part of such assets in trustees upon such trust for the benefit of the contributories, as the liquidator with the like sanction, shall think fit, but so that no member shall be compelled to accept any shares or other securities whereon there is any liability.

#### INDEMNITY

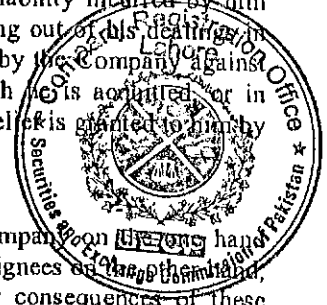
Indemnification

104. Every officer or agent for the time being of the Company may be indemnified out of the assets of the Company against any liability incurred by him in defending any proceedings, whether civil or criminal, arising out of his dealings in relation to the affairs of the Company, except those brought by the Company against him, in which judgement is given in his favour or in which he is acquitted or in connection with any application under Section 488 in which relief is granted to him by the Court.

#### ARBITRATION

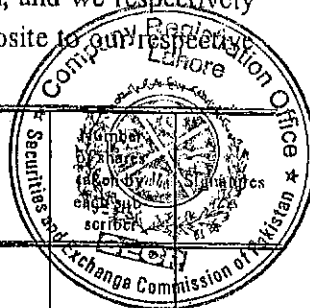
Difference to be  
Referred to  
Arbitrator(s)

105. Whenever any difference arises between the Company on the one hand and any of the members, their executors, administrators or assignees on the other hand, touching the true intent or construction, or the incident or consequences of these Articles or of the statutes or touching anything there or thereafter done, executed, omitted or suffered in pursuance of these Articles or of the statutes or touching any breach or alleged breach of these Articles, or any claim on account of any such breach or alleged breach, or otherwise relating to the premises, or to these Articles or to any statute affecting the Company or to any of the affairs of the Company, every such difference shall, as a condition precedent to any other action at law be referred in conformity with the Arbitration Act, 1940, or any statutory modification thereof and any rules made thereunder, to the decision of an Arbitrator to be appointed by the parties in difference or if they cannot agree upon a single Arbitrator to the decision of two Arbitrators of whom one shall be appointed by each of the parties in difference, or in the event of the two Arbitrators not agreeing, then of an umpire to be appointed by the two Arbitrators, in writing, before proceeding on the reference, and such decision shall be final and binding on the parties.



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

Name and Surname (Present & Former) in Full (in Block Letters)	C.N.I.C. No. (in case of foreigner, Passport No.)	Father's / Husband's Name (in Full)	Nationality with any former Nationality	Occupation	Residential Address (in Full)	
1. USMAN JAVED	35200- 1525704-3	S/o Muhammad Javed Shafi	Pakistani	Business	179 - H, Model Town, Lahore.	2,000 Two Thousand
2. YOUSAF ZAHID	35200- 3235698-1	S/o Zahid Shafi	Pakistani	Business	179 - 182 H, Model Town, Lahore.	2,000 Two Thousand
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>CERTIFIED TO BE TRUE COPY</p> <p>17/11/2015</p> <p>JOINT REGISTRAR OF COMPANIES COMPANY REGISTRATION OFFICE LAHORE.</p> </div>						4,000 Four Thousand



Dated this ..... day of .....

Witness to the above signatures :

Signature .....

Nationality : Pakistani

Full Name : Muhammad Shahzad

Occupation : Business

C.N.I.C. # 34502-4743721-3

Full Address : 158 - Jade Park View Housing  
Society, Multan Road, Lahore.

Father's

Full Name : Muhammad Abdul Majeed

# FORM-A



# FORM A- ANNUAL RETURN OF COMPANY HAVING SHARE CAPITAL

9/9351  
01/09/16

1 Registration No.

2 Name of the Company

3 Form A made upto (Day/Month/Year)

4 Date of AGM (Day/Month/Year)

CUIN-0093809

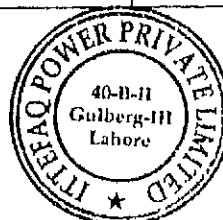
**ITTEFAQ POWER (PRIVATE) LIMITED**

31 AUGUST 2016

31 AUGUST 2016

## PART A

5	Registered office address:	40-B II, GULBERG III, LAHORE															
6	Email Address:	ipl@alshafigroup.com															
7	Office Tel. No.:	042-35384761															
8	Office Fax No.:	042-37535946															
9	Nature of Business:	Power Generation etc															
10	Authorized Share Capital																
	Type of Shares	No. of Shares	Amount	Face Value													
	Ordinary Shares	100,000	1,000,000	10/-													
11	Paid up Share Capital																
	Type of Shares	No. of Shares	Amount	Issue Price													
	Ordinary Shares	25,000	250,000	10/-													
12	Amount of indebtedness on the date upto which Form A is made in respect of all																
	Mortgages/Charges	NIL															
13	Particulars of the holding company																
	Name	NIL															
	Registration No.	% Shares Held															
14	Chief Executive																
	Name	Mr. USMAN JAVED		35200-1525704-3													
	Address	179- H, Block Model Town Lahore.															
15	Chief Accountant																
	Name	MR. ADNAN YOUNAS		35202-2540256-3													
	Address	126-P Model Town Extension Lahore.															
16	Secretary																
	Name	Mr. MUHAMMAD SHAHZAD		34502-4743721-3													
	Address	158-Jade Block Park View Housing Society, Multan road Lah															
17	Legal Adviser																
	Name	MR. HAMAD RAZA		34502-4098243-5													
	Address	Moh Riaz abad Tehsil Shakargarh Garh Narowal															
18	Auditors																
	Name	M/s Kaleem & Co.															
	Address	House # 134 C Link 4, Street # 2, Cavalry Ground Cantt, Lahore															
19	List of Directors on the date of Form-A																
	Name of Director	Address	Nationality	NIC (Passport No. if foreigner)													
	USMAN JAVED	179- H, Model Town Lahore	Pakistani	3	5	2	0	0	1	5	2	5	7	0	4	-	3
	YOUSAF ZAHID	179-182 H, Model Town Lahore	-do-	3	5	2	0	0	3	2	3	5	6	9	8	-	1
	MUHAMMAD HASNAIN TARIQ SHAFI	179-182 H, Model Town Lahore	-do-	3	5	2	0	2	9	1	7	9	6	3	1	-	7
	ALI PERVAIZ	179-182 H, Model Town Lahore	-do-	3	5	2	0	0	0	9	4	6	1	0	5	-	5
	MUHAMMAD SHAHID SHAFI	179- H, Model Town Lahore	-do-	3	5	2	0	0	1	5	2	5	4	6	5	-	1



# PART B

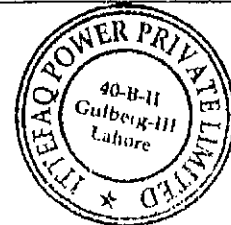
20 List of members & debenture holders on the date upto which this Form A is made					
Folio	Name of Director	Address	Nationality	No. of Shares	NIC (Passport No. if foreigner)
<b>Members</b>					
1-	USMAN JAVED	1295 H. Block Model Town Lahore	Pakistani	5,000	35200-1525704-3
2-	YOUSAF ZAHID	179/182 H. Block Model Town Lahore	Pakistani	5,000	35200-3235698-1
3-	MUHAMMAD HASNAIN TARIQ SHAFI	179/182 H. Block Model Town Lahore	Pakistani	5,000	35202-9179631-7
4-	ALI PERVAIZ	179-182 H. Block Model Town Lahore	Pakistani	5,000	35200-0946105-5
5-	MUHAMMAD SHAHID SHAFI	179/182 H. Block Model Town Lahore	Pakistani	5,000	35200-1525465-1
<b>Total</b>				25,000	
<b>Debenture holders</b>					

21	Transfer of shares (debentures) since last Form A was made			
	Name of Transferor	Name of Transferee	Number of shares transferred	Date of registration of transfer
	Members			
	Debenture holders			

\*\*\*Use separate sheet, if necessary\*\*\*

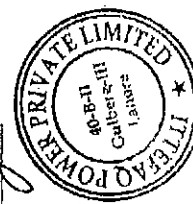
22 I certify that this return and the accompanying statements state the facts correctly and completely as on the date upto which this Form A is made.

Date: 01/09/2016 Signature: *M. Shahzad*  
Designation (Please tick) COMPANY SECRETARY



PARTICULARS OF DIRECTORS AND OFFICERS, INCLUDING THE CHIEF EXECUTIVE, MANAGING AGENT, SECRETARY, CHIEF ACCOUNTANT, AUDITORS AND LEGAL ADVISERS, OR OF ANY CHANGE THEREIN

Please complete us information or in bold black capital.

[illegible]

9/9357  
01/09/16

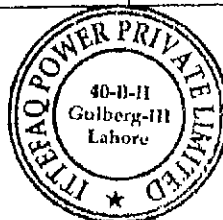
## FORM A- ANNUAL RETURN OF COMPANY HAVING SHARE CAPITAL

- 1 Registration No.  
2 Name of the Company  
3 Form A made upto (Day/Month/Year)  
4 Date of AGM (Day/Month/Year)

CUIN-0093809		
<b>ITTEFAQ POWER (PRIVATE) LIMITED</b>		
31	AUGUST	2018
31	AUGUST	2018

### PART A

5	Registered office address:	40-B II, GULBERG III, LAHORE		
6	Email Address:	ipj@alshafigroup.com		
7	Office Tel. No.:	042-35384761		
8	Office Fax No.:	042-37535946		
9	Nature of Business:	Power Generation etc		
10	Authorized Share Capital			
	Type of Shares	No. of Shares	Amount	Face Value
	Ordinary Shares	100,000	1,000,000	10/-
11	Paid up Share Capital			
	Type of Shares	No. of Shares	Amount	Issued Price
	Ordinary Shares	25,000	250,000	10/-
12	Amount of indebtedness on the date upto which form A is made in respect of all			
	Mortgages/Charges	NIL		
13	Particulars of the holding company			
	Name	NIL		
	Registration No.			
14	Chief Executive			
	Name	Mr. USMAN JAVED		35200-1525704-3
	Address	179- H, Block Model Town Lahore.		
15	Chief Accountant			
	Name	MR. ADNAN YOUNAS		35202-2540256-3
	Address	126-P Model Town Extension Lahore.		
16	Secretary			
	Name	Mr. MUHAMMAD SHAHZAD		34502-4743721-3
	Address	158-Jade Block Park View Housing Society, Multan road Lah		
17	Legal Adviser			
	Name	MR. HAMAD RAZA		34502-4098243-5
	Address	Moh Riaz abad Tehsil Shakargarh Garh Narowal		
18	Auditors			
	Name	M/s Kaleem & Co.		
	Address	Hosue # 134 C Link 4, Street # 2, Caviary Ground Cantt, Lahore		
19	List of Directors on the date of Form-A			
	Name of Director	Address	Nationality	NIC (Passport No. if foreigner)
	USMAN JAVED	179- H, Model Town Lahore	Pakistani	3 5 2 0 0 1 5 2 5 7 0 4 - 3
	YOUSAF ZAHID	179-182 H, Model Town Lahore	-do-	3 5 2 0 0 3 2 3 5 6 9 8 - 1
	UHAMMAD HASNAIN TARIQ SHAFI	179-182 H, Model Town Lahore	-do-	3 5 2 0 2 9 1 7 9 6 3 1 - 7
	ALI PERVAIZ	179-182 H, Model Town Lahore	-do-	3 5 2 0 0 0 9 4 6 1 0 5 - 5
	MUHAMMAD SHAHID SHAFI	179- H, Model Town Lahore	-do-	3 5 2 0 0 1 5 2 5 4 6 5 - 1



## PART B

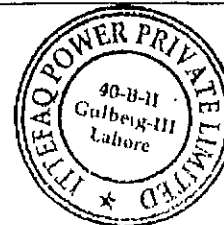
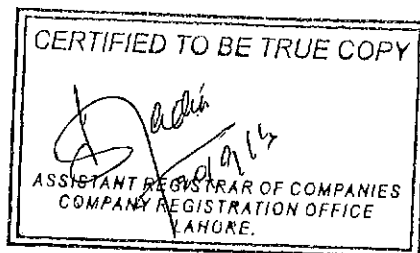
20 List of members & debenture holders on the date upto which this Form A is made						
Folio	Name of Director	Address	Nationality	No. of Shares	NIC (Passport No. if foreigner)	
	<u>Members</u>					
1-	USMAN JAVED	179-, H, Block Model Town Lahore.	Pakistani	5,000	35200-1525704-3	
2-	YOUSAF ZAHID	179-182 H, Model Town Lahore	Pakistani	5,000	35200-3235698-1	
3-	MUHAMMAD HASNAIN TARIQ SHAFI	179-182 H, Model Town Lahore	Pakistani	5,000	35202-9179631-7	
4-	ALI PERVAIZ	179-182 H, Model Town Lahore	Pakistani	5,000	35200-0946105-5	
5-	MUHAMMAD SHAHID SHAFI	179- H, Model Town Lahore	Pakistani	5,000	35200-1525465-1	
	Total			25,000		
	<u>Debenture holders</u>					

21	Transfer of shares (debentures) since last Form A was made			
	Name of Transferor	Name of Transferee	Number of shares transferred	Date of registration of transfer
	<u>Members</u>			
	<u>Debenture holders</u>			

\*\*\*Use separate sheet, if necessary

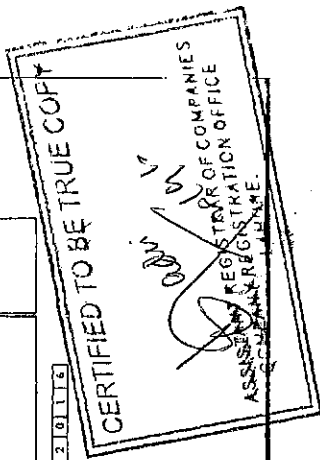
22 I certify that this return and the accompanying statements state the facts correctly and completely as on the date upto which this Form-A is made

Date	0	1	0	9	2016	Signature	<i>[Signature]</i>
Designation (Please tick)							COMPANY SECRETARY



969357  
01/09/16

1. Name of Company		2. Registered Office		3. Date of Incorporation		4. Date of Registration		5. Date of Annual General Meeting		6. Date of Balance Sheet		7. Date of Financial Statements		8. Date of Declaration of Dividend		9. Date of Declaration of Interim Dividend		10. Date of Declaration of Final Dividend		11. Date of Declaration of Interim Dividend		12. Date of Declaration of Final Dividend	
ITTEFAQ POWER PVT LTD		11-E, Model Town, Lahore		1994		1994		1994		1994		1994		1994		1994		1994		1994		1994	
1. Particulars of Directors / New Appointments / Election	2. Particulars of Directors / New Appointments / Election	3. Particulars of Directors / New Appointments / Election	4. Particulars of Directors / New Appointments / Election	5. Particulars of Directors / New Appointments / Election	6. Particulars of Directors / New Appointments / Election	7. Particulars of Directors / New Appointments / Election	8. Particulars of Directors / New Appointments / Election	9. Particulars of Directors / New Appointments / Election	10. Particulars of Directors / New Appointments / Election	11. Particulars of Directors / New Appointments / Election	12. Particulars of Directors / New Appointments / Election	13. Particulars of Directors / New Appointments / Election	14. Particulars of Directors / New Appointments / Election	15. Particulars of Directors / New Appointments / Election	16. Particulars of Directors / New Appointments / Election	17. Particulars of Directors / New Appointments / Election	18. Particulars of Directors / New Appointments / Election	19. Particulars of Directors / New Appointments / Election	20. Particulars of Directors / New Appointments / Election	21. Particulars of Directors / New Appointments / Election	22. Particulars of Directors / New Appointments / Election	23. Particulars of Directors / New Appointments / Election	24. Particulars of Directors / New Appointments / Election
USMAN IYED	35200-1525704-3	S/O. MUHAMMAD JAVED SHAFI	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan
YOUSAF ZAHID	35200-3235698-1	S/O. ZAHID SHAFI	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan
MUHAMMAD HASNAIN TARIQ SHAFI	35200-9179631-7	S/O. MUHAMMAD TARIQ SHAFI	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan
ALI PERVAIZ	35200-0946105-5	S/O. MIAN MUHAMMAD PERVAIZ SHAFI	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan
MUHAMMAD SYAHID SHAFI	35200-1525465-1	S/O. MIAN MUHAMMAD SYAHID SHAFI	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan	179-H, Model Town, Lahore	Director	Pakistan
USMAN IYED	35200-1525704-3	S/O. MUHAMMAD JAVED SHAFI	179-H, Model Town, Lahore	CFO	Pakistan	179-H, Model Town, Lahore	CFO	Pakistan	179-H, Model Town, Lahore	CFO	Pakistan	179-H, Model Town, Lahore	CFO	Pakistan	179-H, Model Town, Lahore	CFO	Pakistan	179-H, Model Town, Lahore	CFO	Pakistan	179-H, Model Town, Lahore	CFO	Pakistan
MUHAMMAD SHAMAZAD	34502-4743711-3	S/O. ABUL MAJEED	158-Jade Park view Housing Society, Multan road Lahore	Co-Sec	Pakistan	158-Jade Park view Housing Society, Multan road Lahore	Co-Sec	Pakistan	158-Jade Park view Housing Society, Multan road Lahore	Co-Sec	Pakistan	158-Jade Park view Housing Society, Multan road Lahore	Co-Sec	Pakistan	158-Jade Park view Housing Society, Multan road Lahore	Co-Sec	Pakistan	158-Jade Park view Housing Society, Multan road Lahore	Co-Sec	Pakistan	158-Jade Park view Housing Society, Multan road Lahore	Co-Sec	Pakistan
HAAMAD RAZA	34502-4098243-5	S/O. SHARIFAT ALI SULTAN	House #11/11, Link 1, S-2, Cavalry Ground, Lahore	Auditor	Pakistan	House #11/11, Link 1, S-2, Cavalry Ground, Lahore	Auditor	Pakistan	House #11/11, Link 1, S-2, Cavalry Ground, Lahore	Auditor	Pakistan	House #11/11, Link 1, S-2, Cavalry Ground, Lahore	Auditor	Pakistan	House #11/11, Link 1, S-2, Cavalry Ground, Lahore	Auditor	Pakistan	House #11/11, Link 1, S-2, Cavalry Ground, Lahore	Auditor	Pakistan	House #11/11, Link 1, S-2, Cavalry Ground, Lahore	Auditor	Pakistan
ADNAN YOUNAS	35202-2540256-3	S/O. MUHAMMAD YOUNAS	125-P Model Town extension, Lahore	CFO	Pakistan	125-P Model Town extension, Lahore	CFO	Pakistan	125-P Model Town extension, Lahore	CFO	Pakistan	125-P Model Town extension, Lahore	CFO	Pakistan	125-P Model Town extension, Lahore	CFO	Pakistan	125-P Model Town extension, Lahore	CFO	Pakistan	125-P Model Town extension, Lahore	CFO	Pakistan



Name of Signatory: MUHAMMAD SHAMAZAD, Designation: CFO, Date: 01/09/16

Signature: [Signature]

# **SPONSOR PROFILE**

## **Brief Profile of Al-Shafi Group**

Al-Shafi Group of Companies is one of the leading industrial and commercial business groups of Pakistan boasting sound production, financial stability and international credibility. The group operates five strategic production units with primary operations in sugar production, manufacture of steel products, Poultry breeding and Poultry Feeds. The production facilities of this Group are operating primarily in the province of Punjab and supplying products throughout the country thus effectively contributing towards economic growth. Before its inception, Al-Shafi Group was a part of the renowned Ittefaq Group of Companies. Through constant hard work, enthusiasm and zeal of the Directors, who are all seasoned and leading businessmen, the Group emerged as one of the most formidable industrial entities of the country.

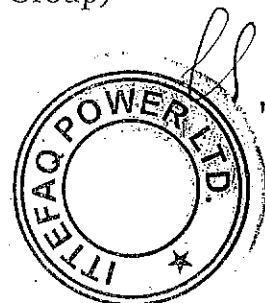
The present equity of the group is Rs. 8 billion, with total capital asset base of about Rs. 14 billion, and annual sales revenue amounting to Rs. 20 Billion. The average number of employees is 4000.

The following companies are currently managed by Al Shafi Group:

- Ittefaq Sons (Pvt.) Ltd.
- Ittefaq Sugar Mills Ltd.,
- Kashmir Sugar Mills Ltd.
- Kashmir Feeds Ltd.
- Ittefaq Bio Tech (Pvt.) Ltd

## **Board of Directors**

- Mian Muhammad Javed Shafi CEO ISML (Group Chairman)
- Mian Muhammad Tariq Shafi (Director Commercial and CEO Kashmir Sugar)
- Mian Muhammad Pervez Shafi (Director Technical)
- Mian Muhammad Shahid Shafi (Resident Director Ittefaq Sugar)
- Mian Muhammad Zahid Shafi (Director Kashmir Feeds)
- Mian Muhammad Usman Javed (Director ISML & Ittefaq Sons)
- Mian Muhammad Shehzad Javed (CEO Ittefaq Sons)
- Mian Muhammad Hasnain Tariq ( Director Operations of the Group)
- Mian Ali Pervez ( Director KSML)
- Mian Yousaf Zahid ( Director ISML)



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### **Ittefaq Sugar Mills Limited**

Ittefaq Sugar Mills Ltd. installed in 1982, was the first Sugar mill of the Ittefaq Group of Industries. It has adopted defection remelt carbonation / phosphatation process to produce high quality refined sugar.

The mill is situated in Distt. Pakpattan on Sahiwal -Pakpattan Road. The project covers 134 acres of land (88 acres inside the mills main boundary wall and 46 acres outside the wall). The land outside the wall is meant for developing Cane Seed of better cane varieties for our growers.

The plant was originally designed for 4,000 TCD but with slight modification in plant and by adding some equipment in milling and process houses, now we can crush up to 6,000 TCD daily. It is the biggest industrial unit in the district of Sahiwal and Pakpattan providing employment at large scale and generating economic activities at National and International level.

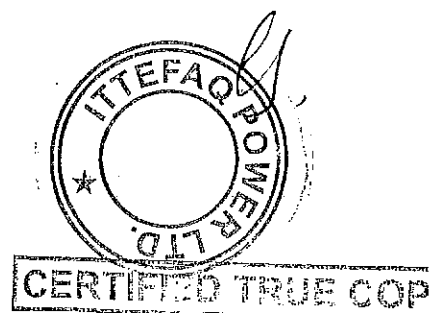
### **Profile of Directors**

#### ***Mian Muhammad JavedShafi***

Mian Muhammad JavedShafi is one of the most eminent industrialists of the country with a superior vision and dynamic brand of leadership. He is one of the pioneer directors of Ittefaq group and had the unique opportunity to learn under the guidance of Mian Sharif (Late), father of Prime Minister Mian Muhammad Nawaz Sharif. He is highly regarded in the society and is associated with many organizations of social and business labels. He is a member of Lahore Chamber of Commerce & Industry, holder of SAARC visa and SAARC life membership. He is in the business for the last four decades and successfully steering the growth of all companies of the group. Presently he is Chairman of Al-Shafi Group of Companies, Director in Ittefaq Sugar Mills Ltd. and Kashmir Sugar Mills Ltd.

#### ***Mian Muhammad Tariq Shafi***

Prior to the inception of Al-Shafi Group, Mr. Tariq Shafi was holding the position as Director Ittefaq Foundry Lahore, thus having a vast experience in the field of Iron & Steel. Presently Mian Muhammad Tariq Shafi is Director Commercial of Al-Shafi Group of Companies as well as Chief Executive of Kashmir Sugar Mills Ltd. He is a member of Lahore Chamber of Commerce & Industry and has been vice-president of the committee in the past. Furthermore, he remained member of SAARC executive committee and presently holds life membership of SAARC Chamber of Commerce & Industry. Mian Muhammad Tariq Shafi is also member of Pak-France Economic Cooperation Committee of FPCCI, member of Pak-Saudi Arabia Business Council of FPCCI and also a member of Pak-Kyrgyzstan Trade and Industry Committee of FPCCI. Currently he is also Vice President of Pakistan Chamber of Commerce and industry (Federation).



## **Financial and Technical Team**

### **Financial Team**

#### *Ahsan Ul Haq Abid*

Ahsan Ul Haq Abid is a Fellow Chartered Accountant with over 25 years of rich experience at senior level positions in multiple/diverse sectors varying from Sugar, Steel, Textile, Poultry Feeds & Hatchery Farms to the field of Management Consultancy. For past 17 years, he has been working at strategic positions like Group General Manager/CFO and excelling in changing/improving/restructuring organizations' cultures, leading them to fast track development, growth/expansion and ensuring maximum shareholders' value.

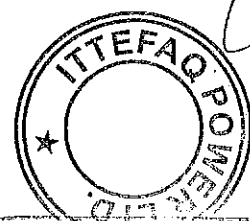
He currently holds the position of Group General Manager Finance in Al-Shafi Group. Span of control includes senior-most managerial grid like GMs, DGMS, AGMs, Head of Departments (HODs) and Managers from comprising units/based in head office and heading divisions like finance, accounts, corporate affairs, production/operations, taxation & legal affairs, procurement, IT, Administration, Imports, Human Resources, etc.

Before employment with Al-Shafi Group of Companies, for about ten years he has been in Textile sector at senior positions in domestic as well as international business concerns. He worked as Group General Manager (Finance) in Sargodha Group of Industries established in 1958 and one of the largest groups in Textile sector having spinning, weaving and finishing units. Outside Pakistan, he worked in Manama Textile Mills WLL in Bahrain as General Manager (Finance) managing the over-all affairs of their spinning and weaving units.

### **Technical Team**

#### *Hafiz Muhammad Kashif Munir*

Mr. Kashif Munir graduated in 2001 and holds a Bachelors degree in Electrical Engineering. He has over 15 years of managerial experience in diversified projects and industrial services. He is currently working as General Manager (Electrical) as Al-Shafi Group. Mr. Munir has extensive experience in installation and maintenance of power plants. Before working at Al-Shafi group he was working at the 26.35 MW Co-Gen Power Plant JDW II Sadiqabad. He also has had the opportunity to work on the rehabilitation project of Lalpir Power Limited a 365 MW power house, which included complete electrical overhaul of the plant. Prior to this, he worked as Assistant Manager Power Plant at Umar Spinning Mills where he was involved in the installation of a 3.7 MW Power Plant.

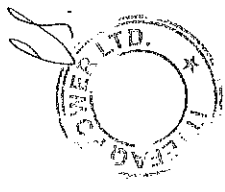
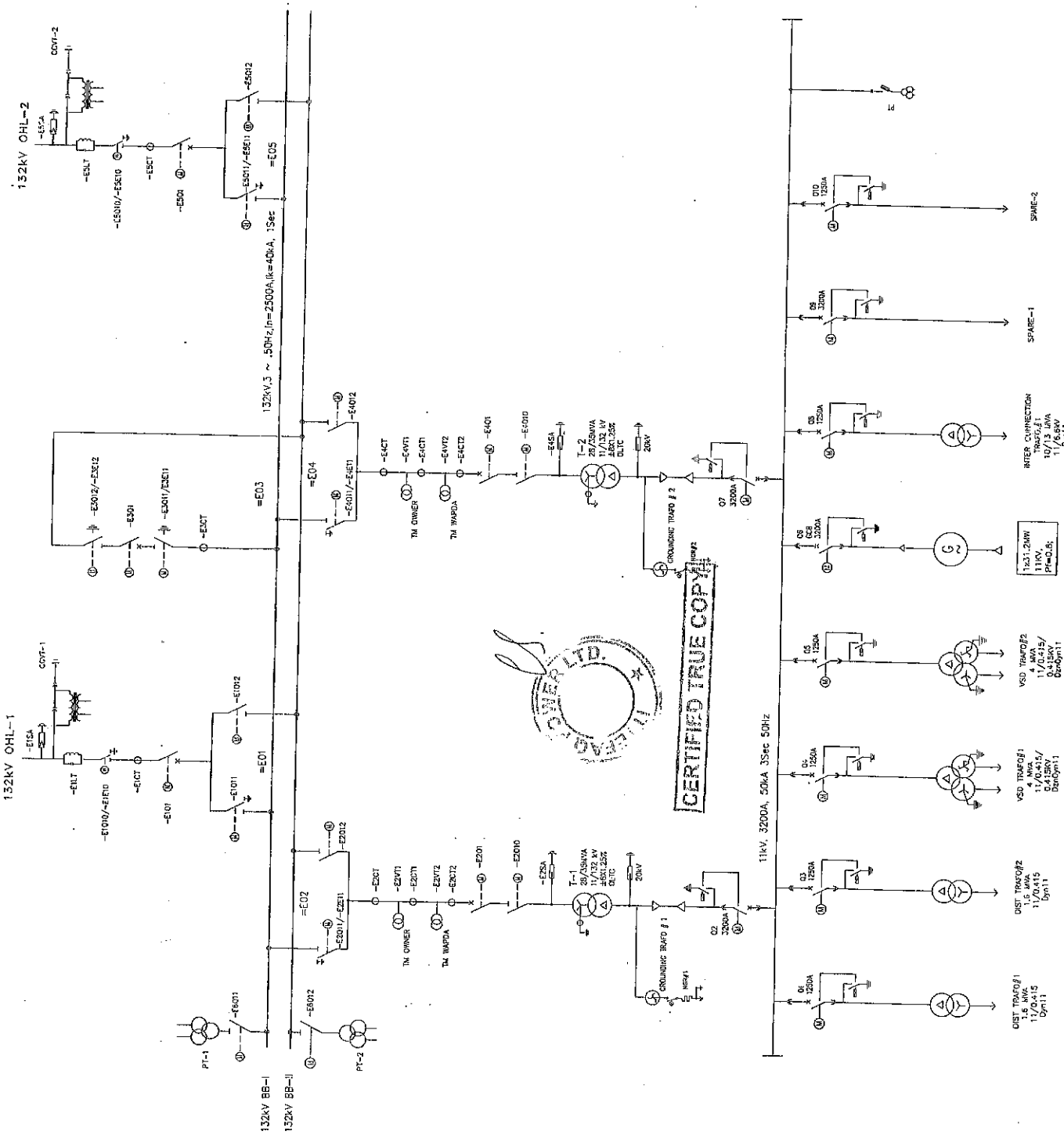


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# SINGLE LINE DIAGRAM

POWER  
ll

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NOTES:

1. EQUIPMENT RATINGS & CHARACTERISTICS IS REQUIRED, IT SHALL BE PROVIDED AT PROJECT STAGE.

PRELIMINARY

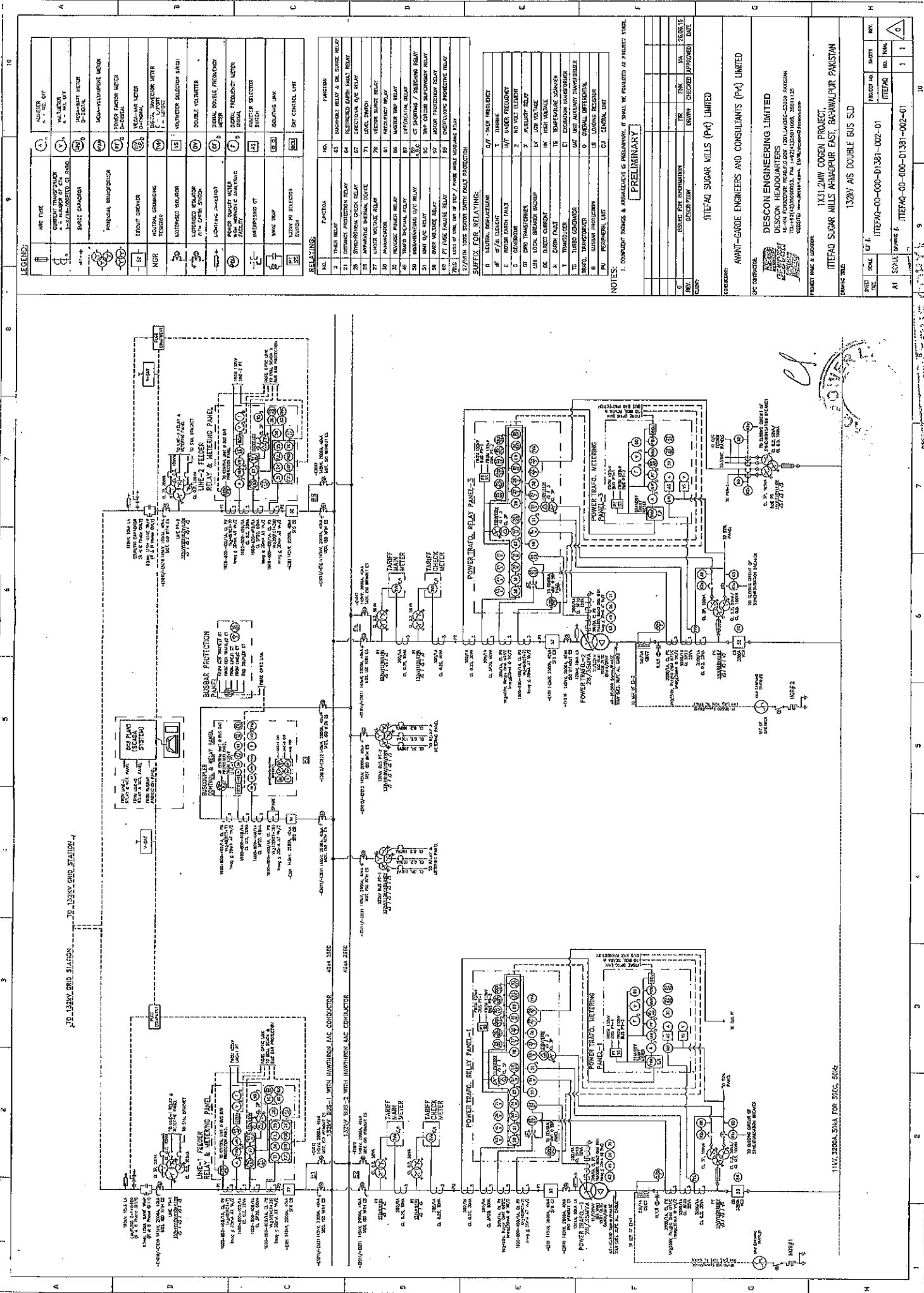
REV.	DESCRIPTION	DATE	BY	CHK.	APP.
1	ISSUED FOR REVIEW	20/01/02	MM	MM	MM
2	ISSUED FOR REVIEW	20/01/02	MM	MM	MM

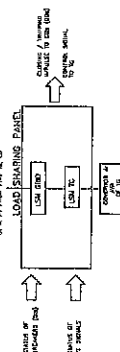
  

CLIENT	AVANT-GARDE ENGINEERS AND CONSULTANTS (PVT) LIMITED
DESIGNER	DESCON ENGINEERING LIMITED
PROJECT NAME & LOCATION	132kV/11kV COGEN PROJECT, ITEFAQ SUGAR MILLS AHMADPUR EAST, BAHAWALPUR PAKISTAN
PROJECT NO.	ITEFAQ-00-000-01381-001-01
PROJECT NO.	ITEFAQ-00-000-01381-001-01
PROJECT NO.	ITEFAQ-00-000-01381-001-01







SCALE	1:1
DATE	20/01/02
BY	MM
CHK.	MM
APP.	MM





**LEGEND:**

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	ELECTRICAL MECHANICAL INTERFACES WITH RES	(C)	DOUBLE POLYMER
	LIGHT-EMITTING DIODES	(D)	DIGITAL SIGNAL PROCESSING AND FILTERS
	PORTABLE DIGITAL DEVICES WITH REMOTE ANALOGUE INPUT	(E)	DIGITAL FREQUENCY MIXERS
	INTERFERENCE CT	(F)	ANALOGUE ELECTRONIC SWITCHES
	DIODES	(G)	NOISE ANALOGUE CURRENT SOURCES
	MONITOR	(H)	TRANSDUCERS WITH SENSOR

NO.	FUNCTION	NO.	FUNCTION
1	START RELAY	49	PT FUSE CHANGE RELAY
2	STOP RELAY	50	STOP RELAY
3	REVERSE DRIVE RELAY	51	REVERSE RELAY & 0% SPEED RELAY
4	FORWARD DRIVE RELAY	52	REVERSE RELAY & 0% SPEED RELAY
5	APPROXIMATE POSITION DEVICE	53	REVERSE RELAY & 0% SPEED RELAY
6	RELAY	54	REVERSE RELAY & 0% SPEED RELAY
7	RELAY	55	REVERSE RELAY & 0% SPEED RELAY
8	RELAY	56	REVERSE RELAY & 0% SPEED RELAY
9	RELAY	57	REVERSE RELAY & 0% SPEED RELAY
10	RELAY	58	REVERSE RELAY & 0% SPEED RELAY
11	RELAY	59	REVERSE RELAY & 0% SPEED RELAY
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48	RELAY	96	REVERSE RELAY & 0% SPEED RELAY
49	RELAY	97	REVERSE RELAY & 0% SPEED RELAY
50	RELAY	98	REVERSE RELAY & 0% SPEED RELAY
51	RELAY	99	REVERSE RELAY & 0% SPEED RELAY
52	RELAY	100	REVERSE RELAY & 0% SPEED RELAY

**SUFFIX FOR RELAYING:**

10	GENERAL DESCRIPTION
11	11/14 ELEMENT
12	12/14 BINDER EARTH PAULT
13	13/14 GROUND
14	14/14 CRD MOUNTAIN
15	15/14 CRD MOUNTAIN
16	16/14 CRD MOUNTAIN
17	17/14 CRD MOUNTAIN
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NOTES:

1. EQUIPMENT RATINGS & APPROPRIATENESS IS PRELIMINARY. IT SHALL BE FINALIZED AT PROJECT START.

**PRELIMINARY**

ISSUED FOR INFORMATION	FOR	PKC	MA	25.08.15
DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
0				
PREV.				

WHITEFAQ SUGAR MILLS (Pvt) LIMITED

**Abstract:**

ARDE ENGINEERS AND CONSULTANTS (Pvt) LIMITED

## CONTRACTORS

**DESCON ENGINEERING LIMITED**  
**DESCON HEADQUARTERS**  
8-KM PURAZOCHI ROAD, P.O. BOX 120, TATANAGH-53000


1997

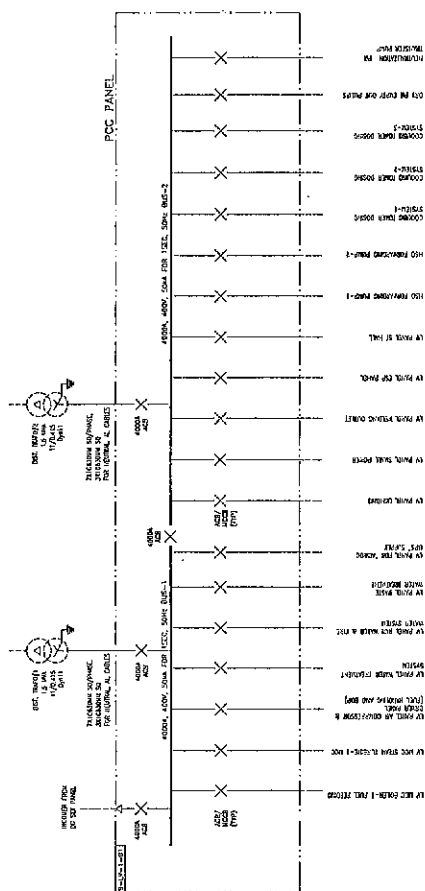
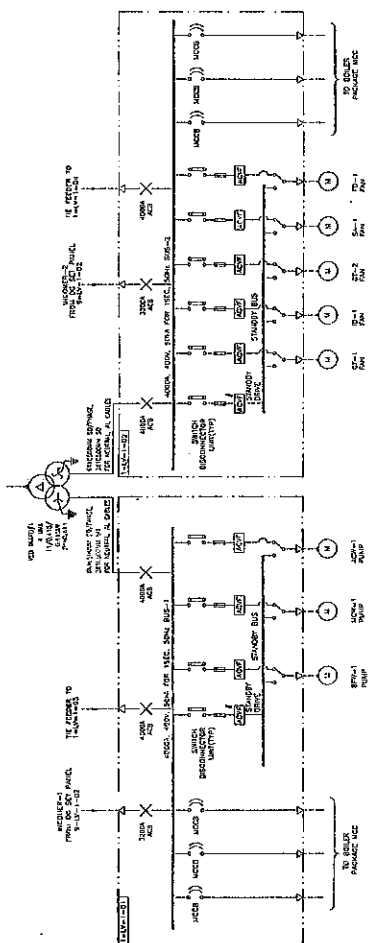
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X31.2MW COGEN PROJECT.

IS AHMADPUR EAST, BAHAWALPUR PAKISTAN

[illegible]

DRAWING SCALE	SCALE	E.F. #	PROJECT NO.		BOX
			ITEFAQ-00-000-D1381-003-01	BOX TOTAL	
A1	SCALE	ISSUANCE #	ITEFAQ	BOX	1
			ITEFAQ-00-000-D1381-003-01		
					



EQUIPMENT RATINGS &amp; ARRANGEMENT IS PRELIMINARY. IT SHALL BE FINALIZED AT PROJECT STAGE.

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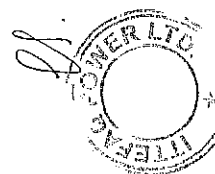
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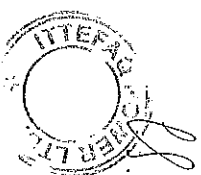
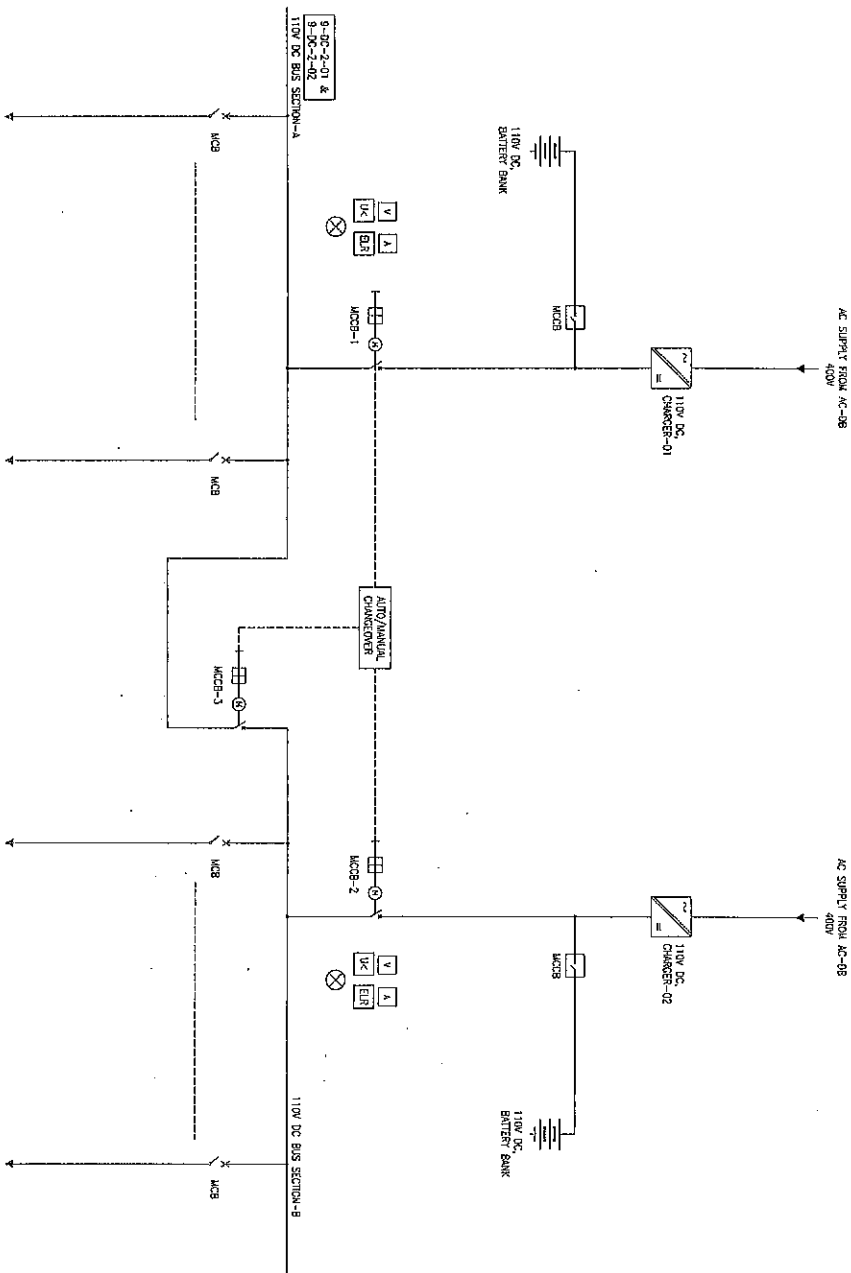
AVANT-GARDE ENGINEERS AND CONSULTANTS (Pvt) LIMITED

**DESCON ENGINEERING LIMITED**  
DESCON HEADQUARTERS  
18-24 FERREPIER ROAD, P.O. BOX 1287, L201-02-DE-53000 PA  
TEL: +91 (43) 2339900 FAX: +91 (43) 2331100, 2681110  
WWW.DESCON.COM EMAIL: descon@disyn.com  
VLS951C

1X31.2MW COGEN PROJECT,  
ATTEFAQ SUGAR MILLS AHMADPUR EAST, BAHAWALPUR PAKISTAN  
400V AC MAIN PANELS SLD

SHEET NO.	SCALE	CF #	PROJECT NO.	SHEETS		REV.
				NO.	TOTAL	
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		ITEFAQ-00-000-D1381-004-01				





# NOTES:-

1- THIS DRAWING IS PRELIMINARY. IT SHALL BE REVISED AT PROJECT STAGE.

## PRELIMINARY

ITTEFAK SUGAR MILLS (Pvt) LIMITED

CLIENT: AMANT-CANAL ENGINEERS AND CONSULTANTS (Pvt) LIMITED

DESIGN: DESCON ENGINEERING LIMITED  
 DESCON HEADQUARTERS  
 15-INDUSTRIAL AREA, KARACHI-75400 PAKISTAN  
 TEL: 37320000 FAX: 37320001 E-MAIL: info@descon.com.pk

PROJECT NAME & LOCATION

110V DC UPS PROJECT

ITTEFAK SUGAR MILLS KARACHI EAST, KARACHI PAKISTAN

110V DC UPS SLD

DATE

110V DC UPS SLD

SCALE

ITTEFAK-00-001-01381-005-01

SCALE

ITTEFAK-00-001-01381-005-01

SCALE

ITTEFAK-00-001-01381-005-01

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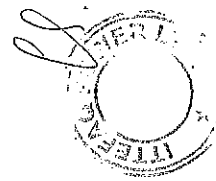
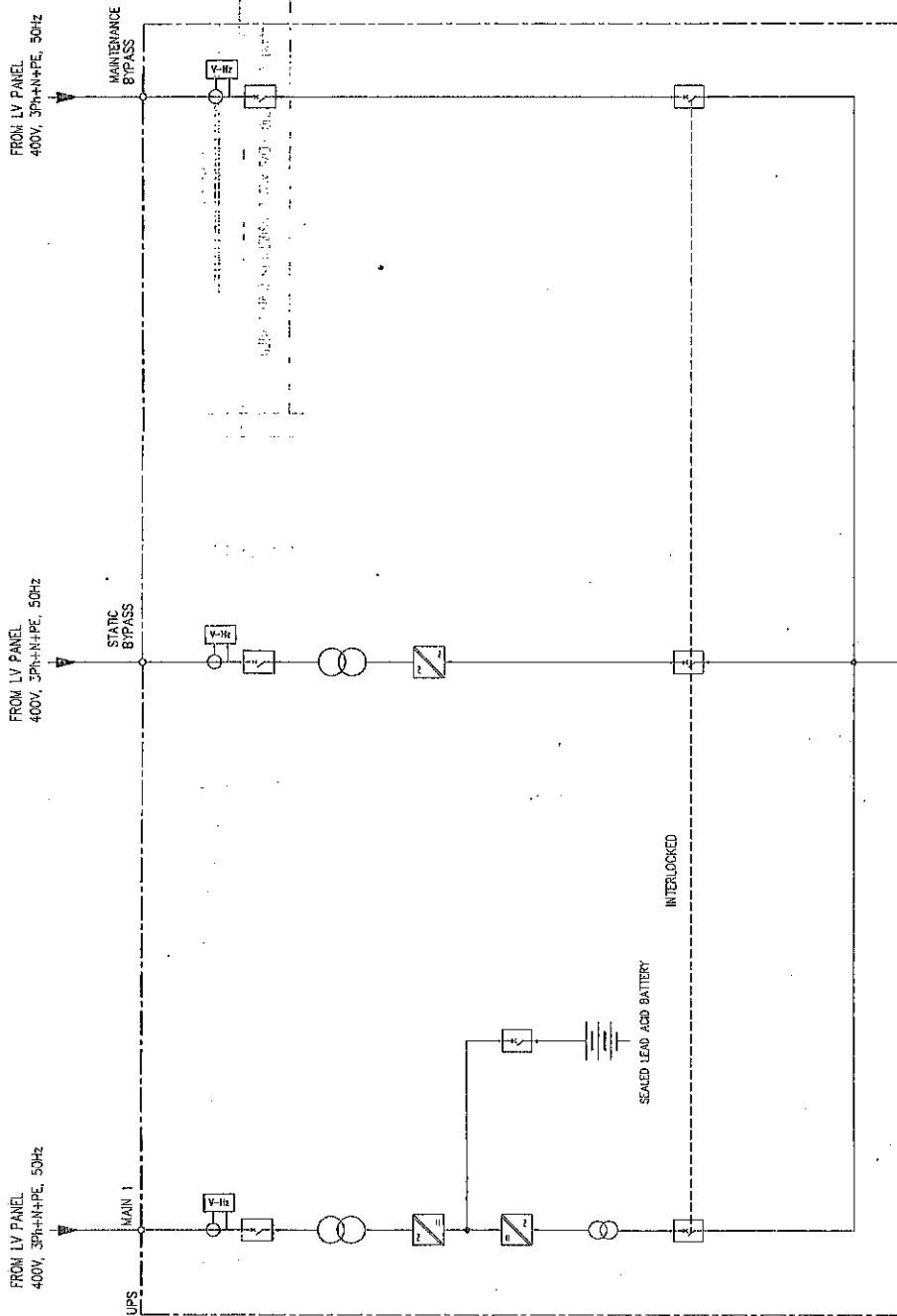
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SCALE

ITTEFAK-00-001-01381-005-01





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**NOTES:-**

1- THIS ARRANGEMENT IS PRELIMINARY. IT SHALL BE FINALIZED AT PROJECT STAGE.

**PRELIMINARY**

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ITEFAQ SUGAR MILLS (Pvt) LIMITED

AVANT-GARDE ENGINEERS AND CONSULTANTS (Pvt) LIMITED

DESIGN ENGINEERING LIMITED

DESIGN ENGINEERING LIMITED  
15-AM ENGINEERING ROAD, 1501 JALDIK-55000 PAKISTAN  
TEL: +92(42)35888888 FAX: +92(42)35888888  
WEBSITE: www.descon.com, info@descon.com

PROJECT NAME & LOCATION

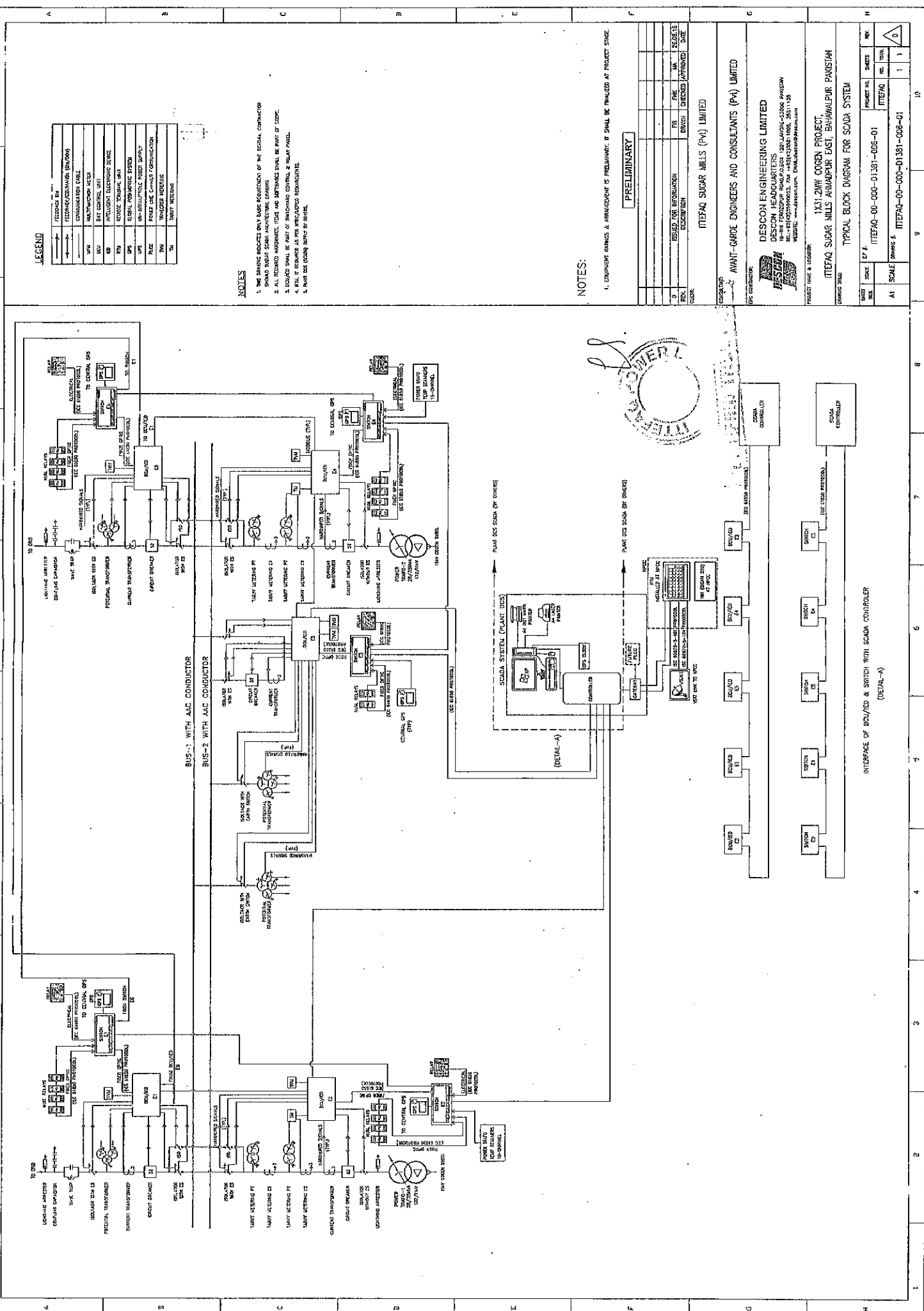
1X31.2MW COGEN PROJECT,  
ITEFAQ SUGAR MILLS AHADPUR EAST, BAHAWALPUR PAKISTAN

230V AC UPS FOR EMERGENCY LIGHTING

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REC'D	RECEIVED				

MTBEAQ SUGAR MILLS (Pvt) LIMITED

CN:


**AWAT-GARDE ENGINEERS AND CONSULTANTS (Pvt) LIMITED**  
 DESCON ENGINEERING LIMITED  
 DESCON HEADQUARTERS  
 14-16 THROCKLEY ROAD, PO BOX 120, LANCIRE-25006, PHANOM  
 TEL: +8562(0)2599065, FAX: +8562(0)2591100, 2591115  
 WEB SITE: www.dpcgroup.com, EMAIL: dpcgroup@descon.com

PROJECT NAME & ADDRESS		1X1.2NH COHEN PROJECT, SUGAR MILLS ANANDPUR DIST, BHARWALPUR PAKISTAN	
DRAWING TITLE			
TYPICAL BLOCK DIAGRAM FOR SCADA SYSTEM			
SHEET NO.	1	SP. F.	ITEFAQ-00-000-01381-008-01
	A1	TOTAL	ITEFAQ-00-000-01381-008-01
		REVISIONS	ITEFAQ-00-000-01381-008-01
		DATE	1
		BY	1
		PROJECT NO.	ITEFAQ
		NO. SHEETS	1
		NO. TOTAL	1
			

## CONTROL ROOM

1. THIS DRAWING IS REQUIRMENT AND IT SHALL BE FINALIZED DURING DETAILED DESIGN
2. GENERATED PC FOR ST. W/ & COMPRESSOR WILL BE PROVIDED BY THE PRICING VENDORS.
3. SATCHHARD ENOWALS WILL BE TRANSMITTED TO DCS THROUGH PO CABLE VIA 4.5/50 PORTCULL
4. ALL W/EDD MODBUS/ENERNET LINKS CONNECTED TO THE OPC SERVER SHALL BE DUAL REDUNDANT
5. TWO NO. AIR COMPRESSORS WITH BUILT-IN PLCs WILL BE CONNECTED TO DCS WITH REDUNDANT ENERNET/ MODBUS LINKS
6. FOLLOWING SYSTEMS SHALL BE CONTROLLED AND MONITORED BY DCS:
  - a. FUEL AND ASH HANDLING SYSTEM
  - b. E.2 EXLER, ESP SYSTEM
  - c. S.3 ESP
7. SCADA FUNCTIONALITY SHALL BE IMPLEMENTED IN DCS THROUGH PROPRIETARY LICENSED SOFTWARE

LEGEND:-

—	: ETHERNET CABLES
—○—	: SOFT LINK MODEMS
— — —	: HARD WIRED
— . — . — .	: HDLM
— — — — —	: F0 CABLE

GOR: BALANCE OF PLANT  
 ERS: ENGINEERING WORKSTATION  
 FCS: FIELD CONTROL STATION  
 HISTORIAN: HISTORICAL DATA STORAGE AND RETRIEVAL  
 IOP: INTERFACING OPERATOR PANEL  
 MCC: MOTOR CONTROL CENTRE  
 OPC: OLE FOR PROCESS  
 OPS: OPERATOR WORKSTATION  
 POP: POWER DISTRIBUTION PANEL  
 SOE: SEQUENCE OF EVENT  
 STG: STEAM TURBINE GENERATOR  
 WTP: WATER TREATMENT PLANT  
 VMS: VIBRATION MONITORING SYSTEM



**PRELIMINARY**

REV	DESCRIPTION	DATE	BY	CHECKED	DATE
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INTEFAO SUGAR MILLS (PVT) LIMITED

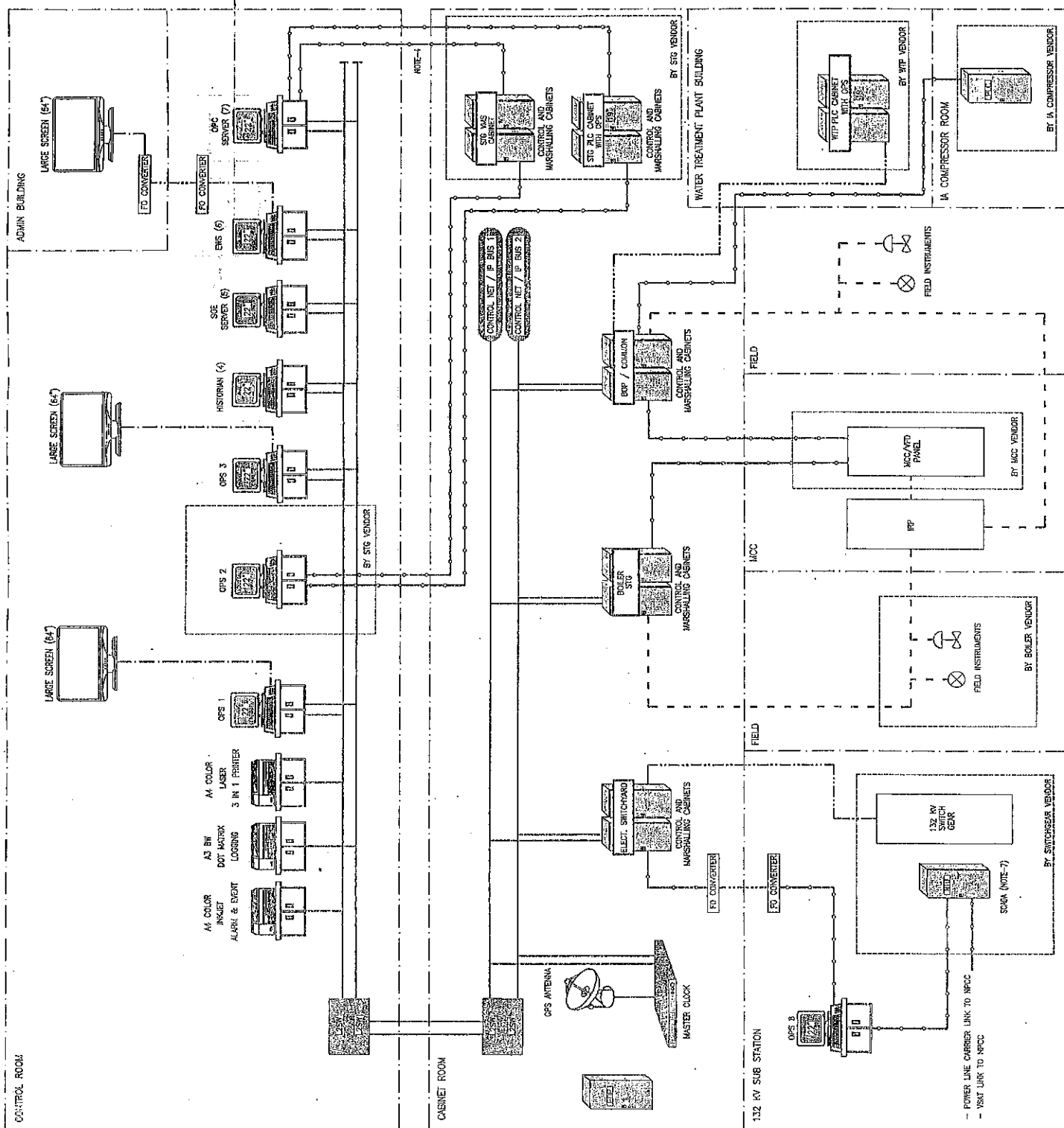
DESCON ENGINEERING LIMITED  
DESCON HEADQUARTERS  
18-19 FERGUSON ROAD P.O. BOX 1261 LAUREL-33000 9/1  
TEL: +27(43)2581100. FAX: +27(43)2581105. 2581105  
WEBSITE: [www.descon.co.za](http://www.descon.co.za) EMAIL: [descon@descon.co.za](mailto:descon@descon.co.za)

PROJECT NAME & LOCATION
1 X 31 2MW ITH-FAO COGEN POWER PLANT - PAKISTAN

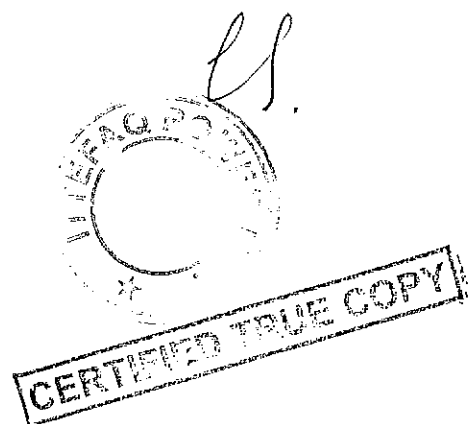
**SOCIAL ANTHROPOLOGY**

CONTROL SYSTEM ARCHITECTURE 0146384M

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						NO.	TOTAL	
A1	11x17		ITEM#AQ-00-IC-708-001-0	ITEM#AQ-00-IC-708-001		1	1	0



# PLANT LAYOT



## Plant Details

### 1. General Information

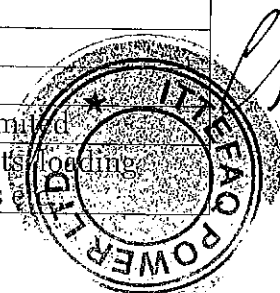
(i)	Applicant's Name	Ittefaq Power Limited
(ii)	Registered Office	40 B-II, Gulberg-III, Lahore
(iii)	Plant Location	Shafiabad, Channi Goth, District Bahawalpur, Punjab (Coordinates: 29.10°N, 71.00°E).
(iv)	Type of Generation Facility	Bagasse fired Cogeneration Power Plant
(v)	Commissioning/Commercial Operation Date	19 months from Financial Close
(vi)	Expected Life of the Facility from Commercial Operation/Commissioning	30 years
(vii)	Expected Remaining Useful Life of the Facility	30 years

### 2. Plant Configuration

(i)	Plant Size Installed Capacity (Gross ISO)	31.20 MW (Gross)
(ii)	Type of Technology	Cogeneration Power Plant with high pressure boilers and Turbo-Generators
(iii)	Number of Units	One (01) in Phase 1
(iv)	Unit Make and Model	110 bar Travelling grate boiler with steam capacity of 155 TPH from Wuxi China  Turbo generator - Extraction cum condensing type based on SIEMENS Design from Hangzhou Steam Turbine Company Limited China
(v)	Installed Capacity	Power Generation: 31.20 MW (Season operation) 31.20 MW (Off-season operation)
(vi)	Auxiliary Consumption	9.0 %
(vii)	Interconnection	1.5 km from proposed project site.

### 3. Fuel / Raw Material Details

(i)	Primary Fuel	Bagasse
(ii)	Alternate Fuel	NIL
(iii)	Fuel Source (Imported/Indigenous)	Indigenous
(iv)	Fuel Supplier	Ittefaq Sugar Mills Limited
(v)	Supply Arrangement	Through conveyor belts/loading trucks/tractor trolleys etc.



(vi)	Sugarcane Crushing Capacity	354.166 TPH
(vii)	Bagasse Generation Capacity	102.70 TPH
(viii)	Bagasse Storage Capacity	Bulk Storage
(ix)	Number of Storage Tanks	Not Applicable, bagasse shall be stored in open yard
(x)	Storage Capacity of each tank	Not Applicable
(xi)	Gross Storage	Bulk Storage

#### 4. Emission Values

Emission values shall remain within the limits prescribed by National Environment Quality Standards. (NEQs) and Company would install electrostatic precipitator (ESP) to ensure the same.

#### 5. Cooling System

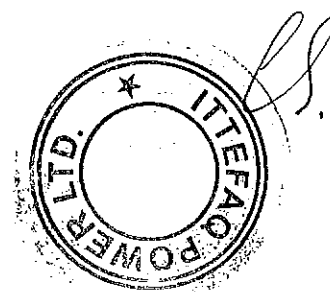
(i)	Cooling Water Source/Cycle	Ground Water/Closed Circuit
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#### 6. Plant Characteristics

(i)	Generation Voltage	11 KV volts
(ii)	Frequency	50 Hz
(iii)	Power Factor	0.8 (lag)
(iv)	Automatic Generation Control (AFG)	By Turbine Governing System
(v)	Ramping Rate	200 rpm / minute (outside critical band)
(vi)	Time Required to Synchronize to Grid and Loading the Complex to Full Load from Cold Start	<div>During cold start (i.e. when plant is started later than 72 hours after shutdown) 150 minutes</div> <div>During warm start (i.e. when plant is started at less than 36 hours after shutdown) 90 minutes</div> <div>During Hot start (i.e. when plant is started at less than 12 hours after shutdown) 60 minutes</div>

#### Note:

All the above figures are indicative in nature. The Net Capacity available for dispatch will be determined through procedure(s) contained in the Energy Purchase Agreement, Grid code or any other applicable document(s).



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# PROSPECTUS

# Prospectus

## **Introduction of Applicant**

Ittefaq Sugar Mills Limited through a wholly owned subsidiary Ittefaq Power Limited intends to set up a green field 31.2 MW (Gross) high-pressure bagasse based co-generation power plant under the provisions of the Framework for Power Cogeneration 2013 and Policy for Development of Renewable Energy for Power Generation 2006. The Project will be located in the premises of ISML located at Shafiabad, District Bahawalpur, Punjab.

The Project will sell power to the national grid through sale of energy to the Central Power Purchasing Agency Guarantee Limited under a 30-year Energy Purchase Agreement as well as partially meet the steam and power requirements of ISML during the crushing season. The Project will enable ISML to establish a sustainable market for its by-product, bagasse, and will also allow the sponsors of ISML to take an exposure in the power sector through incentives offered by the Government of Pakistan under the Framework and RE Policy.

## **Salient features of the facility for which license is sought**

The broad parameters of the project are as under:

Project Capacity	31.20 MW (Gross)
Project Location	Shafiabad, District Bahawalpur, Punjab
Land Area	50 Acre
Construction Period	19 months
Technology	Bagasse/Bio-Mass.
Power Purchaser	CPPA/MEPCO/NTDC
Steam Turbines	1 X 31.2 M.W extraction cum condensing
Turbine	
Boilers	1 X 155 TPH , 110 Bar 540°C
Upfront Levelized Tariff	US Cents 10.62 per kWh

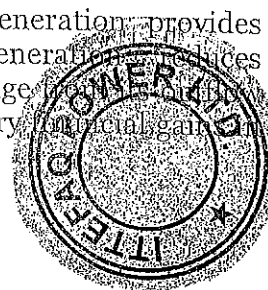
## **Proposed Investment**

The total cost for the project is approximated PKR 3,834 Million (USD 35.18 million), which is expected to be financed in a debt to equity ratio of 75:25.

## **Social and Environmental Impact of the Proposed Facility**

Bagasse based Cogeneration power plant, offers a number of advantages both to the sugar industry and to the country. Besides reducing gap between the demand and the

supply in the power sector, Bagasse based fuel power cogeneration provides environmentally friendly solution for additional power generation, reduces dependence on fossil fuels, saves on hard earned foreign exchange by earning from the country for import of fossil fuels and gives sugar industry financial gain in the form of cheaper energy while using Bagasse as fuel.



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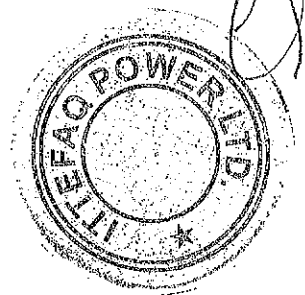
*Major Impacts and Mitigation measures:*

The most significant pollutant emitted from Bagasse-fired boilers is Ash. As ISML is already using low pressure boilers and ash is in very little quantity, the high pressure boilers will produce minor quantity of ash which will be controlled by the use of Electrostatic Precipitator separator (fly ash arrestor) to meet the permitted dust concentration as required by NEQS Pakistan. Both of these technologies have the ability to remove 99.9% of ash (PM) in stack exhausts.

Gaseous emissions of Sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) are lower than conventional fossil fuels due to the characteristically very low levels of sulphur and nitrogen associated with Bagasse, therefore, they will remain within the prescribed limiting values of the NEQS Pakistan.

The Waste water will be treated in lagoons and after treatment will be used within the four boundary walls of project site, for sprinkling on the unpaved sites, for suppression of dust, for plant entries, and for irrigation of plants. Unconsumed treated waste water will be used for the irrigation of the crops of the project proponent.

The noise levels of 75 dB (A) and 65 dB (A) indicated are at the plant boundary, as the maximum noise level shall be 85dB (A) at 3.0 m from the equipment.



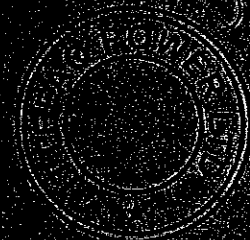
**CERTIFIED TRUE COPY**

# **FEASIBILITY REPORT**

# Ittefaq Power Limited

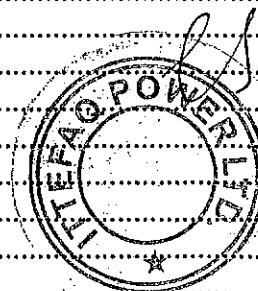
31.2 MW Bagasse-based Cogeneration Power Project  
Shafiabad, District Bahawalpur, Pakistan

*Feasibility Report*

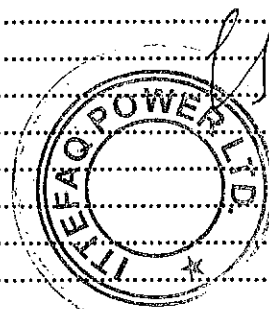


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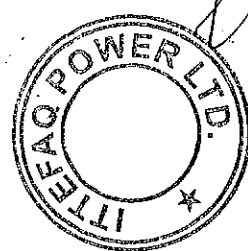


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## 1 Project Background

Ittefaq Sugar Mills Limited (“ISML”) through a wholly owned subsidiary Ittefaq Power Limited (“IPL”) intends to set up a green field 31.2 MW (Gross) high-pressure bagasse based co-generation power plant (“Project”) under the provisions of the Framework for Power Cogeneration 2013 (“Framework”) and Policy for Development of Renewable Energy for Power Generation 2006 (“RE Policy” or “Policy”). The Project will be located in the premises of ISML located at Shafiabad, District Bahawalpur, Punjab.

The Project will sell power to the national grid through sale of energy to the Central Power Purchasing Agency Guarantee Limited (“CPPA-G”) under a 30-year Energy Purchase Agreement (“EPA”) as well as partially meet the steam and power requirements of ISML during the crushing season. The Project will enable ISML to establish a sustainable market for its by-product, bagasse, and will also allow the sponsors of ISML to take an exposure in the power sector through incentives offered by the Government of Pakistan under the Framework and RE Policy.

The objective of this feasibility report (“Feasibility”) is to assist ISML in assessing the viability of the Project under a *given set of assumptions*.

## 2 Power Market

### 2.1 Structure of Power Sector in Pakistan

Historically, the power sector in Pakistan has been owned and operated by government entities, primarily the Water and Power Development Authority (“WAPDA”) until the drive to unbundle started in early 1990s. Since then the sector has evolved much with private sector involvement primarily in generation and more recently on the model of a fully vertically integrated utility company. The generation, transmission, distribution and retail supply of electricity in Pakistan is presently undertaken by a number of public and private sector entities comprising of one (1) national transmission company; nine (9) regional public sector-owned distribution companies; four (4) public sector thermal generation companies; one (1) public sector hydropower generation company and several independent power producers (IPPs). These entities enable the supply of power to the entire country except for Karachi. The metropolitan city of Karachi and some of its surrounding areas are supplied power K-Electric, which is a vertically integrated utility owned by the private sector responsible for the generation, transmission and distribution of electricity in its region. The total installed capacity of the entire country in 2015 was 24,823 MW of which 16,814 MW (67.74%) was thermal, 7,116 (28.67%) was hydroelectric, 787 MW (3.17%) was nuclear and 106 MW (0.43%) was wind.

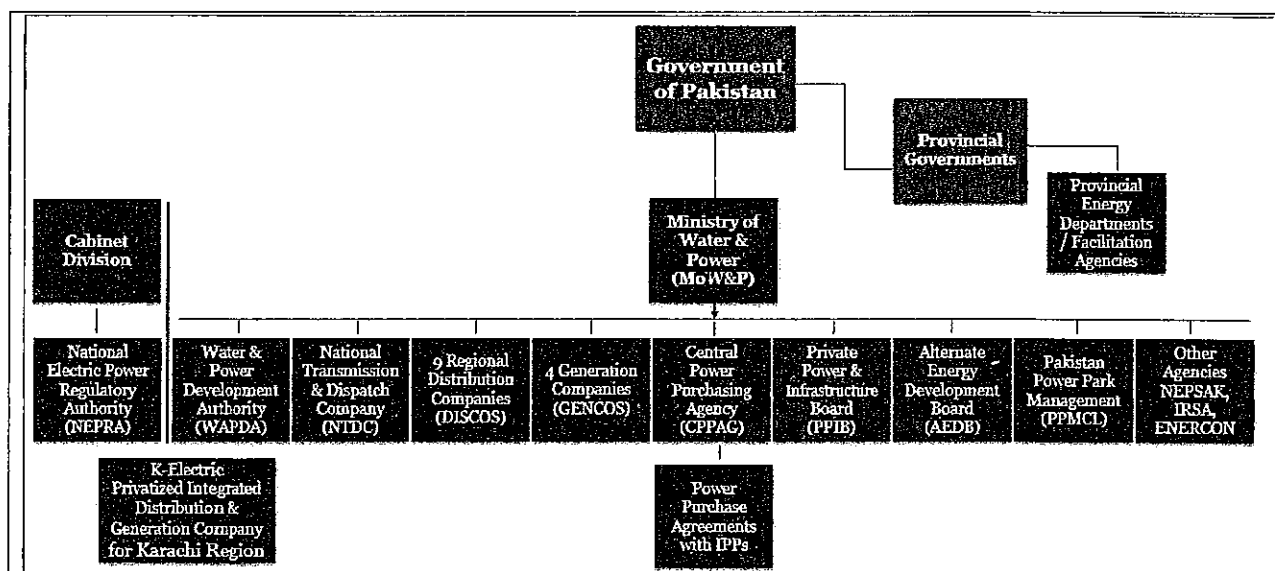
**Table 1: Pakistan Power Generation Capacity**

As on 30 <sup>th</sup> June	2011	2012	2013	2014	2015
Thermal	15,910	15,969	15,941	15,719	16,814
Hydropower	6,645	6,730	6,947	7,116	7,116
Nuclear	787	787	787	787	787
Wind	0	1	50	106	106
Total	23,342	23,487	23,725	23,728	24,823

*All figures in MW; Source: NEPRA State of Industry Report, 2015*

More recently the CPPA, previously residing within NTDC, has been converted into a legally separate independent body acting as a central counterparty to power purchase transactions. The present form of the power structure in Pakistan is presented below:

**Table 1: Pakistan Power Sector Structure**



## 22 Electricity Generation

Historically, Pakistan has relied on hydropower generation to meet its electricity demands, as the ratio of hydel to thermal installed generation capacity in the country in 1985 was about 67% to 33%. However, with the passage of time, the energy mix has shifted towards thermal power generation, which now generates approximately 65% of total power produced in the country. Electrical energy generated in recent years by fuel type is presented in the table below:

**Table 2: Pakistan Energy Generation by Source**

As on 30 <sup>th</sup> June	2010-11	2011-12	2012-13	2013-14	2013-14
Thermal	65,169	64,478	64,034	68,083	69,988
% Share	64.79	65.94	64.91	64.41	64.71
Hydel	31,990	28,643	30,033	32,239	32,979
% Share	31.80	28.85	30.44	30.50	30.24
Nuclear	3,130	4,872	4,181	4,695	5,349
% Share	3.11	4.91	4.24	4.44	4.90
Import	295	296	375	419	443
% Share	0.29	0.30	0.38	0.40	0.41
Wind	0	6	32	263	300
% Share	0.00	0.01	0.03	0.25	0.27
Total	100,584	99,295	98,655	105,698	109,059

All figures in GWh; Source: NEPRA State of Industry Report, 2015



Given the acute gas shortage in the country, the thermal generation has relied mostly on expensive fuels such as Furnace Oil and High Speed Diesel. Increased dependence on expensive thermal fuel sources has not only led to high cost of generation but has also resulted in large amounts of foreign reserves to be spent on the import of fuel. The fuel wise thermal generation in the country in the recent years is given in the table below:

**Table 3: Pakistan Energy Generation by Source (Thermal Fuel Mix)**

	2010-11	2011-12	2012-13	2013-14	2014-15
Gas	37,076	30,162	28,190	30,769	31,196
% share of thermal generation	56.89	46.06	44.02	45.19	44.57
FO + HSD	27,984	35,250	35,804	37,201	38,690
% share of thermal generation	42.94	53.83	55.91	54.64	55.28
Coal	109	66	40	112	102
% share of thermal generation	0.17	0.10	0.06	0.16	0.15
Total	65,169	65,478	64,034	68,082	69,988

All figures in GWh; Source: PSS/NTDC/KEL

Due to this skewed energy mix, it has now become imperative upon the power sector in Pakistan to move towards generation technologies that are sustainable and rely on indigenous resources.

### 23 Demand and Supply of Electricity

For the past decade or so, Pakistan has been suffering from an acute energy crisis due to rising demand exacerbated by structural flaws within the sector. Some of the major reasons contributing to this crisis include:

1. Inefficient transmission and distribution
2. Increasing demand
3. Inefficient use of energy
4. Expensive energy mix and
5. Improper pricing.

Installed capacity in the country grew at an average rate of 5.51% during the period 1990-2015. However, this increase in capacity has been unable to meet the demand of electricity leading to a demand-supply gap, which can go as high as 6,600 MW during peak hours. In 2015, the maximum generation capability remained at 16,500 MW, while the maximum peak demand reached 21,701 MW, resulting in a 5,201 MW gap between supply and demand. Projections by government agencies depict that this shortfall is not going to end till 2019. The tables below show the actual and projected surplus/deficit in demand during system peak hours:

**Table 4: Pakistan Historical Supply and Demand of Power**

Year	Generation Capacity	Peak Demand	Surplus/(Deficit)
2011	15,430	21,086	-5,656
2012	14,483	21,536	-7,053
2013	16,846	21,605	-4,759
2014	18,771	23,505	-4,734

2015	19,132	24,757	-5,625
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All figures in MW; Source: NTDC

**Table 5: Pakistan Projected Supply and Demand of Power**

Year	Planned Generation	Projected Peak Demand	Surplus/(Deficit)
2016	20,303	25,666	-5,363
2017	23,445	27,185	-3,740
2018	28,751	28,678	73
2019	33,545	30,154	3,391
2020	35,590	31,625	3,965

Source: NTDC

Shortage of electricity has become the most critical challenge not only causing social disruption but also hitting the economic growth of the country. According to estimates, energy shortages in the country have resulted in approximately 2% reduction in the annual GDP of the country. Therefore, resolving the energy crisis is amongst the top priorities of the government and steps are being taken to attract new investment in the power sector. Moreover, steps are being taken to optimize the generation mix and add renewable and indigenous energy sources.

## 24 Key Organizations

### 2.4.1 National Electric Power Regulatory Authority ("NEPRA")

In order to promote fair competition in the industry and to protect the rights of consumers as well as producers/sellers of electricity, the GOP enacted the Regulation of Generation, Transmission and Distribution of Electric Power Regulation Act, 1997 ("NEPRA Act"). Under this Act, the NEPRA Policy for Power Generation Projects was established for regulating electric power generation, transmission and distribution in Pakistan. In performing its functions under this Act, NEPRA shall is required to, as far as practicable, protect the interests of consumers and companies providing electric power services in accordance with guidelines laid down by the government. One of NEPRA's most prominent roles is tariff approval for the Project.

NEPRA's role in the power business, inter alia, is to issue licenses for companies and to regulate their operations according to NEPRA rules and regulations. The prospective applicants will be required to comply with all NEPRA rules/procedures, inter alia, for grant of license before security agreements are concluded for any project.

### 2.4.2 Private Power and Infrastructure Board ("PPIB")

PPIB provides a one-window facility to IPPs for implementation of projects above 50 MW capacity and issues the Letter of Interest ("LOI") and Letter of Support ("LOS"). PPIB prepares pre-qualification and bid documents, pre-qualifies the sponsors, evaluates the bids of pre-qualified sponsors, assists the sponsors/project companies in seeking necessary consents / permissions from various governmental agencies, carries out negotiations on the Implementation Agreement, assists the power purchaser, fuel supplier, government authorities in the negotiations, execution and administration of the PPA, fuel / gas / coal supply agreement and water use license respectively, issues and administers the GOP guarantee backing up the power purchaser, fuel supplier and follows up on implementation and monitoring of projects.

### 2.4.3 Alternate Energy Development Board (“AEDB”)

AEDB has been designated as one-window facility for processing all alternative and renewable energy projects in the private sector projects such as wind, biodiesel, bagasse/biomass/waste to energy, small/mini/micro hydro and solar power projects. AEDB also issues bankable IA, EPA, LOI and LOS to alternative energy producers. AEDB shall be the relevant GoP facilitation agency for the issuance of the LOI and LOS as well negotiation of the IA and provision of the GoP guarantee as applicable for the Project.

### 2.4.4 Central Power Purchasing Authority Guarantee Limited (“CPPA-G”)

CPPA-G, a company created by Government of Pakistan, is a non-profit independent company established under the Companies Ordinance, 1984 and solely responsible for implementing and administering the “Single Buyer Plus” market mechanism (ultimately leading to competitive market operations). CPPA purchases powers on behalf of Distribution Companies (“DISCOS”) from IPPs. The Project shall be entering into negotiations with CPPA-G for the sale of energy to the national grid and shall enter into an energy purchase agreement in this regard.

### 2.4.5 Multan Electric Power Company (“MEPCO”)

MEPCO is a public limited company incorporated on May 14<sup>th</sup>, 1998 in line with Government policy of unbundling and corporatization of Pakistan power sector. The company was established to acquire all properties, rights, assets, obligations and liabilities of defunct Multan Area Electricity Board, Grid Stations and transmission lines of the supply system which were directly and exclusively supplying electricity in the jurisdiction of the said Multan Area Electricity Board.

MEPCO is the largest power distribution company in the country operating exclusively in 13 administrative districts of southern Punjab i.e. Multan, Muzaffargarh, Layyah, D.G.Khan, Rajanpur, Lodhran, Bahawalpur, R.Y.Khan, Khanewal, Sahiwal, Pakpattan, Vehari and Bahawalnagar. The Project will evacuate power to MEPCO at the nearest sub-station/transmission line which shall be determined after the finalization of the grid interconnection study, which is in process.

## 3 Applicable Framework & Policy

The Project is being set up under the Framework for Power Cogeneration 2013 pursuant to the Policy for Development of Renewable Energy for Power Generation 2006 being administered by the AEDB. Under the terms of the Framework and Policy, electricity purchase by the CPPA-G from bagasse-based projects has been made mandatory.

The conditions of the Framework/Policy envisage ISML/IPL seeking a Letter of Interest (“LOI”) from AEDB for the Project. In May 2013, NEPRA has announced an upfront tariff (“Upfront Tariff”) for high-pressure boiler based bagasse projects being set up under the Framework. The Upfront Tariff has subsequently been extended up to May 2017; the Company shall upon completion of the applicable prerequisites apply to NEPRA for the same.

Upon receipt of the Upfront Tariff approval from NEPRA the Project Company shall seek a Letter of Support (“LOS”) from AEDB; following which the Company shall enter into negotiations of the EPA and IA with CPPA-G and AEDB respectively, which shall be followed by the financial

close of the Project. Under the terms of the Upfront Tariff (and LOS) the Company is required to achieve the commercial operations date of the Project within 24 months from date of approval of the Upfront Tariff for the Company.

In parallel, the Company shall also apply to NEPRA for the issuance of the generation license for the Project. The application for the generation license shall be made following the issuance of the LOI and will be issued, amongst others, after submission of an approved grid interconnection study from MEPCO and environmental study from the relevant authority.

## 4 Cogeneration

### 4.1 Bagasse Based Cogeneration

Cogeneration refers to generation of electricity and useful heat from use of a single fuel at high efficiency. Co-generation is a well-known process in sugar industry as every sugar mill requires steam for sugar manufacturing while supply of electricity is also necessary to operate machinery. The steam provides thermal energy which is used in heating and concentrating the juice into syrup. This process of juice concentration to syrup involves the evaporation of a lot of water in the juice and this removal of water is done by using low pressure steam, as the heating medium. With the large quantum of low pressure steam usage, the sugar industry stands as an ideal candidate for Cogeneration. Historically, most sugar mill boilers and the power houses were designed primarily to meet the process steam and electricity requirements of the sugar mill. Therefore, the boilers and turbo-generators employed are mostly of low pressure and low temperature style.

There has been, of late, increasing awareness of the advantages of installation of high pressure, high efficiency bagasse based systems. With installation of high pressure boilers, electricity over and above internal use can also be produced and sold to national grid, if allowed. Exports of electricity can make cogeneration an attractive and cost-efficient means of cutting production costs, reducing pollution and generating additional revenues depending on the ratio between the price of electricity secured and production cost of electricity generated in the sugar industry.

## 5 The Project

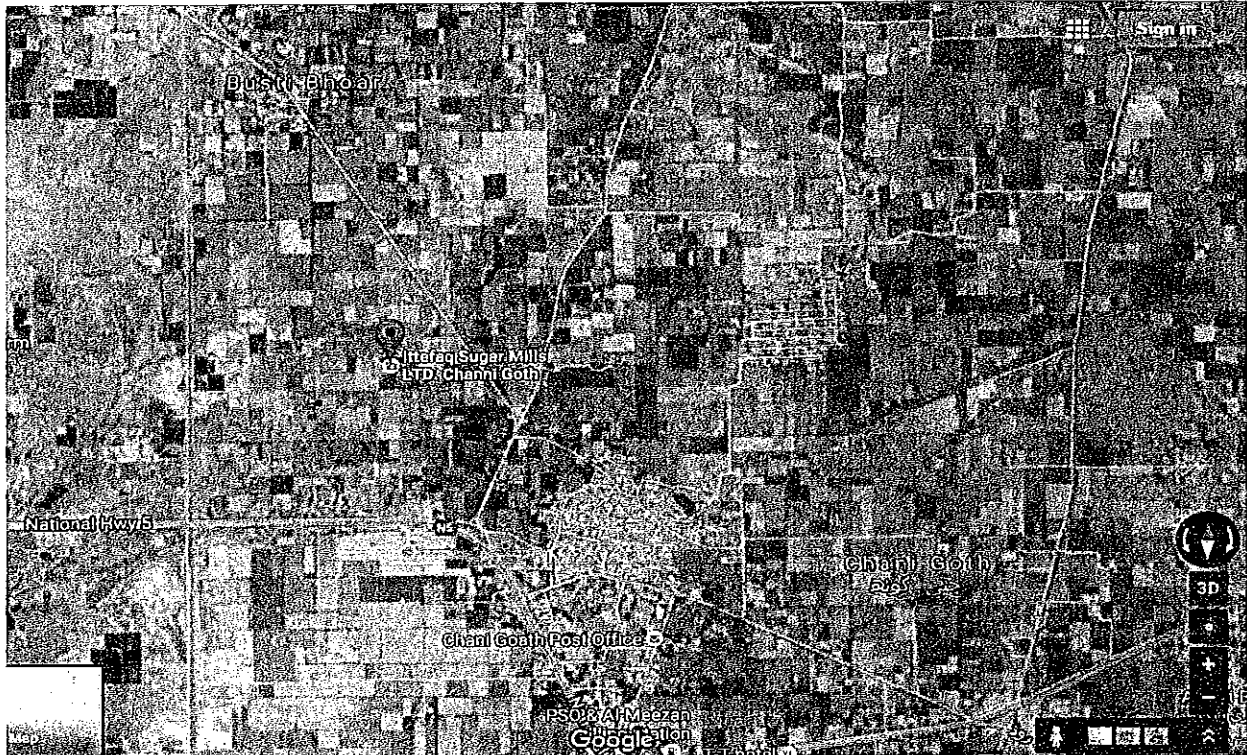
The 31.2 MW Co-generation Project envisages a 1+1 configuration power plant comprising of a high pressure (110 bar) traveling grate boiler having a steam capacity 155 tons per hour, a 31.2 MW condensing/extraction steam turbine generators and balance of plant ("**Plant**"). It is planned that, **during the crushing period**, steam and power for ISML operations will be provided from the existing low pressure ("**LP**") system and the balance steam/power requirement of ISML will be met through the high pressure ("**HP**") system of the Plant. During the crushing period, bagasse from ISML will be utilized both in the HP and LP Systems to generate steam and power. (Note: Only power generated from the HP system may be sold to CPPA-G). During the non-crushing period only the HP system shall operate, which will use unutilized bagasse available with ISML.

Detailed workings regarding the fuel availability and generation mix are provided in the following sections.

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## 5.1 Project Site

The Project Site will be located within the premises of the sugar mill located at Shafiabad, Channi Goth, District Bahawalpur (Coordinates: 29.10°N, 71.00°E). The total area of the sugar mill and its premises is 134 acres and of that, approximately 50 acres will be allocated to the construction of the power plant. A map of the Project site is given below:



## 5.2 Interconnection

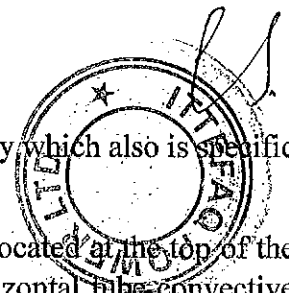
Grid interconnection will be at a MEPCO 132 kV grid station/transmission at a distance of 1.5 km from the Project site. A detailed grid interconnection study has been carried out and submitted to MEPCO for approval.

## 6 Plant Design

### 6.1 General

The design of the Facility is typical for a biomass-fired cogeneration facility which also is specific to the use of bagasse and to the cogeneration requirements.

The boilers will consist of tall water wall furnace with platen generators located at the top of the furnace. The super heater will have three stages. The first stage is a horizontal tube convective super heater located in the boiler second pass. The second stage consists of platens located at the top of the furnace adjacent to the generator section. The third stage consists of pendants located above the furnace arch between the second and first stages. Following the super heater are three horizontal tube economizer sections and four tubular air heater sections.



The steam cycle consists of two high pressure feed water heaters and a deaerator for each unit. The high pressure feed water heaters take steam from the two uncontrolled extractions of the steam turbine. Steam for the deaerator is to be supplied from the controlled extraction of the steam turbine.

The Facility has two modes of operation defined by steam needs of ISML. During the crushing season, ISML needs steam and electricity to crush the sugar cane and produce sugar. Steam for ISML will be supplied from the controlled extraction of the steam turbine which is at approximately 3 bar pressure. The expected steam demand for ISML is 174 tons/hr. The electricity demand during the crushing season is 4.75 MW. During the off-season, the electricity demand is 0.5 MW.

## 6.2 Technology

Combustion technology based on the Rankine Cycle will be utilized in this project which is proven latest technology. The bagasse will be combusted in a high pressure boiler and the steam generated will be fed to the steam turbine to generate power. The turbine will be different from the conventional thermal power plants as the turbine will be provided with a controlled extraction for extracting the process steam required for the sugar mill. To enhance the efficiency of operation, regenerative heaters are used in the feed water circuit. For the Cogeneration power plant proposed for IPL, the Cogeneration cycle is based on the parameters of 110 bar(a) and 540 degree centigrade at the boiler outlet, currently being used in many countries for the Cogeneration projects. The cycle chosen with the above parameters is the latest used in any of the bagasse fired installations around the world. These above selected parameters make the cycle more efficient and help in the generation of more units for the same quantum of the fuel.

There are already many Cogeneration plants operating in Pakistan & India with these parameters and the operating experience of those plants, in synchronization with the sugar mill operation, has been smooth and without any hitch. The Cogeneration scheme for IPL proposes 1x155 TPH capacity boilers and 1x31.2 MW extraction condensing turbo generators. Considering the offseason operation of the plant, the Cogeneration power plant boilers will be designed for firing the saved bagasse and a few other compatible bio-mass fuels.

## 7 Project Specifications and Equipment

### 7.1 Bagasse Fired Boiler

The Boiler shall be single drum, natural circulation, radiant furnace with water cooled membrane wall, three stage super-heater with two stage attemperator, balanced draft and travelling grate Bagasse and coal fired boiler. The boiler is capable of a peak generation of 110% of the MCR for a period of half an hour in eight hour shift. The boiler shall be top supported, outdoor type, with adequate provisions for the thermal expansion of the boilers in all directions.

#### Design Parameters:

- Bagasse Fired Boiler; 155TPH
- Steam pressure at the Main Steam stop valve outlet: 110 bar(a)

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- Steam temperature at the Main steam stop valve outlet at MCR:  $540 \pm 5^{\circ}\text{C}$
- Boiler feed water temperature at the inlet to the Deaerator:  $136^{\circ}\text{C}$ .
- Maximum noise level at 1.0 m distance for the boiler: 85 dB(A)
- Maximum noise level at 1.0 m for boiler drum safety valves: 110 dB(A)

The Bagasse through drum feeders, screw feeders and pneumatic spreaders will be fed into the furnace and shall have future provisions for coal through screw feeder and pneumatic spreaders push into the furnace. The travelling grate is selected for efficient combustion system and to avoid heating of grates. The Ash is collected by the continuous movement of travelling grate.

The air will be supplied by primary Forced Draft (FD) fans & secondary air fans. The air towards Bagasse and coal will be controlled by the fuel air control system in order to guarantee safe and optimum combustion. The air supplied from FD fan will be heated up in air pre-heater. The pressure in the furnace will be controlled by the Induced Draft (ID) fans installed at outlet of boiler. These fans will be provided with Variable Frequency Drive (VFD) in order to optimize the power consumption. ID fans will discharge flue gases.

After complete combustion in furnace the flue gases shall enter the super heater section installed in the upper portion of the furnace. From the super heaters the flue gases will flow downwards into modular bank. The evaporator section of the boiler will be designed for a large circulation ratio. Even during quick plant load changes the water circulation will be stable and thus prevent steam blockage in the evaporator sections.

From evaporator section, the flue gas shall enter the bare tube economizer from the top and leave at the bottom to Air flue Gas Preheater. The economizer tubes will be supported in the structure of the economizer casing and will be bottom supported. The economizer will be fully drainable.

Thereafter, the Fly Ash Arrestor installed at the outlet of the Air Preheater. From Fly Ash Arrestor most of the fly ash will be separated from the flue gases.

The condensate from the sugar mill shall be directly fed into the condensate tank from where it will be pumped to the deaerator via sugar plant exhaust condensate pumps through a level control system.

Demineralized (DM) water will be supplied to the boiler for makeup. The makeup water will be pumped to the overhead surge tank via DM water distribution pumps. The makeup water will be added in the condenser hot well from the overhead surge tank by gravity through a level control system. The condensate from the condenser and makeup water added to the condenser hot well will be pumped to the deaerator by condensate extraction pumps.

3x50% Boiler Feed Water (BFW) pumps shall be provided. BFW pumps are multistage, centrifugal type with low voltage [400V] drive motors with Variable Frequency Drives (VFDs). The condensate and make-up water lines will have level control valve to control deaerator level.

The control philosophy, boilers interlock and protection logic shall be implemented in Distributed Control System (DCS) for safe operation of boiler.

## 72 Steam Turbine and Auxiliaries

### 7.2.1 Steam Turbine

The turbine of the cogeneration power plant will be multistage nozzle governed, horizontal spindle, two bearings, and extraction cum condensing type with two (2) numbers of uncontrolled extractions and one (1) number of control extractions. The exhaust from the turbine will be condensed in the surface condenser at 0.1 bar (a) pressure during off-season operation.

The low pressure steam at 3 bar (a), 133°C will be supplied to the sugar plant for juice heating in the evaporator station. The medium pressure steam at 9 bar (a), 190°C will be supplied for centrifugal washing. 95% condensate of the supplied LP steam will be returned from the sugar mill. There will be no condensate return of medium pressure steam.

### 7.2.2 Gear Box

Heavy duty reduction gear box of Double helical type with hardened & ground gears will be installed, capable of transmitting maximum power generated by turbine and able to withstand 20% over speed over a period of minimum five (5) minutes.

The gear box will be designed with a service factor of 1.3 as per AGMA requirements.

### 7.2.3 Couplings

High speed coupling between the turbine & the gear box will be non-lubricating, steel laminated, flexible type. The coupling between the gear box and the alternator will be low speed. Both the couplings will have coupling guards and acoustic covers. Power rating of the couplings shall be in accordance with AGMA 514

### 7.2.4 Condensing System

Condensing system shall comprise of the following:

- Shell & Tube horizontal type surface condenser with integral hot well, thermal relief valve and atmospheric relief valve.
- Steam Ejector system consisting of:
  - Twin stage main ejectors (1 working + 1 standby) with two surface type inter and after condensers.
  - Startup hogging type ejector with silencer.
- Vertical canister type Condensate extraction pumps (CEP's), with a 3 x 50% capacity with LT motors and suction valves.
- Rupture disc for condenser protection.
- Expansion bellow with spool piece between turbine exhaust and condenser inlet
- Dry air/vapor line within specified battery limit

## 73 AC Generator

AC Generator shall comprise of the following:



- Brush-less exciter with PMG
- Air coolers
- Twin bearings
- AVR cum Excitation panel
- Anti-condensation heaters
- Water leakage detector- 1 per cooler
- Lube oil flow regulator - 1 per bearing

Generator electrical output rating shall be as follow:

- 41MVA rated capacity at 50° C ambient.
- $11 \pm 10\%$  KV
- $50 \pm 5\%$  Hz
- 3 Phase
- Power factor (0.8 lag to 0.95 lead)
- $\pm 0.5\%$  Accuracy Control

#### 7.3.1 Generator Protection and Control System:

Generation protection and control system will consist of the following equipment:

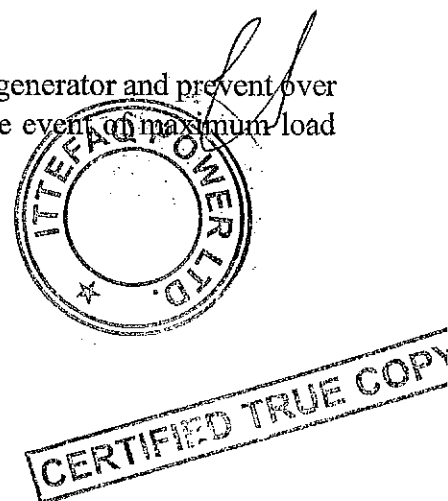
- Generator protection (Relay) Panel
- Metering & Synchronizing Panel
- MCC Panel
- Lightning arrestor, Surge capacitor and Potential transformer (LA, SC & PT) Panel
- Neutral grounding resistor (NGR) Panel
- DC Distribution

#### 7.4 Governing System

The governor system provided will control the acceleration of the turbo generator and prevent over speed without tripping the unit under any operating condition or in the event of maximum load rejection.

The governor system will have the following important functions:

- Speed control
- Over speed control
- Load control
- Inlet steam pressure control
- Extraction pressure control



## 7.5 Lubrication and Control System

A single forced feed lubrication system will be installed for Turbine, Gearbox & Alternator comprising of the following major components:

- Lube oil tank
- Oil Vapor extractor
- AC Electric Main Oil Pump (MOP) driven by gearbox low speed shaft
- AC electric Motor driven Auxiliary Oil Pump (AOP)
- DC Motor driven Emergency lube Oil Pump (EOP) with auto cut-in & cut-out facility
- Lube oil coolers (1 working + 1 standby)
- Lube oil filters (1 working + 1 standby)
- AC motor driven oil mist separator mounted on oil tank

## 7.6 Control Oil System

Control oil system will comprise of the following:

- AC electric Motor driven Auxiliary Control Oil Pump (ACOP) (1 working + 1 standby) to supply oil to Control system.
- Control Oil filter (COF) (1 working + 1 standby)

## 7.7 Main Cooling Water Pumps

The cooling water system shall be designed to provide cooling water to the following area of the plant:

- Surface Condenser
- Auxiliary cooling water coolers

The cooling water system includes the following major components:

### 7.7.1 Main Cooling Water Pumps

Three (3) Main Cooling Water Pumps (two working and one standby) each of capacity approximately 3000 m<sup>3</sup>/hr shall be provided. Pumps will be horizontal centrifugal type driven by electric motors.

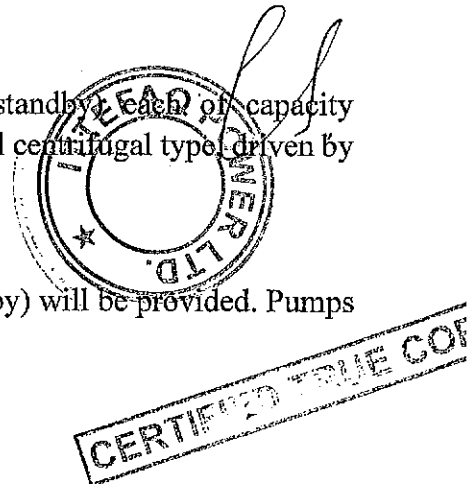
### 7.7.2 Auxiliary Cooling Water Pumps

Two (2) Auxiliary Cooling Water Pump (One working and one standby) will be provided. Pumps will be horizontal centrifugal type driven by electric motors.

### 7.7.3 Cooling Tower System

The Cooling Tower System shall have the following specifications:

- One (1) R.C.C structure mechanically induced draft, counter flow type cooling tower
- Capacity of cooling tower will be approximately 6000 m<sup>3</sup>/hr and is combined and



common for the whole cogeneration power plant.

- There shall be minimum three (3) cells each having a capacity of approximately 2000m<sup>3</sup>/hr.
- The cooling tower will be designed for a cooling range of 10°C, and an approach of 5°C while operating under the atmospheric wet bulb temperature of about 28°C.
- Each cell of cooling tower gear box will be equipped with vibration switches, oil temperature and oil level controls.
- The source of cooling water will be Bore Well Water.
- Cooling water supply and return temperature is 33°C and 41°C respectively.

## 78 Raw Water System

Raw water system consists off the following components:

### 7.8.1 Cooling Water Makeup Pump

Two (2) Cooling Tower make up Water Pumps for season and off-season operation will be provided.

### 7.8.2 Raw Water Transfer Pumps

Two (2) Raw Water Transfer Pumps (one working and one standby) each of capacity 20 m<sup>3</sup>/hr will be provided to ensure raw water supply to Water Treatment Plant.

## 79 Compressed Air System

The function of this system is to provide service and instrument air for cogeneration plant operations. Compressed air system provides air to following users:

- **Instrument Air Users:** Instrument air will be required for the operation of pneumatic instruments like I/P converters, purge instruments, pneumatic actuation of control valves, dampers etc.
- **Service Air Users:** Service air will be required for cleaning of filters, strainers and general purpose.

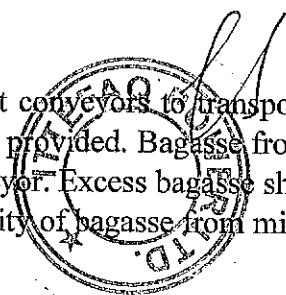
## 7.10 Bagasse Handling System

The bagasse handling system comprising of chain conveyors & belt conveyors to transport the required quantity of bagasse from sugar mill to cogeneration shall be provided. Bagasse from the sugar mill shall be fed to the boiler from a front mounted chain conveyor. Excess bagasse shall be returned to the bagasse storage yard. During off-season/non availability of bagasse from mill, the cogeneration boiler shall use saved bagasse from the storage yard.

## 7.11 Ash Handling System

The ash handling system envisaged for the cogeneration boiler shall consist of Submerged Ash Belt Conveyor System and Dense Phase Ash Handling System.

### 7.11.1 Submerged Ash Belt Handling System



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Submerged Ash Belt Handling System consists of conveyor belts, drive assembly, all type of pulleys, all type of idlers, bearing assembly, inlet / outlet chutes, take-up assembly, trough assembly, support frames, cross over, walkway, structural safety switches, water inlet / outlet / drain nozzles etc. The bottom ash at the discharge of travelling grate shall be conveyed by submerged ash conveyor system.

The ash shall be quenched in the water trough of submerged ash conveyor before conveying. The submerged ash conveyor shall discharge the ash directly to a trolley mounted tractor for further disposal.

#### 7.11.2 Dense Phase Ash Handling System

This system will handle fly ash from boiler ash hopper (other than traveling grate & plenum ash hopper) and ESP hoppers. Surge hopper (water cooled for boiler ash hopper and non-water cooled for ESP hopper) arrangement shall be provided below the boiler and ESP hopper. Two air compressors with built in PLC control system and 1x100% air receiver shall be provided near the dense phase equipment. The required conveying air for dense phase ash system will be supplied by these compressors through air receivers. The ash silo storage capacity shall be enough to store 12 hours ash generation from both the boiler and ESP system.

#### 7.12 Water Treatment System

The Cogeneration power plant make up water requirements will be met from the bore wells located in the sugar plant. For the make up for the cycle, it is proposed to take the raw water through a Water Treatment Plant with the following treatment scheme.

2 x Multi-grade Filter → 2 x Two Stage Reverse Osmosis system → 2 x Electro De Ionization system. (2x MGF + 2xRO + 2x EDI) There shall be two independent streams. The capacity of water treatment plant is 15 m<sup>3</sup>/hr. DM water is collected in two DM water tanks each having a capacity of 300 m<sup>3</sup>. Water will be distributed from DM tanks through pumps to different users i.e. Deaerator, Condenser etc.

#### 7.13 Firefighting System

The function of fire-fighting system is to supply water to the main risk areas of the cogeneration power plant.

The fire protection system is required for early detection, containment and suppression of fires. A comprehensive fire protection system shall be provided to meet the above objective and all statutory and insurance requirements of National Fire Protection Association (NFPA).

The fire-fighting system shall consist of the following:

##### 7.13.1 Stand Pipe and Hose System:

Stand pipe and hose system shall be provided to cover the building and structures of the cogeneration plant. The system shall be designed as per the NFPA 14.

Standpipe shall have a hose of 65mm diameter with connection to a large supply of water. The hose connection shall be not less than 0.9m or more than 1.5m above the floor.

### 7.13.2 Fire Hydrant and Water Monitoring System

The hydrant system shall be provided to cover all areas. The system shall be designed as per NFPA 24. The system shall consist of over ground hydrant mains laid in rings, isolation valves, and stand pipes with hydrant valves (outdoor). A Hydrant shall be placed after every 40m.

### 7.13.3 Portable Fire Extinguishers:

Dry Chemical Powder, CO<sup>2</sup> and foam type extinguisher system shall be provided. The equipment shall be designed as per NFPA 10.

### 7.13.4 Automatic High Velocity Water Spray Nozzle System:

Automatic High Velocity Water Spray Nozzle System shall be provided along with deluge valve assembly for outdoor transformers in switchyard, generator & Turbine lube oil system area. The system shall be designed as per NFPA 15. The deluge valve assembly shall be UL/FM listed.

### 7.13.5 Fire Alarm & Detection System

Fire detection system for the power plant will provide early detection of fire and raise alarm. A comprehensive fire protection system shall be planned to meet the above objective and meet all statutory and insurance requirements of National Fire Protection Association (NFPA). A multitude of systems will be provided to combat various types of fires in different areas of the plant and all such systems for various areas shall form a part of a centralized protection system for the entire plant. Fire alarm system detection system shall be provided in following areas:

- Fire alarm and signaling in all electrical/instrumentation panel rooms in TG building
- Manual call points and Electric Horns in outdoor areas.

## 7.14 Effluent Handling System

Effluent handling system consists of the following main components:

### 7.14.1 Neutralizing Pit

Acid/caustic produced (if any) from Water Treatment Plant will be collected in neutralization pit. This effluent will be transferred to effluent pit after neutralization.

### 7.14.2 Neutralized Effluent Re-circulation cum Transfer Pumps

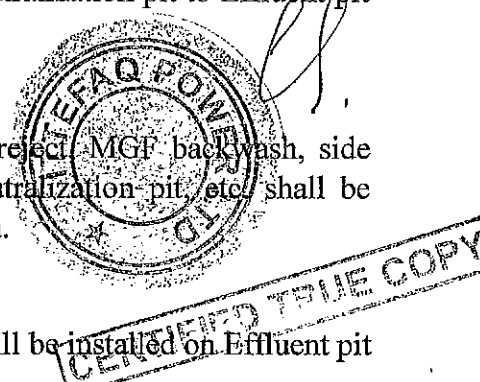
Two (2) Neutralized Effluent Re-circulation cum Transfer Pumps (One working & one standby) shall be installed at Neutralization pit to transfer effluents from Neutralization pit to Effluent pit in water treatment plant area.

### 7.14.3 Effluent Pit

Effluents like Boiler blow down, cooling tower blow down, RO reject, MGF backwash, side stream filter flushing, RO flushing, neutralized effluent from neutralization pit, etc, shall be collected in the separate effluent pit near Water Treatment Plant area.

### 7.14.4 Effluent Transfer Pump

Two (2) Effluent Transfer Pumps (One working and one standby) will be installed on Effluent pit



to transfer effluents. The pumps will also be used to re-circulate the effluent with in Neutralization pit for effective neutralization. The pump capacity shall be minimum 35 m<sup>3</sup>/hr.

### 7.15 Service Water System

Two (2) service water pumps (One working and one standby) will be installed to provide service water to plant users. One (1) expansion vessel will be installed to keep service water header pressurized.

### 7.16 Electric Overhead Travelling (EOT) Cranes

EOT cranes shall be provided in the following buildings:

#### TG Hall

An Electrically operated EOT crane shall be provided for the erection and maintenance requirements of turbo generator and its auxiliaries.

The main hook capacity shall be 24 Tons and suitable for lifting single heaviest component in Turbo Generator. The auxiliary hook lifting capacity shall be of 5 Tons. The crane travel will cover the entire length of the TG building. The crane shall be electrically operated, bridge type and shall be designed and equipped for indoor operations complete with all accessories. The crane bridge shall consist of bridge girders each carrying a rail on which a wheeled trolley is to run. Operation of crane shall be by pendant type push button station from ground level.

#### Workshop and Store

An Electrically operated EOT crane shall also be provided for routine maintenance activities and store material handling to be carried out in the building.

The single hook crane capacity shall be 5 Tons. The crane travel will cover the entire length of maintenance bay of workshop. Operation of crane shall be by pendant type push button station from ground level.

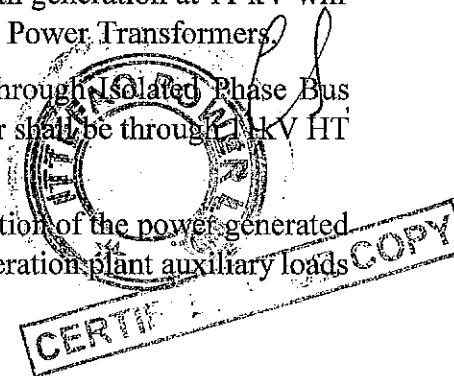
## 8 Electrical Design

### 8.1 Electrical Network

The Plant shall consist of one generator and associated auxiliaries for smooth plant operation. A synchronous alternator for the proposed co-generation power plant with generation at 11 kV will be connected to 132kV system through 11kV switchboard and step-up Power Transformers.

The connection between generator and 11kV switchboard shall be through Isolated Phase Bus Duct and between 11kV switchboard and 11/132kV power transformer shall be through 11kV HT XLPE cables.

The generator will operate in parallel with NTDC National grid. A portion of the power generated in the turbo-generator will meet the power requirements of the Cogeneration plant auxiliary loads and the sugar plant loads through step down transformers.



The surplus power, after meeting the power requirement of cogeneration plant auxiliaries and sugar plant auxiliaries, shall be exported to the grid through 11/132kV power transformer. There shall be total of 2 step-up power transformer (one standby + one working)

Entire Power evacuation system and associated equipment shall be designed so as to export the entire power from cogeneration plant (total generation less auxiliary power consumption), when the sugar plant is not in operation.

All the existing sugar plant loads shall be fed through one (1) interconnecting transformer.

### 8.1.1 Ambient Conditions for Electrical Equipment

Ambient conditions and design temperatures for electrical equipment are given in Table 6 below:

**Table 6: Ambient Conditions for Electrical Equipment**

	Deg C
Maximum Temperature	49.0
Minimum Temperature	1.0
Plant Design Temperature	30
Indoor Equipment Design	40
Outdoor Equipment Design	50

## 8.2 Plant Operating Voltage

The plant shall be designed suitable for operating at a frequency of 50Hz, with voltage levels of various systems of the plant as given in Table 7 below:

**Table 7: Plant Operating Voltage**

Generation (TG) system	11 kV
Power evacuation system	132 kV
Non-AC VSD / auxiliaries of cogeneration plant	400 V
AC VSD / auxiliaries of co-generation plant	400 V
DC system of co-generation plant	110 V
UPS system of co-generation plant	230 V

## 8.3 Basic Electrical Design Parameters

Basic electrical design parameters for the Plant are given in the table below:

**Table 8: Basic Electrical Design Parameters**

Power Factor (lagging)	0.8
Generation Voltage (kV)	11kV, 3 phase
Parallel operation with Grid	Required with 132kV grid
Grid Voltage	132 kV, 3 phase
System Frequency	50 $\pm$ 5%
System Voltage Variation	$\pm$ 10% Variation of Rated Voltage

System Fault Level	
132 kV	40 kA
11 kV	50 kA
400 V	50 kA
Fault Level & Withstand Duration	
132kV Switchgear	40kA for 3 sec
For 11 kV Switchgear	50kA for 3 sec
For 400 V Switchgear	50kA for 1 Sec
400V Lighting System	10kA for 1 Sec
11kV Isolated Phase Bus Ducts	50kA for 1 sec
110VDC	25kA for 1 Sec
48VDC	10kA for 1 Sec
230VAC	10kA for 1 Sec
Transformer and all accessories	All transformers and its accessories shall be capable of withstanding for three (3) seconds short circuit at the terminal
Earthing System	
132 kV	Effectively earthed
11 kV	Neutral grounded (limited to < 50 A) / Unearthed (Whenever the generator is not in service)
400 V	Effectively earthed
110 V DC	Unearthed

#### 84 132kV Switchyard

Switchyard shall be supplied for interface with NTDC Grid in line with following specifications and NTDC requirements. Detailed specifications of the switchyard are given in the table below:

**Table 9: 132kV Switchyard Specifications**

Voltage Level	
132kV	
Service	
Outdoor AIS with SF6 circuit breakers	
Number of Bays	
2 OHL Bays 2 Transformer Bays 1 Bus-Coupler Bay	
Bus Bar	
AAC conductor of "Hawthorn"	
Short Circuit SF6, gang operated	
2500 Amp 40kA 3 sec	
Isolator (Centre break, motor operated with copper alloy blades)	
2000 Amp	
Protection & Metering	
As per NTDC Requirements	
Highest System Voltage(kV rms)	
145 kV	
Power frequency withstand capability (kV rms)	
275 kV	
Basic insulation level (kV peak)	
650 kV	
Creepage distance for insulators (mm/kV)	
31	
Instrument Transformers	
Hermetically sealed, dead tank design. Rating as per SLD	
Insulator	
Brown glazed with min 6kN cantilever	



	Strength
Towers & Support Structures	MS galvanized lattice type
Tariff Metering equipment	Three elements four-wire configuration, electronic, digital, with accuracy class of 0.2S; 30 minutes intervals for a period of 70 days with intervals programmable from 5 minutes to 30 minutes

### 85 Steam Generator

Generator shall be supplied in line with the following specifications:

**Table 10: Steam Generator Specifications**

Description	Parameters
Rating & Count	1 x 31.2 MW
Type	Synchronous type
Number of pole & Excitation System	Four pole, with brushless excitation system.
Power Factor	0.8 PF (lagging) to 0.95 (leading) under entire band of +10% voltage variation and +5% frequency variation
Insulation Class	Class 'F' insulation and shall be suitable for operation within class 'B' limits
Overload Requirements	Over loading of 110% for one hour every 12 hours and 150% for 30 seconds
Short Circuit and Overload Endurance	Generator shall withstand short-circuit of any kind at its terminal, while operating at rated load and 105% rated voltage for at least 3 seconds

### 86 Isolated Phase Bus Duct

Generator shall be connected to 11kV panel through Isolated Phase Bus Duct with Aluminum conductors. All other electrical distribution connections shall be through MV or LV rated cables as per application and voltage grade. Technical details of the Isolated Phase Bus Duct are given in the table below:

**Table 11: Insolated Phase Bus Duct Specifications**

Application	Steam Generator Connection to 11kV Panel
Power Frequency Withstand Voltage	28kV
BIL	75kVp
Enclosure	Minimum thick of 3mm
Sizing Basis	Maximum through fault current either from 132kV grid or from the generator including contribution from total plant loads through Auxiliary Transformers with 20% margin on higher side or 50kA, whichever is higher

**8.7 11kV Switchboard**

Switchboard rated 11kV IP4X 3200Amp 50kA for 3 sec shall be provided for feeding transformers and connection to steam generator.

**8.8 6.6kV Panel**

One (1) 2500A 6.6kV VCB stand-alone panels and HT 6.6kV XLPE Aluminum cables of adequate size shall be provided for interface of co-gen plant with existing sugar mill power house.

**8.9 400 V Switchboard**

All the cogeneration plant auxiliary loads shall be segregated into two groups, each consisting of AC Variable Speed Drive (AC VSD) driven loads and non-AC VSD driven loads.

All AC VSD loads pertaining to cogeneration plant shall be connected to two (2) AC VSD transformers. Common systems like cooling water [main & auxiliary cooling water pumps and cooling tower fans] shall be distributed uniformly on both VSD transformers.

The co-generation plant non-AC VSD loads shall be fed at 400V with two (2) 11/0.415kV transformers.

**8.10 Transformers**

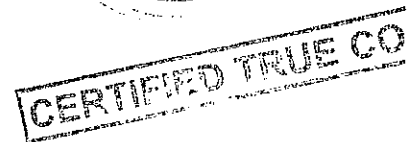
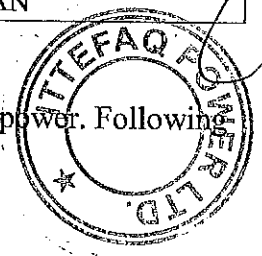
Technical specifications of the different transformers to be installed in the Project are given in the table below:

**Table 12: Specifications of Transformers**

Description	Parameters
Generator transformer (GT) / Power Transformer	28/35 MVA 11/132kV YNd11
VSD transformers [Three winding transformer] for co-generation plant	4 MVA 11/0.415/0.415 kV, Dzn0yn11
Distribution transformer for cogeneration Plant auxiliaries	1.6MVA, 11/0.415kV, Dyn11
Interconnection transformer at sugar plant	10/13MVA, 11/6.9kV, Dyn11
Lighting Transformer	Cast Resin Encapsulated 200kVA, 0.4kV/0.4kV, 50Hz, Dyn11, ONAN, Three Phase, Two Windings
Neutral Grounding Transformer	Yd windings, 50A for 10Sec & 500A for 3Sec, 11KV, ONAN

**8.11 AC & DC UPS System**

AC and DC UPS system will be supplied for loads that require un-interrupted power. Following UPS shall be supplied for this purpose:



**Table 13: AC & DC UPS Specifications**

Description	Parameters
110VDC	2x100% Dual Redundant UPS with Dedicated Battery Bank [SMF type: Sealed Maintenance Free]
230VAC UPS	2x100% Dual Redundant UPS with Dedicated Battery Bank [SMF type: Sealed Maintenance Free]
Lighting 230VAC UPS	1x100% UPS with single battery bank [SMF type: Sealed Maintenance Free]

**8.12 Control Philosophy & Interfacing**

Critical and important electrical loads shall be interfaced with SCADA system [built in plant DCS] for local and remote operation in-line with plant operational & safety requirements.

**8.13 Energy Management System**

The incoming and outgoing feeders of 132kV Switchyard Bays, Main MV [PCC] Panel and AC-VSD panel outgoing feeders shall be provided with PQM/TVM with communication port suitable for MODBUS-RTU protocol. One daisy chained link shall be provided for each switchboard which will communicate soft data to Plant DCS. All these meters shall be hooked up to a dedicated Energy Management System for data logging built in plant DCS.

Communication ports of MODBUS - RTU shall be planned in all TVMs and PQMs provided in the PCCs, AC VSD panels and control panels of the TG, Generator Transformer and switchyard control and relay panels. All the ports shall be hooked up to Energy Management System (Part of DCS) for data logging as well as monitoring purposes. The mimic representation of the complete electrical distribution shall be provided in Energy Management System (part of DCS) from 132 kV level to major/main LT panels.

**8.14 RTDs & Thermistors**

Thermistors shall be installed on motors rated between 30 to 75kW. RTD shall be made available for motors more than 90kW. All RTDs shall be hooked up with relays in Motor Relays in respective MCC.

**8.15 System Earthing**

The grounding installation work shall be as per recommendation of IEEE-80. All panels, transformer, LAVT, NGR and motors shall be provided with double earthing. Lightning protection for tall structure shall be in line with IEC standards.

132kV System is solidly grounded through 132 kV side of transformer neutrals at NTDC side as well as neutral of generator transformer on 132 kV side at co-generation plant.

TG system shall be grounded through Neutral Grounding Resistor (NGR) panel to limit the earth fault current to 50A to suit the system requirement, through the 11 kV neutral point of TG. The 11kV system shall be provided with 11 kV Earthing Transformer and Neutral Grounding Resistor.

(NGR) panel to limit the earth fault current to 50A. This NGR of earthing transformer shall be switched ON whenever the power is imported from the grid with TG circuit breaker in open condition. The 6.6kV system at the secondary side of Interconnection Transformer shall be provided with NGR grounding to limit earth fault current of 100A.

LV system 400V system shall be solidly grounded through transformer neutral. Neutral busbars shall be made available in 400V PCCs, and all MCCs.

400V VSD transformer grounding system shall be as for 6 Pulse AC VSD drives – Solidly grounded.

400V system used for illumination system and small power distribution system shall be solidly grounded.

UPS System shall be of insulated neutral type (ungrounded). DC System shall be of ungrounded type.

#### **8.16 Cable Installation**

Cables shall be installed in concrete cable trenches [installed on trays], on cable racks and direct buried as required.

#### **8.17 Cable Trench**

Concrete Cable Trenches shall be fitted with ventilation fans, air inlets, normal lighting, emergency lighting, utility sockets, fire alarm detectors, manual call points, and annunciation sirens. All wiring shall be in GI conduits.

Trench shall have access inlets provided with ladders, slopped on two sides having water excavation pits and two pumps.

#### **8.18 Lighting & Small Power**

Plant lighting loads shall be fed through two (2) Nos. of 400/400V, Dyn11 connected dry type lighting transformer of minimum rating of 200kVA.

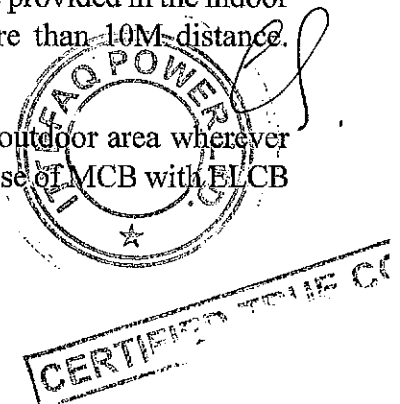
Emergency Lighting Distribution Board (ELDB) shall be fed through inverter of minimum 20 kVA rating.

The number of sockets [where maintenance & operation is required] shall be provided in the indoor area in such a way that approachable distance of any socket is not more than 10M distance. Minimum four (4) nos. of 24V lighting kit shall be provided for the plant.

63A power and welding socket shall be provided in all indoor as well as outdoor area wherever maintenance of mechanical equipment is required. Each socket shall comprise of MCB with ELCB and power / welding socket.

#### **8.19 Plant Communication System**

Plant communication shall be provided with following facility:



- Telephone system
- Public Address System
- Walkie-talkies.

## 8.20 Enclosure Ratings

Enclosure IP ratings for different applications shall be as below:

**Table 14: Enclosure Ratings**

HV Switchgear	IP4X
LV Switchgears	IP4X
Switchgears located outdoors	IP55
Control Panels	IP42
Motors	IP55
Push Button Stations	IP54 (indoor) IP55 (outdoor)
Isolated Phase Bus ducts	IP54 (indoor) IP55 (outdoor)

## 8.21 Plant Startup

The co-generation plant shall be started with two (2) numbers of 400V Black start DG sets. These DG sets shall be connected to DG panel, which shall be planned with two incoming DG set feeder and five outgoing feeders.

Plant startup can also be managed either from Grid supply or existing plant sugar mill feeder. In either case power shall be available at the main 11kV MV Panel. Through respective step down distribution transformers power shall be fed to desired STG auxiliaries and common co-generation plant loads.

The DG set shall be with radiator cooled type. Proposed rating of DG set shall be 1500kVA at Prime duty.

## 8.22 Instrumentation and Control (I&C) Systems

I&C System will ensure control and monitoring of operations of both the technological and electrical part of Cogen Power Plant including balance of plant (auxiliary operations) and 132 kV switchyard. Control room and its auxiliary equipment will be located in an outbuilding (CCR) adjacent to the Turbine Hall. I&C System will be designed as a complex system capable to control the whole Cogen unit both in standard conditions and transient operating conditions (start-up, shutdown, etc.). Specific autonomous functions of protections and control for steam turbines will be performed by their dedicated control system, nevertheless this dedicated control system will be an integral part of the whole I&C System from the viewpoint of operation, monitoring and control. I&C System, as a whole, will ensure control and monitoring of the following equipment:

- Boiler and its Auxiliaries
- Fuel Handling System

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- Ash Handling System
- Steam turbine with accessories
- Balance of plant
- Electric equipment of Switchyard

### 823 Digital Control System (DCS)

The controlling and monitoring of operation of main power unit, loading and synchronizing, balance of the plant will be provided from the common control room through the operator panels of the process, electrical part including power outlet equipment, frequency control and switchyard etc. The working place of the system operator will be placed at the control room. The working place of shift engineer will be located in separate room with the window to control room. The DCS will be based on fully redundant process and network bus. The power plant will be fully automated with a target of high operation reliability as well as high operation safety. Control system will fulfill required standard functions for securing optimal, economical, safe and ecological operation for installed equipment in nominal and transient operation conditions. System will cover control function from basic level control up to fully automated control of function groups and units, control of system output and optimization of block operation. Specific autonomous functions of the plant safety system and selected regulation and control functions will be realized by special subsystems in a hierarchical model. From a viewpoint of control, these items will create an integrated part of the DCS control system.

Hardware and software will enable realization of loop control, binary control, data functions, monitoring, remote control and emergency manual control. Communication within the system will be handled by bus routing connected to the standard bus system RS 485, Ethernet etc.

### 824 Field Instrumentation

Instrument power circuits will employ an isolation transformer and will be individually protected from fault with the help of MCB's and fuses. Power supply to the individual instrument will be disconnect-able with the help of switch and will be protected with the help of fuse.

All instruments and equipment will be suitable for use in a hot, humid and tropical industrial climate. All instruments and enclosures in field will be dust proof, weather proof of type NEMA 4 and secured against the ingress of fumes, dampness, insects and vermin. All external surfaces will be suitably treated to provide anti-corrosion protection.

The complete instrument system will be designed for safe operation, by using normally closed contacts which open on fault conditions.

The operating value of field instrument will fall between 40% and 60% span for linear and 60% to 80% span for square root.

Transmitter valve manifold block assemblies will be type 316 stainless steel unless process conditions require higher-grade material. Internal wetted parts will be type 316 stainless steel unless process conditions require use of other material.

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Process switches e.g. pressure switch and level switch will be of micro switch type.

All field-mounted instruments will be equipped with sufficient isolation device such as a block and bleed valves assembly, and vent and drain valves so as to permit safe maintenance, removal, testing and calibration of instruments during plant operation

## 9 Operations and Maintenance (O&M)

The Facility will be a standalone operation under the management of the Plant Manager who shall be in charge of both technical and administrative functions of the co-generation facility's operation and maintenance. Most operation and maintenance functions will be performed by permanent staff; however, certain functions, such as performance monitoring of equipment, environmental monitoring, fuel yard operation, ash handling and major maintenance, will be performed under various contracts with specialized vendors. The contracts will be equipment specific performance monitoring and maintenance contracts and will also include contracts for supply of manpower for major maintenance activities. To the extent practical, the operation of the Facility will be automated through a distributed control system.

The Facility operation is planned to be divided into three shifts with a fourth shift in reserve. Each operating shift will include a shift charge engineer, one control room operator, one operator, one boiler operator two field operators and a chemist. All the operations staff will report through the shift charge engineers who report to the Operations Manager reporting to Plant Manager

The maintenance of the Facility will be divided into three work areas – instrumentation, electrical, and mechanical. Each work area will be managed by a manager who reports directly to the Plant Manager. Maintenance staff reporting to the managers will be provided on each shift. The total maintenance staff is as follows:

The maintenance staff will perform the routine maintenance on the Facility. During the off-season periods when the Facility is not operating, the maintenance staff will support any major maintenance work that needs to be performed.

In addition to the operation and maintenance departments, there will be a separate performance department and a fire and safety department. The staffing for these two departments is as follows:

**Table 15: O&M Staffing**

Mechanical Maintenance		Electrical Maintenance		Instrumentation & Control	
Manager – Mechanical	1	Manager – Electrical	1	Manager – I&C	1
Mechanical Engineer	1	Electrical Engineer	1	I&C Engineer	1
Mechanical Supervisor	1	Electrical Supervisor	1	I&C Supervisor	1
Mechanic/Fitter	8	Electrician	5	I&C Technician	5

The performance/efficiency engineer will be responsible for monitoring the operation of the Facility and identifying any operational issues that affect the performance of the Facility. Additional responsibilities include maintaining the plant design records and drawings.

Hence the total operation and maintenance staffing, including the Plant Manager, is 64. This excludes the contract operation and maintenance staff.

## **9.1 Maintenance of the Plant**

Routine maintenance of the Project will be performed on a shift basis. Most of the routine maintenance activities are expected to be preventative maintenance work and troubleshooting during the time the Facility is operating. There will be some time during the off-season where the Facility will not be operating due to unavailability of bagasse or other appropriate biomass fuels. During these non-operating periods, which shall last up to one month during a given year, the maintenance staff can perform more extensive repairs.

The major maintenance cycle for the key components will be a function of the number of operating hours accumulated. Given the expected downtime during the off-season, it is logical to expect boiler inspections, cleaning and repairs to be performed each year. The annual boiler work would include measurement of tube thickness in certain areas of the boiler, weld repairs where there is localized tube metal loss, tube replacements where the metal loss is more extensive, refractory repairs, grate bar replacements, grate chain adjustments, ash system repairs, etc. Extensive repairs would not be required for the first ten years of operation, particularly if the fuel burned is primarily bagasse and the operating period is less than 180 days a year.

Major maintenance on the steam turbine and generator is to be performed on a five to seven year basis for a base loaded plant. A thorough inspection of the steam turbine and generator is expected prior to the expiration of the supplier warranties. After that, given the expected operating regime of 180 days per year, the first major inspection of the steam turbine and generator would not be anticipated for ten years unless there are indications of some mechanical or electrical failure.

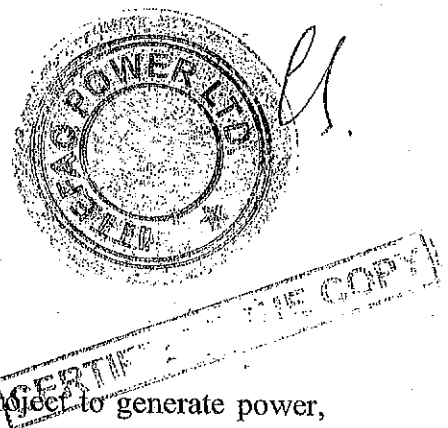
## **10 Key Operating Assumptions**

The following sections provide a summary of the general, project cost, operating and financing assumptions related to the Project as well as ISML. The feasibility has been prepared following a detailed discussion of these assumptions with Project sponsors. The proceeding sections discuss the following assumptions:

- Sugar Mill Operations & Fuel Availability
- Plant Generation
- General & Timeline
- Project Cost
- Financing Assumptions
- Project Tariff & Revenue
- Operating Cost Assumptions (including fuel)

### **10.1 Sugar Mill Operations & Fuel Availability**

The tariff structure of the Project is based on the availability of the Project to generate power, which in turn depends on the availability of fuel i.e. bagasse to ensure such generation. In such a





scenario adequate availability of bagasse for generation is the most important factor for the feasibility of the Project.

As stated above, during the assumed 120-day crushing period, power generation will be based primarily on bagasse provided by ISML. During non-crushing days, the un-utilized bagasse from the crushing period at ISML will be utilized for power generation. ISML management plans to bring efficiencies in the current sugar mill which will increase the crushing capacity to 8,500 TCD by the time the project comes online. Based on a 120-day season and 92% capacity utilization, the mill shall be able to generate 272,136 MT of bagasse during the crushing period and as a consequence the Plant shall be capable of operating at a 92% capacity factor for 157 days in a year or an effective 145 days.

## 102 Plant Generation Parameters

As discussed earlier, 31.2 MW steam turbine generator shall be provided steam by the HP boiler. During the crushing period, the HP boiler and steam turbine shall meet the steam and power requirements of ISML to the extent these are not met by the LP boiler. To meet the steam requirements of the ISML process, the current LP boiler along with a 5 MW (net) backpressure turbo generator shall be operational during the crushing period. The steam generation through the LP system shall only be available during the season and will be dedicated to the sugar mill. Key generation parameters during are as follows:

**Table 17: Plant Generation**

	Crushing Period	Non-Crushing Period
Extracting & Condensing Turbine Capacity	31.20 MW	31.20 MW
Auxiliary Consumption of Turbine	2.59 MW	2.59 MW
Net Capacity from HP System	28.61 MW	28.61 MW
Gross Capacity of Backpressure Turbo generator	6.00 MW	n/a
Auxiliary Consumption of Backpressure Turbo generator	1.00 MW	n/a
Net Capacity of LP System	5.00 MW	n/a
Sugar Mill Requirement	9.75 MW	0.5 MW
Net Exportable to Sugar Mill from HP System	4.75 MW	0.5 MW
Net Exportable to Grid from HP System	23.86 MW	28.11 MW
Generation (92% PF)	75,806 MWh	23,583 MWh

## 103 Project Timeline

As per discussions with the Sponsors a 20-month construction time following financial close has been assumed for the Project. Financial Close is targeted in end-April 2017 with a target Project commercial operations date ("COD") of end-November 2018. This would enable the Project to smooth any teething issues that may arise before the crushing period commences in mid to end November 2017.

As per the standard energy purchase agreement ("EPA") the Project life and EPA term has been assumed as 30 years from COD.

## 104 Project Cost

The break-down of the estimated Project Cost is provided below in Table 18. The Engineering, Procurement & Construction Cost accounts for 80.6% of the total Project Cost. The Project Cost in Pakistan Rupees assumes an annual devaluation of 5.0% over the 19-month construction period. It may be noted that only 40% of the devaluation over the construction period is to be adjusted in the final tariff to be determined by NEPRA.

**Table 18: Estimated Project Cost**

Estimated Project Cost	USD million	PKR million
EPC Cost	28.08	3060.41
Non-EPC Cost	1.38	150.71
Project Development Costs	2.30	251.14
Insurance during Construction	0.28	30.60
Financing Fee & Charges	1.04	113.64
Interest during Construction (IDC)	2.09	227.90
<b>Total</b>	<b>35.18</b>	<b>3,834.40</b>
<i>EPC Cost per MW (USD million)</i>	<i>0.90</i>	
<i>Project Cost per MW (USD million)</i>	<i>1.13</i>	

- **EPC Cost** at USD 0.90 per kW has been based on applicable costs in precedent transactions with an adjustment for smaller plant size. The Company is in the process of finalizing the equipment for the Project.
- **Non-EPC costs** include costs related to
  - Land, colony, workshop and non-reimbursable fuel during testing.
- **Project Development costs** include costs related to technical studies, owners' engineer, construction manager as well as legal and other advisors; fees related to NEPRA, AEDB, SECP; and Company overheads during the construction period.
- **Construction Insurance** has been budgeted at 1.0% of EPC cost, which is in line with precedent transactions.
- **Financing Fees & Charges** have been estimated in line with precedent transactions and have been budgeted in the range of 3.5% of total debt.
- **Interest during Construction** has been calculated over a 19-month construction period, a 75:25 debt to equity ratio and a lending rate of 3-month KIBOR plus 3.00%. Disbursement over the 19-month period is based on an advance payment of 15.0%; final acceptance payment of 5% and an equal distribution over the remaining 17 months. The payment profile shall be firmed at the time of finalization of the EPC contract(s).

## 105 Project Financing

In line with debt financing parameters with precedent transactions, a debt to equity assumption 75 to 25 has been applied to the financial projections. Under the base case financial projections debt is assumed to be repaid 10 years after COD with debt being amortized over the period through fixed annuity based installments.

Key parameters of the Project funding are provided in Table 19 below:

Table 19: Project Funding

Project Cost	PKR 3,834.40 million
Debt	PKR 2,875.80 million
Equity	PKR 958.60 million
Lending Rate	9.44% (3-month KIBOR + 3.0%)
Repayment Period	10 years
Repayment Frequency	Quarterly
Annual Installment	PKR 447.51 million

### 10.6 Project Tariff

NEPRA had announced a 30-year Upfront Tariff for high pressure boiler based bagasse power projects in May 2013 which was valid for a period of 2 years. Subsequently, the Upfront Tariff was extended up to May 2017 and in the meanwhile an adjusted Upfront Tariff (**Adjusted Upfront Tariff**) was announced based on indexations applicable at May 2015. As per discussions with NEPRA, the Adjusted Upfront Tariff shall be applicable for the Project.

The Adjusted Upfront Tariff is calculated on notional capacity of 1 MW with appropriate indexing of different tariff determining components. This tariff structure is generic in nature and is applicable for various sizes of new bagasse based co-generation power plants of 60 bar or higher pressure boilers. The critical assumptions upon which the tariff is based appear in the table below:

Table 20: Key Assumptions for Adjusted Upfront Tariff

Description	Basis
Auxiliary Consumption	8.5%
Plant Factor	45%
EPC cost per MW	USD 0.7960
Project Cost per MW	USD 0.9795
Construction Period	20 months
Exchange rate (PKR/USD)	101.60
Benchmark Efficiency	24.5%
Bagasse Price	Linked to CIF Karachi Coal Price, Minimum USD 100.67 per MT
Bagasse CV	6,905 BTU/kg
Total O&M Cost	3.25% of EPC
Variable O&M Local	5% of total O&M
Variable O&M Foreign	45% of total O&M
Fixed O&M Local	40% of total O&M
Insurance	1.0% of EPC
Working Capital	45 days of Fuel @ 3-month KIBOR plus 2.0%
Debt	80%
Return on Equity	17.0%
Return on Equity during Construction	17.0%

Loan Repayment Period	10 years
Repayment Frequency	Quarterly
Debt Cost	3 month KIBOR plus 3.0% (Base KIBOR: 7.99%)

Respective tariff components along with relevant indexations are provided in Table 21 below:

The tariff is payable on a take or pay basis based on the declared availability of the Plant by the Company. Key features of the tariff applicability are as follows:

1. For all energy dispatched to the grid, a tariff based on the sum of indexed values of all the above mentioned components shall be payable.
2. During the crushing period, if the Plant is not dispatched following a declaration of energy a tariff based on the sum of indexed values of all the above mentioned components shall still be payable based on the declared energy.
3. During the non-crushing period, if the Plant is not dispatched following a declaration of energy a tariff based on the sum of indexed values of all the above mentioned components (excluding the fuel and variable components) shall be payable based on the declared energy.
4. All upside and downside risk with respect to the annual generation lies with the Company. In case the Company is able to achieve a plant factor above 45% the full indexed tariff shall be payable.

**Table 21: Adjusted Upfront Tariff**

Description	Reference Tariff PKR per kWh		Indexation
	Year 1-10	Year 11-30	
Fuel Cost	5.9825	5.9825	Yearly PKR/USD parity and annual CIF Coal Price w.e.f 1st October of each year
Variable O&M – Local	0.1198	0.1198	Quarterly CPI changes notified by FBS on start of each quarter
Variable O&M – Foreign	0.3393	0.3393	Quarterly changes in PKR/USD and US CPI changes notified by Bureau of Labor Statistics on start of each quarter
Fixed O&M	0.3194	0.3194	Quarterly CPI changes notified by Federal Bureau of Statistics ("FBS") on start of each quarter
Insurance	0.2204	0.2204	No indexation
Working Capital	0.1673	0.1673	Quarterly adjustment for changes 3 M KIBOR
Return on Equity	1.0345	1.0345	After onetime adjustment at COD, annual changes in PKR/USD parity
Debt Servicing Component	3.6658		After onetime adjustment at COD, quarterly changes in 3-M KIBOR
<b>Total Tariff</b>	<b>11.8491</b>	<b>8.1833</b>	
<b>Levelized Tariff</b>	<b>10.5727</b>		

Note: The tariff is adjusted quarterly for changes in 3-month KIBOR variations. The financial projections have been prepared on the basis of the recent 3-month KIBOR rate of 6.44% with the tariff and related cost adjusted accordingly.

### 10.7 Project Revenue

As stated above, the Project shall be selling power to the national grid as well as partially meeting the power and steam requirements of ISML. In such a case, the Project shall be expecting three (3) revenue streams as follows:

- Sale of energy to national grid i.e. CPPA-G
- Sale of energy to ISML
- Sale of steam to ISML

### 10.8 Profitability Analysis

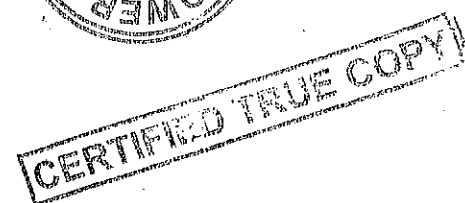
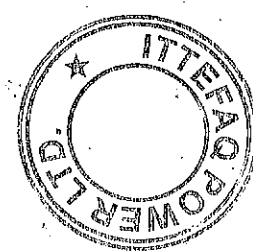
The base case financial projections show that the Project is expected to generate a positive earnings before interest, taxes and depreciation (EBITDA) and net profits throughout the life of the Project. A summary of key investment and financial indicators applicable to Project financing based on base case projected financials over the life of the project is provided in Table 23 below:

**Table 23: Key Financial Indicators**

Indicator	
Project NPV (PKR) @ 10%	73,825,963
Investor NPV (PKR) @ 10%	239,850,354
Project IRR	10.28%
Equity IRR	12.19%
Debt Service Coverage Ratio	1.21
Project Payback Period	6 years, 9 months approx.
Equity Payback Period	9 years, 10 month approx.

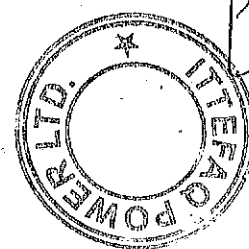
### 10.9 Projected Financial Statements

Projected financial statements and key financial ratios based on the base case assumptions discussed in Section 10 are provided in the following sections. Financial Statements presented below are limited to the 10-year debt period.



**10.10 Projected Income Statement**

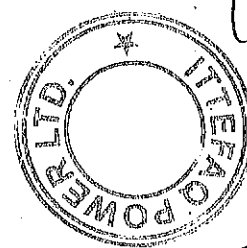
PKR million	1	2	3	4	5	6	7	8	9	10
<b>Total Revenue</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>	<b>1,369</b>
Bagasse Cost	687	687	687	687	687	687	687	687	687	687
Local Variable O&M	12	12	12	12	12	12	12	12	12	12
Foreign Variable O&M	40	40	40	40	40	40	40	40	40	40
Local Fixed O&M Cost	31	31	31	31	31	31	31	31	31	31
<b>Total O&amp;M Cost</b>	<b>83</b>	<b>83</b>	<b>83</b>	<b>83</b>	<b>83</b>	<b>83</b>	<b>83</b>	<b>83</b>	<b>83</b>	<b>83</b>
Insurance Cost	33	33	33	33	33	33	33	33	33	33
Depreciation	128	128	128	128	128	128	128	128	128	128
<b>EBIT</b>	<b>439</b>	<b>439</b>	<b>439</b>	<b>439</b>	<b>439</b>	<b>439</b>	<b>439</b>	<b>439</b>	<b>439</b>	<b>439</b>
Working Capital Cost	21	21	21	21	21	21	21	21	21	21
Interest on LT Loan	265	247	228	206	183	157	128	97	63	25
<b>Net Income</b>	<b>152</b>	<b>170</b>	<b>190</b>	<b>211</b>	<b>235</b>	<b>261</b>	<b>289</b>	<b>320</b>	<b>355</b>	<b>392</b>



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## 10.11 Projected Balance Sheet

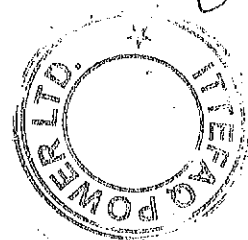
PKR millions	1	2	3	4	5	6	7	8	9	10
Fixed Assets	3,707	3,579	3,451	3,323	3,195	3,068	2,940	2,812	2,684	2,556
Advance	-	-	-	-	-	-	-	-	-	-
Accounts Receivable	-	-	-	-	-	-	-	-	-	-
Debt Reserves	-	-	-	-	-	-	-	-	-	-
Cash	-	-	-	-	-	-	-	-	-	-
<b>Total Current Assets</b>	-	-	-	-	-	-	-	-	-	-
<b>Total Assets</b>	<b>3,707</b>	<b>3,579</b>	<b>3,451</b>	<b>3,323</b>	<b>3,195</b>	<b>3,068</b>	<b>2,940</b>	<b>2,812</b>	<b>2,684</b>	<b>2,556</b>
Accounts Payable	-	-	-	-	-	-	-	-	-	-
Working Capital	-	-	-	-	-	-	-	-	-	-
Debt Current Portion	200	220	241	265	291	319	350	385	422	-
<b>Current Liabilities</b>	<b>200</b>	<b>220</b>	<b>241</b>	<b>265</b>	<b>291</b>	<b>319</b>	<b>350</b>	<b>385</b>	<b>422</b>	-
Long-term Debt	2,493	2,273	2,032	1,767	1,477	1,157	807	422	-	-
<b>Total Liabilities</b>	<b>2,693</b>	<b>2,493</b>	<b>2,273</b>	<b>2,032</b>	<b>1,767</b>	<b>1,477</b>	<b>1,157</b>	<b>807</b>	<b>422</b>	-
Paid-up Capital	959	959	959	959	959	959	959	959	959	959
Retained Earnings	55	127	219	332	469	632	824	1,046	1,303	1,598
<b>Total Equity</b>	<b>1,013</b>	<b>1,086</b>	<b>1,177</b>	<b>1,291</b>	<b>1,428</b>	<b>1,591</b>	<b>1,782</b>	<b>2,005</b>	<b>2,262</b>	<b>2,556</b>
<b>Equity &amp; Liabilities</b>	<b>3,707</b>	<b>3,579</b>	<b>3,451</b>	<b>3,323</b>	<b>3,195</b>	<b>3,068</b>	<b>2,940</b>	<b>2,812</b>	<b>2,684</b>	<b>2,556</b>



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**10.12 Projected Cash Flows**

PKR millions	1	2	3	4	5	6	7	8	9	10
Earnings after tax	152	170	190	211	235	261	289	320	355	392
Add: Depreciation	128	128	128	128	128	128	128	128	128	128
Change in Advances	-	-	-	-	-	-	-	-	-	-
Change in A/C Receivable	-	-	-	-	-	-	-	-	-	-
Change in A/C Payable	-	-	-	-	-	-	-	-	-	-
<b>Cash Flow from Operations</b>	<b>280</b>	<b>298</b>	<b>318</b>	<b>339</b>	<b>363</b>	<b>389</b>	<b>417</b>	<b>448</b>	<b>482</b>	<b>520</b>
<b>Cash Flow from Investment</b>	-	-	-	-	-	-	-	-	-	-
Repayment of LT Debt	(182)	(200)	(220)	(241)	(265)	(291)	(319)	(350)	(385)	(422)
Repayment of WC Loan	-	-	-	-	-	-	-	-	-	-
Disbursement of Equity	-	-	-	-	-	-	-	-	-	-
<b>Cash Flow from Financing</b>	<b>(182)</b>	<b>(200)</b>	<b>(220)</b>	<b>(241)</b>	<b>(265)</b>	<b>(291)</b>	<b>(319)</b>	<b>(350)</b>	<b>(385)</b>	<b>(422)</b>
<b>Net Cash Flow</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>98</b>



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# 11 Financial Summary

	Min.	1	2	3	4	5	6	7	8	9	10
Revenue	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369
EBITDA	567	567	567	567	567	567	567	567	567	567	567
Net Income	152	152	170	190	211	235	261	289	320	355	392
Dividends	98	98	98	98	98	98	98	98	98	98	98
Annual Interest	47	287	269	249	228	204	178	150	119	84	47
Debt Servicing	469	469	469	469	469	469	469	469	469	469	469
Debt to Equity	0.00	2.66	2.30	1.93	1.57	1.24	0.93	0.65	0.40	0.19	0.00
Times Interest	1.98	1.98	2.11	2.27	2.49	2.78	3.18	3.78	4.78	6.73	12.15
DSCR	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
Loan Life Cover Ratio	1.14	1.14	1.15	1.16	1.16	1.17	1.18	1.18	1.19	1.20	1.21



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**SAFETY, EMERGENCY,  
TRAINING &  
DEVELOPMENT PLANS**

## **Safety Plan**

To provide a safe working environment, the company shall follow a well devised safety plan. Key features of safety plan are given below:

### **Awareness**

Staff working at the facility shall be given information to help them to identify the risks and take necessary measures of safety and protection during their working. To create awareness, personnel at the facility shall be briefed through handouts, in-house seminars, mock safety drills. Particular areas of interest shall be:

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

### **Use of Safety Equipment**

Use of Personal protective equipment (PPEs) will be made mandatory. PPEs like safety helmet, safety shoes, uniform, dust mask, ear plugs, ear muff, leather apron, leather sleeves, face shield, gloves for their safety shall be issued to all personnel.

### **Emergency Alarms**

Automatic Emergency Alarms shall be installed along with fire suppression system at all fire hazardous locations of the plant site.

### **Emergency Numbers**

Emergency call numbers shall prominently be displayed in bold at prominent places in the facility.

### **Emergency Shutdown**

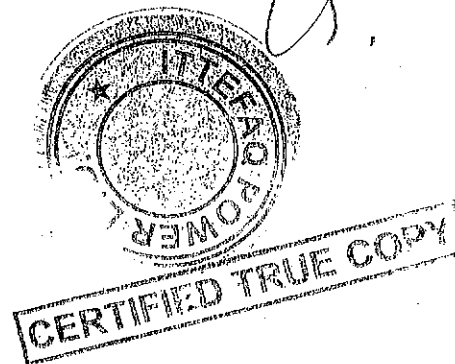
The Emergency Response Team shall be responsible to ensure immediate shutdown of the operational systems and equipment if required in the Emergency.

### **First Aid Facilities**

The availability of first aid facilities and necessary staff to provide urgent and immediate first aid facilities will be ensured at the facility.

### **Ambulances**

Availability of Ambulance at the facility shall be ensured for causality evacuation to the hospitals.



## **Mock Fire Drills**

To keep fire brigade staff in good practice, mock fire drill will be executed by creating mock emergency situations.

## **Firefighting System**

The function of fire-fighting system is to supply water to the main risk areas of the cogeneration power plant. The fire protection system is required for early detection, containment and suppression of fires. A comprehensive fire protection system shall be provided to meet the above objective and all statutory and insurance requirements of National Fire Protection Association (NFPA). The fire-fighting system shall consist of the following:

### **Stand Pipe and Hose System:**

Stand pipe and hose system shall be provided to cover the building and structures of the cogeneration plant. The system shall be designed as per the NFPA 14.

Standpipe shall have a hose of 65mm diameter with connection to a large supply of water. The hose connection shall be not less than 0.9m or more than 1.5m above the floor.

### **Fire Hydrant and Water Monitoring System**

The hydrant system shall be provided to cover all areas. The system shall be designed as per NFPA 24. The system shall consist of over ground hydrant mains laid in rings, isolation valves, and stand pipes with hydrant valves (outdoor). A Hydrant shall be placed after every 40m.

### **Portable Fire Extinguishers:**

Dry Chemical Powder, CO<sub>2</sub> and foam type extinguisher system shall be provided. The equipment shall be designed as per NFPA 10.

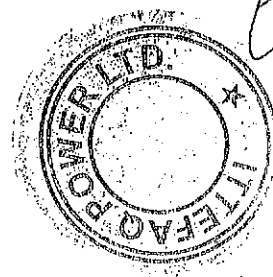
### **Automatic High Velocity Water Spray Nozzle System:**

Automatic High Velocity Water Spray Nozzle System shall be provided along with deluge valve assembly for outdoor transformers in switchyard, generator & Turbine lube oil system area. The system shall be designed as per NFPA 15. The deluge valve assembly shall be UL/FM listed.

### **Fire Alarm & Detection System**

Fire detection system for the power plant will provide early detection of fire and raise alarm. A comprehensive fire protection system shall be planned to meet the above objective and meet all statutory and insurance requirements of National Fire Protection Association (NFPA). A multitude of systems will be provided to combat various types of fires in different areas of the plant and all such systems for various areas shall form a part of a centralized protection system for the entire plant. Fire alarm system detection system shall be provided in following areas:

- Firm alarm and signalling in all electrical/instrumentation panel rooms in TG building
- Manual call points and Electric Horns in outdoor areas.



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## **Emergency Plan**

A comprehensive emergency plan would be implemented to meet unexpected situation to ensure zero injury, damage or loss of any life/property.

Key features of the emergency plan are as follows;

### **Emergency Escapes/Evacuation Plan**

A comprehensive evacuation plan will be prepared and emergency escape procedure and route maps will be displayed at prominent places in the facility. All personnel at the facility shall be made aware of Emergency escape routes and procedures for a quick and safe escape.

### **Awareness of Different Types of Emergencies**

All personnel at the facility shall be educated on how to react to each type of emergency. All staff working at the facility will be given detailed briefing regarding different types of emergencies and their response so that they would be able to identify emergency situations.

### **Training to React to an Emergency Alert Alarm**

All personnel at the facility shall be trained to react to each emergency to take necessary measures of safety and protection at the earliest.

### **Emergency Equipment**

In addition to emergency combatants training, emergency equipment like fire extinguishers and fire hydrants will be provided at the facility to tackle with different types of Emergency.

### **Use of Safety Gears and Equipment**

The staff working at the facility will be given with proper information, guidance and training about the use the safety gears and equipment.

### **Emergency Alarm**

Easy access to emergency alarms shall be provided to raise the alarm in case of any type of Emergency.

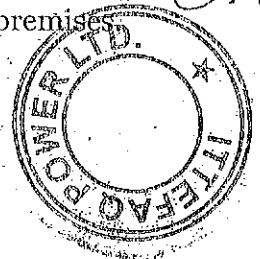
### **Emergency Numbers**

Emergency call numbers shall prominently be displayed at prominent places in the facility.

### **Emergency Response Team**

A well-equipped and specialized team will be formed which will be responsible to take all necessary measures and decisions to deal with the emergency and provide relief, support and first aid to the effected staff. The emergency response team will also be responsible for the evacuation of personnel and material from the premises.

### **Emergency Shutdown**

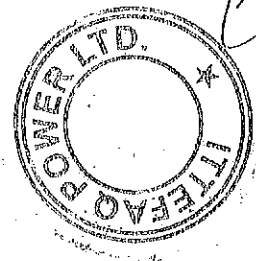


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The Emergency Response Team shall be responsible to ensure immediate shutdown of the operational systems and equipment if required in the Emergency.

### **Assembly Areas and Muster Points**

Designated assembly areas / Muster points shall be identified and all personnel working at the facility will be educated to muster at the designated assembly area / muster points in the event of an evacuation for head count.



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## **Training and Development**

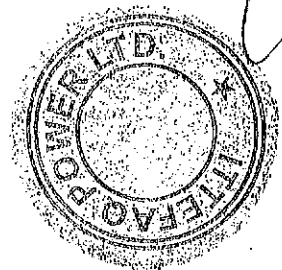
The major objectives of the operational training shall be to acquaint the operators of the following:

- The nature, purpose and limitations of all plant and equipment.
- The detailed operating instructions on each section and equipment of the plant.
- Normal start up and shutdown program for the unit.
- The emergency procedures.

The basis, for the training shall be the Plant's operating and Maintenance Manual Particulars Book, which shall be compiled from the manufacturers' instructions, the contract documents and the drawings. In addition, the information gathered from the visits to the other operating plants and to the manufacturers works shall also be included in the training. Supervision and co-ordination of the training program requires full time attention of a senior executive of the plant, and also the consultant's assistance may be taken. The training program shall include lectures, expositions by experienced plant operators and maintenance personnel, informal discussions and visits to operating plants and manufacturer's works and exposure to the courses conducted by Institutions like Power Plant Training Institute or any other Institution to be given to the operating & maintenance staff.

The maintenance training program shall be based on the requirements of the individual maintenance functions, like mechanical, electrical, instrumentation etc. The Engineers and the Technicians shall be sent to the manufacturers' works to witness the production and be associated with the erection of plant and equipment.

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



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# PROSPECTUS



# Prospectus

## **Introduction of Applicant**

Ittefaq Sugar Mills Limited through a wholly owned subsidiary Ittefaq Power Limited intends to set up a green field 31.2 MW (Gross) high-pressure bagasse based co-generation power plant under the provisions of the Framework for Power Cogeneration 2013 and Policy for Development of Renewable Energy for Power Generation 2006. The Project will be located in the premises of ISML located at Shafiabad, District Bahawalpur, Punjab.

The Project will sell power to the national grid through sale of energy to the Central Power Purchasing Agency Guarantee Limited under a 30-year Energy Purchase Agreement as well as partially meet the steam and power requirements of ISML during the crushing season. The Project will enable ISML to establish a sustainable market for its by-product, bagasse, and will also allow the sponsors of ISML to take an exposure in the power sector through incentives offered by the Government of Pakistan under the Framework and RE Policy.

## **Salient features of the facility for which license is sought**

The broad parameters of the project are as under:

Project Capacity	31.20 MW (Gross)
Project Location	Shafiabad, District Bahawalpur, Punjab
Land Area	50 Acre
Construction Period	19 months
Technology	Bagasse/Bio-Mass.
Power Purchaser	CPPA/MEPCO/NTDC
Steam Turbines	1 X 31.2 M.W extraction cum condensing
Turbine	
Boilers	1 X 155 TPH , 110 Bar 540°C
Upfront Levelized Tariff	US Cents 10.62 per kWh

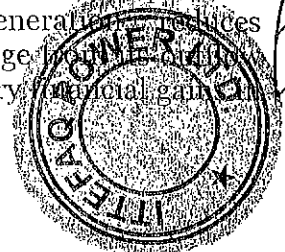
## **Proposed Investment**

The total cost for the project is approximated PKR 3,834 Million (USD 35.18 million), which is expected to be financed in a debt to equity ratio of 75:25.

## **Social and Environmental Impact of the Proposed Facility**

Bagasse based Cogeneration power plant, offers a number of advantages both to the sugar industry and to the country. Besides reducing gap between the demand and the

supply in the power sector, Bagasse based fuel power cogeneration provides environmentally friendly solution for additional power generation. It reduces dependence on fossil fuels, saves on hard earned foreign exchange, reduces the need for the country for import of fossil fuels and gives sugar industry financial gain in the form of cheaper energy while using Bagasse as fuel.



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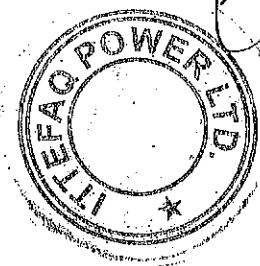
*Major Impacts and Mitigation measures:*

The most significant pollutant emitted from Bagasse fired boilers is Ash. As ISML is already using low pressure boilers and ash is in very little quantity, the high pressure boilers will produce minor quantity of ash which will be controlled by the use of Electrostatic Precipitator separator (fly ash arrestor) to meet the permitted dust concentration as required by NEQS Pakistan. Both of these technologies have the ability to remove 99.9% of ash (PM) in stack exhausts.

Gaseous emissions of Sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) are lower than conventional fossil fuels due to the characteristically very low levels of sulphur and nitrogen associated with Bagasse, therefore, they will remain within the prescribed limiting values of the NEQS Pakistan.

The Waste water will be treated in lagoons and after treatment will be used within the four boundary walls of project site, for sprinkling on the unpaved sites, for suppression of dust, for plant entries, and for irrigation of plants. Unconsumed treated waste water will be used for the irrigation of the crops of the project proponent.

The noise levels of 75 dB (A) and 65 dB (A) indicated are at the plant boundary, as the maximum noise level shall be 85dB (A) at 3.0 m from the equipment.



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**CONTROL, METERING,  
INSTRUMENTATION AND  
PROTECTION**

## **Control. Metering, instrumentation and protection:**

The power generating system will be well equipped with the modern protection & control technologies. All protections in system are capable to safeguard any level of control with onsite metering provision. Below are the main power plant protection panels / instruments planned:

### **Protections available:**

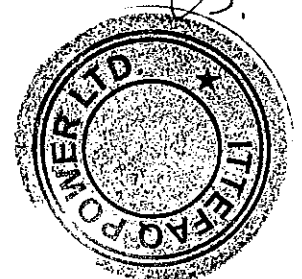
1. List of Protections available in Multifunction Generator Protection Relays —GPR-1 & 2
  - a) Generator differential protection (87g)
  - b) 95% stator e/f protection (51g1)
  - c) Field failure or loss of field protection (40g)
  - d) Negative sequence protection (46g)
  - e) Low forward power (37)
  - f) Reverse power (32)
  - g) Under/over voltage (27/59)
  - h) Under/over frequency (81u/81o)
  - i) Over fluxing protection (24)
  - j) Non-dir. Inst. Cum IDMT o/c pro. (50/51)
  - k) Voltage restrained/dependent over current (Sly) I) Generator pole slipping protection (98)
  - m) Accidental energisation protection (50/27)
  - n) Local breaker backup pro. (50Ibb)

2. STAN BY E/F PROTECTION (51G)

3. ROTOR E/F RELAY- 2 Stages (64F), Type: RXNB4 / Equivalent

### **Metering Equipment Available:**

1. Ammeter, Analog type, 240Deg. Scale, Class 1.5, 96sq.mm
2. Voltmeter, Analog type, 240Deg. Scale, Class 1.5, 96Sq. mm. Red marking at 11KV
3. Frequency Meter, Digital Type, Class 0.2, 96sq. mm
4. MW Meter, Digital Type, Class 0.2, 96Sq. mm, 3Ph, 4Wire
5. MVA Meter, 3ph, 4wire, Analog type, 240 Deg. Scale, class 1.5, 96 sq. aim,
6. MVAR Meter, 3Ph, 4Wire, Analog type, 240Deg. Scale, Class 1.5, 96sq. mm.
7. PF Meter, 3Ph, 3Wire, 3Ele, Digital type, Class 2Deg, 96 sq.mm.
8. Power Quality meter with RS 485 port MODBUS RTU protocol and Harmonic analysing facility



9. MW Transducer, 3Ph, 4Wire, 3Element, Class 0.5, Dual Output: 4-20mA Aux Sup
10. Annunciator for Trip 48 windows for Trip Microprocessor based with first in first out - feature auxiliary supply 10V DC with RS 485 port Modbus protocol.
11. Temperature Scanner for Generator No. of channels: 16 Input: RTD (PT100)  
 Display — 7 segment LED Temp.  
 range: 0 to 200deg C, Resolution: 0.1degC

**Synchronizing components available:**

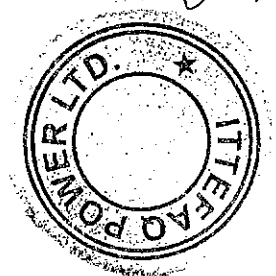
1. Double Voltmeter, analog indicating type, 110V AC, Range 0-15kv with red mark at 11kv, Class 1.0, Size 144 sq.mm.
2. Double frequency meter, reed Type, 110V AC Range 45-55 Hz, Class 1.0, Size 144sq.mm.
3. Synchroscope rotating disc type, 110 V AC, Size 144 sq.mm
4. Check synchronizing relay Type: SKE11, Phase angle 10 Deg Aux. supply 110V DC.
5. No Volt Relay, Type: VAG21, Aux. supply 110V DC.-02 Nos
6. Guard Relay, Type: VAA21, Aux. supply 110V DC
7. Isolation VT for synchronizing signal 110/ 110VAC, 50VA, CL: 1.0-02nos
8. Reversing VT 110/110 VAC, 50 VA, CL :1.0
9. Auto Synchronizer Digital Type, Model-SPM-D, Aux. supply 24V DC
10. Synchroscope OFF/ON Selector switch, 90Deg., 2-position (OFF/ON) Stayput type, Spade Handle, non-lockable, 4-pole

**Transformer Relay Panel:**

1. Transformer differential protection (87gt)
2. Ref protection relay-64gt
3. Non-dir. Inst. Cum IDMT E/F pro. (50n/51n)
4. Non-dir. Inst. Cum IDMT o/C pro. (50/51)
5. Neutral displacement protection (59d)
6. Vector surge protection (78)
7. Over excitation/over fluxing protection (24)
8. Under voltage - (27)
9. Over voltage - (59)
10. Over /under frequency (81o/81u)
11. Local breaker backup pro. (50lbb)
12. Oil temperature (49q)
13. Winding temperature (49t)
14. Buchholz relay & oil surge relay.-63

**Transformer Metering Panel:**

1. Ammeter
2. MW meter
3. MVAR meter



4. PF meter
5. MVA meter
6. HZ meter
7. MW Transducer
8. POWER QUALITY Meter (PQM) with RS 485 port MODBUS RTU protocol and Harmonic analyzing facility
9. TVM -E/1
10. BCU
11. Voltmeter
12. PT Fuse Relay-60
13. Annunciator-30

**Tariff Metering:**

1. Tariff main meter
2. Tariff check meter

**Busbar Protection Panel:**

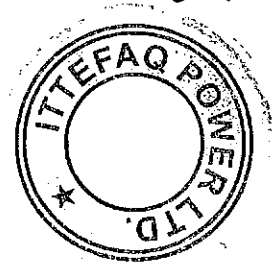
Low impedance busbar protection — 87b Line Feeder

**Relay & Metering Panel - Protections**

1. Local breaker backup pro (50lbb)
2. Distance protection relay-21
3. Dir. E/F Pro. (67n)
4. BCU
5. Annunciator-30
6. PT fuse relay-60
7. Synchronizing relay-25

**Line Feeder Relay & Metering Panel - Meters**

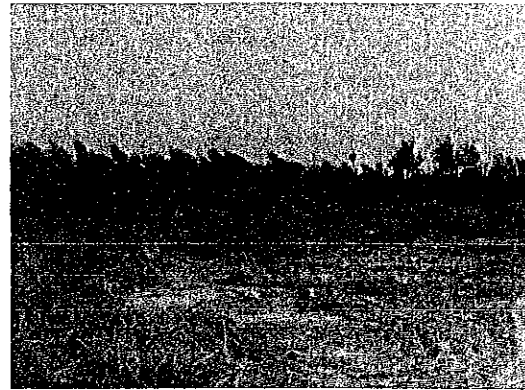
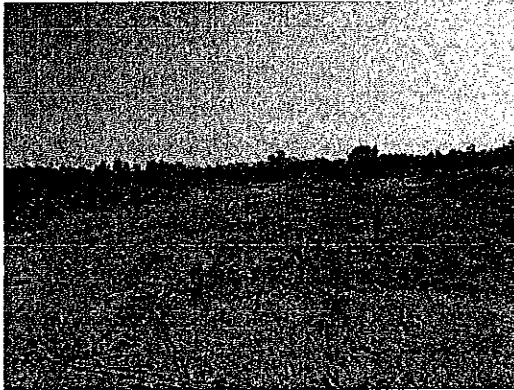
1. MW meter.
2. HZ meter
3. TVM
4. Ammeter.
5. Voltmeter
6. Frequency meter
7. MVAR Meter



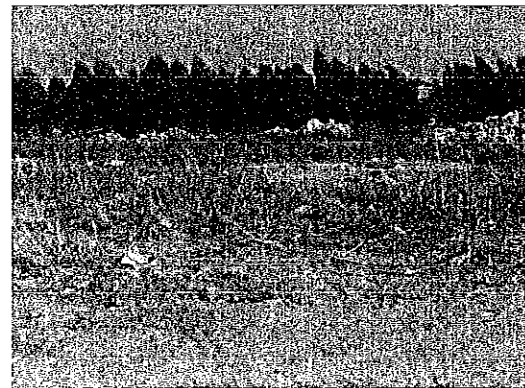
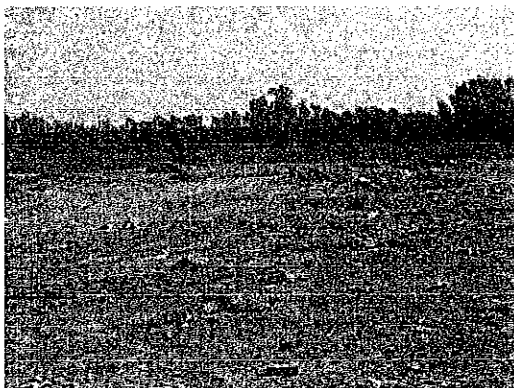
# **INITIAL ENVIRONMENTAL EXAMINATION REPORT**

**ITTEFAQ POWER (Pvt) LIMITED**

**INSTALLATION OF 31.2 MW BIO MASS (BAGASSE) BASED CO-GENERATION POWER PLANT  
AT SHAFIABAD,  
CHANI GOTH, TEHSIL AHMEDPUR SHARQIYA, DISTRICT BAHWALPUR, PUNJAB**



**INITIAL ENVIRONMENTAL EXAMINATION  
(IEE)**



**Prepared by:**



Suite 4, 2<sup>nd</sup> Floor, Link Arcade, Model Town Link Road, Lahore-Pakistan

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Email: ectech\_ectech@yahoo.com

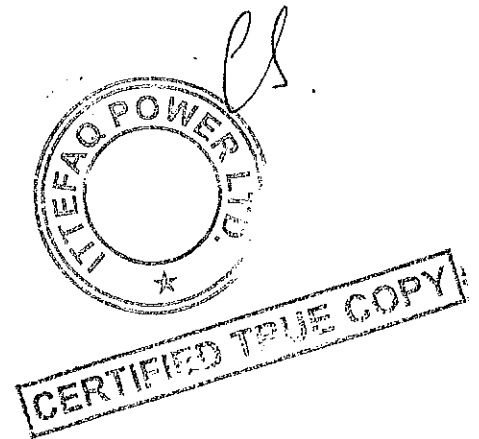
October-2016



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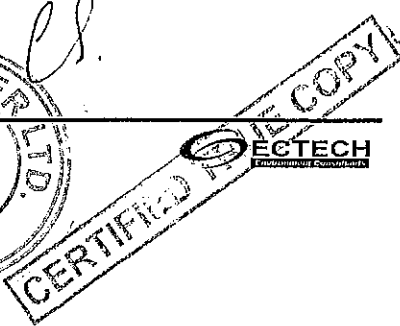
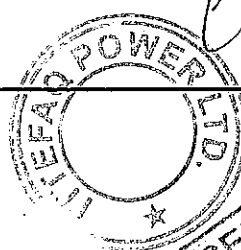
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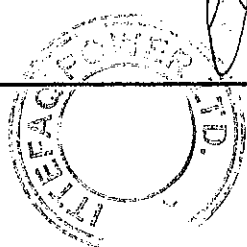
Email: ectech\_ectech@yahoo.com

October-2016

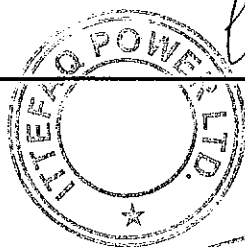
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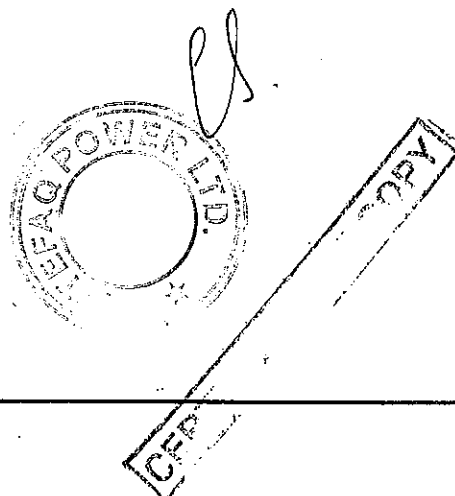
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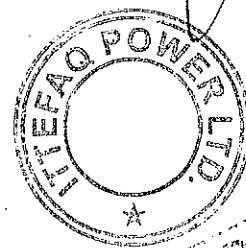
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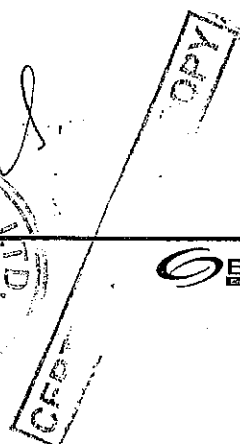
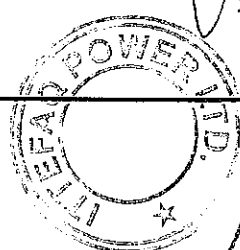
## ACRONYMS

AAUs	Assigned Amount Units
CEO	Chief Executive Officer
COD	Commercial Operation Date
DOC	Designated Operational Entity
DISCOs	Power Distribution Companies
DCS	Distributed Control System
EPA	Environmental Protection Agency
EOT	Electrically Operated Overhead Travelling
EMP	Environmental Management Plan
EMTP	Environmental Monitoring Plan
EA	Environmental Approval
EPO	Environmental Protection Order
ET	Emissions Trading
FSA	Fuel Supply Agreement
FESCO	Faisalabad Electric Supply Company
GOP	Government of Pakistan
GDP	Gross Domestic Product
GEPCO	Gujranwala Supply Company
GHG	Green House Gas
HERP	Hazard and Emergency Response Plan SIEMENS
HP	High Pressure
LP	Low Pressure
HSE	Health Safety Environment

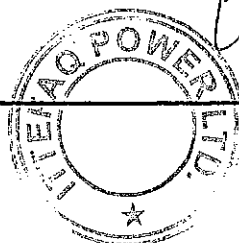


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HESCO	Hyderabad Electric Supply Company
IPPS	Independent Power Producers
IEE	Environmental Examination
IEP	Institute of Engineering Pakistan
IESCO	Islamabad Electric Supply Company
JICA	Japan International Cooperation Agency
KESC	Karachi Electric Supply Company
KM	Kilometer
LOS	Letter of Support
LESCO	Lahore Electric Supply Company
MW	Mega Watt
MEPCO	Manpower export Placement Corporation
MOE	Ministry of Environment
NEQSAA	National Environment Quality Standards for Ambient Air
NEQSN	National Environment Quality Standards for Noise
NOC	No objection certificate
NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission & Dispatch Company
NCS	National Conservation Strategy
PEPC	Pakistan Environmental Protection Council
PEPA	Pakistan Environmental Act
PEPC	Pakistan Environmental Protection Council
PPDB	Punjab Power Development Board
PEPCO	Pakistan electric power company

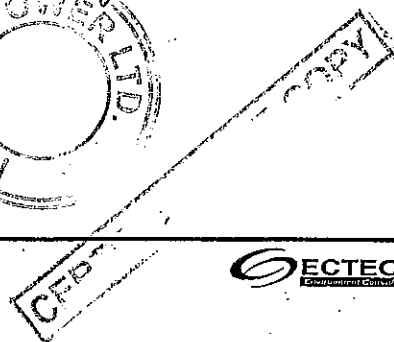
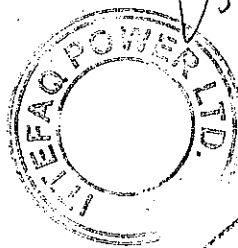


PPDB	Punjab Power Development Board
PESCO	Peshawar Electric Supply Company
POPs	Parenting Organic pollutants
QESCO	Quetta Electric Supply Company
ISML	Ittefaq Sugar Mill Limited
IPPL	Ittefaq Power Private Limited
SMART	Self- Monitoring and Reporting by Industry
SNGPL	Sui northern gas pipe lines
SIA	Social Impact Assessment
TG	Turbo Generators
USTDA	US Trade and Development Agency
WAPDA	Water and Power Development Authority





## 1.0 EXECUTIVE SUMMARY



## 1.0 EXECUTIVE SUMMARY

Pakistan is passing through acute shortage of power resulting in daily long drawn out load shedding. Frequency and duration of the load shedding are also on the increase. Unreliability and non-availability of power has led businesses to fail and Pakistani families to struggle. Even routine and social life is sufferings. The power shortage is well documented by the Government of Pakistan (GoP) and is estimated at over 6,000MW. This gap in power supply and demand is on the increase.

The total installed power generation capacity of Pakistan in 2010-11 was 23,412 MW. Out of this, 16,070 MW was thermal (69 percent), 6,555 MW was hydroelectric (28 percent) and 787 MW was nuclear (3 percent). The power shortage is estimated at over 6,000MW. This gap in power supply and demand is on the increase.

As results fast increase in the cost of fossil fuels and natural gas, cost of power is virtually becoming unbearable for the people from every walk of life. Industrial sector is forced to install their own private power plants to ensure uninterrupted supply of electricity at low cost, otherwise they are facing loss in their business at national and international levels besides suffering from routine loss in productivity.

In view of this situation, the Government of Pakistan formed a Working Group with the mandate to:

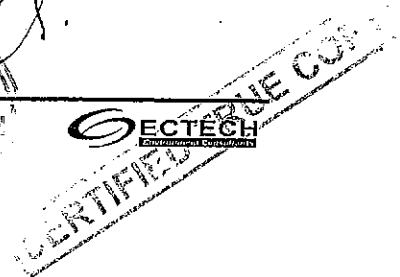
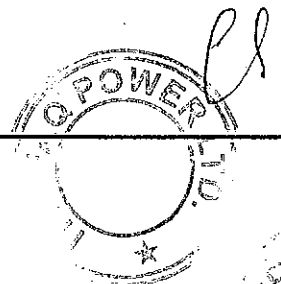
- i- Ensure action on the 11th Five Year Plan and Vision 2025.
- ii- reduce difference between supply and demand of electricity
- iii- search for cheaper sources of electricity,
- iv- prepare proposals for the already under construction projects,
- v- monitoring of the projects working in the country,
- vi- Prepare recommendations for the projects whose feasibility studies are already available and those operational projects whose feasibility studies have not been prepared.

### Title and Location of the project:

M/S Ittefaq Power Private Limited are in the process of installing a power plant under the name "31.2 MW Co-generation Bagasse Based Power Plant" at Shafiabad Channi goth, District Bhawalpur, Punjab from where Bagasse is already available.

The power plant will cover a total area of 50 acers. Location map and site of the project is given in this IEE report.

Cost of the project is approximately 1.3 Million USD/ MW and plant Technology suppliers will be China Wuxi/ HTC / Siemens / PEL/ ABB yet decided by bidding financial & technical proposal .



**Identification of the consultant:**

Ectech Environment Consultant have prepared the IEE report. Names, qualification, experience and position of the persons involved in this IEE study are given in this report.

**Identification of the proponent:**

M/S, "Ittefaq Power Private limited" are the proponent of this project.

**Brief outline of the proposal:**

The M/S Ittefaq Power Private Limited are in the process of installing 31.2 MW bagasse based co generation power plant at Channi Goth Tehsil Ahmed Pur Sharqiya, Dist Bahawal pur. The Major raw material for this project is Bagasse, will be obtained from Ittefaq Sugar Mill , which will utilize most of the power to produced during crushing season and rest will be sold to to the national grid. After fulfilling their own needs during off season the rest power will be sold to the national grid.

The project is being run on fast track so as to make it operational within 20 months of the Zero Date. Major part of this electric power generated will be exported to the national grid, after fulfilling the own needs.

Bagasse based Cogeneration power plant, offers a number of advantages both to the sugar industry and to the country. Besides reducing gap between the demand and the supply in the power sector, Bagasse based fuel power cogeneration provides environmentally friendly solution for additional power generation, reduces dependence on fossil fuels, saves on hard earned foreign exchange from its outflow from the country for import of fossil fuels and gives sugar industry financial gains in the form of cheaper energy while using Bagasse as fuel.

Ground water is available at the project site in abundance that will fulfill the total water requirement of project. All requirements of water are given in this report.

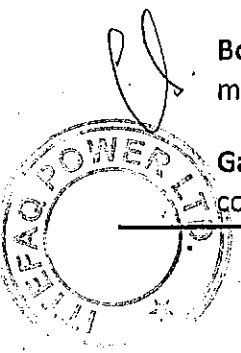
Major equipment required for the plant has also been listed in this report.

**Major Impacts and Mitigation measures:**

The most significant pollutant emitted from Bagasse-fired boilers is **Ash**. As ISML is already using low pressure boilers and ash is in very little quantity, the high pressure boilers will produce minor quantity of ash which will be controlled by the use of Electrostatic Precipitator separator (fly as arrestor) to meet the permitted dust concentration as required by NEQS Pakistan. Both of these technologies have the ability to remove 99.9% of ash (PM) in stack exhausts.

**Bottom and fly ash** will be disposed off through the most suited methods out those mentioned in the later part of this report.

**Gaseous Emissions** of sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) are lower than conventional fossil fuels due to the characteristically very low levels of sulfur and



nitrogen associated with Bagasse, therefore, they will remain within the prescribed limiting values of the of the NEQS Pakistan.

The Waste water treated in lagoons and after treatment will be used within the four boundary walls of project site, for sprinkling on the unpaved sites, for suppression of dust, for plant entries, and for irrigation of plants. if the treated waste water is left unconsumed it will be used for the irrigation of the crops of the project proponent.

The noise levels of 75 dB (A) and 65 dB (A) indicated are at the plant boundary, as the maximum noise level shall be 85dB (A) at 3.0 m from the equipment.

According to the Punjab Environmental Protection (amendment-2011) Act (PEPA) 1997, Section 12 "Initial environmental examination and environmental impact assessment – (1) No proponent of a project shall commence construction or operation unless he has filed with Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof."

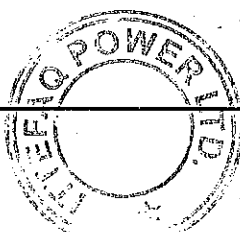
according to the 'Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000" the project falls in "Category B" requiring submission of IEE report to the EPA Punjab for getting the required Environmental Approval(EA)/NOC.

This IEE study has been conducted in accordance with the requirements of the serial 2.3 of the "Guidelines for the preparation and review of Environmental Reports, November 1997/2000".

**Legal Framework** in which the capability of regulatory institutions for environmental management largely ensures the success of environmental assessment for ensuring that development projects are environmentally sound and sustainable. For decision-making and policy formulation in the environmental and conservation issues, the institutional framework, as it exists in Pakistan, is described in this IEE report.

Environmentally sensitive areas of special or unique value in which Topography and geology; Soils and Climate; water; Ecological resources: Fisheries and aquatic biology, Biodiversity, Forestry, Wildlife, scientific institutions, Socio-economic and Cultural and other heritage are also discussed in this report.

The report provides comprehensive **Environment Management Plan** both for managing environment during construction and regular operation. Comprehensive onsite monitoring on the project was carried out to ascertain the levels of the baseline environmental status before commencing any work on the project.



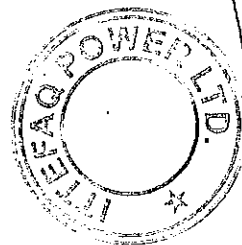
### **Proposed Monitoring:**

Environmental monitoring will be carried out by the staff to be engaged for the purpose. Third party quarterly monitoring will further ensure compliance with the required standards.

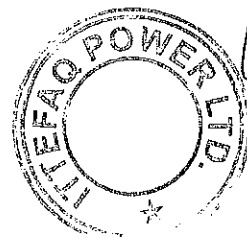
All out environmental monitoring of the power plant should be carried out according to the schedule as recommended in the SMART.

**Public consultations** were also held with the stake holders to know about their views for the project. On the overall basis the participants of the public consultation were strongly in the favor of the project to be accomplished as soon as possible.

In **conclusion**, it was found that the project is fully justified for its installation at the earliest and at the selected site.



## 2.0 INTRODUCTION



## 2.0 INTRODUCTION

Pakistan is passing through acute shortage of power resulting in daily long drawn out load shedding. Frequency and duration of the load shedding are also on the increase. Unreliability and non-availability of power has led businesses to fail and Pakistani families to struggle. Even routine and social life is suffering. The power shortage is well documented by the Government of Pakistan (GOP) and is estimated at over 6,000 MW. This gap in power supply and demand is on the increase.

The total installed power generation capacity of Pakistan in 2010-11 was 23,412 MW. Out of this, 16,070 MW was thermal (69 percent), 6,555 MW was hydroelectric (28 percent) and 787 MW was nuclear (3 percent). The growth in energy supply continues to lag behind the growth in energy demand.

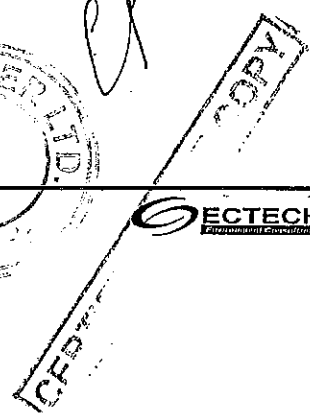
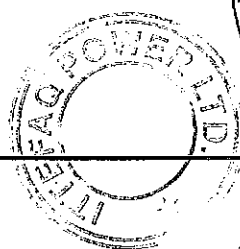
The power shortage is estimated at over 6,000 MW. This gap in power supply and demand is on the increase. Resultantly, Pakistan currently faces severe power shortages, which results in frequent and long drawn out load shedding. The frequency of the load shedding is also on the increase.

The demand and supply of electricity was balanced in 1997 with the commissioning of private sector Independent Power Producers (IPPs) established under the Private Power Policy of 1994. As peak demand growth approached 6.6% per year during 2001 to 2007, the supply shortage occurred much earlier than 2009.

In order to bridge the gap between power demand and supply, Pakistan Government liberalized its investment policies, which resulted in not only investments in power production sector from local resources, but also foreign investments are pouring in large amounts.

As a result of a wide gap between available energy and the demand and fast increase in the cost of fossil fuels and natural gas, cost of power is virtually becoming unbearable for the people from every walk of life. Industrial sector is forced to install their own private power plants to ensure uninterrupted supply of electricity at low cost, otherwise they are facing loss in their business at national and international levels besides suffering from routine loss in productivity.

The European Parliament comprising 27 countries provided Pakistan Textile and Linen sectors, GS plus Status. As a result of this facility, Pakistani products have excess to the markets of the countries of the European Union free of 11.0% duty being charged presently. All this has greatly added to the export of Pakistan. The opportunity has resulted in export of 35000 products from Pakistan to these markets amounting to net increase in the export of Pakistan to the tune of US\$1.0 billion. This export facility is for textile and also available to the Linen sector of Pakistan.



This opportunity requires in time production and execution of the orders for which there is every need for provision of uninterrupted supply of electricity, otherwise Pakistan instead of availing itself of the export facility will get a bad name.

To ensure processing such a huge volume of the products for in time production and execution of the orders, there is every need for provision of supply of uninterrupted electricity; otherwise Pakistan instead of availing itself of the export facility will get a bad name.

After energy crisis in 1970, special attention was paid to alternative fuels for their use as fuel for power generation. Consequently, the concept of Bagasse combustion changed and it has come to be regarded as a biomass fuel rather than refuse. Bagasse is the matted cellulose fiber residue from sugarcane that has been processed in a sugar mill. Previously, Bagasse was burned as a means of solid waste disposal.

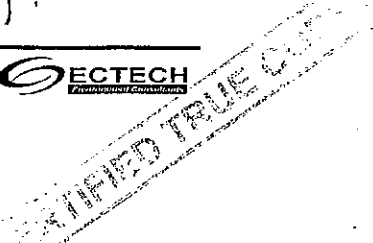
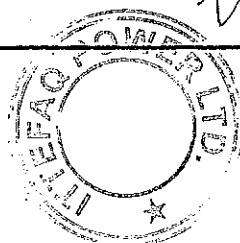
Ittefaq Sugar Mills Limited was incorporated in Pakistan on 4th May, 1982 as a Public Limited Company. The mill is located at Sahiwal Pakpattan Road, Pakpattan in the Province of (Punjab). It went into commercial production in November 1983. It started with a crushing capacity of 4,000 tons per day. Later on the plant was expanded to 5,500 tons per day. Due better availability of sugar cane Ittefaq Sugar Mills Limited (ISML) shifted from Pakpattan to Channi Goth, Ahmedpur Sharqia in 2013-14, and Southern Punjab. Southern Punjab is very famous in the superior quality and highest yield of sugar cane in Pakistan. Present crushing capacity of mills is 8,000 tons sugarcane per day. The operating pattern of the sugar mill is as follows:

- a. Milling season: it traditionally runs from the Mid of November to the beginning of April. During this period, mature sugarcane is harvested and transported to the mill, where it is crushed to extract sugar juice. The juice is then processed to produce white sugar.
- b. Off-milling season: it starts immediately after the milling season (i.e., from the beginning of April to the start of November). During this period, the sugar mill is shut down for maintenance activities

With this background, M/S Ittefaq Sugar Mills Limited (ISML) is in the process of installing a 31.2 MW Bio Mass (Bagasse) based Co-generation power plant for the generation of electricity. Bagasse based co-generation power plant under the name "Ittefaq Power Private Limited ("IPPL"). The plant is to be installed at Channi Goth, Ahmed Pur Sharqiya, Dist Bahawal Pur, Punjab from where Bagasse is already available.

The project is being run on fast track so as to make it operational make it operational as per energy policy frame work of power cogeneration 20 months of the Zero Date. Major part of this electric power generated will be exported to the national grid, after fulfilling its own needs, the "Ittefaq Power Private Limited will be owned by" Ittefaq Sugar Mills Limited"

With increasingly more disparity between energy supply and demand, and keener use of attention of the Government to environmental protection, use of non conventional





energy resources i.e. use of Bagasse as a primary fuel for power generation could win favor from the governments' policies. As ISML already using low pressure boilers for generation of electricity, adopting with high pressure boilers will be more efficient.

Fragile economy of Pakistan cannot afford to continue importing fossil fuels spending so much hard earned foreign exchange. Under these circumstances, there is an immediate need to find a practical solution whereby, the dire need for electricity of the country could be met with minimum pressure on the national exchequer.

With increasingly more disparity between energy supply and demand, and keener attention of Government to environmental protection, use of non conventional energy sources such as Bagasse as primary fuel for power generation has been favored in the government's policies. The GOP has recently announced a Co-Gen power policy for sugar mills to generate power using Bagasse more efficiently. Bagasse is currently being used in the sugar industry in an uneconomical way for producing heat and power in low-pressure boilers.

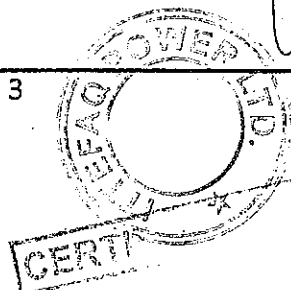
Fossil fuels, which are already in short supply, and the available are fast depleting. On the other hand their industrial use is fast on the increase. In order to meet the present day requirements of the fuels and to fulfill the future increased demand, alternate/non conventional fuels are to be inducted without losing any time as already being done by ISML "the production of electricity from non conventional fuel by using Bagasse and now adopting low pressure boilers with high pressure boilers for more efficiency.

The new cogeneration power plant will be installed within the premises of Ittefaq Sugar Mills Limited . Power plant with installed capacity of 31.2 MW (Gross), operating 31.2MW in which major part of electric power (23.86 MW) generated will be exported to National Grid and remaining power (7.34 MW) shall be consumed in-house during season.

Cost of the project is approximately 1.3 Million USD/MW and plant Technology suppliers will be China Wuxi/ HTC / Siemens / PEL/ ABB yet decided by bidding financial & technical proposal .

Bagasse based Cogeneration power plant, offers a number of advantages both to the sugar industry and to the country. Besides reducing gap between the demand and the supply in the power sector, Bagasse based fuel power cogeneration provides environmentally friendly solution for additional power generation, reduces dependence on fossil fuels, saves on hard earned foreign exchange from its outflow from the country for import of fossil fuels and gives sugar industry financial gains in the form of cheaper energy while using Bagasse as fuel.

In Pakistan almost all sugar mills are in the process of using Bagasse as fuel for production of cheaper and environmental & cleaner energy. The Bagasse based Cogeneration of electric power is also being extensively used in India, with already the installed generation capacity is close to 1800 MW with more plants coming up.



Mauritius (around 250 MW), Reunion Island (around 220 MW), Brazil etc are among other countries that had exploited Bagasse based Cogeneration to a major extent.

The Bagasse (Bio Mass) based Power Plant (31.2 MW) under reference of the project will utilize Bagasse from ISML, as already Bagasse is available and ISML using this Bagasse in low pressure boilers and after adopting low pressure boilers with high pressure boilers this Bagasse will be used. Mainly Bagasse saved during season will be used as fuel during off season, nevertheless Ittefaq Sugar Mills will explore the possibility of purchasing Bagasse and other bio masses to be used as fuel in off season if the cost of these fuels is economically viable.

The cultivable area surrounding the proposed power plant site is approximately (80,000 ) acres where major crop is sugarcane hence a surplus amount of Bagasse will be available for the power plant. Ground water availability is about 5 ft. And is quite suitable for meeting all water needs of the project.

The proposed new Bagasse based power plant will be in a position to run for about 120 days during season and 72 days offseason using Bagasse saved during operational phase from ISML.

Presently the electric power need is being met by low pressure STG. Emergency power requirement is met by Emergency Diesel Generator and WAPDA The existing available power house for ISM is as under:

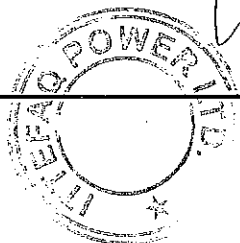
Source	Power
STGs	11 MW
Emergency Diesel Generator	600 KVA+1250 KVA
WAPDA source 1 ( KW)	200 KW

Current in home power requirement of ISML is about 9918 KW during season and 500 KW during off season

Specification of cogeneration plant is as under:

Cogeneration plant	Specification
High pressure boiler	155 TPH
Pressure	110 bar
Temperature	540°C
Turbo Generators	Specification
(ii) Extraction / condensing STG set	31200 KW

Grid station 11 kV step up to 132kV will export its major power to National Grid.



This IEE report covers the activities related to Bagasse based cogeneration power plant with installed capacity of 31.2 MW.

## **2.1 Purpose of the report, Identification of the project, and proponent:**

### **2.1.1 Purpose of the report:**

According to the Punjab Environmental Protection (amendment-2012) Act (PEPA) 1997, Section 12 ANNEXURE-I, "Initial environmental examination and environmental impact assessment – (1) No proponent of a project shall commence construction or operation unless he has filed with Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof."

It is this legal mandatory requirement that this IEE report regarding installation of "31.2 MW Bagasse based co-generation Power Plant" using Bagasse as Fuel has to be submitted to the Punjab Environmental Protection Agency (EPA), Government of the Punjab, Lahore before initiating any work for installing of the power plant under reference of this project.

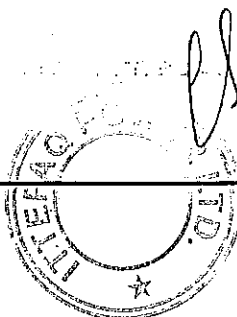
according to the 'Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000" ANNEXURE-II the project falls in "Category B" requiring submission of IEE report to the EPA Punjab for getting the required Environmental Approval(EA)/NOC.

This IEE report has been prepared, according to the "Guidelines for the preparation and review of Environmental Reports, October 1997/2000"-ANNEXURE-III as approved by the Government of Pakistan. It provides necessary information about the project under reference for its consideration by the Punjab EPA, Government of the Punjab, Lahore, for decision making before the requested Environmental Approval (EA) is awarded for the project to start development in compliance with the Punjab Environmental Protection (Amendment 2012) Act, Section12.

### **2.1.2 Identification of the project& the proponent:**

#### **The project:**

In view of acute shortage of electricity in Pakistan, all segments of life be it industry, commerce, social, domestic or else are facing lot of hardships. Industries with export potential are especially facing an extremely tough competition in the foreign markets due to high and ever increasing cost of energy resulting in very high cost of production leaving marginal profitability. Uncertainty of uninterrupted supply of electricity makes it difficult to in time execution of foreign orders. Such a situation not only shakes the confidence of foreign buyers but also a loss to individual industry and national exchequer.



Ittefaq Sugar Mills Limited was incorporated in Pakistan on 4th May, 1982 as a Public Limited Company. The mill is located at Sahiwal Pakpattan Road, Pakpattan in the Province of (Punjab). It went into commercial production in November 1983. It started with a crushing capacity of 4,000 tonnes per day. Later on the plant was expanded to 5,500 tonnes per day. Due better availability of sugar cane Ittefaq Sugar Mills Limited shifted from Pakpattan to Chani Goth, Ahmedpur Sharqia in 2013-14, Southern Punjab. Southern Punjab is very famous in the superior quality and highest yield of sugar cane in Pakistan. Present crushing capacity of mills is 8,000 tonnes sugarcane per day.

As above mentioned M/S Ittefaq Sugar Mills Limited is in the process of installing a new Bagasse based Co-generation Power Plant with installed capacity of 31.2 MW by using Bagasse as Fuel" at Chani Goth, Ahmed Pur Sharqiya, Dist Bahawal Pur, Punjab within premises of Ittefaq Sugar Mills .

This Power Plant with adoption of new high pressure boilers and Turbo Generators will supply Major part of electricity to National Grid and house requirements of ISML. This will also add to its own share to reduce the power shortage at the National Level although not so big quantity.

Alternative Energy Development Board (AEDB), Government of Pakistan, issued letter of intent vides its No. B/3/21/2016/Bagasse-Biomass/IPPL Biomass/ISM dated 04<sup>th</sup> October 2016 to M/S Ittefaq Sugar Mills Limited for 31.2 MW Bagasse/Biomass Based High Pressure Co-Generation Power Plant Punjab Province. For more details refer to ANNEXURE-IV

### 2.1.3 Identification of the proponent

Ittefaq Power Private Limited

Name of the contact person: Ahsan-ul-Haq abid

Full address: 40 BII Gulberg III Lahore

Phone:0300 -4000121

Email:ahsan\_ggmf@ittefaqsteel.com

### 2.1.4 Contact Person:

Mr. Hafiz Muhammad Kashif Munir

Ittefaq Power Private Limited

Full address: 40 BII Gulberg III Lahore

Phone:0322 4612833

Email:kashiif.muneer@gmail.com

### 2.1.5 Consultants who prepared the report:

ECTECH--Environment Consultants,

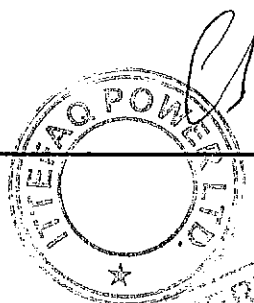
Suite No. 4, 2<sup>nd</sup> Floor, Link Arcade,

Model Town Link Road, Lahore-Pakistan

Phone: +92 42 35887517, 35925693, 35841688

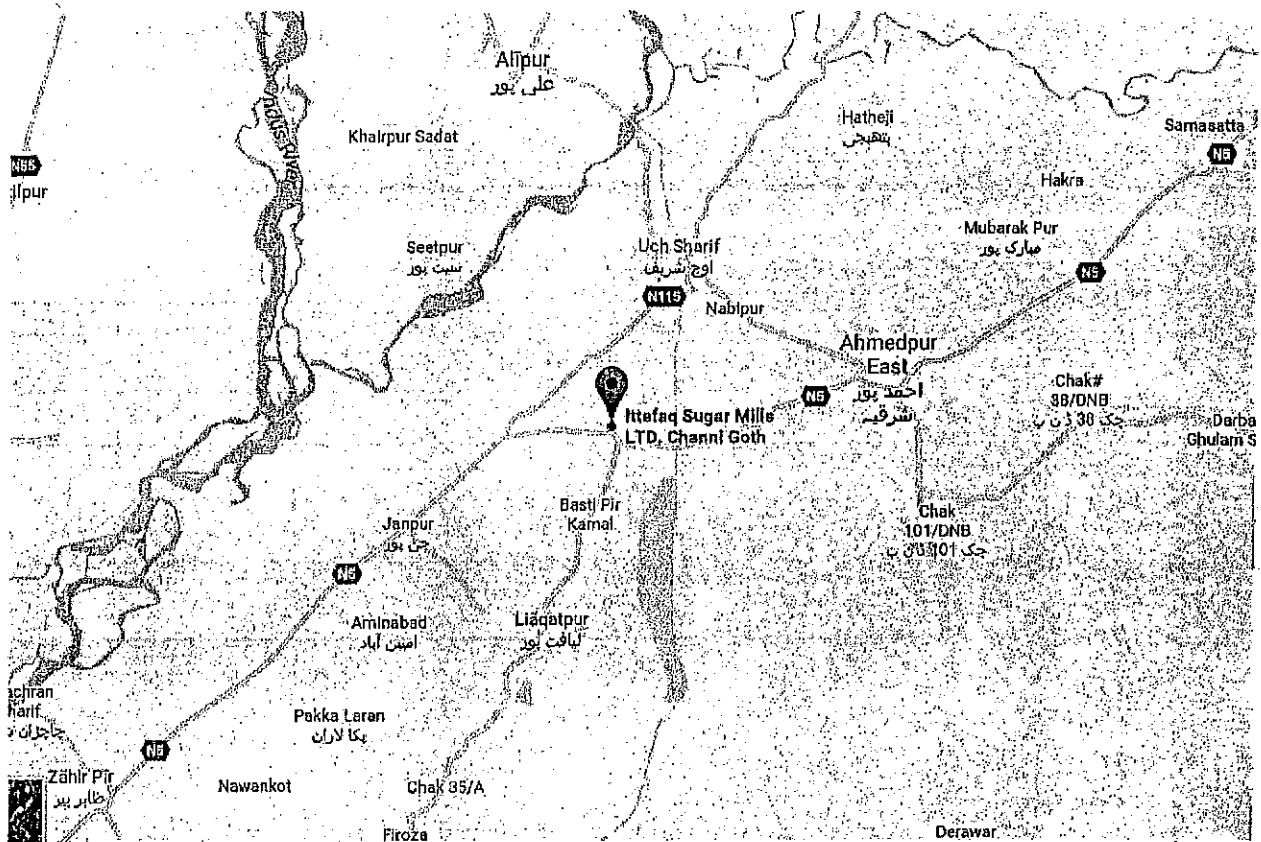
Fax: +92 42 35855508

E-mail: ectech\_ectech@yahoo.com.



### 2.1.6 Location of the project:

The Ittefaq Power Private will be installed at Chani Goth, Ahmed Pur Sharqiya, Dist Bahawal Pur, Punjab.



The location of the proposed power plant is shown hereunder:

Courtesy: Google

Location of the Project

### 2.1.7 Nature and size of the plant:

Nature and size as previously described in which installed capacity is 31.2 MW and the proposed power plant will cover a total area of 50 acers. The total estimated cost of the power plant is 1.3 Million USD/ MW (Approx).

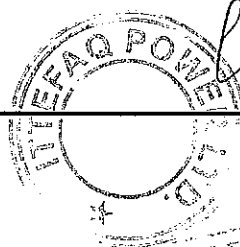
ISML is currently producing heat and power through topping cycle cogeneration at medium pressure around 35 bars. Bagasse is a valuable resource which can be consumed more effectively. In framework for power Co-Generation 2013 (Bagasse / Biomass) opportunity is provided to sugar mill to export the electricity to grid under the scope of Renewable Energy Policy of 2006. NEPRA has prepared upfront tariff for bagasse based high pressure power plants. The power portion (high grade energy) of combined heat and power mix can be increased by adopting higher pressures.

### 2.1.8 Site for the Project:

The site for the proposed power plant is shown hereunder.



Courtesy Google

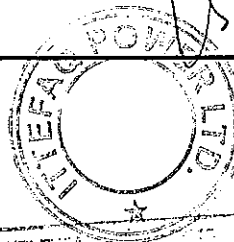


## 2.1.9 Persons performing the study:

Names, qualification, experience and position of the persons involved in this IEE study are given as below:

Table showing the persons performing this study:

Name of the EIA/IEE team	Qualification and brief experience	Position in the EIA Team and role*
Dr. Muhammad Hanif (Chief Executive) ECTECH-Environment Consultants And APEX Environment Laboratory	<p><b>A-Qualifications:</b></p> <p>1- M.Sc. (Chem: Tech.) Punjab Uni; Lahore; 1962.</p> <p>2-Ph.D. (Chemistry) Charles University, Czech Republic; 1968.</p> <p>3- Post Doctorate-Alex. Humboldt. Foundation, Senior Post Doctorate Fellow, Germany; 1974-75.</p> <p><b>B-Experience/past Positions:</b></p> <p>1-Director General (R), PCSIR Labs. Complex, Lahore.</p> <p>2-Director General (Ex.) Ministry of Environment, Local Government and Rural Development, Govt; of Pakistan.</p> <p>3- (ex.) Consultant Environment, Category-A, Asian Development Bank.</p> <p>4- (ex.) Consultant Environment, UN—ESCAP</p> <p>5- Worked on World Bank Funded Project.</p> <p>6- Author of the National Environment Quality Standards (NEQS)</p> <p>7- Author of:</p> <p>i -104 Scientific Research papers</p> <p>ii - Over 60 technical end project reports on environment.</p> <p>8- Carried out EIA for 28 projects and reviewed over 15 EIA reports.</p> <p>9--Among many others, EIA carried out on behalf of the Asian Development Bank regarding Katmandu Valley (Nepal) Industrial Sites.</p> <p>10-EIA-Saindak Gold/copper Project, Pakistan.</p> <p>11-EIA Pakistan Steel, Karachi;</p> <p>12-ESIA Report (According to OPIC Environmental Handbook Format) for D.G. Cement Company Limited, Kallar Kahar, District Chakwal, Pakistan.</p> <p>ESIA Report (According to OPIC Environmental Handbook Format) for Lucky Cement Limited, Pezu, District Lakki Marwat, North West Frontier Province, Pakistan.</p> <p>ESIA Report (According to OPIC Environmental Handbook Format) for D.G. Cement Limited, Kallar Kahar/ Khairpur Project, District Chakwal Pakistan.</p> <p>ESIA Report (According to OPIC Environmental Handbook Format) for Chakwal Cement Company Limited, District Chakwal Pakistan.</p> <p>ESIA Report (According to OPIC Environmental Handbook Format) for Packages Limited, Lahore.</p>	<p>- Project Team Leader.</p> <p>-Principal author of the EIA report.</p> <p>- Coordination, supervision, guidance and co author of the EIA report.</p> <p>-Over all monitoring of the project work, supervision, guidance and participation in all activities to ensure quality of work.</p>



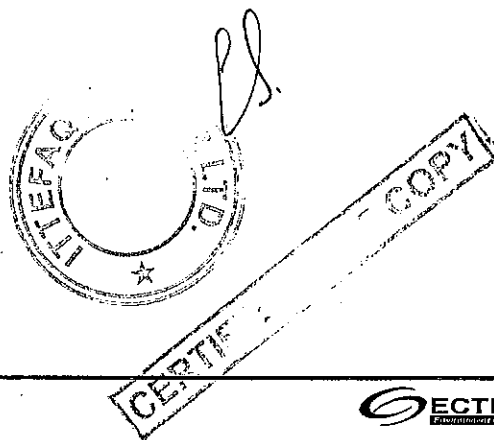
Mr. Muhammad Saif-Ur-Rehman	<p>-B.Sc. (Chemical Engineering), Punjab Uni, Lahore, Pakistan.</p> <p>-M.Sc. (Applied Environmental Sciences), Punjab Uni, Lahore, Pakistan.</p> <p>- Special B.Sc. Final Year thesis was completed on Environmental Management Practices and Waste Water Treatment Technologies.</p> <p>-General Manager, APEX Environment Lab.</p> <p>-Chief Engineer Monitoring, ECTECH</p> <p>-Experience in Environment:</p> <p>For the last over 10 years working in the field of environment on the following subjects:</p> <p>- Prepared 10 EIA reports, in the field of cement, textile, oil &amp; gas, power generation, fertilizer, power alcohol and chemical industry.</p> <p>-Designing, fabrication, installation and operation of Waste Water Treatment Plants; So far three plants have been installed.</p> <p>- Carrying out environmental Audit: Around 18 industrial units have been completed so far.</p> <p>- Lab. Testing of effluents and water: For the last 5 years lab. testing services have been provided.</p> <p>-Full time participation in the assignments under serial 12 – under Dr. M. Hanif's contributions.</p>	<p>-Senior Team Member</p> <p>-Project on site monitoring &amp; related activities.</p> <p>- Co-author of the EIA report.</p> <p>- Collection of demographic data.</p> <p>- Preparation of environmental management plan.</p>
Mr. Muhammad Anees	<p>B.A; L.L.B; Expert on Environment Law</p> <p>- Full time participation in the assignments under serial 12 – under Dr. M. Hanif's contributions (legal aspects).</p>	<p>Guidance on various aspects of Environmental Law as applicable to EIA.</p> <p>Environmentalism.</p> <p>Preparation of Environmental management plan,</p>
Mr. Muhammad Aqeel	<p>M.Sc.(Hons) (Environmental Sciences), University of Agriculture Faisalabad.</p> <p>B.Sc.(Hons) (Environmental Sciences), University of Agriculture Faisalabad.</p> <p>Lab. Analyst cum Environmentalist</p> <p>APEX Environment Laboratory &amp; ECTECH-Environment Consultants</p> <p>-Environmental monitoring and preparing of 3 projects for EIA and IEE report</p>	<p>On site monitoring and lab. Testing of samples and data processing.</p> <p>- Report writing.</p> <p>-Preparation of environmental management plan</p> <p>-Environmental monitoring</p>
Mr. Hassan Waqas	<p>M. Phil (Env. Sciences), University of Gujrat.</p> <p>BS.(Hons) Environmental Sciences</p> <p>University of Gujrat</p> <p>Lab. Analyst Environmentalist</p> <p>APEX Environment Laboratory &amp; Environmentalism</p> <p>ECTECH-Environment Consultants</p>	<p>On site monitoring and lab. testing of samples and data processing.</p> <p>- Report writing.</p> <p>-Preparation of environmental management plan</p> <p>- Environmental monitoring</p>
Mr. Arif Hussain	<p>M.Sc Environmental Sciences</p> <p>(University of The Punjab)</p>	<p>Lab. Analyst,</p> <p>APEX Environment Laboratory</p> <p>Monitoring Engineer</p> <p>ECTECH-Environment Consultants</p>





Mr. Rizwan Saeed	M. Phil Environmental Sciences University of Lahore B.S (Hons) Environmental Sciences (Gujrat University)	Lab. Analyst, APEX Environment Laboratory Monitoring Engineer ECTECH-Environment Consultants
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\*Only the main roles of the team members are given. However, their role was not restricted to these only; rather it also includes many other studies in their respective fields as required by the matrix of this proposal.



## 2.2 Extent of the IEE study, scope of the study:

As mentioned above, this IEE study has been conducted in accordance with the requirements of the serial 2.3 of the "Guidelines for the preparation and review of Environmental Reports, November 1997/2000".

The scope of this IEE report briefly covers the followings:

### 1.0 Executive Summary

### 2.0 Introduction including:

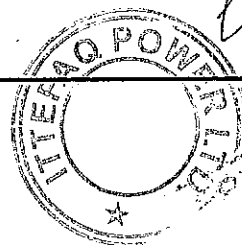
- Purpose of the report, including identification of the project and the proponents.
- Extent of the IEE study, scope of the study, magnitude of the effort, persons performing the study.

### 3.0 Description of project including:

- Type and category of the project.
- Objectives of the project.
- Alternatives considered, and reasons for their rejection.
- Location and related features
- Proposed schedule for implementation
- Description of the project, including drawing showing layouts, components of the project etc.
- Details of the restoration and rehabilitation plan at the end of the project life.
- Government approvals and leases required by the project

### 4.0 Description of the Environment: (in the area affected by the project)

- Existing (baseline) condition of the biophysical and socio-economic environment, trends and anticipated future environmental conditions should the project not go ahead
- Physical resources topography, climate, surface water, soils, ground water, Geology, Seismology etc.
- Ecological resources, wild life, forest, rare or endangered species,
- Human and economic development, population, communities, numbers, locations, compositions and employment.
- Industries, including known major development project, infrastructure-Water Supply, Sewage, flood control/drainage etc.
- Institutions



- Transportation-Roads, Rail, Harbor, Air ports, Navigable Rivers
- Land Use Planning –including dedicated use areas
- Power Sources and \Transmission
- Agricultural and /Mineral Development

**Quality of life values:**

- Socioeconomic values
- Public Health
- Recreational Resources and development
- Aesthetic Values
- Archeological historic treasures
- Cultural Values

**5.0 Screening of Potential Environmental Impacts and Mitigation Measures Including:**

- Environmental problems resulting from project construction
- Environmental problems due to project location.
- Environmental problems related to design.
- Environmental problems resulting from project operations.
- Potential environmental enhancement measures
- Additional consideration

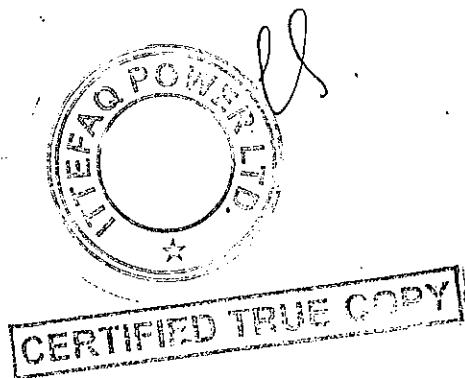
**6.0 Environmental Monitoring Programme and Institutional Requirements:**

**7.0 Grievance Redressing Mechanism-Formal And Informal Channels:**

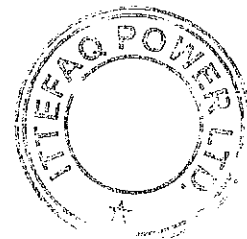
**8.0 Public Consultations/Scoping**

**9.0 Conclusions:**

**10.0 Recommendation**



### 3.0 DESCRIPTION OF THE PROJECT



### 3.0 DESCRIPTION OF THE PROJECT

#### 3.1 Type and category of the project:

##### Type:

Pakistan is an energy deficit country. Fossil fuels are already in short supply, and their local availability is fast depleting along with price hike taking place during very short intervals of time. Import bills of the fossil fuels are swelling at a very fast rate due to their fast increasing demand in the country. Pakistan's fragile economy cannot afford to continue with the present situation. Consequently, the present state demands to explore other cheaper fuels which could fully or partially replace the fossil fuels presently in use.

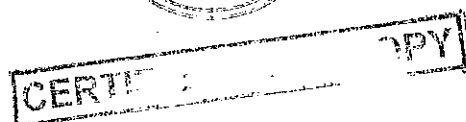
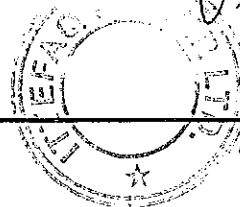
Ittefaq Sugar Millis are in the process of installing a 31.2 MW Bio Mass (Bagasse) based Co-generation power plant by adopting new high Pressure Boiler and Turbo Generators for the generation of electricity. Bagasse based co-generation power plant under the name "Ittefaq Power Private Limited". The plant is to be installed at Chani Goth, Teh. Ahmed Pur Sharqiya, Dist Bahawal Pur, Punjab.

Bagasse is the matted cellulose fiber residue from sugarcane generated in a sugar mill. The efficient use of Bagasse as fuel for the production of low cost power is one of the main objectives of the cogeneration power plant. So far, the tendency to consider Bagasse as surplus commodity has recently been changed to its being a cheaper fuel especially for cogeneration of cheaper electric power and steam, to increase its contribution to the country's energy supply. It is worth mentioning here that ISML already using Bagasse in low pressure boilers going to replace with high pressure boilers the process flow diagram of the project is attached at ANNEXURE-II.

The plant site is situated within the legal jurisdiction of the Environmental Protection Agency, Government of the Punjab, Lahore. Therefore, this IEE report will be submitted to this EPA for getting Environmental Approval/No Objection Certificate as required under the Punjab Environment Protection (Amendment 2012) Act, Section-12 to fulfill the mandatory legal condition.

#### 3.2 Category of the project

keeping in view the conditions, according to the 'Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000' ANNEXURE-II the project falls in "Category B" requiring submission of IEE report to the EPA Punjab for getting the required Environmental Approval(EA)/NOC.



### 3.3 Objectives of the project:

Pakistan is passing through the phase of acute shortage of electric supply verses the generation. The total installed power generation capacity of Pakistan in 2010-11 was 23,412 MW, with 16,070 MW from thermal sources (69 percent), 6,555 MW hydroelectric (28 percent) and 787 MW nuclear (3 percent). The growth in energy supply continued lagging much behind increasing demand in its supply. Resultantly, the power shortage as of today stands at over 6,000MW with further increase in the demand in all sectors of life. Consequently, Pakistan currently faces severe power shortages, which results in frequent and long drawn out load shedding. The frequency of the load shedding is fast on the increase.

The "Energy Security Action Plan" developed by the Planning Commission of Pakistan, (2005) planned the increase in electric generation capacity. Planed electricity generation & installed capacity are presented in the following table:

**Planed Electricity Generation & Installed Capacity MW**

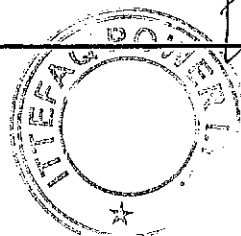
Year	Nuclear	Hydro Power	Coal	Renewable	Gas + Oil	Total
2005	400	6,460	160	180	12,340	19,540
2010	0	1,260	900	700	5,020	7,880
2015	900	7,570	3,000	800	7,850	20,120
2020	1,500	4,700	4,200	1,470	12,860	24,730
2025	2,000	5,600	5,400	2,700	22,790	38,490
2030	4,000	7,070	6,250	3,850	30,660	51,830
TOTAL	8,800	32,660	19,910	9,700	91,520	162,590

According to the Planning Department, Government of Pakistan (daily Jang, Lahore, Janaury18, 2013), "it will not be possible to end load shedding during the planned year even if all power projects are completed on schedule". It looks very difficult to bridge the shortage gap between production and demand of electricity for a longer time to come and load shedding will remain a constant feature in the country.

#### **GS plus Eight Status to Pakistan Textile and the Linen sectors by European Parliament**

With the grant of GS Plus Eight Status to Pakistan by European Union Parliament comprising 27 countries, Pakistani Textile and the Linen products, as of the 1<sup>st</sup> January, 2014; has excess to the markets of the countries of European Union free of 11.0% duty presently levied. This in other words means that Pakistan has the opportunity of exporting of 35000 products from Pakistan to these markets amounting to net increase in the export of Pakistan to the tune of US\$1.0 billion.

To ensure in time production of such huge volume of the products for timely execution of the orders, there is every need for provision of supply of uninterrupted electricity.



The Government being aware of its responsibilities, according to the advice of The Prime Minister of Pakistan, has already formed a working group comprising expertise, planners, administrators etc. All members of the group agree to give first preference to the short term and medium term projects along side work will also be carried out on Long Term Projects.

For renewables projects Alternative Energy Development Board (AEDB) is the sole representing agency of the Federal Government that was established in May 2003 with the main objective to facilitate, promote and encourage development of Renewable Energy in Pakistan and with a mission to introduce Alternative and Renewable Energies (AREs) at an accelerated rate<sup>15</sup>. Small hydro projects under 50 MW are also come under the scope of AEDB. The Federal Government established AEDB as a statutory organization by announcing and promulgating the AEDB Act in May 2010<sup>16</sup>. The Act bestowed upon AEDB the authorities and the responsibilities for the promotion and development of AREs. The Government of Pakistan has tasked the AEDB to ensure 5% of total national power generation capacity to be generated through renewable energy technologies by the year 2030.

#### **Purpose of the Working Group**

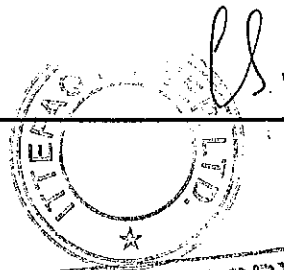
Purpose of the Working Group is to:

- i- Ensure action on the 11 the Five Year Plan and Vision 2025.
- ii- reduce difference between supply and demand of electricity
- iii- search for cheaper sources of electricity,
- iv- prepare proposals for the already under construction projects,
- v- monitor the projects working in the country,
- vi- Prepare recommendations for the projects whose feasibility studies are already available and those operational projects whose feasibility studies have not been prepared.

The mandate of the Working Group is not restricted only to the projects relating to Water and Power but also extends to the projects relating to petroleum and natural resources.

In view of the prevalent status of the big gap between electric power generation and supply, every day price hikes in power tariff, uncertainty in supply resulting in long drawn out load shedding with ever increase in their frequency; Ittefaq Power Private Ltd. has planned to install its own power generation facility using Bagasse a fuel cheaper than all fossil fuels.

Bagasse based Cogeneration Power production facility in sugar industry, provides a lot of advantages both to the sugar industry as well as to the country at very less cost as compared to the use of fossil fuels, though for a shorter time period per year due to its



limited availability. Some of the advantages using Bagasse as fuel are highlighted as below:

- i- Reduces, at very low cost, gap between demand and supply in the power sector with Bagasse as fuel available at very low cost.
- ii- the Bagasse based cogeneration is environment friendly,
- iii- cutting upon foreign exchange bills outflow from the country for the purchase of the fossil fuels
- iv- improving financial status of sugar sector and its downstream products, by the use of Bagasse as fuel for power production, which can also be called value addition,
- v- Bagasse storage does not require cost storage, maintenance, repair and equipment besides, involve no danger of high losses in case of fire,
- vi- Bagasse based Cogeneration is extensively used in India, installed generation capacity close to 1800 MW, while more plants are at various stages of implementation. The other countries like Mauritius (around 250 MW), Reunion Island (around 220 MW), and Brazil etc are also using Bagasse as fuel for cogeneration of electricity.

It will be worth mentioning here that even with the existing crushing capacity of ISML there is surplus Bagasse available to run the new cogeneration power plant during crushing as well off season of the sugar mills.

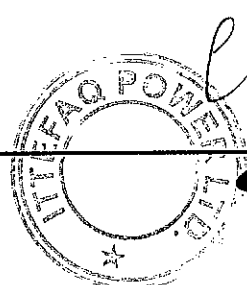
The gross power generation, during the season, after the implementation of the Cogeneration program will be 31.2 MW (Operational) with having installed capacity of 31.2 MW and sugar mill power consumption is 9918 KW during season and 500 KW during offseason, the auxiliary power requirement of the Cogeneration plant during the season operation of the plant is estimated to be 2700 KW.

Power house Auxiliary load	2700 KW
Sugar mill consumption during season	9918 kW
Sugar mill consumption during off season	500 KW
Total load during season	2700+9918 KW
Total load during off season	2700+500 KW

Thus exportable power provided to the national Grid will be 23.86 MW during season and 28.11 MW during off season.

### 3.4 Alternatives considered for Site Selection:

Hereunder, alternatives considered for the site selection for installation of the cogeneration power plant are highlighted.





**a- Availability of Land for the Power Plant:**

A lot of land within the premises of ISML is available at the site selected for the project. Presently, 50 acers are required for the project which has already been earmarked ANNEXURE-III. Therefore, the present site is quite suited which is within the premises of ISML.

**b- Availability of Bagasse as Fuel from In Sourcing:**

The sugar plant Ittefaq Sugar Mills generate 277125.12 MT Bagasse/season during crushing period. Out of this 41774.42 MT Bagasse will be saved for off season and 235350.70 MT Bagasse will be used during the season. 40,000 ton Bagasse will be purchased from the third party.

Bagasse from ISML will be available for Co generation plant within the premises of ISML. As sugar factory also belongs to the proponents of the Cogeneration Power Plant. This will further reduce the cost of power production, resulting in advantages to all the downstream users of the project.

**c- Availability of Bagasse/bio mass from Out Sourcing.**

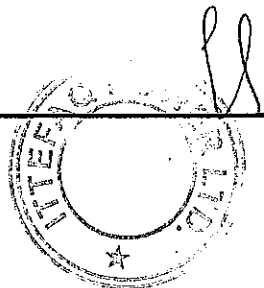
The area around the project site is extensively under agriculture use from which the other bio masses like sugar cane trash, cotton straw, wheat straw, rice husk, etc. can be purchased during off season further Bagasse from other factories who have not installed their power plant can be used.

**d- Basic infrastructure:**

Basic Infrastructure like roads, plentifully availability of underground water of good quality, cheap labor, telephone, Internet, transportation etc. are available and well developed.

The City lies just south east of the Head Panjnad. It is situated 50 km from Bahawalpur, 470 km from Lahore, 15 km from Uch Shareef, 25 uch sharif, the distance from the industry to head panjnad 40 km, distance from the canal 6 km, 60 km from Yazman, 320 km from Faisalabad and about 750 km from the national capital, Islamabad. The west region of the city is called the Sindh. Distance from the cholistan is 50 km. Railway system is also near to the industry area. The distance from the industry to railway station ahmad pur sharqiya is 25 km, Liaqat pur 18 Km, Channi goth 5 km.

The project site is situated at N5 and linked with Ahmad Pur Sharqiya, Uch Sharif, Liaqat pur, Jan pur districts through metalled road. The project site is also connected to all the country through network of roads, railway and by air from Bhawalpur, Multan, Lahore and Islamabad up to Karachi. The nearest air port is at Bhawalpur 65 km and the



nearest sea port is Karachi. The site is well connected by road to Islamabad, Lahore, Multan, Sadiqabad, Sukker, Karchi through national high way.

#### **e- Interconnection with Grid**

It is proposed to step up the generation voltage of 11 kV to 132 kV and injected to the National grid at 132 kV level. The 132 kV transmission lines from the Cogeneration plant shall be connected to the NTDC, Channi Goth 11/132 kV Grid, The Grid is only 1.5 KM away.

#### **f- Transportation cost of Bagasse as raw material:**

To meet the requirement of steam for power generation at Ittefaq Power Private Limited, 31.2 MW High Pressure Cogeneration project, the site is located within the premises of ISML and this will drastically cut the cost of the transportation of the Bagasse from its source of production to the power plant. Therefore, the project site has been selected adjacent to the Bagasse yard of the Ittefaq Sugar Mills , Chani Goth, Ahmed Pur Sharqiya, Dist Bahawal Pur, Punjab. It is also connected to N5.

#### **g- Environment**

Environmental consideration for industrial sitting is of utmost importance. The plant is to operate according to the Environment Management Plan (EMP) as provided under section 5. Under this EMP necessary safeguards have been provided to minimize all type of pollutants to the level as required under the National Environment Quality Standards (NEQS), National Environmental Quality Standards for Ambient Air (NEQSAA) effective 1<sup>st</sup> January 2013 and National Environmental Quality Standards for Noise (NEQSN) effective 1<sup>st</sup> July, 2012.

The present site for installation of the power plant is not situated within or near to any sensitive environment around. Accordingly, the site selected for the power plant is quite suitable.

#### **h- Waste water disposal facility:**

Approximately all the effluent generated from the power plant will be used within the boundary walls of the project. After water treatment process and passing through skimmers for the collection of oil and grease the water will be used for irrigation of the grassy plots, plants, trees and sprinkling of the road sides and open spaces to suppress fugitive dust. Thus virtually all treated water will be consumed within the four boundary walls of the project

**i- Labor availability:**

All categories of the labor required for the project operation are available conveniently and plentifully at affordable cost at the project site. This factor too supports siting of the project at the present site.

Estimated 300- 350 labour will be engaged during construction phase while 120 persons in three (03) shifts during regular operation of the power plant.

On the basis of the above facts, the selected site for the new cogeneration power plant project is the most suitable.

**3.5 Size or magnitude of the operation, including capital cost, and associated Activities:**

As above mentioned 31.2 MW Co-generation power plant using Bagasse as fuel is going to install. The estimated cost of the project is 1.3 Million USD/MW. The total area required for the project is 50 acres which has already earmarked ANNEXURE-III. There will not any other activity except the generation of power.

**3.6 Project Implementation Stages:**

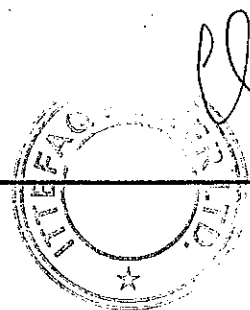
The project, provided everything goes according to the planning, will be completed within 20 months from the Zero date. Time line chart is attached as ANNEXURE-XI.

***Project Implementation stages (tentative):***

Project implementation stages along with the tentative time frame are attached as ANNEXURE-X. This schedule envisages the project commissioning and synchronization in Twenty (20) months from the date of ordering of the boilers and turbo generators. The proposed COD date November 2018. With the completion of the detailed project report by November, the preparation of the procurement specifications for the boilers and turbo Generators will be taken up. It is expected that the tendering, evaluation and order finalization will take about three months time. The boiler and the Turbo Generators will be ordered by December 2016.

For the major packages, the schedule includes the following applicable activities. The time period requirement for these activities has been included in the periods shown against each package.

**Indicative Implementation Schedule**



S. No	Particulars	Start Date	End Date
1	Issuance of LOI	15-Aug-16	14-Sep-16
2	Load Flow/Evacuation Study	15-Sep-16	14-Nov-16
3	Consent from Power Purchaser	15-Nov-16	15-Dec-16
4	Application and Approval of Project Tariff	16-Dec-16	14-Jan-17
5	Application and Approval for Generation License	15-Nov-16	14-Jan-17
6	Issuance of EPC Tender Documents	14-Sep-16	14-Sep-16
7	Submission of EPC Tender	14-Sep-16	13-Dec-16
8	Negotiation & Finalization of EPA	15-Jan-17	16-Mar-17
9	Negotiation & Finalization of IA	15-Jan-17	16-Mar-17
10	Financial Close Activities	15-Dec-16	14-May-17
	EPC Contract Activities		
11	Design and Detailed Engineering	10-Feb-17	11-May-17
12	Manufacturing & Delivery	4-Apr-17	20-May-18
13	Civil Construction	26-Oct-17	20-Jul-18
14	Erection	22-Apr-17	20-Sep-18
15	Precommissioning & Commissioning Checks	21-Sep-18	21-Oct-18
16	Plant Commissioning	22-Oct-18	22-Oct-18
17	Test on Completion (Plant Trial Run)	23-Oct-18	7-Nov-18
18	Ready for Commercial Operation	8-Nov-18	8-Nov-18

In the proposed Cogeneration plant the boiler, the turbo Generator and GRID equipments are the long lead items and the planning of the schedule for the project implementation should provide adequate time period for the installation of these equipment.

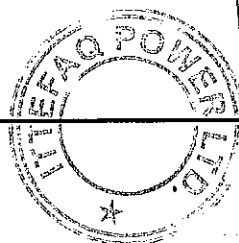
### 3.7 Description of the Project:

The plant layout is attached as ANNEXURE-III. While relevant details of the project are described in the aforesaid sections B and C, more technical detail are given here under.

- **Layout of the Steam Generating Unit**

The steam generators will be laid out, along the North to South direction, with the steam generator front facing the North. The steam generator is of semi-outdoor design, with a canopy over the furnace area and the bagasse storage silo.

The Deaerator, Coal bunker, bagasse storage silos along with the feeders, chutes and the distributors will be kept in front of the steam generator. The steam generator feeder operating floor level will be approximately at 8.5 meters.



The economizer and the air pre-heater are to be arranged in a single vertical pass behind the steam generator. The air pre-heater will be laid out in such that the tube replacement could be done easily. The fans and Electro Static Precipitator shall be arranged as shown in the layout drawing.

Adequate platforms and stairways, as required for convenient operation and maintenance of the steam generator shall be provided.

The steam generator feed water pumps shall be located on the ground floor below the deaerator structure. The deaerator will be located on the front side of the steam generator in between the TG building and the steam generator. The feed water control station shall be located on the steam generator operating floor.

A RCC Chimney is to be located downstream of the Electrostatic Precipitator, on to the Southern side. Concrete paving will be provided in the steam generator area with necessary drains and trenches for cables and pipes.

The steam generator gets its fuel mainly from the sugar plant's milling section. The bagasse will be fed through a system of belt and slat chain conveyors and the surplus bagasse will be taken back to the storage yard through a set of conveyors. Belt conveyors will be used for stacking the bagasse into the covered storage yard and also for reclaiming the bagasse from the storage yard to the boiler.

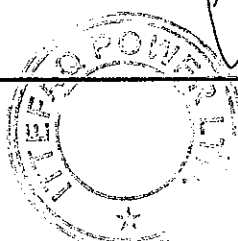
#### • Turbo Generator Building Layout

The turbo generator building, to be located on the Southern side of the steam generator will be of size 84.8 m x 25.5 m, and sized to accommodate the Turbogenerator and its main auxiliary equipment. The turbo generator operating floor shall be at 9.0 m elevation. The building superstructure will be of RCC with brick wall and RCC floor slabs.

The building roof will be of steel tresses and Galvalume steel sheets. The transformers & DG sets will be located on the Southern side of the TG building.

The turbine and generator foundation will be of reinforced concrete, isolated from the building foundation and the superstructure. The turbogenerator will be laid out with its axis in the East-west direction perpendicular to the steam generator axis, at the 9.0 m elevation. The oil system console and other auxiliaries will be located within the building.

One Electric Overhead Travelling (EOT) crane, with a span of 13.5 m, capable of serving the entire length of the building shall be provided in the turbogenerator building. An opening of 15 m x 8 m provided on the turbine operating floor at the western end which serves to take out the turbogenerator components for maintenance.



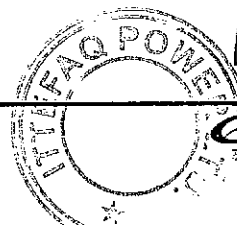
Road access is provided for this maintenance bay for the easy transportation of the material and equipment into the TG building or from the TG building.

The steam inlet piping and the extraction steam piping will be run below the operating floor, and a bay is reserved for routing of all these pipes.

Adequate staircases will be provided for accessing the building. The drawing nos.1-12340-500-0304 to 0308 Annexure gives the equipment layouts for the TG hall at various levels.

- **Control and Electrical Rooms**

The Ten and half meter wide bay on Southern side of the TG bay (B-C) houses the electrical panels & control room for the complete cogeneration plant. The electrical panel room will be located on the Southern side of the TG building at 3.5 M elevation. Con23roll room for the entire plant will be located on the Northern side of the TG at 9.0 M level. There will be false flooring for the control room, to facilitate cable routing to the various panels and the DCS systems.



### 3.8 Raw Materials:

The Major raw material for this project is Bagasse, which is a by-product of the sugar production process. The Co-generation power plant will use Bagasse produced in-house by ISML. The quantity of the Bagasse to be used for the co generation plant is detailed as below.

#### Bagasse:

1- Bagasse to be used for running cogeneration plant during crushing period:

i- APPROXX: 235350.70 MT/Season

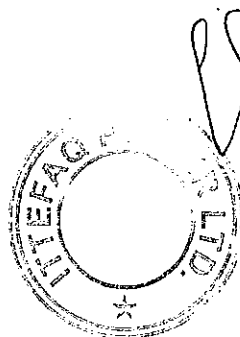
2- Bagasse to be used for running cogeneration plant during off season :

i- APPROXX: 41774.42 MT + 40,000 MT purchase from the third party

#### 3.8.1 Ash analysis

The following table gives the ultimate ash analysis of design Bagasse:

Carbon	23.96 %
Hydrogen	2.93 %
Oxygen	21.36 %
Moisture	50 %
Nitrogen	0.07 %
Ash	1.55 %
Sulphur	0.15 %
Total	100 %
HHV	2224kcal/kg



## a. Typical bagasse ash analysis:

ASH ANALYSIS Constituents	Design	Minimum	Maximum
Fe <sub>2</sub> O <sub>3</sub>	18.10	15	21
MnO	1.04	0.5	1.5
Cr <sub>2</sub> O <sub>3</sub>	0.13	0.05	0.20
V <sub>2</sub> O <sub>5</sub>	0.13	0.05	0.20
TiO <sub>2</sub>	0.65	0.03	1.0
CaO	2.87	1.50	3.50
K <sub>2</sub> O	3.26	2.00	12.00
P <sub>2</sub> O <sub>5</sub>	1.83	1.00	2.50
SiO <sub>2</sub>	54.80	45	75
Al <sub>2</sub> O <sub>3</sub>	7.80	5.00	10.00
MgO	9.10	7.00	15.00
Na <sub>2</sub> O	0.10	0.1	1.0
Cl	0.02	0.01	0.05
S	0.01	0.01	0.05

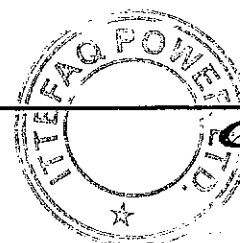
ASH FUSION TEMPERATURES (°C)	
Reducing & Oxidizing Conditions	
Deformation	1110
Softening	1222
Hemispherical	1250
Flow	1322

## 3.9 Water:

All requirements of water are given as:

The water requirement for different processes during construction and operation phase are fulfill by underground water.

- a. Boiler feed water total requirement 160 Ton/h  
In which:
  - I) Re-circulation of condensate from sugar plant 90%
  - II) From the treated raw water, 10%
- b. The raw water will be made available from the deep 3 Well turbine pump. 2 turbine is reserved if there is problem in any one. The capacity of each turbine is 120 m<sup>3</sup>/h. Cooling water for extraction / condensing turbine total requirement is 7,200 m<sup>3</sup>/h. All the water will be re-circulated. Drift Losses 0.005 % will be met from underground water. Evaporation loss 1.56 %. All cooling water requirement will be met through cooling tower.





Cooling water for extraction / condensing turbine

Total requirement: 7,200 m<sup>3</sup>/h

Drift Losses 0.005 %

- Water requirements during construction phase = 100 – 150 cum/day
- Water requirements during operational phase ( during season) = 5400 cum/day
- Water requirements during operation phase ( during off season) = 7200 cum/day
- Coolant water requirement = 7,200 cum/hr

### 3.10 Major Equipment:

The following are major items / equipment of the plant:

- HP boiler
- HP STG set
- DCS & Instrumentation
- Fuel & ash handling system
- Cooling towers
- Switchyard and Transformers
- Water Treatment Plant
- Low voltage package
- VFDs and Drives
- Plant Piping & accessories
- Ventilation & Air Conditioning System
- Fire Fighting System
- EOT crane
- Panels, Cables and other electrical accessories

### 3.11 Plant Technology Suppliers

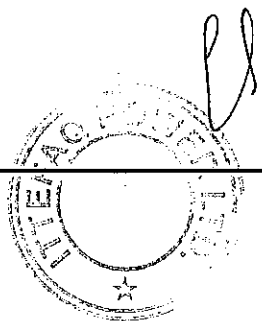
- China Wuxi/ HTC / Siemens / PEL/ ABB will be finalized by financial and technical proposal

**Ash handling system –**

- INFRATECH INDIA TEKNIK PLANT & MACHINERY MANUFACTURING COMPANY  
METHODS (INDIA) PVT, LTD.

**Water treatment plant –**

- WEMS / KONTEL TECHNOLOGIES PAKISTAN CHEMICALS



### Cooling towers –

- LIANG CHL INDUSTRY PVT LTD, THAILAND
- ADK ENTERPRISES PAKISTAN
- GEA POLACEL COOLING TOWERS
- SPIG PAKISTAN
- INDUSTRIAL DEVELOPMENT & ENGINEERING ASSOCIATE PAKISTAN
- True Water cooling towers Malasiya
- Capacity: 7,200 Cu. Mtr. /hr.

### Drives/Motors/Instrumentation –

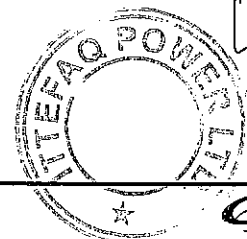
- ABB
- SIEMENS
- YOKOGAWA
- EMERSON
- SUPCON
- WEG

### 3.12 Details of restoration and rehabilitation at the end of the project life:

The co-generation power plant is expected to have a project life of about 30 years. Once the useful life of the new plant will be over, it will be refurbished completely. A comprehensive mechanical, electrical and civil structural overhaul will be carried out. To bring the plant to-date with the then technology available, all necessary equipment replacements will also be done. In this way, the plant will be revived for another term of its useful life. The redundant parts and equipment will be sold in the market for recycling.

In fact the replacement / up gradation of damage / obsolete components of all the major equipments will be carried out as and when needed. However, if the restoration / rehabilitation of any component/ equipment will be deemed imperative and that will be carried out with the most modern technology available at that time.

This all will be done conforming to the environmental management and controls so as to avoid any damage to any segment of environment or human health. Good part of the civil works, specially the digging of the soil, has already been completed therefore for restoration and rehabilitation of the site at the end of the project shall be one month.



### **3.13 Government approvals and leases required by the project:**

No objection certificate (NOC)/Environmental Approval (EA) from the EPA, Punjab, Lahore is the major requirement to start work on the project.

### **3.14 Land use in the project area:**

The project site is within Ittefaq Sugar Mills , Channi Goth, Tehsil Ahmed Pur Sharqiya, Dist Bahawal Pur, Punjab. Most of the area around the project is in agricultural use. Sugarcane is one among the major cash crop of the project area.

### **3.15 Regulatory framework**

Government of Pakistan is facilitating investment, both local and foreign, in power sector in face of acute shortage of electric power in the country leading to so frequent and drawn out load shedding. Liberalization and industrialization in the country, as a policy of the Government, is well reflected in the following initiatives:

### **3.16 Deregulation of the economy**

Deregulation is the prioritized policy of the Government of Pakistan. Under same policy there is a systematic movement towards deregulation of the economy and privatization of the state owned companies.

### **3.17 Import policy**

Import policy has been largely liberalized to a great extent through the provision of various incentives. And it is being further liberalized at a quicker pace. There is an increased reliance on development of the industrial sector and enhancement of international trade.

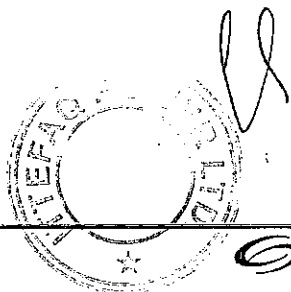
### **3.18 Infrastructure facilities**

In order to facilitate fast industrialization basic infrastructure facilities like roads network, water and power supply, means of transportation and communications etc. are being improved/developed speedily.

### **3.19 Incentives**

In order to maintain Pakistan's competitiveness in international markets and support viability of local and foreign investments in the country, the following incentives are available equally to both the foreign and the local investors:

- a- Initial depreciation allowance (IDA),
- b- Amortization and
- c- Normal tax rates.



### 3.20 Legal Framework

The capability of regulatory institutions for environmental management largely ensures the success of environmental assessment for ensuring that development projects are environmentally sound and sustainable. For decision-making and policy formulation in the environmental and conservation issues, the institutional framework, as it exists in Pakistan, is described below.

#### 3.20.1 National Environmental Regulatory/Legal Requirements:

After the 18<sup>th</sup> Amendment to the Constitution of The Islamic Republic of Pakistan-1973, the regulation & management of environment has largely been delegated to the Provinces. The Federal Ministry of Environment has been abolished and instead the Ministry of Climate Change was created which controls: Pakistan Environmental Protection Council; Pakistan Environmental Protection Agency;

The Pakistan Environmental Protection Agency, sometimes known as Pak-EPA, is an executive agency Government of Pakistan managed by the Ministry of Climate Change (formerly Ministry of Environment). The agency is charged with protecting human health and the environment by writing and enforcing regulation based on laws passed by Parliament. The Pakistan Environmental Protection Act was passed in 1997 by the Parliament repealing the Pakistan Environmental Protection Ordinance 1983. The agency was established under the 1983 Ordinance and saved in the 1997 Act. The agency is led by an appointed director-general, who is appointed by the Prime Minister on the advice of the Minister for Environment.

The Pakistan Environmental Protection Agency (Pak EPA) looks after the environment related issues for the federally controlled areas and territories. Lacking laws at the provincial levels; the laws, rules, regulations etc., those already available at the federal level and operational at the provincial levels will continue as such.

#### 3.20.2 National Conservation Strategy (NCS) - Pakistan

The National Conservation Strategy (NCS) – Pakistan, as approved by the Federal Cabinet in March 1992 is the guiding document on the environmental issues in the country (Ref. EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources.

The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the envisaged project are pollution prevention and abatement, restoration of supporting forestry and plantations, and preservation of cultural heritage. A mid-term review of the achievements, impacts and prospects of Pakistan's NCS was undertaken between years 1999 - 2000.

The Government of Pakistan promulgated "Pakistan Environmental Protection Act" in 1977. Two organizations, the Pakistan Environmental Protection Council (Pak-EPC) and the Pakistan Environmental Protection Agency (Pak-EPA), are primarily responsible for administering the provisions of the Act. The Pak-EPC oversees the functioning of the Pak-EPA. Among its major members include representatives of the Federal and Provincial Governments especially the Provincial Environmental Protection Agencies, industry, non-governmental organizations, academia, environment experts, Federation of Chamber of Commerce and Industry and the private sector.

The Provincial EPAs, are now independent to frame, make changes (if deemed necessary) in the documents already available with the Federal Ministry of Climate Change, and are independent in implementation of all rules, regulations, laws etc. required to ensure compliance with the National Environmental Quality Standards (NEQS) and establish monitoring and evaluation systems. As a primary implementing agency in the hierarchy, it is responsible for identifying the need for, as well as initiating legislation whenever necessary. Approval, disapproval or modifications of Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) reports of the projects undertaken in their respective jurisdictions is also the responsibility of the PEPAs.

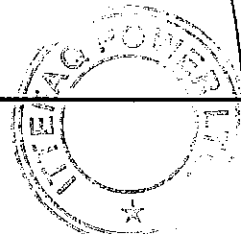
### 3.20.3 Pakistan Penal Code (1860)

The Pakistan Penal Code usually called PPC is a penal code for all offences charged in Pakistan. It was originally prepared by Lord Macaulay in 1860 on the behalf of the Government of British India as the Indian Penal Code. After the partition of British India in 1947, Pakistan inherited the same code and subsequently after several amendments [e.g. Protection of Women (Criminal Laws Amendment) Act, 2006, Criminal Laws (Amendment) Act, 2004 (I. of 2005), Criminal Law (Amendment) Ordinance (LXXXV of 2002), Criminal Laws (Reforms) Ordinance (LXXXVI of 2002), etc.] it is now mixture of Islamic and English Law.

Pakistan Penal Code is a general criminal law, applies all over the country, and contains specific provisions on the subject. Thus it prohibits mischief by killing or maiming animals, or damaging works of irrigation or a river or a road or a bridge or drain or firing explosive substances with intent to cause damage. The Code also prohibits public nuisance by acting negligently to spread the infection of disease or disobeying quarantine rule or causing adulteration of food or drink or drug, or fouling water or making the atmosphere noxious to health etc.

### 3.20.4 Pakistan Environmental Protection Act, 1997

The promulgation of the Environmental Protection Ordinance, 1983 was the first codifying legislation to the issue of environmental protection. Later, the Government



passed the **Pakistan Environmental Protection Act (PEPA), 1997**, which is the basis of IEE/EIA studies carried out for the projects in Pakistan.

PEPA, 1997 is a fairly comprehensive legislation and provides protection, conservation, rehabilitation and improvement of the environment. It contains concrete action plans and programs for the prevention of pollution and promotes sustainable development. The salient features of the law are:

It covers the air, water, soil, marine and noise pollution including pollution caused by motor vehicles.

The Act provides National Environmental Quality Standards (NEQS) for wastewater, air emissions and noise.

Law provides clear cut guidelines for IEE/EIA for various projects as per their magnitude and anticipated impacts.

Law also empowers Federal Government to issue notices and to enforce them for the protection of the environment.

For the effective implementation of the provisions of PEPA, 1997, Pakistan Environmental Protection Agency, headed by a Director General was constituted. On the same pattern, Provincial Environmental Protection Agencies (EPA's) were created in all the provinces. Environmental Tribunals were also constituted according to PEPA, 1997.

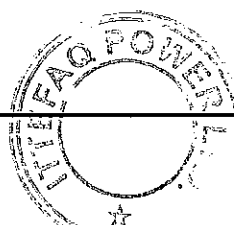
### **3.20.5 Policy and Procedures for the Filing, Review and Approval of Environmental Assessments**

This document sets out the key policies and procedural requirements. It contains a brief policy statement on the purpose of environmental assessment and the goal of sustainable development and requires that environmental assessment be integrated with feasibility studies. It also defines the jurisdiction of the Federal and Provincial EPA's. It lists down the responsibilities of the proponent and states the duties of responsible authorities. It provides schedules of reports that require either an IEE or EIA.

### **3.20.6 Guidelines for the preparation and review of Environmental Reports (NOVEMBER 1997/2000)**

These guidelines are descriptive documents regarding the format and content of IEE/EIA reports to be submitted to EPA for "No-Objection Certificate (NOC)/Environmental Approval (EA)". Following are the major areas, which are covered by these guidelines:

The IEE report (scope, alternatives, site selection, format of IEE report) Assessing impacts (identification, analysis and production, baseline data, significance) Mitigation and impact management (and preparing an environmental management plan) Reporting (drafting style, main features, shortcomings, other forms of presentation) Review and decision making (role, steps, remedial options, checks and balances) Monitoring and



auditing (systematic follow up, purpose, effective data management) Project Management (inter-disciplinary teams, programming and budgeting).

### 3.20.7 Guidelines for Public Consultations

These guidelines deal with possible approaches to public consultation (PC) and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures the incorporation of their legitimate concerns in any impact assessment study. These guidelines cover:

Consultation, involvement and participation of Stakeholders Techniques for public consultation (principles, levels of involvements, tools, building trust) Effective public consultation (planning, stages of EIA where consultation is appropriate) consensus building and dispute resolution Facilitation involvement (including the poor, women, building community and NGO capacity).

### 3.20.8 National Environmental Quality Standards (NEQS)-1993, Amended August 2000

The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and have been amended in August, 2000.

The following standards are specified therein:

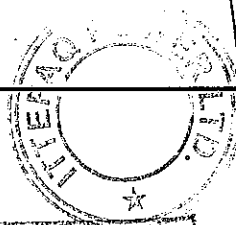
Maximum allowable concentrations of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers) Maximum allowable concentrations of pollutants (16 parameters) in gaseous emissions from the industrial sources.

The Guidelines for "Self-Monitoring and Reporting" (SMART) for the industry as approved by the Pakistan Environmental Protection Council (PEPC).

A copy of the Government of Pakistan, Gazette Notification dated August 10, 2000 regarding NEQS is available with the documents.

### 3.20.9 National Environmental Quality Standards for Ambient Air- November- 2010

The Ministry of Environment, Government of Pakistan vide its Notification, Islamabad, the 18<sup>th</sup> October, 2010 under S.R.O. 102 (1)/2010 established standards which provide the maximum allowable limits, in the ambient air, of Sulphur Dioxide (SO<sub>2</sub>), Oxides of Nitrogen as (NO<sub>x</sub>) and as (NO), Suspended Particulate Matter-(SPM), Respirable Particulate Matter-PM<sub>10</sub>, Respirable Particulate Matter-PM<sub>2.5</sub>, Lead and Carbon Monoxide (CO).



### 3.20.10 National Standards for Drinking Water Quality - November, 2010

The Ministry of Environment, Government of Pakistan vide its Notification, Islamabad, the 18<sup>th</sup> October, 2010 under S.R.O. 102(1)/2010 established standards for Drinking Water Quality. The major quality parameters fixed depend upon Bacterial, Physical and Chemical ones.

### 3.20.11 National Environmental Quality Standards for Noise - November, 2010

The Ministry of Environment, Government of Pakistan vide its Notification, Islamabad, the 18<sup>th</sup> October, 2010 under S.R.O. 102(1)/2010 established standards for Noise. These standards are based on Category/zone i.e. residential area, Commercial area, Industrial area and Silence zone. The limiting values for day and night have also been fixed for all categories/zones.

### 3.20.12 Sectoral Guidelines for Environmental Reports

These guidelines identify the key environmental issues that need to be assessed as well as mitigation measures and project alternatives to be considered in the actual EIA. These guidelines include:

- Sector overview of the industry and the processes
- Potential impacts on the environment
- Mitigation measures
- Monitoring and reporting
- Management and training
- Checklist of likely environmental impacts and mitigation measures

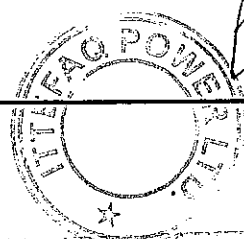
### 3.19.13 Guidelines for Sensitive and Critical Areas

These guidelines identify sensitive and critical areas in Pakistan, in relation both to the natural environment and the cultural aspects.

### 3.20.14 National Resettlement Policy and Ordinance

At this point, the only legislation relating to land acquisition and compensation is the Land Acquisition Act (LAA) of 1894. Following a national consultative process, a national resettlement policy and a related ordinance were drafted. The draft policy and the ordinance are presently being reviewed by the provinces, and have yet to be approved and notified by the government. The salient applicable features of the Draft Resettlement Policy are given below:

The Pak-EPA will be responsible for both environment-related as well as resettlement-related matters. The responsibilities for implementation at a provincial level are to be delegated to the concerned provincial EPAs with overall control of the provincial Planning and Development (P&D) Departments.





All categories of 'loss' arising from development projects that entail resettlement, need to be addressed: these include not only loss of land, built-up property, other infrastructure, and crops and trees, but also loss of income, job opportunities, and access to natural resources, etc.

Vulnerable groups whose issues need to be addressed in particular include: women, children, destitute persons, tribal communities, squatters, those with usurper rights, and landless groups.

There should be a special emphasis on consultation with affected groups when preparing a Resettlement Action Plan (RAP).

The provisions of the Draft Resettlement Policy are consistent with the requirements of the World Bank OD 4.30 on involuntary resettlement.

### 3.20.15 Forest Act, 1927

All India Forest Act, 1927 was adopted by the Government of Pakistan, which was subsequently implemented by the respective provinces. Basically, the law was enacted to conserve and protect the forest resources of the country for sustainable development. It lays down Rules and Regulations for exploitation of various categories of forests such as reserved, protected or unclassified. Further, the Act spells out the licensing method for timber cutting, grazing, hunting etc. It also gives the details of magisterial powers of Forest Department officers and penalties for offences committed with regard to forest resources and products.

### 3.20.16 Industrial Relation Ordinance, 2002

The ordinance has been promulgated to amend, consolidate and rationalize the law relating to formation of trade unions, regulation and improvement of relations between employers and workmen and avoidance and settlement of any differences or disputes arising between them. Pakistan's labour laws trace their origination to legislation inherited from India at the time of partition of the Indo-Pak subcontinent. The laws have evolved through a continuous process of trial to meet the socio-economic conditions, state of industrial development, population and labour force explosion, growth of trade unions, level of literacy, Government's commitment to development and social welfare. To meet the above named objectives, the government of the Islamic Republic of Pakistan has introduced a number of labour policies, since its independence to mirror the shifts in governance from martial law to democratic governance.

While Article 18 of the Constitution affords every citizen with the right to enter upon any lawful profession or occupation, and to conduct any lawful trade or business, the Industrial and Commercial Employment (Standing Orders) Ordinance was enacted in 1968 to address the relationship between employer and employee and the contract of employment. The Ordinance applies to all industrial and commercial establishments



throughout the country employing 20 or more workers and provides for security of employment. In the case of workers in other establishments, domestic servants, farm workers or casual labour engaged by contractors, their labour contracts are generally unwritten and can be enforced through the courts on the basis of oral evidence or past practice.

The Constitution of Pakistan contains a range of provisions with regards to labour rights found in Part II: Fundamental Rights and Principles of Policy.

**Article 11** of the Constitution prohibits all forms of slavery, forced labour and child labour;

**Article 17** provides for a fundamental right to exercise the freedom of association and the right to form unions;

**Article 18** proscribes the right of its citizens to enter upon any lawful profession or occupation and to conduct any lawful trade or business;

**Article 25** lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone;

**Article 37(e)** makes provision for securing just and humane conditions of work, ensuring that children and women are not employed in vocations unsuited to their age or sex, and for maternity benefits for women in employment.

### **3.20.17 Punjab Industrial Relations Bill 2010**

In December 2010 Punjab Assembly passed new legislation that will govern the formation of trade unions, relations between industries and their workers, and the process for the settlement of labour disputes.

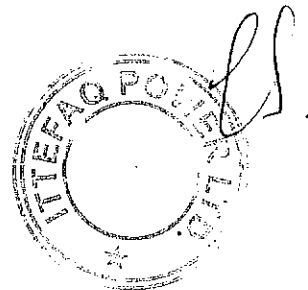
### **3.20.18 Industrial Relations Ordinance 2011 Promulgation**

The Government has promulgated Industrial Relations Ordinance 2011. The Ordinance has been approved by the President on the Advice of the Prime Minister. The Government has promulgated Industrial Relations Ordinance, 2011 in view of the current legal vacuum created due to deletion of the concurrent Legislative List through the 18th Constitutional Amendment. The Industrial Relations has also been transferred to the Provinces which have promulgated provincial laws to regulate industrial relations. However, there is no law in place to deal with Industrial Relations in the Islamabad Capital Territory or in respect of national level trade federations and for resolutions of trans-provincial industrial issues. The Parliament has yet to promulgate the Ordinance as law.

### **3.20.19 Other Relevant Laws**

Some of the other relevant laws and legislations are listed below:

- Canal and Drainage Act, 1873
- The Explosives Act, 1884



- The Fire Wood and Charcoal (Restriction ) Act, 1964
- Motor Vehicles Ordinance, 1965
- The West Pakistan Regulation and Control of Loudspeaker and Sound Amplifier Ordinance, 1965
- Agriculture Pesticides Ordinance, 1971
- The Antiquities Act, 1975

### 3.20.20 National Electric Power Regulatory Authority (NEPRA) Act 1997

The NEPRA Act was approved by Parliament and signed into law in December 1997. It seeks to create an autonomous, independent regulatory authority, which will be solely responsible for the power sector. It will be responsible for the oversight of the power sector and will exercise control through its power to license power generation, transmission and distribution. It will regulate tariffs for all these activities. It will perform its functions through transparent processes to be enshrined in rules that are being framed in a transparent manner through appropriate rules.

### 3.20.21 Power Policy 1998

The revised power policy was implemented in 1998. The objective and intentions of the Government of Pakistan (GOP) to new policy is to move towards the creation of a competitive power market in Pakistan. It proposes to do so by restructuring and privatizing the existing thermal power generation, the power transmission and distribution functions and assets of existing public sector utilities (WAPDA/KESC), by the creation of a fully autonomous regulatory authority, the National Electric Power Regulatory Authority (NEPRA), and through its future IPP policy.

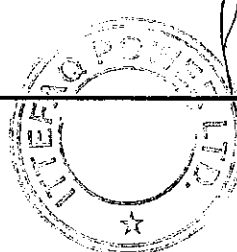
The salient features of the Policy are;

The basis for selection of private power project will be minimum levelized tariff through International Competitive Bidding. Variable tariffs over the life of the project will be permitted under terms specified prior to bidding. The process of selection will involve pre-qualification, issuance of a Request for Reports (RFP), bidding and evaluation of bids against bid criteria clearly laid out in the RFP.

It is recognized that without a proper feasibility study for a particular site-specific hydel or indigenous coal based project, it will not be possible to invite competitive bids and receive firm offers. Thus, detailed feasibility studies for such projects will be prepared before bids are invited.

Hydel projects will be implemented on a Build-Own-Operate-Transfer (BOOT) basis; to be transferred to the province in which it is situated at the end of the concession period, and thermal projects on a Build-Own-Operate (BOO) basis.

Competitive Tariffs will comprise an Energy Purchase price and a Capacity Purchase Price with adequate provisions for escalation.



### 3.20.22 Provincial Local Government Ordinances, 2001

These ordinances, issued following the devolution process, establish regulations for land use, the conservation of natural vegetation, air, water, and land pollution, the disposal of solid waste and wastewater effluents, as well as matters related to public health and safety.

### 3.20.23 Factories Act, 1934

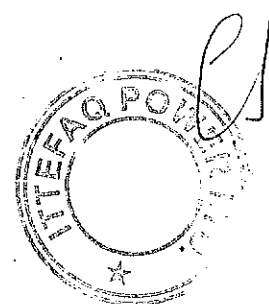
There is no independent legislation on occupational safety and health issues in Pakistan. The main law, which governs these issues, is the Chapter 3 of Factories Act, 1934. All the provinces, under this act, have devised Factories Rules. The Hazardous Occupations Rules, 1963 under the authority of Factories Act is another relevant legislation. These rules not only specify some hazardous occupations but also authorize the Chief Inspector of Factories to declare any other process as hazardous.

The other related laws are:

- Workmen Compensation Act, 1923
- Provincial Employees Social Security Ordinance, 1965
- West Pakistan Shops and Establishments Ordinance, 1969
- Boilers and Pressure Vessels Ordinance, 2002

Chapter 3 of the Act has general provisions on health and safety at the workplace. Provincial governments are allowed to make rules under this Act and inspectors under this Act also have discretion in defining the rules. Chapter 3 talks about various safety arrangements. This list is being provided just to show how meticulously labor law covers these issues.

- Cleanliness
- Disposal of wastes and effluents
- Ventilation and temperature
- Dust and fume
- Artificial humidification.
- Overcrowding
- Lighting
- Drinking water
- Latrines and urinals
- Spittoons
- Precautions against contagious or infectious disease
- Compulsory vaccination and inoculation
- Power to make rules for the provision of canteens
- Welfare officer
- Precautions in case of fire
- Fencing of machinery
- Work on or near machinery in motion
- Employment of young persons on dangerous machines



- Striking gear and devices for cutting off power
- Self-acting machines
- Casing of new machinery
- Prohibition of employment of women and children near cotton openers
- Cranes and other lifting machinery
- Hoists and lifts
- Revolving machinery
- Pressure plant
- Floors, stairs and means of access
- Pits, sumps, opening in floors, etc.
- Excessive weights
- Protection of eyes
- Power to require specifications of defective parts or tests of stability
- Safety of building, machinery and manufacturing process
- Precautions against dangerous fumes
- Explosive or inflammable dust, gas, etc.
- Notice of certain accidents

### 3.20.24 Applicable International Environmental and Occupational Safety and Health Laws and Regulations

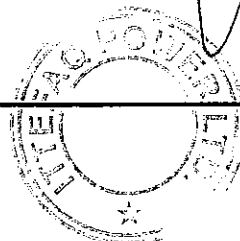
#### ➤ International and National Non-Governmental Organizations

International and national Non-Government Organizations (NGOs), such as the International Union for Conservation of Nature and Natural Resources (IUCN) and the World Wide Fund for Nature (WWF), have been active in Pakistan for some time. Both of these NGOs have worked closely with the governments at the federal as well as provincial levels and have positively contributed to the cause of environment. They have played significant role with regard to the formulation of environmental and conservation policies. And last but not the least, another the most prominent NGO namely "Sustainable Development Policy Institute (SDPI)" has also played very significant role in upholding the cause of environmental protection in Pakistan.

Environmental NGOs have been particularly active in the advocacy for promoting sustainable development approaches. Most of the government's environmental and conservation policies, even at the provincial and federal levels, has been formulated in consultation with these leading NGOs, who have also been involved in drafting new legislation on conservation.

### 3.20.25 International Framework

For the assessment of the environmental impacts of the proposed project on air, water and noise according to the international legal framework, this report has also incorporated the requirements of the "Pollution Prevention and Abatement Handbook" by the World Bank Group- effective July 1998.



Within this handbook, different guidelines are mentioned for the purpose of assessing industrial facilities with respect to their environmental compliance. In the present case, the guidelines for new thermal power plants are applicable for the preparation of the environmental impact assessment.

### 3.20.26 National policy for power-cogeneration by sugar industry and guideline for investors

Bagasse is a fibrous residue of cane stalk that is obtained after crushing and extraction of juice; it is environmental friendly containing only 4% ash and no sulphur. It has a higher net calorific value (1850 to 19, 00 kcal/kg) than most brown coals expensively mined in the worlds. Cogeneration is a high-efficiency energy system that produces both electrically and valuable heat from a single fuel source. The potential to make electricity is utilized thereby reducing the cost of energy and pollution. Co-generation projects based on Bagasse are being set up worldwide.

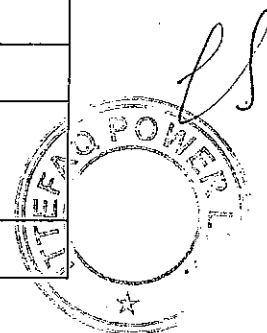
### 3.20.27 Explosive Act, 1884

Under the Explosives Act, 1884, the Project contractors are bound by regulations on handling, transportation and using explosives during quarrying, blasting, and other purposes.

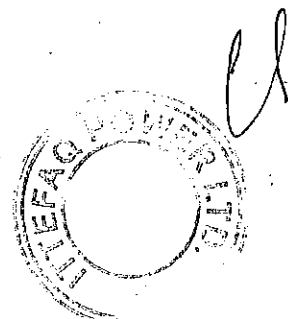
### 3.20.28 Environment Related Relevant International Agreements in Pakistan's context

Pakistan is a party to the following treaties and agreements in furtherance of its environmental goals and programme.

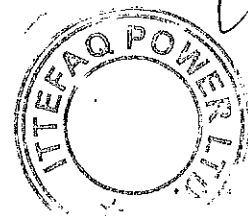
Treaty	Pakistan Status
Convention on the Protection of Ozone Layer on Dec 18, 1992.	Ratified
The Amendment to Montreal Protocol on Substance that Depleting Ozone layer	Signed
UN Framework Convention on Climate Change on June 13, 1992	Signed
Convention on the Continental Shelf on October 31, 1958	Signed
The Convention on High Seas on October 31, 1958	Signed
Convention on the Fishing and Conservation of the living Resources of the High Seas on October 1958.	Signed
The UN Convention on Law of the Sea on December 10, 1982	Signed
The Convention on Territorial Sea and the Contagious Zone and the Agreement for the establishment of Network of Aquaculture Centers in Asia and the Pacific	Signed
The Convention on Wetlands of the International Importance	Signed



on July 23, 1976	
The Convention on protection of the World Cultural and Natural Heritage on July 23, 1976	Signed
The Convention on International Trade in Endangers Spice of Wild Fauna and Flora	Signed
The Convention on Conservation of Migratory Specie of Wild Animal on Dec 01, 1987	Signed
The Convention on Biological Diversity in 1994 and became party to the CBD, Convention duly recognizes the intrinsic value of biological diversity, genetic, social, economic, cultural, educationist, recreational and esthetic values of biodiversity and its components	Signed
The International Plant Protection Convention.	Signed
The Plant Protection Agreement for Area & pacific region	Signed
The Agreement for the establishment of a convention for controlling the desert lost in eastern region of its Distribution Area in South East Asia	Signed
The Treaty Banning Nuclear Weapon Test in the Atmosphere, in Outer Space and under Water on March 3, 1988	Signed
The International Convention on Oil Pollution Preparedness Response and Corporation	Signed
The Convention on prohibition of Military or any other Hostile Use of Environmental Modification Techniques and Accession of Feb 27, 1986	Signed
Pakistan became a party to Montreal Protocol by Ratifying the protocol and its London amendment on Dec 18, 1982.the subsequent amendments known as Copenhagen Amendment which, accelerate the phase out for rectified in Jan 1995.	Signed
Convention of International trade Endangerous Species (CITS)	Signed
World heritage Convention Ramsar Convention	Signed
United Nation Convention to Combat Ozone Depletion (CCD). The convention signed and ratified in 1996	Signed
Stockholm Convention for Phasing out Parenting Organic pollutants (POPs) in 2001.	Signed



#### 4.0 DESCRIPTION OF THE ENVIRONMENT (AREA AFFECTED BY THE PROJECT)



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#### 4.0 DESCRIPTION OF THE ENVIRONMENT (AREA AFFECTED BY THE PROJECT)

##### 4.1 Spatial and temporal boundaries adopted for the various aspects of the study

While carrying out the present study, factors including present environmental settings and likely future trends around the project site were taken into consideration. Availability of basic infrastructure, water, raw materials, and markets for the product, labor, transport and electricity were the major among other factors considered in the project area. Socio-economic conditions were also considered during the course of the study.

##### 4.2 Existing (baseline) condition of the biophysical and socio-economic environment, trends and anticipated future environmental conditions should the project not go ahead.

Canals and tube wells provides water for the irrigation in the project area. The major crops in the area are sugar cane, wheat, cotton rice. Even though the sugar cane is considered as a predominant crop in the command area, it still forms only 60% of the agricultural production in the area.

Many people rear especially cows and buffalos for producing milk even on semi commercial scale. It will not be out of place to say that the area is one among the other food baskets of the Punjab province.

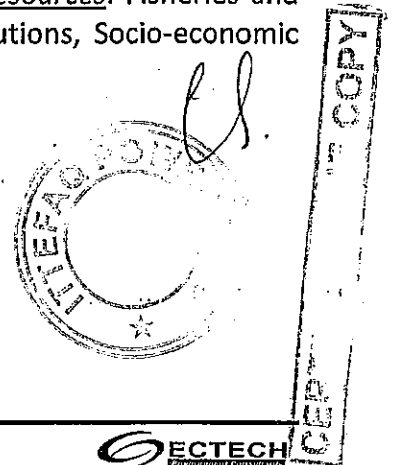
The awareness about the importance of education is now developing in the area. Some people of the area are playing an important role in the politics of the country even at higher levels. Fairly reasonable proportion of the people in cities is educated. While in villages, like in other parts of the Punjab province, % of educated people is low. Modern means of communication including television, radio, telephone, fax, e-mail and newspapers are within the reach of majority of the people especially in the cities. The socio-economic values are subject to change in cities specifically under the influence of media especially television.

##### 4.3 Environmentally sensitive areas of special or unique value

Topography and geology; Soils and Climate; water; Ecological resources: Fisheries and aquatic biology, Biodiversity, Forestry, Wildlife, scientific institutions, Socio-economic and Cultural and other heritage,

##### 4.3.1 Physical Resources of the Project Area:

The physical resources of the project area are described below:



## • Topography and Geology:

Pakistan, lying in the northwestern part of the Southern Asian Subcontinent, occupies the western end of the Indo-Genetic Plain, which is beyond bounded in the north by mountain wall of the Great Himalayas and their offshoots.

Physiology of the earth is description of the behavior of the upper crust. Accordingly, some knowledge of the geology is desirable.

Of the six Physiographic Divisions of Upper Indus Plain namely:

- i- Bari Doab- 2.9 million hectares,
- ii- Rechna Doab-2.8 million hectares,
- iii- The Chaj Doab- 1.3 million hectares,
- iv- The Sindh Sagar Doab/Thal Desert, 3.2 million hectares,
- v- The Bahawalpur Plain and
- vi- The Derajat/Suleman Piedmont, 2 million hectares.

The Punjab plain, where the project is to be sited in Channi Goth Ahmedpur Sharqiya District Bahawalpur, comprises mainly the province of Punjab. It is the gift of Head punjad and its five eastern tributaries- Jhelum, Chenab, Ravi, Sutlej and Beas. The plain spreads from the south of Potohar plateau up to Mithankot, where Sulaiman Range approaches river Indus. The Punjab plain is almost a featureless plain with a gentle slope southward averaging one foot to the mile. The entire plain is extensively irrigated by a network of canals.

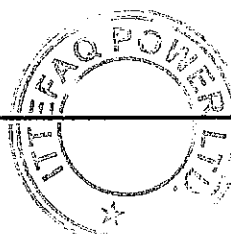
District Ahmad pur Sharqiya is bounded on the south east of the head Panjnad, at the distance of 40 km. Channi Goth is lying between the Ahmad pur Sharqiya, Janpur, Liqat pur and uch Sharif. It lies from 29.103°N and 71.003 °E

District bahwalpur tehsil Ahmad Pur Sharqiya is spread over an area of 1,474 square Kilometres and Channi goth villiage is located in tehsil ahmad pur sharqiya.

Sugar cane, wheat, cotton, and vegetables are extensively grown in the area around. Under ground water being sweet in most of the areas, it is used for irrigation through tube wells. Perennial and non perennial canals also provide water for irrigation.

## • Soils:

Soils form major part of environment. Their fertility and other special characteristics have great relationship with environment. Climate has great influence on the formation of soils; therefore study of these factors is of great importance. Soil is dynamic layer in which many complex physical, chemical and biological activities are taking place. Therefore soil is a dynamic changing body. Soil scientists restrict the word soil or solum



to the surface materials which over the ages have adopted the distinctive layers or horizon.

Soils are made up of solids, liquids and gases. The solid part of the soil is made up of both inorganic and organics. While weathering of rocks make inorganic particles, the organic solids consist of living and decayed plants. In order to classify the entire soils in Pakistan, the Soil Survey of Pakistan has divided the entire country into nine ecological zones.

The project site falls in the unit of areas between Old River terraces and flood plains of the rivers. The nature of sediments, their surface configuration and deposition pattern are similar to the areas called "bar" areas. From age point of view, they are much younger having been deposited during the sub recent times. This age difference is mainly responsible for weaker development in the soils. The soils are developed in to moderate depth and locally they are known as Bangar Soils.

#### Layer 1

Cohesive layer appeared in all boreholes at shallow depth. This layer was recovered as brown, Lean CLAY/sandy SILT. The insitu compactness of cohesive layers was firm to stiff condition with SPT N-values ranging from 3 to 17 blows for 12 Inch penetration of the split spoon sampler.

#### Layer 2

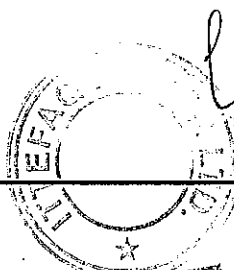
Non-Cohesive layer appeared below layer-1. The phenomenon continued to maximum depth of investigation i.e. 45.0ft. The non-cohesive layer consisted of grey, Silty SAND/poorly graded SAND with silt. The insitu compactness of cohesive layer was generally found to be in medium dense to dense state. The SPT N-values were 11 to 50 blows for 12 Inch penetration of the split spoon sampler.

#### • Climate:

Pakistan is situated on the western margin of one of the main regions of the world—the monsoon region. Due to this, the climate of the country is more Continental than that of the other parts of Subcontinent. Pakistan has four seasons namely:

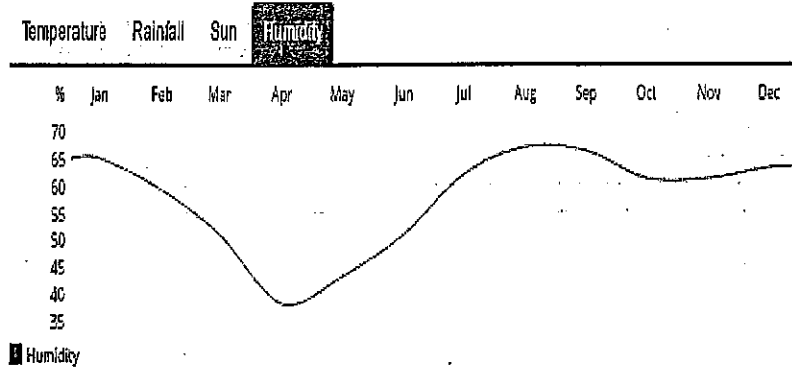
- Cold Weather Season—December to February.
- Hot Weather Season—march to July.
- Monsoon Season -- August to September
- Post Monsoon Season—October & November.

This district has a moderate climate, hot in summer and cold in winter. During the peak of summer the temperature may rise to 55°C during the day, but in the winter months the minimum temperature may fall below 12°C. Average temperature in summer is 33c and 18c in winter. Rainfall is very scarce and scanty. The average rainfall is 20 to 25 cm annually



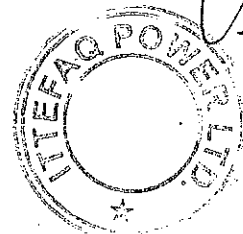
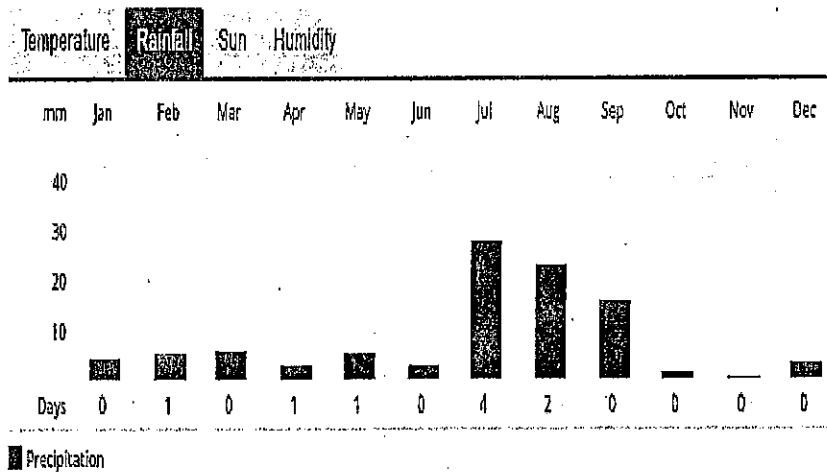
## Humidity

Climate data for Channi Goth



## Rain Fall

Climate data for Channi Goth



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## Weather Condition



### Current Weather Conditions in Chani Goth, Punjab

Last Updated: Wed, 21 Sep 2016 01:07:00 -0700

Observation Time: 09/21/2016 01:07 am

Current Weather: Dry

Current Temperature: 105.14°F (40.63°C)

Current Feel Like: 104.78°F (40.43°C)

Dew Point: 56.43°F (13.57°C)

Cloud Cover: 0%

Nearest Storm Distance: miles

Nearest Storm Bearing: NA

Relative Humidity: 20%

Precipitation Probability: 0%

Precipitation Intensity: 0 in./hr.

Precipitation Type: NA

Pressure: 1003.12 millibars

Ozone: 279.17 Dobson units

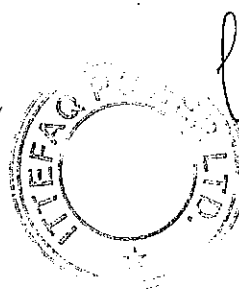
Visibility: miles

Wind Direction: 222°

Wind Speed: 3.01 mph

<http://www.meteovista.co.uk/Asia/Pakistan/Chani-Goth/3314590>

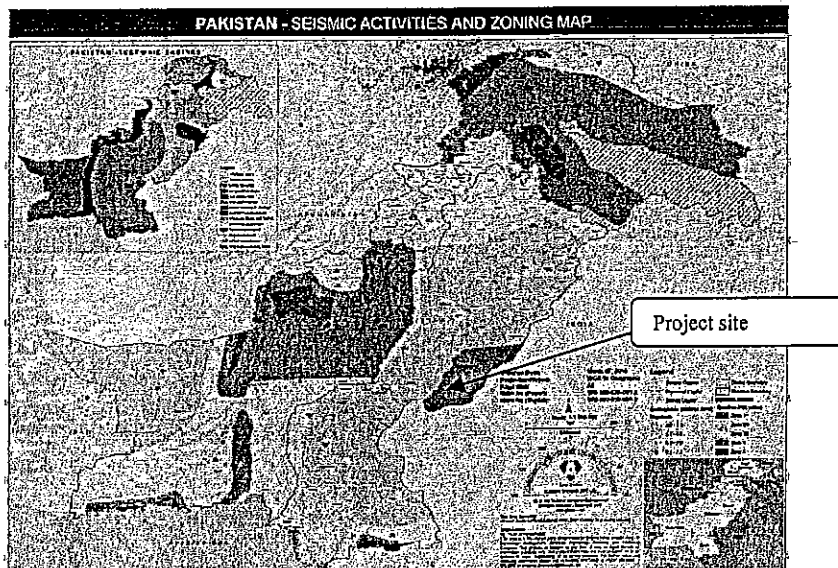
<http://www.gnarlysunset.com/asia/pakistan/punjab/chani-goth/weather>



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- **Seismicity:**

The project site falls Zone 1 which falls in Minor no Damage with factor of the Seismic Hazard Zones of Pakistan.



- **Water:**

The fertile part of the land is one among the food baskets of Pakistan. Canal water and underground sweet water are the two main sources of water for irrigation with rain water as the additional sources.

**a) Underground Water:**

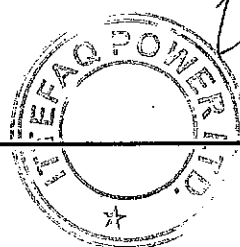
Underground water of good quality is available in large quantities will be used for the entire needs of the project. Extraction of water for project needs will not be at the cost of its availability for irrigation or other uses. The water table of the area 5 ft.

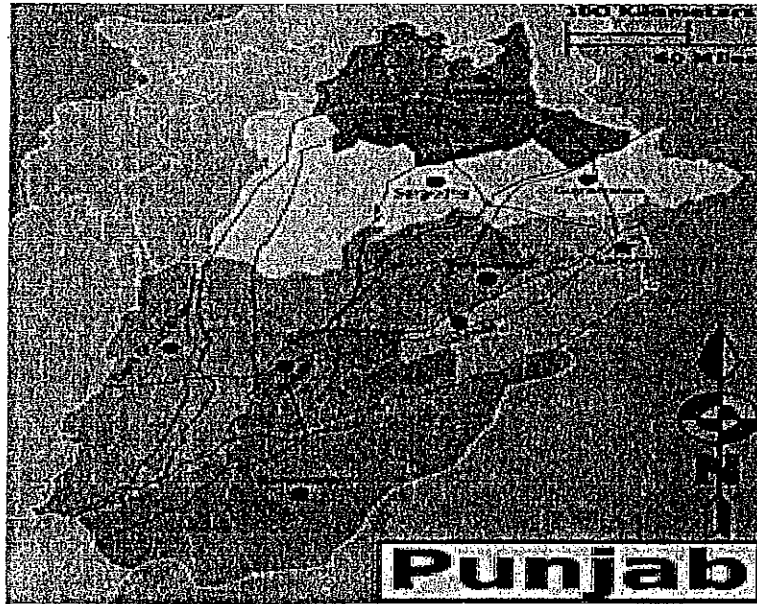
**b) Surface Water/Wet Lands**

There are no wet lands in the area in the true sense. However, river Panjnad flows in the area at the distance of 40 km and there is canal which flows at the distance 6 km from the channi goth.

**4.3.2 Ecological Resources fisheries, aquatic biology, wildlife, forests, rare or endangered species:**

Channi goth, the project site lies in the province Punjab. Lahore is the provincial capital and Punjab's main cultural, historical, administrative and economic center.





Map of Punjab, Pakistan  
 Coordinates: 31°20'N 74°13'E 31.33°N 74.21°E  
 Main article: List of cities in Punjab (Pakistan)  
 Courtesy: Wikipedia

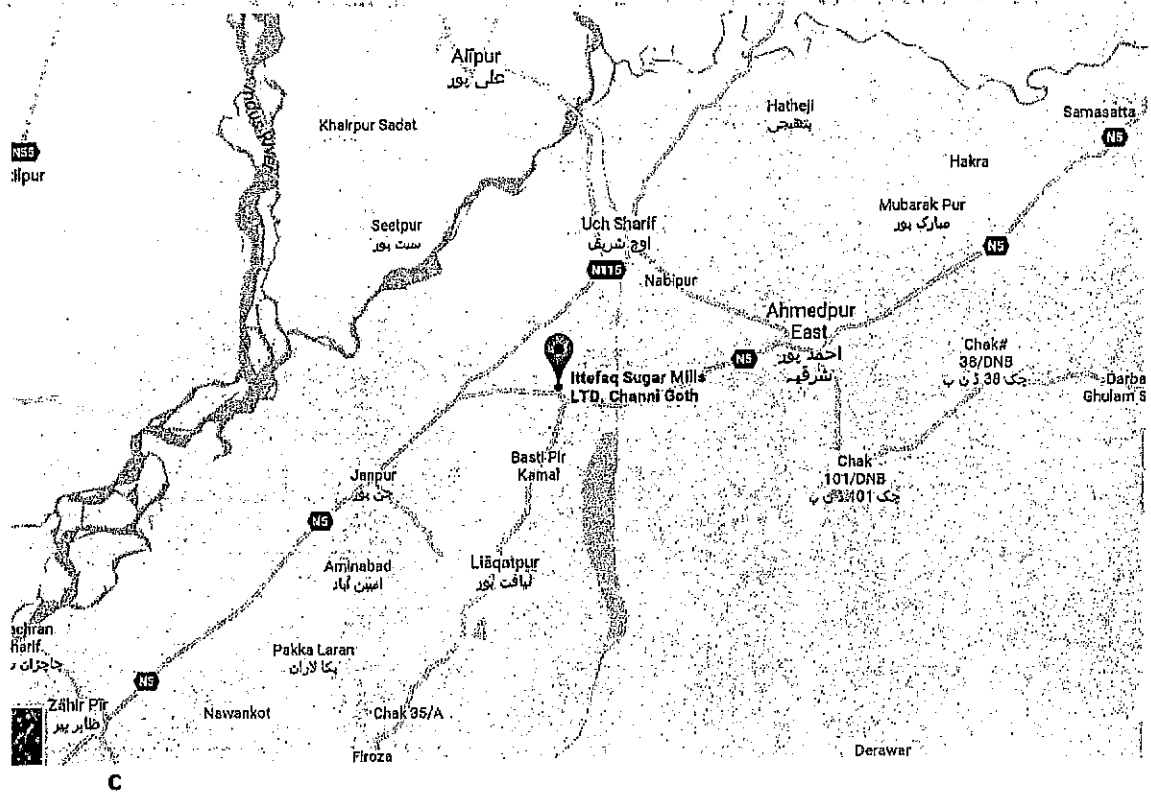
#### 4.3.3 Total Population of the Area.

According to Punjab Development Statistics 2008, total population of Channi goth district is 10,000 thousands persons out of which 60 % are females and 40 % are males. Density of population in the district is 102 persons per square Kilometer. Distribution of Rural population is given in Table under below:

TOWN-WISE DISTRIBUTION OF RURAL POPULATION NAME OF TOWN	RURAL
Channi goth city	4,000
Channi goth chakker	3500
Channi goth railway station	2,200
Channi goth Tahir wali	1,100

Handwritten signature and a circular stamp.

## Map of Punjab Showing Ahmad Pur Sharqiya District :



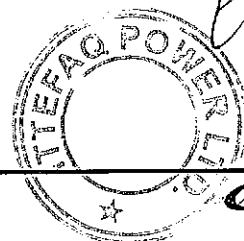
### • Biology:

Channi Goth is lying south east of punjad river . The Rive punjad flowing in the area has fish of a number of varities. The fish is sold to the private contractors on yearly basis by the Irrigation Department. The contractors sell the fish in the market.

### • Biodiversity:

Natural capital of a country mainly includes all of a country's wilderness areas and scenic landscapes, including the associated flora and fauna.

Pakistan has a total of nine major ecological zones. The contribution of the "Natural capital" is recognized at three distinct levels: species, genera, and communities (habitat and ecosystem). Both collectively and within each level, the range or variety of the resources is referred to as the "Biological Diversity". The term has relevance for each of Pakistan's administrative units—district, province, and particularly country. The more the number of species, genera and habitats and ecosystems present within these units, the greater is said to be the Biodiversity. The biodiversity of the area, with this background, is discussed as under:





- **Forestry:**

There are no forests in quite a large area around the project site.

- **Wildlife:**

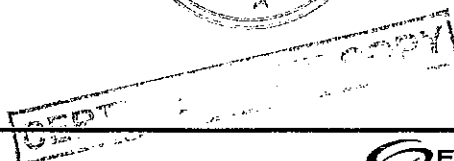
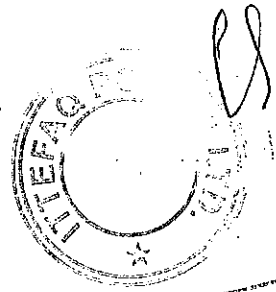
There is no adequate habitat for wild life in these areas. However, among the main species of wildlife sparsely found in the area especially in the cultivable lands include snakes, wild rats, goh and lizards, foxes, ( very few), jackals (very few), wild pigeons, sparrows, crows, owls and doves.

- **Flora:**

The land is fertile. Major cash crops include sugar cane wheat and cotton. Trees, grasses and shrubs found both in the irrigated areas.

**PRODUCTION OF MAIN CROPS  
(2005-06 to 2007-08)**

CROPS	Production (000 M.TONS)		
	2005-06	2006-07	2007-08
Sugarcane	1326	1637	1622
Wheat	344	327	314
Rice (Cleaned)	150	136	160



- Plant

Local name	Botanical name	Local name	Botanical name
Kikar	Acacia Arabia	Nim	Azadirachta Indica
Dates			
Phulahi	Acacia modesta	Aam	Mangifera Indica
Shisham tali	Dalbergia sisso	Jal or Wan	Salvadora oleodes
Jaman	Eugenia jambolana	<b>SHRUBS:</b>	
Pipal	Ficus retusa	Babri	Acacia Jacquemontii
Barh	Ficus bengalensis	Jawanh	Alhaji-camelorum
Poplar	Populus spp	Aak	Alotropis procera
Jand	Prosopis spicigera	Khar	Haloxylon recurvum
Mesquite	Prosopis glandulosa		
<b>GRASSES:</b>		<b>GRASSES:</b>	
Khabbal	Cynodon dactylon	Siriala	Hetropogon contortus
Khowi	Cymbopogon jwaraucusa	Kana	Saccharum munja
Dabb	Eragrostic cynosuriodes	Kundar	Typha angusti-folia

Source: Directorate of Agriculture, Crop Reporting Service, Punjab

- Fauna:

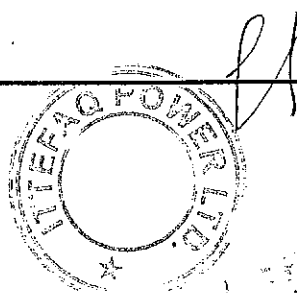
Habitat for accommodation of any fauna of special mention in the area. Rearing of buffalos and cows is done for milk both for own use and for commercial purpose. Goats and sheep are also kept in abundance for meat and milk. Horses and donkeys are also reared for transport of goods especially in villages for carriage of fodder from fields to the farm houses or "dairas", sugar cane to sugar factories and cotton to ginning factories besides other uses. Moreover Dogs (kutay), Cats (Bilian), Hens (murgean), Rabbits (khargosh), Pigeons (kabutar), Fishes (informs), Ducks (batkhain) etc are included in major fauna of District Ahmad Pur Sharqiya.

#### 4.3.3 Socio-Economic:

The project site is situated in the mid of fertile agriculture land. Land holdings are small on the over all basis. However, there are a few landlords. Sugarcane, Wheat, Rice, Cotton and are the major cash crops.

Punjab contributes about 76% to annual food grain production in the country. Cotton and rice are important crops. They are the cash crops that contribute substantially to the national exchequer. Attaining self-sufficiency in agriculture has shifted the focus of the strategies towards small and medium farming, stress on barani areas, farms-to-market roads, electrification for tube-wells and control of water logging and salinity.

Many people rear especially buffalos for producing milk even on semi commercial scale. On the over all basis most of the people belong to middle class, while a few people are



economically doing well. The area is one among the other food baskets of the Punjab province.

There is a lot of awareness about the importance of education. Some people of the area are playing an important role in the politics of the country even at higher levels. Fairly reasonable proportion of the people in cities is educated. While in villages, like in other parts of the Punjab province, percentage of educated people is low. Modern means of communication including television, radio, telephone, fax, e-mail and newspapers are within the reach of majority of the people especially in the cities. The socio-economic values are subject to change in cities specifically under the influence of media especially television.

The project site is connected with other parts of the country by roads and railway. These facilities provide good opportunities to the people to mix up with the public of the other parts of the country. The economy of the district is growing quite fastly.

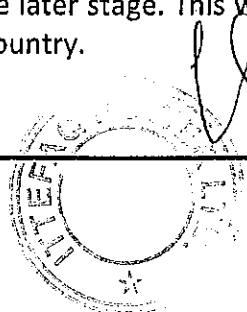
There is a trend in setting industries in the area. Already Ittefaq Power Private Ltd. has set a trend for further industrialization of the area.

There also exists a highly educated and well placed segment of society, this segment is quite affluent and socially and politically well off also. Their way of life is comparable with that of any developed segment of the society in Pakistan. This segment of the society is playing leadership role for the people of the area.

Most of the people belong to villages. But they are quite aware of the socio economic, political and other development activities of the country. Mostly, villagers follow old traditions in almost every walk of their life. Elderly people command respect and play deciding role in decision making. A large cross section of the older generation is uneducated. But due to awareness about education younger generation of both sexes, is now trying to get education in almost every department including science and technology on preferential basis. There is a rising trend in the society to change their old traditional socioeconomic pattern of life. Print and electronic media are playing great role in bringing tangible change in the old pattern of life.

Environmentally speaking the carrying capacity of the environment is not yet utilized. The project activity, under the proposed strict operational environmental controls, is not going to leave adverse impacts on all out environment. The operational Environmental Management Plan and Environmental Monitoring Plan further provide protection to the environment around. Legal compliance of environmental monitoring with NEQS standards are to doubly ensure environmental protection of all the segments of the environment.

The project will pay large sums of Government taxes which will be another addition to the earnings of the national exchequer on recurring basis. Even foreign exchange will be earned through the export of the products at some later stage. This will still be another source of addition to the foreign exchange of the country.



#### 4.3.4 Quality of life values:

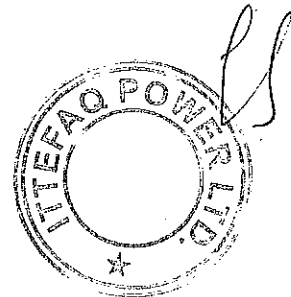
Tehsil Ahmadpur East or Ahmadpur Sharqia (Punjabi, Saraiki, Urdu: تحصیل احمدپور شرقیہ) is one of the five tehsils, or administrative subdivisions, of Bahawalpur District in the Punjab province of Pakistan. Its capital is Ahmadpur East. It is the biggest tehsil in terms of population in Pakistan. The Population Of Tehsil Is Over 10lacs). The main language spoken in the region is Saraiki. Urdu, Pujabi and Hindi are also spoken.

- **Cultural and Other Heritage:**

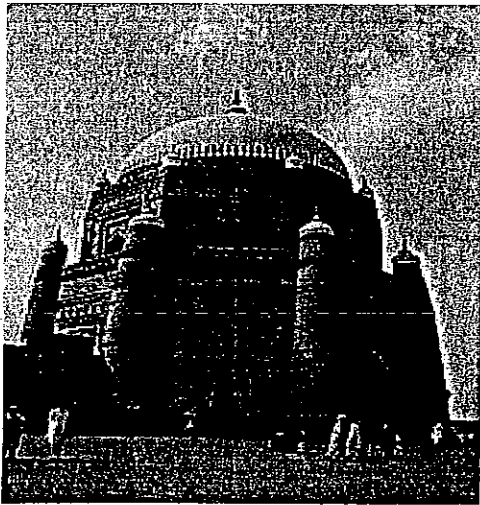
Punjab has been the cradle of civilization since times immemorial. Derawar fort was built by Rai Jajja Bhatti, a Rajput ruler of the Bhatti clan. The fort was built in the 9th century AD as a tribute to Deoraj Bhatti, a Rajput sovereign king of the Jaisalmer and Bahawalpur areas who had his capital at Lodhrva. The fort was initially known as Dera Rawal, and later referred to as Dera Rawar, which with the passage of time came to be pronounced Derawar. This historically-significant fort presents an enormous and impressive structure in the heart of the Cholistan desert, but it is rapidly deteriorating and in need of immediate preventative measures for preservation.

In the 18th century, the fort was taken over by Muslim Nawabs of Bahawalpur from the Shahotra tribe. It was later renovated by Abbasi rulers, but in 1747 the fort slipped from their hands owing to Bahawal Khan's preoccupations at Shikarpur. Nawab Mubarak Khan took the stronghold back in 1804.

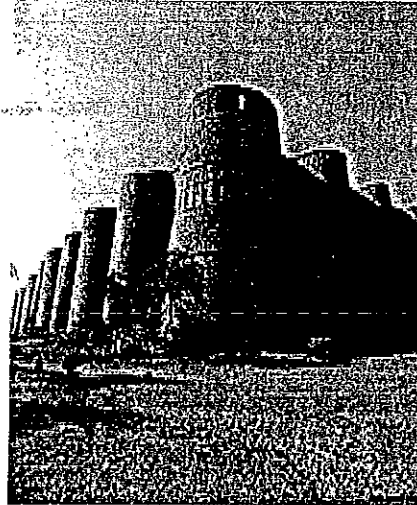
The structure of a mosque is simple and it expresses openness. Calligraphic inscriptions from the Quran decorate mosques and mausoleums in Punjab. The inscriptions on bricks and tiles of the mausoleum of Shah Rukn-e-Alam (1320 AD) at Multan are outstanding specimens of architectural calligraphy. The earliest existing building in South Asia with enamelled tile-work is the tomb of Shah Yusuf Gardezi (1150 AD) at Multan. A specimen of the sixteenth century tile-work at Lahore is the tomb of Sheikh Musa Ahangar, with its brilliant blue dome. The tile-work of Emperor Shah Jahan is of a richer and more elaborate nature. The pictured wall of Lahore Fort is the last line in the tile-work in the entire world.



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Sha Rukne Alam  
Courtesy: Wikipedia



Derawar fort: Courtesy: Wikipedia

There is no worth mentioning cultural or other heritage around the project site.

- **Industries:**

Despite lack of a coastline, Punjab, to which the project site belongs is the most industrialized province of Pakistan; its manufacturing industries produce textiles, sports goods, Heavy machinery, electrical appliances, surgical instruments, Cement, Vehicles, Auto Parts, I.T, metals, Sugar mill plants, Aircraft, Cement Plants, Agriculture Machinery, bicycles and rickshaws, floor coverings, and processed foods. In 2003, the province manufactured 90% of the paper and paper boards, 71% of the fertilizers, 69% of the sugar and 40% of the cement of Pakistan.

Punjab has also more than 68 thousand industrial units. The small and cottage industries are in abundance. There are 39,033 small and cottage industrial units. The number of textile units is 14,820. The ginning industries are 6,778. There are 7,355 units for processing of agricultural raw materials including food and feed industries.

Lahore and Gujranwala Divisions have the largest concentration of small light engineering units. The district of Sialkot excels in sports goods, surgical instruments and cutlery goods.

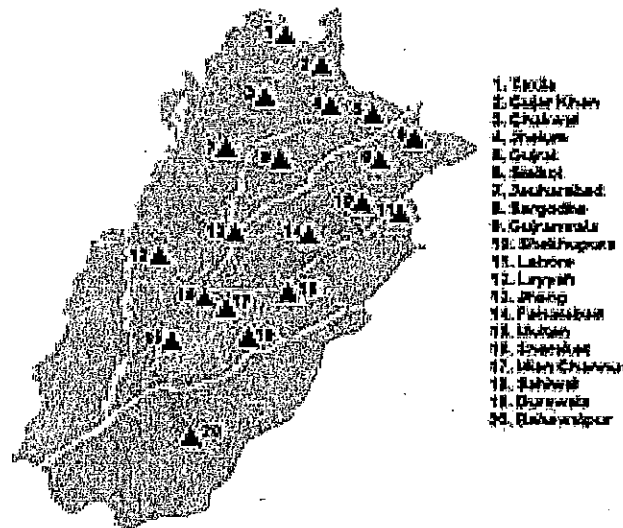
Punjab is also a mineral rich province with extensive mineral deposits of Coal, Iron, Gas, Petrol, Rock salt (with the second largest salt mine in the world), Dolomite, gypsum, and silica-sand. The Punjab Mineral Development Corporation is running over a hundred economically viable projects. Manufacturing includes machine products, cement, plastics, and various other goods.

The incidence of poverty differs between the different regions of Punjab. With Northern and Central Punjab facing much lower levels of poverty than Western and Southern Punjab. Those living in Southern and Western Punjab are also a lot more dependent on agriculture due to lower levels of industrialization in those regions.



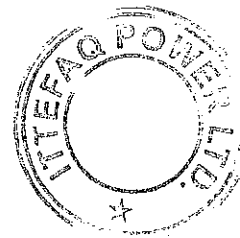
As of June 2012 Pakistan's electricity problems were so severe that violent riots were taking place across Punjab. According to protesters, load shedding was depriving the cities of electricity 20–22 hours a day, causing businesses to go bust and making living extremely hard. Gujranwala, Toba Tek Singh, Faisalabad, Sialkot, Bahawalnagar and communities across Khanewal District saw widespread rioting and violence on Sunday 17 June 2012, with the houses of several members of parliament being attacked as well as the offices of regional energy suppliers Fesco, Gepco and Mepco being ransacked or attacked.

### Industrial Zones Punjab



Industrial Zones Punjab, Source:  
Courtesy: Wikipedia

Ittefaq Sugar Mills Ltd, Robert cotton Associates and rice mill only other industries in the area around the project site for the new "Ittefaq Sugar Mill Power Plant, 31.2 MW High Pressure Cogeneration Power Plant".



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## 5.0 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES



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## 5.0 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### 5.1 Baseline/ Zero Environmental Monitored Data:

In order to assess the existing status of the environment as baseline, on site environmental monitoring was carried out. Results of this monitored data are shown in the ANNEXURES-( VII, VIII, IX, X)

### 5.2 Environmental problems during construction and mitigation measures:

#### i- Environmental problems due to project location

The project aims at installation of new Cogeneration Power Plant under the name "Ittefaq Power Private Limited, 31.2 MW High Pressure Cogeneration Power Plant" using Bagasse as fuel. The power plant will be installed near the Bagasse storage facility of ISML to reduce cost of its transport to the power plant that is within the premises of the ISM. Surplus quantity of Bagasse required to run the power plant will be available from the project site around where it is available in abundance.

Environmental Management Plan (EMP) as described hereunder is to be followed covering all activities during construction phase; therefore no environmental problems are envisaged due to the project location.

#### ii- Environmental problems related to design

The plant is to be designed in away that it complies with the required limiting values as set under the NEQS, NEQSAA (effective from 1<sup>st</sup> January 2013) & NEQSN (effective from 1<sup>st</sup> July, 2012).

Under the conditions no environmental problem worth mentioning relating to design are envisaged.

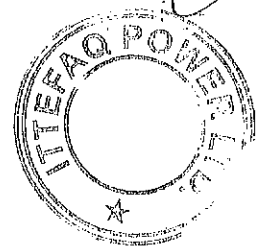
#### iii- Third party quarterly monitoring

Third party quarterly monitoring will further ensure compliance with the required standards.

#### iv- Environmental problems resulting from construction:

The most likely environmental problems to occur during construction phase could due to:

- Construction machinery,
- Compaction of soil activity,
- leveling of land,
- moving vehicles,
- Construction of building and associated civil work.





The pollution from these activities could be in the form of the following emissions from the exhaust of vehicles and from fuel burning in the operation of machines to be used for several of construction activities:

- Gaseous emission of SO<sub>2</sub>, NO<sub>x</sub> and CO, hydrocarbons etc.
- Particulate Matter (PM).
- Noise.
- Effluent.

In the first place, construction activity is going to be on very limited scale and for short duration, therefore, magnitude of emissions/pollutants will not be very big.

Secondly, the scheduled traffic plan of vehicles visiting plant regularly will further ensure that the environmental pollution does not adversely affect the people and environment.

The scale of erection and commissioning will also be small, thus the potential contribution of noise and dust as pollutants will also be very small and will be curtailed within the plant boundaries.

And lastly, a dedicated Environmental Management Plan (EMP) to be operational during construction will further ensure that environmental problems to accrue during construction are well managed within the required limits of the NEQS Pakistan, NEQSAA (effective 1<sup>st</sup> January 2013) & NEQSN (effective 1<sup>st</sup> July, 2012).

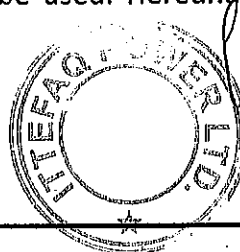
#### v- Environmental problems resulting from project operations:

The technology suppliers/designers and fabricators enjoy international reputation. The boiler/s will be designed in a way that all sort of emissions from them meet the required levels of the NEQS Pakistan.

##### ➤ Noise levels:

Since most of the machinery will be placed within the built up area thus ensuring noise level compliance with the required standards. Wherever necessary, double housing to the rattling parts of the machinery, is to be provided for reduction of noise levels. This is to be incorporated at the design stage of the plant. The maximum noise levels will not increase from 75 dB (A) during day time and 65 dB (A) during night time at the plant boundary thus will remain in compliance with the limits of the NEQSN Pakistan limits.

State of the art technology (if and wherever required) to reduce CO, NO<sub>x</sub> and SO<sub>2</sub> and Particulate Matter (PM) emissions will be used. Hereunder, more details are given.



### ➤ Boiler Stack Emissions

Boiler stack emissions of concern are primarily nitrogen oxides ( $\text{NO}_x$ ), carbon monoxide (CO) and particulate matter (PM) and sulphur dioxide ( $\text{SO}_2$ ).

Since CO emissions are a function of plant operations such as the level of excess air and maintenance of combustion temperature and residence time, therefore, its concentrations can be easily controlled while controlling these factors.

### ➤ Ash Handling

The ash handling system envisaged for the cogeneration plant is of two types and shall be provided for two boilers individually:

- Submerged scrapper conveyor system for grate ash
- Dense phase handling system for fly ash

The fly ash from Electrostatic precipitator (EP) will be dry and powdery in nature and occasionally with hot solids. Since the fly ash is to be collected through EP, therefore for the fly ash from the stack gas emission will be trapped in the system up to 99.9%. This ensures that the main emission of PM will be conveniently controlled to the desired levels as set by the NEQSAA.

The fly ash will be collected in storage yard having a suitable capacity & will be disposed-off by trucks / trailers suitably covered to avoid any spillage on the way. This ash may be disposed off according to any one of the following methods, individually of collected:

- Supply to cement factory. In case of using this method both fly ash and bottom ash can be mixed and disposed off together.
- Land fills. In case of using this method both fly ash and bottom ash can be mixed and disposed off together.
- For making bricks for face lifting,
- Used as manure in field,
- making bricks for paving
- Supply of the fly ash to agriculture use as rich source of Potassium, (K) being cheaper substitute of costly potassium fertilizer. It is to remember that since the ash comes from Bagasse an agree product therefore it will not harm to soil.

### ➤ Bottom ash

The furnace bottom ash is collected by water impounded scrapper conveyers, and as the quantity of ash discharge is less, the same is collected in trolleys parked near the scraper conveyor. The bottom ash of ash during transportation. This ash can be disposed of in variety of methods like:

- In cement as aggregate
- Manufacturing of tiles for face lifting of buildings, flooring of paths etc.
- Landfill

➤ **Quantity & Quality of the effluents from the 31.2 MW Cogeneration Plant**

The figures given below are for the normal operation of the plant during the seasonal with Bagasse as the fuel.

➤ **Gaseous pollutants from the Cogeneration Plant during Bagasse firing.**

Flue gases from the stack	210,780 kg/hr
Temperature of the gas leaving stack	160 Deg C (max)
CO	350 mg/Nm <sup>3</sup>
SO <sub>2</sub>	11.3 mg/Nm <sup>3</sup>
NO <sub>x</sub>	149.8 mg/Nm <sup>3</sup>
PM through flue gases	50. mg/Nm <sup>3</sup>

➤ **Solid Wastes from the Plant during Bagasse firing**

Dry fly Ash	0.86 MT/h
Wet bottom ash from Grate	0.57MT/h

➤ **Liquid Effluents**

- a) Boiler Blow down Water : 3.65TPH  
 Total Dissolved Solids : 70-100 ppm (Max)  
 pH @ 25 Deg.C : 9.8to 10.3
- b) Cooling Tower Blow down : 1 – 2 Cu.Mtr./Hr  
 Total Dissolved solids : 600 – 700 ppm  
 pH @ 25 Deg.C : 9.8to 10.6  
 Chlorine : N A
- c) Waste Water from water treatment 6 TPH (average) Neutralizing pit  
 Total Dissolved solids : 500 ppm (Max.)  
 pH @ 25 Deg.C : 7.81



The figures given below are for the normal operation of the plant during the off-season operation.

**Gases Effluents from the cogeneration plant during bagasse firing**

Flue Gases from the stack from the boilers	210,780 kg /Hr
Temperature of the gases leaving the stack	160 Deg .C (max)
SO2 emission	11.3 mg/Nm <sup>3</sup>
NOx emission	less then 80 ppm
PM	50 mg/nm <sup>3</sup>

➤ **SO<sub>2</sub> emissions**

After the plant startup, SO<sub>2</sub> emissions will be **11.3 mg/Nm<sup>3</sup>** as the sulphur content in the fuel is very less.

➤ **NOx emissions**

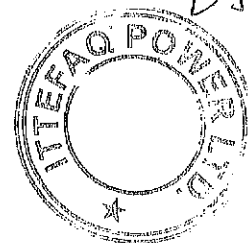
After the plant startup, NOx emissions will be **149.8 mg/Nm<sup>3</sup>** due to the very low level of nitrogen content in Bagasse. The maximum stack emissions of SO<sub>2</sub> and NOx will not exceed the permissible limits of the NEQS Pakistan.

➤ **Particulate Matter (PM) emissions:**

Particulate matter emissions will be approximately **50.0 mg/Nm<sup>3</sup>** and will be controlled with Electrostatic Precipitator (EP) to remain within the prescribed limits of the National Environmental Quality Standards (NEQS)-Pakistan limits.

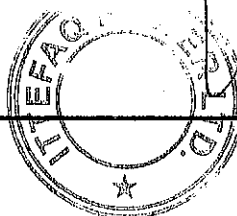
➤ **Effluents:**

The Effluent generated from Co-generation power plant lagoon treatment process will be used as effluent will be neutralized and will be let into the proposed effluent treatment plant. The treated water from the power plant, ETP will be used for agriculture purpose and for sprinkling on unpaved places to reduce fugitive dust irrigation of grassy plots and trees inside the plant boundary.



### 5.3 Environment Management Plan /Mitigation / Compensation Measures during Construction Phase

Potential	Mitigation/ Compensation Measures Impact
Air Quality	<ol style="list-style-type: none"> <li>1. Vehicles transporting loose construction material to be Covered with tarpaulins.</li> <li>2. Limit on speed and movement of vehicles, where considered appropriate speed-breakers should be installed</li> <li>3. Use low emissions trucks/vehicles for material transport where possible.</li> <li>4. Routine service and maintenance of vehicles and machines to reduce engine emissions.</li> <li>5. During periods with abnormal wind speeds, In particular during dry weather conditions, workers on the construction site should be provided with adequate inhalation and eyes protection gears. In case particulates in air hamper a clear view over the site completely, so that safety is impaired, the construction should be interrupted until weather conditions improve.</li> <li>6. To reduce generation of dust in the construction process, onsite roads and parking areas, as far as possible, would be constructed with asphalt over a compacted sub base.</li> <li>7. Spraying exposed soil with water to reduce PM emissions. Water to be applied at a rate to maintain a moist surface, but not create surface water runoff or erosion conditions.</li> <li>8. Provide wheel washers to remove particulate matter that would otherwise be carried offsite by vehicles that would decrease deposition of particulate matter on area roads and subsequent entrainment from those roads.</li> <li>9. Routing and scheduling construction trucks to reduce delays to traffic during peak travel times would reduce secondary air quality impacts caused by a reduction in traffic speeds while waiting for construction trucks.</li> <li>10. As far as possible planting vegetative cover (matching the local climate), as soon as possible after grading, would reduce windblown particulate matter in the area.</li> </ol>
Water Supply	<ol style="list-style-type: none"> <li>1. During construction, non-potable water would be supplied by Trucks to provide dust control.</li> <li>2. Potable drinking water for construction workers would be provided by a water service to be contracted by the site contractor.</li> </ol>



#### Ground Water

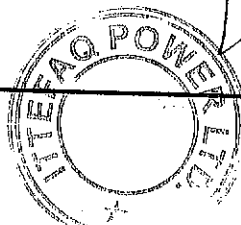
1. Any liquid material and lubricants (e.g. hydrostatic Testing) Water and wastewater) that accumulate during the construction phase should not infiltrate into the soil that have a direct contact to the ground water. Septic tanks shall be used for any waste water collection. Each tank, when filled and closed, should be brought to the closest wastewater treatment plant for further treatment.
2. Closed tanks should be removed from the site as soon as possible and should not be allowed to remain on the construction site as an interim storage until the end of the construction phase.
3. Monitoring of the characteristic of waste water collected in the septic or other tanks should be carried out on routine basis.
4. Maintenance and washing of all mobile machinery & vehicles should be carried out at adequate service stations. Good and regular maintenance of all vehicles and machines used on site is mandatory.
5. Maintenance and re-fueling (if necessary) of any construction equipment shall be done at a decent distance from the excavation area and only be undertaken on sealed area. Any re-fuelling must be handled carefully taking particular attention to not spilling any fuel.
6. On site storage of fuel, engine oil and lubricants (if any) shall be in locked tanks, sealed and shadow-roofed area.
7. On site storage of fuel, engine oil and lubricants that might be stored shall be collected at the end of construction phase and brought to either a disposal point as hazardous waste or be brought back for re-use to the place it was rented for the purpose of this construction.

#### Solid Waste

1. All solid wastes shall be disposed off according to a set Procedure and record of sales will be kept to track at any time when it is required.
2. The contractors to whom any waste is to be sold shall be fully made aware of the environmental impacts and health effects of the waste to be sold to him. He shall be provided instructions for reuse / handling of such wastes in environmentally sustainable way.

#### Soil

1. Construction activities must be limited to the designated areas.



2. Refilling of excavated soil should be done as far as possible. Where possible reuse of excavated soil should be done.
3. Prevention measures should be developed in the event of an accident or threat (e.g. massive, uncontrolled leakage of waste water into unsealed soil on-site).

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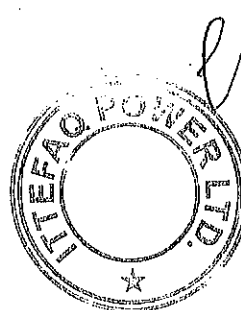
Fauna and flora

1. Planting of indigenous grass, trees and bushes between the edge of the site and the adjacent un-utilized area should be carried out. If not earlier practical, such measures should be implemented after the completion of all construction activities
2. Develop green strips of suitable vegetation, along the access road to improve the landscape shape.

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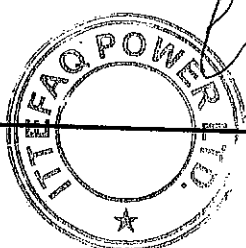
Noise

1. Power mechanical equipment like bulldozers, air compressors, Concrete pumps, excavators, concrete mixers etc. shall only be used with low sound power, whenever possible.
2. Optimize transportation management to avoid needless truck trips; avoidance of truck movements in residential areas at least during night time.
3. The building machinery equipment shall be well-maintained and serviced regularly during construction phase.
4. Silencers or mufflers on construction equipment shall be used.
5. Whenever possible, mass construction material and excavated soil shall be stored in direction of the nearest habitat as noise barrier.
6. Construction activities shall be scheduled in such a way that noise intensive operations side by side with an increased net noise level will be avoided.
7. Workers on the construction site should be equipped with ear protection in particular those directly exposed to higher noise levels.



#### 5.4 Environment Management Plan /Mitigation / Compensation Measures During Operation Phase

Potential	Mitigation /Compensation measures Impact
Landscape	1. To the extent possible, develop a green belt along the Facilities boundary area and other open spaces, to create to some extent a natural landscape. The flora to be used for such green belt should be tolerant to the local climate.
Ambient Air Quality	2. Continuous monitoring of ambient air for SO <sub>2</sub> , NO <sub>x</sub> , and PM to be carried. National Ambient Air Quality Standards (NAAQS) -2010 will also be applicable Standards.
Surface Water	3. Waste water treatment, as described in this report, to be carried out continuously and monitored.
Ground Water	4. Regular inspection of facilities for intercepting leaking and spilled liquids. Hazardous chemicals shall be handled only in appropriate segregated, sealed and bundled areas at site.
Solid Waste	1. All solid wastes shall be disposed off according to a set procedure and record of sales will be kept to track at any time when it is required. 2. The contractors to whom any waste is to be Sold shall be fully made aware of the environmental impacts and health effects of the waste to be sold to him. He shall be provided instructions for reuse/handling of such wastes in environmentally sustainable way.
Noise	1. Equipment will be acoustically shielded and /or lagged as far as possible. 2. A noise measurement campaign during full operation at operation start should be implemented to verify the real noise levels are in line with NEQSN-Pakistan.





3. Workers should be obliged to use ear protection in areas within the plant and for specific work that exceed the tolerable maximum noise limits.
- 4- Double housing of the rattling parts will be incorporated at the design stage in the area wherever necessary to ensure noise level reduction to the NEQSN Pakistan.

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#### Ash handling

1. Bottom Ash and fly ash generated by burning Bagasse in the boiler will be used as manure / Fertilizer and disposed to the farmers and also made available to other growers in the region. The ash will be stored in enclosed silos on site. Transportation of the ash from the site will be done through trucks to be completely covered with tarpaulin to avoid any ash being spread on the roads during transportation.

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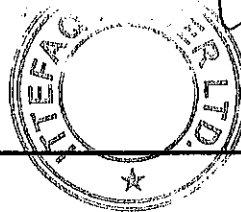
With all these arrangements in place Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMtP), as recommended in this report will also be operational as legal requirement under the Punjab Environmental Protection (amendment 2011) Act . This will further ensure the power plant operation in environmentally sustainable fashion.

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of project in complete accordance with the 5RS Principles- Reducing, Recycling, Reusing, Refurbishing and Retrofitting. Good house keeping will be the order of the day. Tree plantation on the project site and its vicinity will be carried out.

#### 5.5 Potential Environmental enhancement measures

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of project in complete accordance with the 5RS Principles- Reduce, Reuse, Recycle, Refurbish and Retrofit. Good house keeping will be the order of the day. Tree plantation on the project site, the quarries and on roads in the project vicinity will be carried out.

As a part of the Ittefaq Sugar Mill Limited as its mother project, already a lot of environmental enhancement measures including also tree plantation over a vast stretch of the project area boundary wall have been adopted.



During construction and regular operation of the project activity large number of the persons will be employed. Local people will be preferred for employment as per employment policy of Ittefaq Sugar Mill Limited. It is estimated that about 300 people of all categories will get employment during construction phase of the project while 50 regular employees are required for the smooth running of the plant.

#### 5.6 Occupational Health and Safety Management

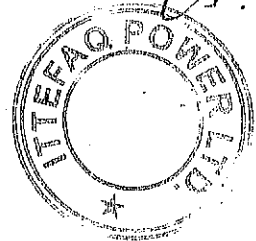
The HSE management system will be implemented and attach as ANNEXURE-VI.

#### 5.7 Disaster Management Plan

Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of such eventualities. However, it is not possible to totally eliminate such eventualities and random failures of equipment or human errors, omissions and unsafe acts cannot be ruled out. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such Emergency and restoration of normalcy at the earliest. The overall objective of a disaster management plan is to make use of the combined resources at the site and outside services to achieve the following:

1. To localize the emergency and if possible eliminate it.
2. To minimize the effects of the accident on people and property.
3. Effect the rescue and medical treatment of casualties.
4. Safeguard other people.
5. Evacuate people to safe areas.
6. Informing and collaborating with statutory authorities.
7. Provide authoritative information to news media.
8. Initially contain and ultimately bring the incident under control.
9. Preserve relevant records and equipment for the subsequent enquiry into the Cause and circumstances of the emergency.
10. Investigating and taking steps to prevent reoccurrence.

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## 6.0 ENVIRONMENTAL MONITORING PROGRAM AND INSTITUTIONAL REQUIREMENTS:



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## 6.0 ENVIRONMENTAL MONITORING PROGRAM AND INSTITUTIONAL REQUIREMENTS:

The project aims at installation of 31.2 MW Bagasse based Cogeneration power plant using Bagasse as fuel at Chani Goth, Ahmed Pur Sharqiya, Dist Bahawal Pur, Punjab. Environmental Management Plan (EMP) and Environmental Monitoring Programme (EMtP) as recommended for the project will ensure that all type of pollutants from the projects remain within the prescribed limiting values of the NEQS, NEQSAA and NEQSN-Pakistan.

### 6.1 Assigning responsibility for implementation (by name or position)

#### 6.1.1 Institutional capacity

The project will be implemented and monitored by the Project Proponent that will be executed as Implementing Agency (IPPL), which will be supported by Design and Supervision Consultant (Engineer). Ittefaq Power Private Limited (ISML) will be the Implementing Agency.

IPPL shall be responsible for ensuring compliance to environmental requirements as well as central/ state governments. An Environmental Management Plan (EMP) will be a part of contract with the civil works contractors engaged for execution of the works. The supervision and implementation of EMP shall be the responsibility of contractors and Engineers with IPPL as implementing agency (with assistance of HSE Inspector).



**For effective environment management, responsibilities are set for each operation as follows:**

Official concerned	Responsibility
1-General Manager/Plant Incharge/ RD	i- Over all in-charge of all the Environmental Management Plan (EMP) and EMtP. ii- He will be responsible to ensure smooth functioning of the EMP and EMtP/ system iii- Daily progress on the state of the environmental status will be reported to him in writing by his junior responsible staff. iv- All other Environmental Management and Monitoring matters , issues and problems will be reported to him for rectification. v- He will work as bridge between the Government concerned authorities and the inside E.M. vi- He will be answerable to the higher management in all matters relating to E.M.
2- Shift Engineer/ In Charge	i- During his shift timings, he will be responsible to look into smooth functioning of the process in environmentally sustainable fashion. ii- He will be responsible to rectify any problem regarding environmental matters. iii- He will directly report all matters regarding E.M. to the G.M.
3- Plant Operator	i- He will record emissions behavior on hourly basis and will report to the Shift Engineer.
4- Laboratory Chemist	i- He will be responsible to carry out all tests regarding environmental monitoring which includes Gaseous emissions monitoring, particulates monitoring, sound levels monitoring etc. according to the monitoring scheduled and will report to the Shift Engineer/In Charge.

## 6.2. Monitoring program to assess performance:

According to "Guidelines for Self- Monitoring and Reporting by Industry (SMART)," Final Report, March 1998, approved by Pakistan Environmental Protection Council (PEPC), in August 1999, Power Plant falls under "Category B" regarding monitoring of gaseous emissions.

All out environmental monitoring of the power plant should be carried out according to the schedule as recommended in the SMART.

After the plant start up, once a comprehensive monitoring report for all NEQS parameters for normal plant operations should be carried out. This is to establish that the plant does meet the environmental commitments made in this IEE Report. This

monitoring should be carried out by a third party. Thereafter, subsequent regular monitoring will be restricted to priority parameters as suggested in the SMART. Reporting will be done according to the format as approved in the SMART.

Even though all effluent generated through the entire project activities along with sewage will be treated in the designed waste water treatment plant and all relevant data regarding generation, treatment and disposal mode of the effluent will be duly recorded.

A track record of all solid wastes and their disposal shall also be regularly maintained for its use as and when required.

All monitoring data should be reviewed and analyzed regularly in comparison with the NEQS limiting values. In case of any deviation/violation of the required standards, immediate necessary corrective actions should be taken. All the monitored data should be reported to the EPA Punjab.

### 6.3 Reporting and reviewing procedures

Monitoring schedule, as explained above will be adhered to and all the data to be monitored will be scrutinized at the level of Shift Engineer/ In Charge and on monthly basis at the G.M. level. The data will be documented according to appropriate format. Discrepancies will be duly addressed to. For presentation of the data to the Government Agencies, approved data recording to the SMART format.

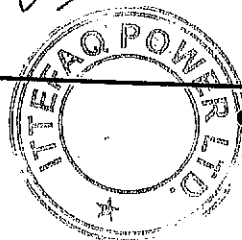
### 6.4 Training Schedules

In order to effectively operate the EMP all the staff to be engaged in this activity should be trained extensively.

All the environment management staff to be engaged for operating effluents treatment plant, monitoring and testing should be duly trained. Laboratory chemist should be trained in all operations of laboratory testing of the effluents and other relevant materials/samples. He should be trained in applying analytical methods/techniques of testing, data processing, interpretation and reporting. He should know the local laws, rules and regulations as applicable to the testing of effluents.

### 6.5 Environmental Monitoring

*Environmental monitoring will be carried out by the staff to be engaged for the purpose.* The person to monitor gaseous emissions, PM and noise levels should be extensively trained to handle his job capably. Training program should include use of monitoring instruments, data generation, processing, interpretation, recording and presentation.



## 6.6 Environment quality monitoring laboratory

The existing laboratory will be upgraded and furnished with required equipment to also act as environmental monitoring laboratory.

## 6.7 Summary of Impacts and mitigation measures

The most significant pollutant emitted by Bagasse-fired boilers is Ash. As IPPL is already using High pressure boilers and ash is in very little quantity, the high pressure boilers will produce minor quantity of ash which will be controlled by the use of Electrostatic Precipitator separator (fly ash arrestor) to meet the permitted dust concentration as required by NEQS Pakistan. Both of these technologies have the ability to remove 99.9% of ash (PM) in stack exhausts.

**Gaseous Emissions** of sulfur dioxide ( $\text{SO}_2$ ) and nitrogen oxides ( $\text{NO}_x$ ) are lower than conventional fossil fuels due to the characteristically very low levels of sulfur and nitrogen associated with Bagasse, therefore, they will remain within the prescribed limiting values of the of the NEQS Pakistan.

The noise levels of 75 dB (A) and 65 dB (A) indicated are at the plant boundary, as the maximum noise level shall be 85dB (A) at 3.0 m from the equipment.

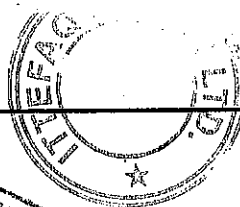
### Bottom ash

- Supply to cement factory. In case of using this method both fly ash and bottom ash can be mixed and dispose off together.
- Land fills. In case of using this method both fly ash and bottom ash can be mixed and dispose off together.
- For making bricks for face lifting,
- Used as manure in field,
- making bricks for paving
- Supply of the fly ash to agriculture use as rich source of Potassium, (K) being cheaper substitute of costly potassium fertilizer. It is to remember that since the ash comes from Bagasse an agree product therefore it will not harm to soil.

The furnace bottom ash is collected by water impounded scrapper conveyers, and as the quantity of ash discharge is less, the same is collected in trolleys parked near the scraper conveyor. The bottom ash of ash during transportation. This ash can be disposed of in variety of methods like:

- In cement as aggregate
- Manufacturing of tiles for face lifting of buildings, flooring of paths etc.
- Landfill
- Fertilizer

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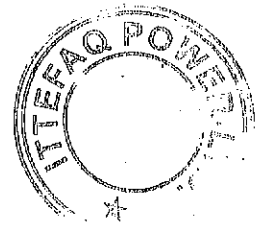


#### 6.8 Equipment maintenance details

Predictive maintenance and preventive maintenance will be managed as per recommendation of OEM.

#### 6.9 Environmental budget

The cost for environmental management and monitoring will be the part of contract of Contractor and Consultants respectively. However, a lump sum amount of Rs. 1.5 million will be allocated by the project proponent as cost for environmental training and monitoring for a period of two years during construction and operation of the project. After that, monitoring program will be revised in consultation with EPA and cost will be revised accordingly.





## 7.0 GRIEVANCE REDRESSING MECHANISM-FORMAL AND INFORMAL CHANNELS:



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## 7.0 GRIEVANCE REDRESSING MECHANISM-FORMAL AND INFORMAL CHANNELS:

### 7.1 Formal Channel

The formal channel under PEPA (Amendment 2012) is as per law. It is immaterial whether it is produced in the IEE report for our cogeneration plant or not. As and when any issue may arise the law will take its own course.

#### 7.1.1 Environmental Legislation

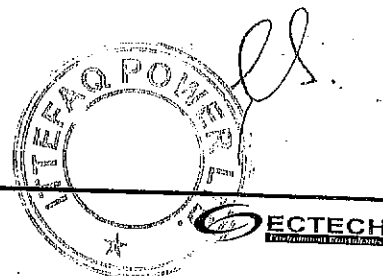
The Punjab Environmental Protection (Amendment 2012) Act (PEPA) provides a complete code of conduct for addressing grievances stemming from damages to any sector of the environment from the project activities.

The project is required to operate at least 95 % of its operational period in strict compliance with the required emission standards of Pakistan as provided in the (Punjab Environmental Protection (Amendment 2012) Act and the National Environmental Quality Standards. This ensures that the project proponent is legally bound to observe all legal requirements to avoid damaging the environment around the project.

#### 7.1.2 Punjab Environmental Protection (Amendment 2012) Act and Environmental Management

The Punjab Environmental Protection (Amendment 2012) Act covers aspects related to the protection, conservation, rehabilitation and improvement of the environment and the prevention, control of pollution and promotion of sustainable development. Being the prime environmental law, Punjab Environmental Protection (Amendment 2012) Act establishes complete regulatory and monitoring bodies, policies, rules, regulations and national environmental quality standards. To ensure enforcement, the act establishes regulating bodies i.e. Punjab Environmental Protection Council (PEPC) and responsible bodies i.e. Pakistan Environmental Protection Agency (Pak-EPA) at Federal level and Environment Protection Agencies at Provincial level. The act extends to the whole of Punjab province.

Punjab-EPA has the power to arrest without warrant any person against whom reasonable suspicion exists of his having been involved in an offence under the PEPA-2011, and enter, inspect and search without warrant any premises, vehicle or vessel. It also provides for seizing any plant, machinery, equipment, vehicle or substance, record or document. Punjab Environmental Protection (Amendment 2012) Act also provides the power to summon and enforce the attendance of any person and issuance of Environmental Protection Order, PO 16, an Environmental Protection Order (EPO), in relation to a person who is contravening a provision of the PEPA-2012.



### 7.1.3 Enforcement of PEPA and Liability

The Government of Punjab is bound to protect the environment in accordance with its international commitments under various conventions and treaties it has signed or ratified. The PEPA-2011 translates these commitments into a compliance programme for the industrial establishments. Non-compliance to these commitments may result in loss of credibility, popularity and even financial aid from the international forums.

With the eighteenth amendment in the Constitution of Pakistan, the Punjab EPA is responsible for implementation of all Rules and Regulations within the province. Punjab EPA is responsible to ensure under the PEPA- 2011 requires:

- That no person (including companies) under its purview will discharge or emit any effluent or noise in contravention of the National Environmental Quality Standards.
- That no proponent of a project shall commence construction or operation unless he has filed with the Punjab-EPA, an Environmental Assessment report according to the sensitivity of the project or where the project is likely to cause an adverse environmental impact.
- That no person may dispose of waste on public land or on highway or on a land owned or administered by a local council, unless done in accordance with the provisions of the Punjab Environmental Protection (Amendment 2012) Act.

The following section of this act further clarifies the mechanism of Environmental Management and Grievance Redress Mechanism.

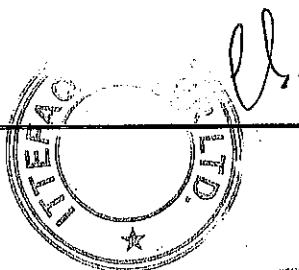
#### Section 11:

"Prohibition of certain discharges or emissions. — (1) Subject to the provisions of this Act and the rules and regulations no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6."

"(2) The Federal Government may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed."

#### Section 12:

"Initial environmental examination and environmental impact assessment.—(1) No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof".



**Section 16:**

"Environmental protection order.--(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include;

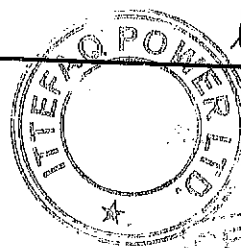
- (a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;
- (b) installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;
- (c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and
- (d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or, Provincial Agency."

**Section 17:**

"Penalties.--(1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13 or section 16 or any order issued there under shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any license, any order or direction, issued by the Council or the Federal Agency or Provincial Agency, shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention or failure with an additional fine which extend to one thousand rupees for every day during which such contravention or failure continues.



Contraventions of the provisions of the PEPA-1997 is punishable with imprisonment extending up to five years, or with fine extending up to one million or with both. Where an offence is committed by a company every Chief Executive officer (CEO) and the company shall be deemed guilty of the offence. Action can even be taken against Government Agencies and Local Authorities.

Government may also constitute an Environmental Tribunal to hear cases relating to the PEPA-1997. The tribunal may only hear cases when the complaint is made in writing by Pak-EPA, or Local Council or any aggrieved person who has given at least thirty days notice to Pak-EPA of the offence and of his intention to make a complaint to the Tribunal. The Tribunal may also hear appeals from the Agencies. Appeals from the tribunal shall go to the High Court.

In order to resolve the disputes relating to the environment issues, Environmental Tribunal Rules 1999 have been promulgated. In trying the offences, the tribunal has to follow the Code of Criminal Procedures 1898. The tribunal shall send the copies of his orders to the parties concerned and the Director General of the Federal EPA and Provincial EPAs. The Tribunal shall dispose of its proceedings within 60 days. An appeal to the Tribunal, accompanying a copy of the impugned order, copies of the documents relied and prescribed fees, shall be sent to the Registrar by the appellant. Generally the proceedings of the Tribunal shall be open. "

## 7.2 Grievance Redress Mechanism- Informal

In the PEPA Act or in any other law, to the best of our information, the informal channel to settle any dispute or issue has not been provided. Its status is like an agreement in between two parties. To settle any dispute or issue which may arise in between them it is not binding on any of the parties to settle it through informal channel, rather as and when an issue or dispute may arise, they will be free to opt for it and if any party do not wish to opt for it, the channel efficacy will be of no avail. To our mind its status is like "The Arbitration" option available in the Management – CBA negotiations process. If any of the parties do not wish to enter into arbitration, the arbitration provision will not bind the parties must enter into arbitration.

### 7.2.1 Compensation for Environmental Damages

As described under Section 17- Penalties, Subsection-(5), (f) of the Punjab Environmental Protection (Amendment 2012) Act, the likely damages to be caused to any sector of the environment or property or else will be paid to the affected parties. Secondly, under the PEPA -2011, the EPA Punjab and the Environment Tribunal can legally prosecute the project proponent for the damages to occur from the pollution generation from the project.

There is complete legal cover to address issues related to compensation for any environmental damage arising out of project activity. However, to address any such

issues more expeditiously, the project administration will have a local committee as an Informal Mechanism.

This informal mechanism will provide convenient, quick and cost effective decisions for compensation against any environmental damages that occur from the project activity. This informal mechanism will also build confidence between the project administration and public and safeguard the interests of both the project and the public at large.

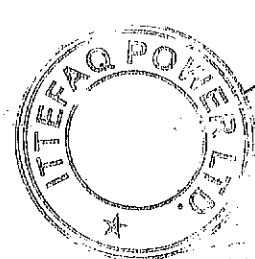
The project administration, therefore, proposes the following committee at the local level for amicable and speedy resolution of cases pertaining to any environmental damages that likely occur from the project activity. The decision of the committee will be executed in letter and spirit.

#### 7.2.2 Constitution of the Committee:

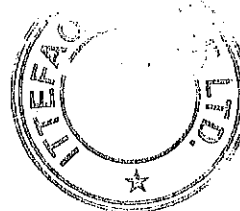
- |  |                   |
|--|-------------------|
| • Chief Executive of the Company or his nominee: Chairman/Chief Executive of the committee |                   |
| • Head of the District Local Self Government   | Ex-officio Member |
| • A dignitary of the project area (enjoying confidence of the people of the project area)  | Member            |
| • Head EHS Department of the project   | Member            |
| • Representative of the NGO the project area.  | Member            |
| • Representative of the aggrieved person   | Member            |
| • Environmentalist   | Member            |

#### 7.2.3 Time Schedule for Redressing the Grievance

- The committee will be under obligation to decide the grievance within three weeks of the complaint by the aggrieved party.
- Compensation as decided by the committee will be paid in full to the aggrieved party within two weeks from the date of decision of the committee.
- The decision of the committee will be binding on both parties, i.e. the project proponent as well as the aggrieved party.



## 8.0 PUBLIC CONSULTATIONS



## 8.0 PUBLIC CONSULTATIONS

Public consultations were held with the people from the project area. They are very much in favor of the project installation for the reasons and advantages to accrue to them directly as well as indirectly as described below.

Written comments/views of the public consultations are attached as ANNEXURE-XX.

### *Community Awareness and Perception about the Project:*

- By and large, a large proportion of the people of the project area are aware of the planned project implementation.
- Among the people consulted as a part of the Public Consultations, virtually all of them welcome the project.
- The people have clear perception that there will at least some addition to the shortfall of power.
- People foresee all out positive impacts like employment opportunities, business development, operating small hotels/tea stalls, tires and tubes repairing shops along with other vending services for the vehicles.
- Study findings depict that the people of the study area perceive overall positive impacts as a result of installation of the power plant. Therefore, their attitude towards the project installation is quite positive.
- As far as the Social Impact Assessment (SIA) is concerned, positive social impacts are dominant over hardly conceived any negative social impacts observed during the study.
- They correlate their positive attitude towards the plant with many socio-economic opportunities and benefits to restart.
- The people believe that installation of the plant in the area will not only help to restart earning opportunities but also, it will open up vast employment new opportunities which in turn follow a chain of indirect socio-economic benefits.
- They also perceive accelerated economic activity due to the business opportunities likely to emerge in the area. Directly or indirectly, some reasonable number of the local people will get employment and business from the installation of the plant e.g.: shop keepers, traders, suppliers, contractors, transporters, technicians etc.
- They feel that the plant and its related activities will provide a strong base for positive financial and social change.



- They foresee improvement in the quality of life of the people.

From the above facts one can conclude that many positive economic and social impacts will reappear in the quality of the lives of the people of the Study Area due to the plant installation.



[CERTIFICATE]

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## 9.0 CONCLUSIONS:



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## 9.0 CONCLUSIONS:

Ittefaq Sugar Mills is in the process of installing a 31.2 MW Bio Mass (Bagasse) based Co-generation power plant for the generation of electricity. Bagasse based co-generation power plant under the name "Ittefaq Power Private Limited". The plant is to be installed at Channi Goth, Ahmed Pur Sharqia, Dist Bahawalpur, Punjab.

Bagasse based Cogeneration is being considered by many countries as an environment friendly way of augmenting the generation capacity. The Government of Pakistan has estimated a potential of 3000 MW of Cogeneration power from the existing sugar mills. The Government of Pakistan is treating these projects on "fast track basis". The present project of ISML to generate 31.2 MW with installed capacity of 32 MW of power with the Bagasse to be generated for a period of about 120+72 days.

The proposed new Cogeneration plant, on commissioning will export a substantial quantum of power to the national grid. The proposed Cogeneration cycle is already proven and implementation of this project will benefit the sugar mill and the project in itself and the country.

According to the "Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000" the project falls in category "B". Accordingly, this IEE has been prepared for issuance of NOC/EA by the EPA, Government of the Punjab, Lahore before initiation of the project on ground.

It has been found that the project has inbuilt mechanism to:

- Treat the effluents, control stack gases emissions and PM, control Noise to the prescribed limits of the NEQS, NEQSAA and NEQSN- Pakistan.
- Solid wastes disposal will be done according to the environmentally sustainable order.
- EMP and EMtP as recommended in this IEE Report are to be put in place during operations of the project.
- Biannual monitoring of all out environmental monitoring by a third party also certifies that the project will run in accordance with legal requirements.

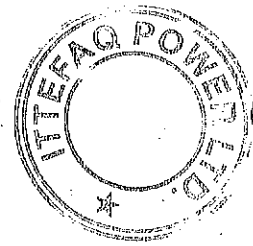
### SPECIAL ADVANTAGES:

Among various other advantages some are listed as below

- i- The project will provide cheaper power to the project proponent and increase profitability on recurrent basis.
- ii- It will reduce demand on the national grid.

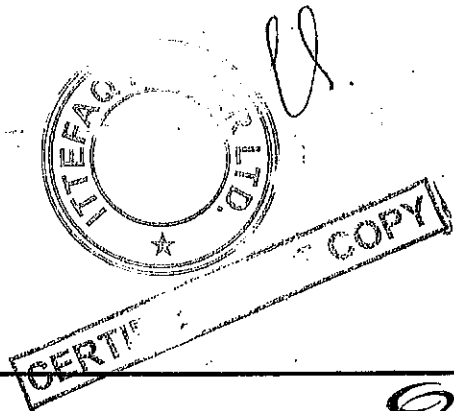
- iii- It will reduce emissions of Green Houses Gases (GHGs) which is the responsibility of Pakistan and a commitment at the international level.
- iv- It will provide jobs to about 50 persons on regular basis. Which in other words means that about 3000 people (one family comprising of 6 persons) will earn their bread and butter during regular operations.
- v- It will add to the taxes to the Government on regular basis.
- vi- It will save foreign exchange being spent on the import of fuel.
- vii- Devolvement of basic infrastructure especially roads.

On the basis of the major facts summarized as above, the project merits for issuing No Objection Certificate (NOC)/Environmental Approval (EA) by the Environmental Protection Agency, Government of Punjab, Lahore.



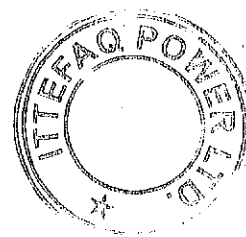
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## 10.0 RECOMMENDATION:



## 10.0 RECOMMENDATION:

On the basis of the facts summarized as above, the project merits for issuing Environmental Approval by the Environmental Protection Agency, Government of Punjab, Lahore



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# **GRID INTERCONNECTIVITY STUDY**



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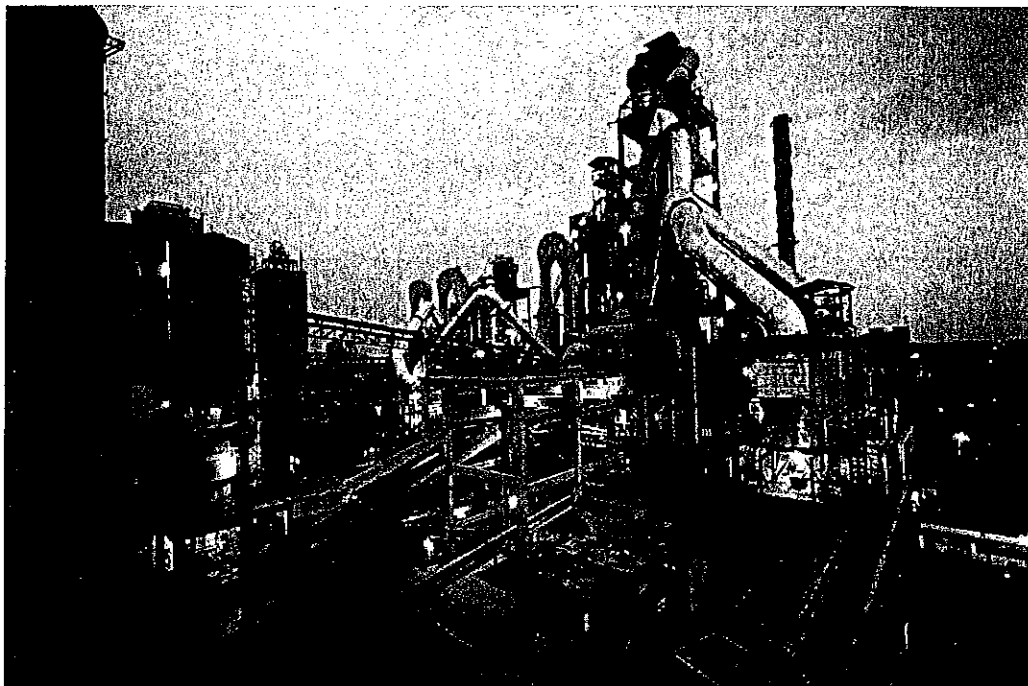


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# INTERCONNECTION STUDY

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*For*  
**31.2 MW Ittefaq Power (Pvt) Limited Power  
Plant near Chani Goth, Punjab**



*Draft Report  
(October 2016)*

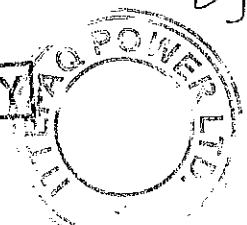
## POWER PLANNERS INTERNATIONAL

UK Office:  
3-Sylvester Road,  
Sudbury Town, Middlesex,  
HA0 3AQ, UK  
Phone & Fax: +44-(0)208-9223219

Pakistan Office:  
64-F/1, Wapda Town,  
Lahore, Pakistan  
Phone: +92-42-35182834-35;  
Fax: + 92-42-35183166

Email: [info@powerplannersint.com](mailto:info@powerplannersint.com)  
[www.powerplannersint.com](http://www.powerplannersint.com)

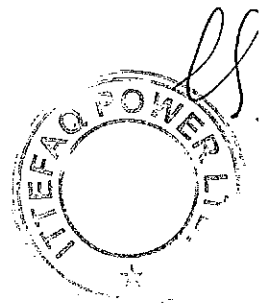
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## **Executive Summary**

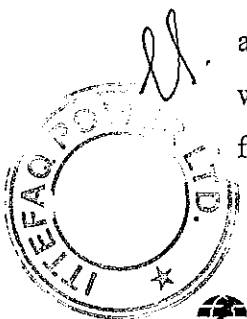
- ❖ The Final Report of interconnection of the 31.2 MW Cogeneration Power Plant by Ittefaq Power (Pvt) Limited with MEPCO grid system is submitted herewith.
- ❖ Ittefaq Power (Pvt) Limited would like to go for high pressure cogeneration with the aim of exporting spillover power to the national grid during the crushing season (November to March) and Off-Season (April to October).
- ❖ The study objective, approach and methodology have been described and the plant's data received from the Client is validated. The network around Ittefaq Power (Pvt) Limited PP (referred to as Ittefaq PP in the remainder of the report) at 132 kV and 11 kV has been modeled as shown in Appendix-A (Sketch-2).
- ❖ As MEPCO has inherent problems of over loading and under voltages in the area under study, the following reinforcements were finalized in the meeting held in NTDC (Planning) office on 05-10-2016 and 06-10-2016 and are shown in Appendix-A (Sketch-2):
  - The double circuit, initially proposed from R. Y. Khan-New to Khanpur on Rail conductor should instead be laid from R. Y. Khan-New to Feroza. The length of this circuit would be 35 km.
  - A double circuit on Rail conductor from R. Y. Khan-New should be laid such that it is looped in-out at the R. Y. Khan-Old to R. Y. Khan Industrial Estate 132 kV circuit. The length of this circuit would be approximately 50 km and the looping point is 6 km from both R. Y. Khan-Old and R. Y. Khan Industrial Estate 132 kV Grid Station. It was further proposed that although the circuit from R. Y. Khan-Old to R. Y. Khan Industrial Estate is on Lynx conductor, the portion of the transmission from the looping point to R. Y. Khan-old should be replaced with Rail conductor.
- ❖ The nearest MEPCO grid facility available for interconnection to Ittefaq PP is the R.Y.Khan-PP 132 kV Grid Station and the Ahmedpur-East 132 kV Grid Station.
- ❖ According to the new scheme, Ittefaq PP will be looped in-out at one of the existing single circuit from R. Y. Khan-PP to Ahmedpur-East. The looping distance would be 2 km. The scheme is shown in Sketch-2 in Appendix-A.



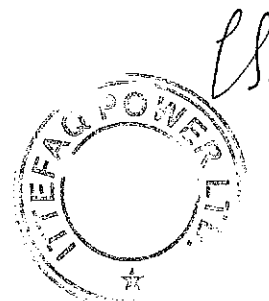
- ❖ Ittefaq PP will generate at 11 kV voltage level from where it is stepped-up to 132 kV using two 30/40 MVA 132/11 kV transformers.
- ❖ The proposed scheme will require two breaker bays of 132 kV at Ittefaq PP to connect with the 132 kV circuits with R.Y.Khan-PP and Ahmedpur-East and two transformer bays to connect to two 30/40 MVA 132/11 kV transformers.
- ❖ With the gross capacity of 31.2 MW, the spillover from Ittefaq PP would be 28.11 MW in Off-Season and 23.86 MW in the Crushing Season.
- ❖ In view of planned COD of the Ittefaq PP in November 2018, the above proposed interconnection scheme has been tested for steady state conditions through detailed load flow studies for the peak conditions of
  - January 2019 for maximum thermal power dispatches in the grid during the Crushing Season for Ittefaq PP.
  - September 2019 for maximum hydropower dispatches in the grid during the off-season of Ittefaq PP.

The system conditions of normal and N-1 contingency have been studied to meet the reliability criteria of NEPRA Grid Code.

- ❖ The proposed scheme of interconnection has also been tested for the extended term scenario of peak load conditions of the year 2021 for steady state conditions.
- ❖ Steady state analysis by load flow for all the scenarios described above reveals that the proposed scheme is adequate to evacuate the spillover of up to 28.11 MW power of the Plant under normal as well as contingency conditions.
- ❖ The short circuit analysis has been carried out to calculate maximum fault levels at Ittefaq PP and the substations of 132 kV in its vicinity. We find that the fault currents for the proposed scheme are within the rated short circuit capacities of switchgear installed at these substations. There are no violations of exceeding the rating of the equipment due to contribution of fault current from Ittefaq PP.
- ❖ The maximum short circuit levels of Ittefaq PP 132 kV is 4.58 kA and 4.84 kA for 3-phase and 1-phase faults respectively for the Year 2019-20 and 4.66 kA and 4.92 kA for 3-phase and 1-phase faults respectively for the Year 2021. It would be advisable to go for standard size switchgear of short circuit rating of 40 kA. It would provide large margin for any future increase in short circuit levels due to future generation additions and network reinforcements in this area.



- ❖ The dynamic stability analysis of proposed scheme of interconnection has been carried out for January 2019. The stability check for the worst case of three phase fault right on the 132 kV bus bar of Ittefaq PP substation followed by the final trip of one 132 kV circuit emanating from this substation, has been performed for fault clearing of 5 (100 ms) and 9 cycles (180 ms), in case of stuck breaker, as understood to be the normal fault clearing time of 132 kV protection system. The stability of system for far end faults of 3-phase occurring at 132 kV bus bar have also been checked. The proposed scheme successfully passed the dynamic stability checks for near and far faults for the most stringent cases. The system is found strong enough to stay stable and recovered with fast damping.
- ❖ The proposed scheme of interconnection has no technical constraints or problems, it fulfills all the criteria of reliability and stability under steady state load flow, contingency load flows, short circuit currents and dynamic/transient conditions; and is therefore recommended to be adopted.



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- 1.2. Objectives
- 1.3. Planning Criteria

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- 2.2 Network Data

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- 4.1 The Existing and Ongoing Network
- 4.2 The Scheme of Interconnection of Ittefaq PP Generation Ltd.

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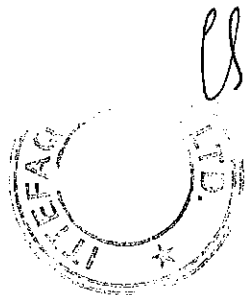
- 5.1 Peak Case Load Flow January 2019, without Ittefaq PP
- 5.2 Peak Case Load Flow January 2019, with Ittefaq PP in Crushing Season
- 5.3 Peak Case Load Flow September 2019, with Ittefaq PP in Off-Season
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#### 7.2.2 Fault at 132 kV Near Ittefaq PP (Stuck Breaker)

#### 7.2.3 Fault at 132 kV Ahmedpur-East (Far-End Fault)

### 7.3 Conclusion of Dynamic Stability Analysis

## 8. Conclusions

### Appendices

#### Appendix –A:

- NTDC Generation Plan
- NTDC Transmission Plan
- NTDC Load Forecast
- MEPCO Transmission Expansion Plan
- Technical Data provided by the Sponsor

#### Appendix –B:

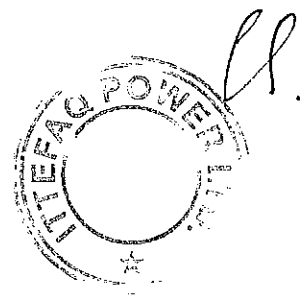
- Sketches for Chapter-4

#### Appendix –C: Plotted Results of Load Flow for Chapter – 5

#### Appendix –D: Results of Short Circuit Analysis for Chapter – 6

#### Appendix –E: Plotted Results of Stability Analysis for Chapter – 7

#### Appendix –F: Dynamic Data for Ittefaq Power (Pvt) Limited PP



# **1. Introduction**

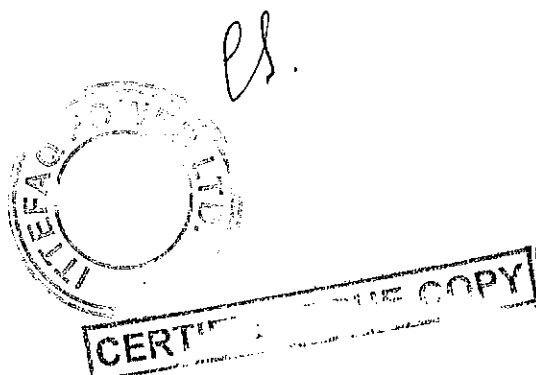
## **1.1 Background**

Ittefaq Power (Pvt) Limited would like to go for high pressure cogeneration with the aim of exporting spillover power to the National Grid. The electricity generated from this project would be supplied to the grid system of MEPCO through 132 kV grids available in the vicinity of this project. The nearest grid facility is a 132 kV R.Y.Khan-PP and 132 kV Ahmedpur-East as shown in Sketch-2 in Appendix-A.

## **1.2 Objectives**

The overall objective of the Study is to evolve an interconnection scheme between Ittefaq PP and MEPCO network, for stable and reliable evacuation of the electrical power generated from this plant, fulfilling N-1 reliability criteria. The specific objectives of this report are:

1. To develop scheme of interconnections at 132 kV for which right of way (ROW) and space at the terminal substations would be available.
2. To determine the performance of interconnection scheme during steady state conditions of system, normal and N-1 contingency, through load-flow analysis.
3. To check if the contribution of fault current from this new plant increases the fault levels at the adjoining substations at 132 kV voltage levels to be within the rating of equipment of these substations, and also determine the short circuit ratings of the proposed equipment of the substation at Ittefaq PP .
4. To check if the interconnection withstands dynamic stability criteria of post fault recovery with good damping.





### 1.3 Planning Criteria

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

#### **Steady State:**

Voltage	$\pm 5 \%$ , Normal Operating Condition $\pm 10 \%$ , Contingency Conditions
Frequency	50 Hz Nominal 49.8 Hz to 50.2 Hz variation in steady state 49.4 - 50.5Hz, Min/Max Contingency Freq. Band

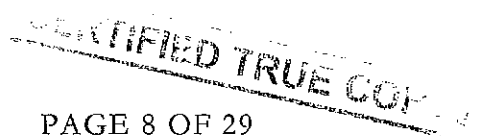
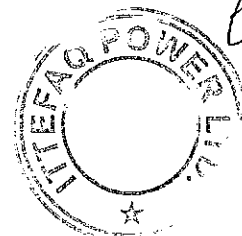
#### **Short Circuit:**

Substation Equipment Rating for 132 kV should be 31.5 kA or 40 kA.

#### **Dynamic/Transient:**

The system should revert back to normal condition after dying out of transients without losing synchronism with good damping after permanent three-phase fault on any primary transmission element; including: transmission circuit, substation bus section, transformer, or circuit breaker. It is assumed that such a fault shall be cleared by the associated circuit breaker action in 5 cycles.

In case of failure of primary protection (stuck breaker case), the total fault clearing time from the instant of initiation of fault current to the complete interruption of current to isolate the faulted element, including the primary protection plus the backup protection to operate and isolate the fault, is equal to 180 ms (9 cycles) for 132 kV and higher voltage levels.



## 2. Assumptions of Data

The number of generating units at Ittefaq PP is one. The following data have been provided by the Client:

### 2.1 Ittefaq PP data

Generator data:

Gross capacity of power plant =  $1 \times 31.2 = 31.2$  MW

Lump sum MVA capacity =  $1 \times 39 = 39$  MVA

Generating Voltage = 11 kV

Power factor = 0.80 lagging

#### Crushing Season:

Load = 4.75 MW

Auxiliary Consumption = 2.59 MW

Spillover to the Grid = 23.86 MW

#### Off-Season:

Load = 0.5 MW

Auxiliary Consumption = 2.59 MW

Spillover to the Grid = 28.11 MW

GSU Transformer = 30/40 MVA (x2)

GSU Transformer reactance = 12.5 %

### 2.2 Network data

The latest Generation Expansion Plan and Load Forecast has been used as provided by NTDC and is shown in Appendix-A.

The 132 kV network in the area near Ittefaq PP are as shown in Sketches in Appendix-A. The system data of MEPCO has been used as already available with PPI.



### **3. Study Approach and Methodology**

#### **3.1 Understanding of the Problem**

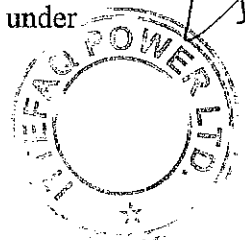
Ittefaq Power (Pvt) Limited would like to go for high pressure cogeneration with the aim of exporting a maximum of 28.11 MW supply to the grid during the Off-Season and 23.86 MW in Crushing Season. The proposed Power Project is going to be embedded in the transmission network of MEPCO through this nearest available 132 kV network.

The adequacy of MEPCO network of 132 kV in and around the proposed site of Ittefaq PP has been investigated in this study for absorbing and transmitting this power fulfilling the reliability criteria.

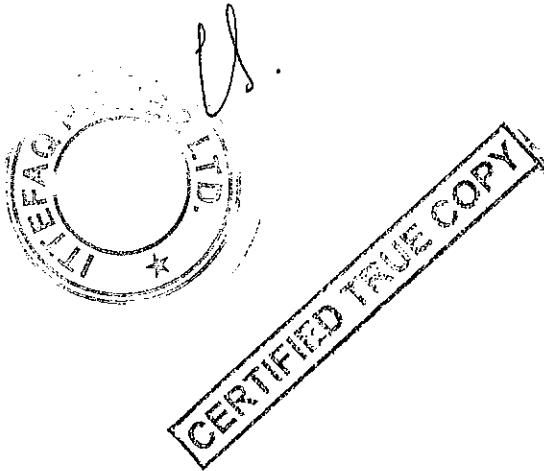
#### **3.2 Approach to the problem**

The consultant has applied the following approaches to the problem:

- A base case network model has been prepared for January 2019 (Crushing Season) and September 2019 (Off-Season) after the commissioning of Ittefaq PP in November 2018, comprising all 500 kV, 220 kV and 132 kV system, envisaging the load forecast, the generation additions and transmission expansions for that year particularly in MEPCO.
- Month of January 2019 and September 2019, while representing Crushing Season and Off-Season respectively, also represent low water and high water conditions respectively in the grid system. Thus both the high water and low water flow patterns can be observed allowing us to judge the maximum impact of the plant on the transmission system in its vicinity. In addition, case for extended term scenario of the year 2021 has also been studied.
- Interconnection scheme without any physical constraints, like right of way or availability of space in the terminal substations, have been identified.
- Perform technical system studies for peak load conditions to confirm technical feasibility of the interconnections. The scheme will be subjected to standard analysis like load flow, short circuit, and transient stability study to check the strength of the machines and the proposed interconnection scheme under disturbed conditions.



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



## **4. Development of Scheme of Interconnection**

### **4.1 The Existing and Ongoing Network**

The existing 132 kV network available around Ittefaq PP is shown in Sketch-1 in Appendix-A.

The system around Ittefaq PP has other co-generation power plants in the vicinity like Hamza Power Plant, RYK Unit I and Unit II. The existing network of MEPCO in the vicinity of Ittefaq PP is notorious for low voltages and problems of circuit overloading in contingency conditions. A joint meeting was held in GM (Planning), NTDC office on 5<sup>th</sup> and 6<sup>th</sup> of October 2016 to address and resolve these issues. The reinforcements proposed in the meeting are:

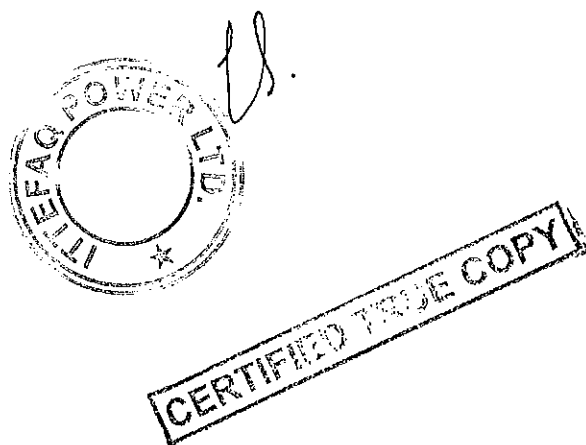
- The double circuit, initially proposed from R. Y. Khan-New to Khanpur on Rail conductor should instead be laid from R. Y. Khan-New to Feroza. The length of this circuit would be 35 km.
- A double circuit on Rail conductor from R. Y. Khan-New should be laid such that it is looped in-out at the R. Y. Khan-Old to R. Y. Khan Industrial Estate 132 kV circuit. The length of this circuit would be approximately 50 km and the looping point is 6 km from both R. Y. Khan-Old and R. Y. Khan Industrial Estate 132 kV Grid Station. It was further proposed that although the circuit from R. Y. Khan-Old to R. Y. Khan Industrial Estate is on Lynx conductor, the portion of the transmission from the looping point to R. Y. Khan-old should be replaced with Rail conductor.

In addition, MEPCO has also taken steps to improve the voltage profile of this area by proposing capacitors at Ahmedpur-East (24 MVAR) and Uch-Sharif (12 MVAR).



#### **4.2 The Scheme of Interconnection of Ittefaq PP**

Keeping in view of the above mentioned 132 kV network available in the vicinity of the site of the Ittefaq PP and the reinforcements proposed in this area, the interconnection scheme for Ittefaq has been developed. According to the new scheme, Ittefaq PP will be looped in-out at one of the existing single circuit from R. Y. Khan-PP to Ahmedpur-East. The looping distance would be 2 km. The scheme is shown in Sketch-2 in Appendix-A. The network of Ittefaq PP has been modeled at 132 kV and 11 kV.



## 5. Detailed Load Flow Studies

### 5.1 Peak Case Load Flow January 2019, without Ittefaq PP

A base case has been developed for the peak load of January 2019 using the network data of NTDC and MEPCO available with PPI, after updating with latest load forecast and expansion plan of NTDC and MEPCO. The peak load of the year 2018-19 for MEPCO has been modeled as per the latest PMS Demand forecast obtained from NTDC.

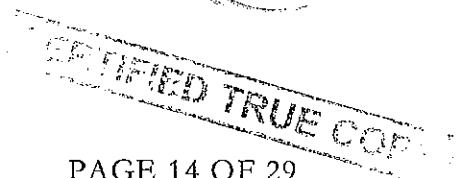
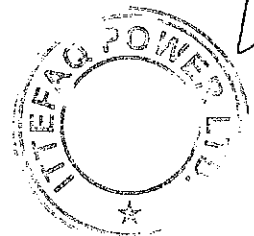
The results of load flow for this base case are plotted in Exhibit 0.0 of Appendix-C. The system plotted in this Exhibit comprises of 132 kV network feeding Ahmedpur-East, R. Y. Khan-PP, Khanpur, Feroza, Khanbela and the surrounding areas.

The load flow results show that the power flows on all the circuits are within their normal rating. The voltage profile of these surrounding substations is also within normal limits.

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

Exhibit-0.1	RYK-PP to Ahmedpur-East 132kV Single Circuit Out
Exhibit-0.2	Feroza to RYK-PP 132kV Single Circuit Out
Exhibit-0.3	Feroza to Khanpur 132kV Single Circuit Out
Exhibit-0.4	RYK-New to Feroza 132kV Single Circuit Out
Exhibit-0.5	Bahawalpur-New to Mubarakpur 132kV Single Circuit Out
Exhibit-0.6	Mubarakpur to Ahmedpur-East 132kV Single Circuit Out

We see that in all the cases the power flows on all circuits remain within their rated limit. Also the bus voltages are within the acceptable operating range.



## **5.2 Peak Case Load Flow January 2019, with Ittefaq PP in Crushing Season**

The scheme of interconnection modeled in the load flow for Ittefaq PP is as described in Chapter-4.

Load flow studies have been carried out for January 2019 because it represents the maximum thermal power dispatch conditions in the grid during the Crushing Season condition of Ittefaq PP. Thus the loading on the lines in the vicinity of Ittefaq PP will be maximum, allowing us to judge the maximum impact of the plant on the transmission system in its vicinity. The results of load flow with Ittefaq PP interconnected as per proposed scheme are shown in Appendix-C.

The results of Normal case of Peak January 2019 are plotted in Exhibit 1.0. We find no capacity constraints on 132 kV circuits under normal conditions i.e. without any outages of circuits.

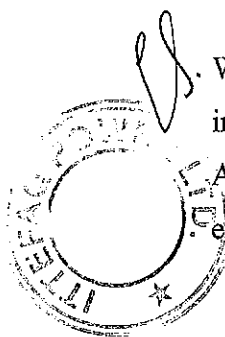
The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of  $\pm 5\%$  off the nominal.

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

Exhibit-1.1	Ittefaq-PP 132/11 kV Single Transformer Out
Exhibit-1.2	Ittefaq-PP to Ahmedpur-East 132kV Single Circuit Out
Exhibit 1.3	RYK-PP to Ittefaq-PP 132kV Single Circuit Out
Exhibit-1.4	RYK-PP to Feroza 132kV Single Circuit Out
Exhibit-1.5	Feroza to Khanpur 132kV Single Circuit Out
Exhibit-1.6	RYK-New to Feroza 132kV Single Circuit Out
Exhibit-1.7	Bahawalpur-New to Mubarakpur 132kV Single Circuit Out
Exhibit-1.8	Ahmedpur-East to Mubarakpur 132kV Single Circuit Out

We see that in all the contingency cases, in the event of outage of any circuit, the intact circuits remain within the rated capacity.

Also the bus bar voltages are well within the permissible limits in all the contingency events.





### **5.3 Peak Case Load Flow September 2019, with Ittefaq PP in Off-Season**

The scheme of interconnection modeled in the load flow for Ittefaq PP is as described in Chapter-4.

Load flow studies have been carried out for September because it represents the maximum hydropower dispatch conditions in the grid during the Off-Season of Ittefaq PP. Thus the loading on the lines in the vicinity of Ittefaq PP will be maximum, allowing us to judge the maximum impact of the plant on the transmission system in its vicinity. The results of load flow with Ittefaq PP interconnected as per proposed scheme are shown in Appendix-C.

The results of Normal case of Peak September 2019 are plotted in Exhibit 2.0. We find no capacity constraints on 132 kV circuits under normal conditions i.e. without any outages of circuits.

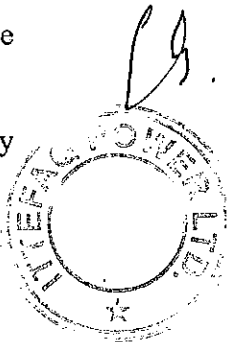
The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of  $\pm 5\%$  off the nominal.

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

Exhibit-2.1	Ittefaq-PP 132/11 kV Single Transformer Out
Exhibit-2.2	Ittefaq-PP to Ahmedpur-East 132kV Single Circuit Out
Exhibit 2.3	RYK-PP to Ittefaq-PP 132kV Single Circuit Out
Exhibit-2.4	RYK-PP to Feroza 132kV Single Circuit Out
Exhibit-2.5	Feroza to Khanpur 132kV Single Circuit Out
Exhibit-2.6	RYK-New to Feroza 132kV Single Circuit Out
Exhibit-2.7	Bahawalpur-New to Mubarakpur 132kV Single Circuit Out
Exhibit-2.8	Mubarakpur to Ahmedpur-East 132kV Single Circuit Out

We see that in all the contingency cases, in the event of outage of any circuit, the intact circuits remain within the rated capacity.

Also the bus bar voltages are well within the permissible limits in all the contingency events.



#### **5.4 Peak Load Case 2021: Extended Term Scenario**

We have also studied the future scenario of Year 2021 to assess the impact of the plant in the extended term.

The results of Normal case of Peak 2021 are plotted in Exhibit 3.0. The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of  $\pm 5\%$  off the nominal.

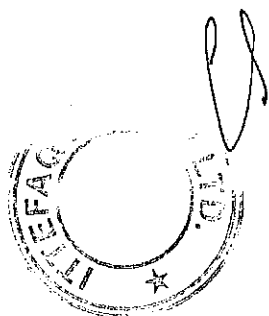
We find no capacity constraints on 132 kV circuits under normal conditions i.e. without any outages of circuits.

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

Exhibit-3.1	Ittefaq-PP 132/11 kV Single Transformer Out
Exhibit-3.2	Ittefaq-PP to Ahmedpur-East 132kV Single Circuit Out
Exhibit-3.3	Ittefaq-PP to RYK-PP 132kV Single Circuit Out
Exhibit-3.4	RYK-PP to Feroza 132kV Single Circuit Out
Exhibit-3.5	Feroza to Khanpur 132kV Single Circuit Out
Exhibit-3.6	RYK-New to Feroza 132kV Single Circuit Out
Exhibit-3.7	Bahawalpur-New to Mubarakpur 132kV Single Circuit Out
Exhibit-3.8	Mubarakpur to Ahmadpur-East 132 KV Single Circuit Out

The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of  $\pm 10\%$  off the nominal for contingency conditions' criteria

We find that there are no capacity constraints in the proposed connectivity scheme of Ittefaq PP.

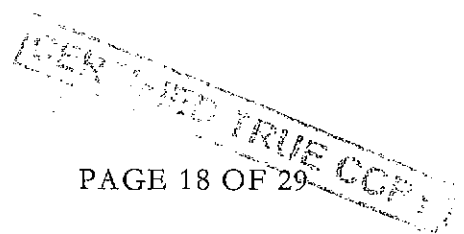


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### **5.5 Conclusion of Load Flow Analysis**

The proposed interconnection scheme of Ittefaq PP is adequate to evacuate the spillover electrical power from Ittefaq PP under normal and contingency conditions tested for peak load conditions of January 2019, September 2019 and extended term scenario of the Year 2021. In all the normal and contingency cases, we find that the loading on the circuits remain within the rated capacity. Also the bus bar voltages are well within the permissible limits in all the normal and contingency events. Hence the proposed interconnection scheme of Ittefaq PP has no constraints according to the Load Flow Analysis.



## **6. Short Circuit Analysis**

### **6.1 Methodology and Assumptions**

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

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

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

For evaluation of maximum short circuit levels we have assumed contribution in the fault currents from all the installed generation capacity of hydel, thermal and nuclear plants in the system in the year 2019-20 i.e. all the generating units have been assumed on-bar in fault calculation's simulations.

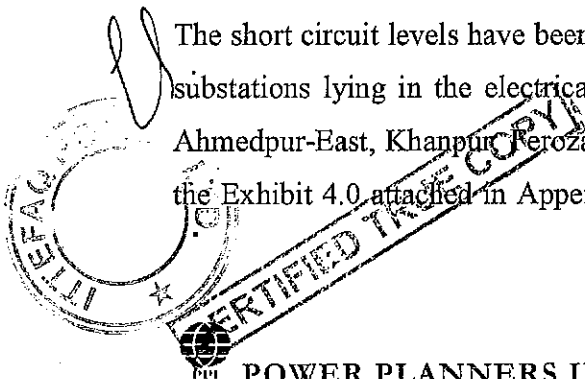
The assumptions about the generator and the transformers data are the same as mentioned in Ch.2 of this report.

### **6.2 Fault Current Calculations without Ittefaq PP – Year 2018-19**

In order to assess the short circuit strength of the network of 132 kV without Ittefaq PP for the grid of MEPCO in the vicinity of the site of the Plant, fault currents have been calculated for balanced three-phase and unbalanced single-phase short circuit conditions. These levels will give us the idea of the fault levels without Ittefaq PP and later on how much the contribution of fault current from Ittefaq PP may add to the existing levels.

The results are attached in Appendix – D.

The short circuit levels have been calculated and plotted on the bus bars of 132 kV of substations lying in the electrical vicinity of our area of interest i.e. R.Y.Khan-PP, Ahmedpur-East, Khanpur Piroza and surrounding bus bars and are shown plotted in the Exhibit 4.0 attached in Appendix-D. Both 3-phase and 1-phase fault currents are



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

The tabular output of the short circuit calculations is also attached in Appendix-D for the 132 kV bus bars of our interest i.e. the substations connecting in the 132 kV circuits lying close to R.Y.Khan-PP, Ahmedpur-East, Khanpur, Feroza. The total maximum fault currents for 3-phase and 1-phase short circuit at these substations are summarized in Table 6.1. We see that the maximum fault currents do not exceed the short circuit ratings of the equipment at these 132 kV substations which normally are 20 kA, 25 kA or 31.5 kA for older substations and 40 kA for new substations.

**Table-6.1**  
**Maximum Short Circuit Levels without Ittefaq PP - Year 2018-19**

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Ahmedpur-East 132kV	4.14	4.90
Uch Sharif 132kV	2.94	3.30
R.Y.K-PP 132kV	5.54	5.42
Khanbela 132kV	4.62	4.25
Feroza 132kV	9.56	9.03
R.Y.K-New 132kV	15.98	15.47
Khanpur 132kV	9.92	10.29

### **6.3 Fault Current Calculations with Ittefaq PP – Year 2019-20**

Fault currents have been calculated for the electrical interconnection of proposed scheme. Fault types applied are three phase and single-phase at 132 kV bus bars of Ittefaq PP itself and other bus bars of the 132 kV substations in the electrical vicinity of Ahmedpur-East, R.Y.Khan-PP, Khanpur, Feroza. The graphic results showing maximum 3-phase and 1-phase fault levels are indicated in Exhibit 4.1. Both 3-phase and 1-phase fault currents are indicated in the Exhibit which are given in polar coordinates i.e. the magnitude and the angle of the current. The total fault currents are shown below the bus bar.

The tabulated results of short circuit analysis showing all the fault current contributions with short circuit impedances on 132 kV bus bars of the network in the



electrical vicinity of Ittefaq PP are placed in Appendix-D. Brief summary of fault currents at significant bus bars of our interest are tabulated in Table 6.2

**Table-6.2**  
**Maximum Short Circuit Levels with Ittefaq PP – Year 2019-20**

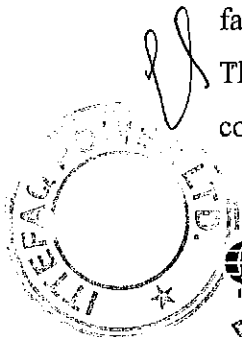
Substation	3-Phase fault current, kA	1-Phase fault current, kA
Ittefaq-PP 132kV	4.58	4.84
Ahmedpur-East 132kV	4.51	5.35
Uch Sharif 132kV	3.13	3.47
R.Y.K-PP 132kV	5.84	5.68
Khanbela 132kV	4.67	4.29
Feroza 132kV	9.79	9.19
R.Y.K-New 132kV	16.28	15.74
Khanpur 132kV	10.08	10.42

Comparison of Tables 6.1 and 6.2 show slight increase in short circuit levels for three-phase and single – phase faults due to connection of Ittefaq PP on the 132 kV bus bars in its vicinity. We find that even after some increase, these fault levels are below the rated short circuit values of the equipment installed on these substations. The maximum short circuit level of Ittefaq PP 132 kV is 4.58 kA and 4.84 kA for 3-phase and 1-phase faults respectively.

#### **6.4 Fault Current Calculations with Ittefaq PP – Year 2021**

Fault currents have been calculated for the electrical interconnection of proposed scheme in the year 2021. Fault types applied are three phase and single-phase 132 kV bus bars of Ittefaq PP itself and other bus bars of the 132 kV substations in the electrical vicinity of R.Y.Khan-PP, Ahmedpur-East, Khanpur, Feroza. The graphic results showing maximum 3-phase and 1-phase fault levels are indicated in Exhibit 4.2. Both 3-phase and 1-phase fault currents are indicated in the Exhibit which are given in polar coordinates i.e. the magnitude and the angle of the current. The total fault currents are shown below the bus bar.

The tabulated results of short circuit analysis showing all the fault current contributions with short circuit impedances on 132 kV bus bars of the network in the

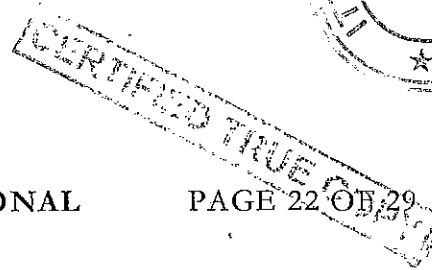
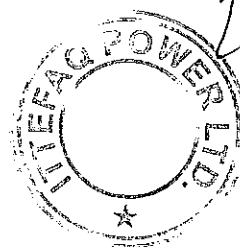


electrical vicinity of Ittefaq PP are placed in Appendix-D. Brief summary of fault currents at significant bus bars of our interest are tabulated in Table 6.3

**Table-6.3**  
**Maximum Short Circuit Levels with Ittefaq PP – Year 2021**

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Ittefaq-PP 132kV	4.66	4.92
Ahmedpur-East 132kV	4.58	5.47
Uch Sharif 132kV	3.16	3.52
R.Y.K-PP 132kV	6.02	5.85
Khanbela 132kV	4.90	4.49
Feroza 132kV	10.31	9.67
R.Y.K-New 132kV	17.44	16.81
Khanpur 132kV	10.62	10.97

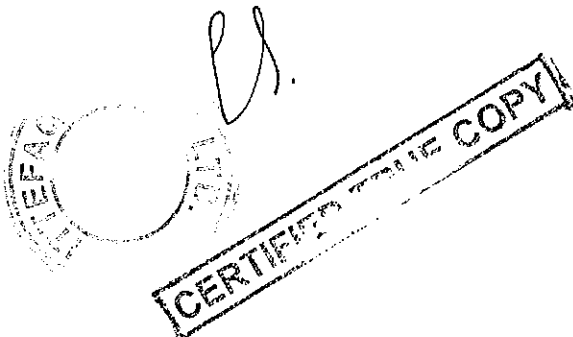
We find that the short circuit levels have increase a little more in the future scenario but are still below the rated short circuit values of the equipment installed on these substations. The maximum short circuit level of Ittefaq PP 132 kV is 4.66 kA and 4.92 kA for 3-phase and 1-phase faults respectively. It would be advisable to go for standard size switchgear of short circuit rating of 40 kA. It would provide large margin for any future increase in short circuit levels due to future generation additions and network reinforcements in this area.



## **6.5 Conclusion of Short Circuit Analysis**

The short circuit analysis results show that for the proposed scheme of interconnection of Ittefaq PP there is no problem of violations of short circuit ratings of the already installed equipment on the 132 kV equipment of substations in the vicinity of Ittefaq PP due to fault current contributions from this power house under three-phase faults as well as single phase faults.

The short circuit level of the Ittefaq PP 132 kV is 4.58 kA and 4.84 kA for 3-phase and 1-phase faults respectively for the year 2019-20. The same values for the year 2021 are 4.66 kA and 4.92 kA. Therefore industry standard switchgear of the short circuit rating of 40 kA would be fine to be installed at 132 kV switchyard of Ittefaq PP taking care of any future generation additions and system reinforcements in its electrical vicinity and also fulfill the NEPRA Grid Code requirements specified for 132 kV switchgear.





## **7. Dynamic Stability Analysis**

### **7.1 Assumptions & Methodology**

#### **7.1.1 Dynamic Models**

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

We have employed the generic dynamic models available in the PSS/E model library for dynamic modeling of the generator, exciter and the governor as follows;

Generator	GENROU
Excitation System	EXST1
Speed Governing System	TGOV1
Inertia Constant	$H = 2.321 \text{ MW-sec/MVA}$

#### **7.1.2 System Conditions**

The proposed scheme as described in Chapter-4 has been modeled in the dynamic simulation.

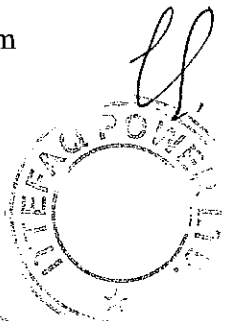
All the power plants of WAPDA/PEPCO and IPPs from Tarbela to Hub have been dynamically represented in the simulation model.

#### **7.1.3 Presentation of Results**

The plotted results of the simulations runs are placed in Appendix-E. Each simulation is run for its first one second for the steady state conditions of the system prior to fault or disturbance. This is to establish the pre fault/disturbance conditions of the network under study were smooth and steady. Post fault recovery has been monitored for nine seconds. Usually all the transients due to non-linearity die out within 3-4 seconds after disturbance is cleared in the system.

#### **7.1.4 Worst Fault Cases**

Three phase faults are considered as the worst disturbance in the system. We have considered 3-phase fault in the closest vicinity of Ittefaq PP i.e. right at the 132 kV bus bar of Ittefaq PP substation, cleared in 5 cycles, as normal clearing time for 132 kV i.e. 100 ms, followed by a permanent trip of single 132 kV circuit emanating from this substation.

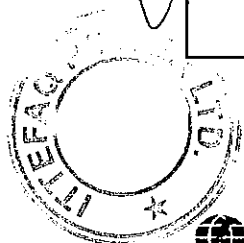


## 7.2 Dynamic Stability Simulations' Results with Ittefaq PP in Crushing Season

Three-phase faults were applied on 132 kV bus bars, followed by clearing of fault in 5 cycles (100 ms) or 9 cycles (180 ms) and then tripping of a circuit between the faulted bus and a nearby grid station. Different quantities were monitored for one second pre-fault and nine second after clearance of fault (post-fault) conditions and the results are plotted in Appendix – E. These fault locations and monitored quantities are discussed one by one as follows;

### 7.2.1

<b>Fault Location: Ittefaq PP 132 kV bus bar</b>			
<b>Fault Duration: 5 cycles (100 ms)</b>			
<b>Line Tripping: Ittefaq PP to Ahmedpur-East 132 kV Single Circuit</b>			
<b>Variable</b>	<b>Bus/Line</b>	<b>Response</b>	<b>Figure No.</b>
<b>Voltage</b>	1. Ittefaq PP 132 kV 2. Ahmedpur-East 132kV 3. R.Y.K-PP 132 kV 4. Feroza 132 kV 5. R.Y. Khan-New 132 kV 6. Khanpur 132 kV	The voltages of all the bus bars recover after fault clearance	1.1
<b>Frequency</b>	Ittefaq PP 11 kV	Recovers after fault clearance	1.2
<b>MW/MVAR Output of the Plant</b>	Ittefaq PP 11 kV	Recovers after damping down oscillations	1.3
<b>Speed and <math>P_{mechanical}</math> of the Plant</b>	Ittefaq PP 11 kV	Recovers after damping down oscillations	1.4
<b>Line Flows (MW/MVAR)</b>	Ittefaq PP to R. Y. Khan-PP 132 kV intact single circuit	Attains steady state value after damping of oscillations	1.5
<b>Rotor Angles</b>	1. Ittefaq PP 11 kV 2. Hamza Unit-II 11 kV 3. B.W.P-Energy-PP 11 kV 4. R.Y.K Unit – II 11 kV 5. Etihad-PP 11 kV 6. Hub 500 kV (reference angle)	Damps down and attain a steady state value	1.6



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### 7.2.2

<b>Fault Location:</b> Ittefaq PP 132 kV bus bar			
<b>Fault Duration:</b> 9 cycles (100 ms)			
<b>Line Tripping:</b> Ittefaq PP to Ahmedpur-East 132 kV Single Circuit			
Variable	Bus/Line	Response	Figure No.
<b>Voltage</b>	1. Ittefaq PP 132 kV 2. Ahmedpur-East 132kV 3. R.Y.K-PP 132 kV 4. Feroza 132 kV 5. R.Y. Khan-New 132 kV 6. Khanpur 132 kV	The voltages of all the bus bars recover after fault clearance	2.1
<b>Frequency</b>	Ittefaq PP 11 kV	Recovers after fault clearance	2.2
<b>MW/MVAR Output of the Plant</b>	Ittefaq PP 11 kV	Recovers after damping down oscillations	2.3
<b>Speed and P<sub>mechanical</sub> of the Plant</b>	Ittefaq PP 11 kV	Recovers after damping down oscillations	2.4
<b>Line Flows (MW/MVAR)</b>	Ittefaq PP to R. Y. Khan-PP 132 kV intact single circuit	Attains steady state value after damping of oscillations	2.5
<b>Rotor Angles</b>	1. Ittefaq PP 11 kV 2. Hamza Unit-II 11 kV 3. B.W.P-Energy-PP 11 kV 4. R.Y.K Unit – II 11 kV 5. Etihad-PP 11 kV 6. Hub 500 kV (reference angle)	Damps down and attain a steady state value	2.6

### 7.2.3

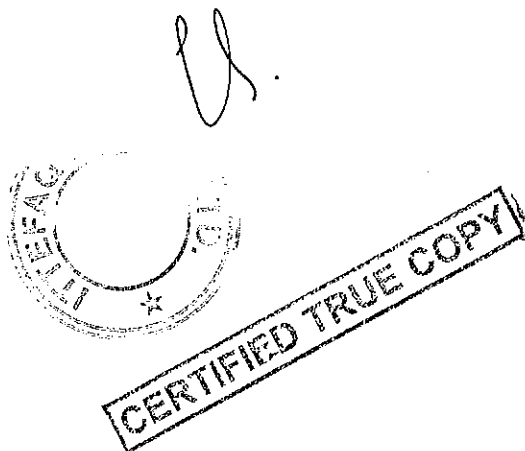
<b>Fault Location:</b> Ahmedpur-East 132 kV bus bar			
<b>Fault Duration:</b> 9 cycles (180 ms)			
<b>Line Tripping:</b> Ahmedpur-East to Ittefaq PP 132 kV Single Circuit			
Variable	Bus/Line	Response	Figure No.
<b>Voltage</b>	1. Ahmedpur-East 132kV 2. Ittefaq PP 132 kV 3. R.Y.K-PP 132 kV 4. Feroza 132 kV 5. R.Y. Khan-New 132 kV	The voltages of all the bus bars recover after fault clearance	3.1



	6. Mubarakpur 132 kV		
<b>Frequency</b>	Ittefaq PP 11 kV	Recovers after fault clearance	3.2
<b>MW/MVAR Output of the Plant</b>	Ittefaq PP 11 kV	Recovers after damping down oscillations	3.3
<b>Speed and <math>P_{\text{mechanical}}</math> of the Plant</b>	Ittefaq PP 11 kV	Recovers after damping down oscillations	3.4
<b>Line Flows (MW/MVAR)</b>	Ahmedpur-East to Mubarakpur 132 kV intact single circuit	Attains steady state value after damping of oscillations	3.5
<b>Rotor Angles</b>	1. Ittefaq PP 11 kV 2. Hamza Unit-II 11 kV 3. B.W.P-Energy-PP 11 kV 4. R.Y.K Unit – II 11 kV 5. Etihad-PP 11 kV 6. Hub 500 kV (reference angle)	Damps down and attain a steady state value	3.6

### 7.3 Conclusion of Dynamic Stability Analysis

The results of dynamic stability show that the system is very strong and stable for the proposed scheme for the severest possible faults of 132 kV systems near to and far of Ittefaq PP. Therefore there is no problem of dynamic stability for interconnection of Ittefaq PP; it fulfills all the criteria of dynamic stability.

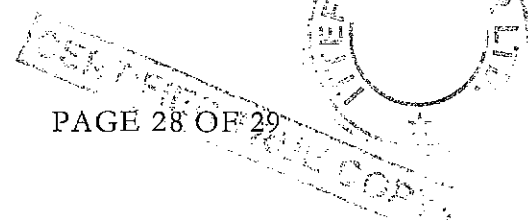


## 8. Conclusions

- ❖ Ittefaq Power (Pvt) Limited would like to go for high pressure cogeneration with the aim of exporting spillover power to the national grid during the crushing season (from November to March and Off-Season (April to October).
- ❖ The nearest MEPCO grid facility available for interconnection to Ittefaq PP is the R.Y.Khan-PP 132 kV Grid Station and the Ahmedpur-East 132 kV Grid Station. A 132 kV Single circuit on lynx conductor between R.Y.Khan-PP and Ahmedpur-East is being operated which passes about 73 km away from the location of Ittefaq PP. R.Y.Khan-II is tapped at this circuit as shown in Sketch-1 in Appendix-A
- ❖ The most feasible interconnection scheme, as suggested by MEPCO Grid System Construction Organization, would be looping in-out one direct circuit between R.Y.Khan-PP 132 kV and Ahmedpur-East 132 kV Grid Station at the proposed Ittefaq PP 132 kV grid as shown in Sketch-2 in Appendix-A. The looping distance would be 2 km and the conductor will be Lynx.
- ❖ Ittefaq PP will generate at 11 kV voltage level from where it is stepped-up to 132 kV using two 30/40 MVA 132/11 kV transformers.
- ❖ The proposed scheme will require two breaker bays of 132 kV at Ittefaq PP to connect with the 132 kV circuits with R.Y.Khan-PP and Ahmedpur-East and two transformer bays to connect to two 30/40 MVA 132/11 kV transformers.
- ❖ With the gross capacity of 31.2 MW, the spillover from Ittefaq PP would be 28.11 MW in Off-Season and 23.86 MW in the Crushing Season.
- ❖ In view of planned COD of the Ittefaq PP in November 2018, the above proposed interconnection scheme has been tested for steady state conditions through detailed load flow studies for the peak conditions of
  - January 2019 for maximum thermal power dispatches in the grid during the Crushing Season
  - September 2019 for maximum hydropower dispatches in the grid during the Off-Season.

The system conditions of normal and N-1 contingency have been studied to meet the reliability criteria of NEPRA Grid Code.

- ❖ The proposed scheme of interconnection has also been tested for the extended term scenario of peak load conditions of the year 2021 for steady state conditions.



- ❖ Steady state analysis by load flow for all the scenarios described above reveals that the proposed scheme is adequate to evacuate the spillover up to 28.11 MW power of the Plant under normal as well as contingency conditions with some load shedding required for certain line outages in winter and summer peak due to excessive load in MEPCO area.
- ❖ The short circuit analysis has been carried out to calculate maximum fault levels at Ittefaq PP and the substations of 132 kV in its vicinity. We find that the fault currents for the proposed scheme are within the rated short circuit capacities of switchgear installed at these substations. There are no violations of exceeding the rating of the equipment due to contribution of fault current from Ittefaq PP.
- ❖ The maximum short circuit levels of Ittefaq PP 132 kV is 4.58 kA and 4.84 kA for 3-phase and 1-phase faults respectively for the Year 2019-20 and 4.66 kA and 4.92 kA for 3-phase and 1-phase faults respectively for the Year 2021. It would be advisable to go for standard size switchgear of short circuit rating of 40 kA. It would provide large margin for any future increase in short circuit levels due to future generation additions and network reinforcements in this area.
- ❖ The dynamic stability analysis of proposed scheme of interconnection has been carried out for January 2019. The stability check for the worst case of three phase fault right on the 132 kV bus bar of Ittefaq PP substation followed by the final trip of one 132 kV circuit emanating from this substation, has been performed for fault clearing of 5 (100 ms) and 9 cycles (180 ms), in case of stuck breaker, as understood to be the normal fault clearing time of 132 kV protection system. The stability of system for far end faults of 3-phase occurring at 132 kV bus bar have also been checked. The proposed scheme successfully passed the dynamic stability checks for near and far faults for the most stringent cases. The system is found strong enough to stay stable and recovered with fast damping.
- ❖ The proposed scheme of interconnection has no technical constraints or problems, it fulfills all the criteria of reliability and stability under steady state load flow, contingency load flows, short circuit currents and dynamic/transient conditions; and is therefore recommended to be adopted.

