

SCHEDULE I [Regulation 3(1)]

FORM OF APPLICATION

The Registrar National Electric Power Regulatory Authority Islamabad

Re: Application for Generation License

I, Farhan Javed, being the duly authorized representative of Etihad Power Generation Limited ("EPGL") by virtue of Board Resolution dated 25/11/2014, hereby apply to the National Electric Power Regulatory Authority for the grant of a Generation License to EPGL 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 (the "1999 Regulations"), and undertake to abide by the terms and provisions of the above said regulations. 1 further undertake and confirm that the information provided in the attached documents in support is true and correct to the best of my knowledge and belief.

A demand draft No. 00172987 dated 26/11/2014 drawn on Bank Alfalah, G-II Markaz Branch, Islamabad in the sum of Rupees three hundred and forty six thousands eight hundred (Rs.3,468,00) being the non refundable license application fee calculated in accordance with Schedule II to the 1999 Regulations, is also attached herewith.

Best regards. Very truly yours Farhan Javed General Manager Etihad Power Generation Limited

ETIHAD POWER GENERATION LIMITED

ADDRESS: 91-F, MODEL TOWN. LAHORE. PAKISTAN TEL: +92-42-35926485-87 | FAX-+92-42-35926490



EXTRACT OF RESOLUTION PASSED IN THE MEETING OF BOARD OF DIRECTORS OF THE COMPANY HELD AT REGISTERED OFFICE ON <u>NOVEMBER 25, 2014</u> AT <u>11:00</u> AM

"Resolved that Mr. Zaheer Ahmad Ghanghro (Project Director), Mr. Farhan Javed (General Manager), Mr. Usman Ahsan (Project Development Manager), and Mr. Abid Rasool (Manager Corporate Affairs), 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 Generation License application to be filed with National Electric Power Regulatory Authority ("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:

(a) Represent the Company before NEPRA, and in doing so perform all lawful acts, deeds and things which we shall be entitled or permitted to do ourselves, 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

(b) Do all acts, deeds and things, which are ancillary and incidental to the afore-said purposes and issuance of Generation License."

Sd/-Chairman

Certified to be true copy (Company Secretary)

(Company Secretary) COMPANY SECRETARY SLAFAR ABBAS KAZMI





COMPANY REGISTRATION OFFICE, LAHORE

CERTIFICATE OF INCORPORATION

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

Corporate Universal Identification No.0087957

I hereby certify that <u>ETIHAD POWER GENERATION</u> <u>LIMITED</u> S this for mean order the Companies Ordinance, 1984 (XLVII of 1984) and that the company Climited by Shares.

Given And at Lahore this Twenty First day of April, Two

Thousand and Fourteen.

Fee Rs<u>.5,000/-</u>





(SHAUKAT HAMEED) Joint Registrar of Companies

ETIHAD POWER GENERATION

ETIHAD POWER GENERATION

THE COMPANIES ORDINAN

COMPANY LIMITED BY SHARES

MEMORANDUM OF ASSOCIATION

OF

ETIHAD POWER GENERATION LIMITED

NAME

I. The name of company is ETIHAD POWER GENERATION LIMITED

REGISTERED OFFICE

II. The registered office of the company shall be situated in the province of the Punjab.

OBJECTS

III. The objects for which the company is established are to undertake any or all of the following business in and outside Pakistan:

1. To carry on the business of power generation and in relation thereto, to generate, accumulate, transmit, distribute and sell electric power anywhere in Pakistan using conventional and non-conventional fuel/energy resources (including bagasse, natural gas, oil, coal, solar, hydel, wind, bio-mass or any other energy resources whether indigenous or imported), to the public sector, including Pakistan Electric Power Company (Private) Linuted, National Transmission and Dispatch Company Limited, Government and Government bodiess and the private sector subject to any permission required under the law.

2. To design, finance, insure, build, establishter operate takeover, maintain, manage, power generation units, sub-stations, work shops, repartitions, work shops, repartitions, cables, transmission lines, accumulators for the purpose of conservation, distribution and supply of electricity to private and public sector companies/organizations for industrial, commercial, domestic, public and other purposes and also to provide regular services for repairing and maintenance of all distribution and supply lines subject to permission required under any law

3. To install, operate, use, inspect, maintain, repair, replace, and remove cables, lines, ducts, transformers, switchgear (remotely controlled and otherwise and including time switches), fuses, circuit breakers, electricity services equipment, meters and other devices for measuring or controlling the quantity or quality of electricity supplied, prepayment and debt payment devices, items provided to afford access to, support, encase, insulate and protect from damage or tampering, the above-mentioned gadgets, or to protect people and property from injury or damage, or to comply with any legal obligation.

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

5. To apply for and obtain necessary consents, permissions and licenses from any government, provincial, local, foreign, multilateral or other authorities or entities for enabling the Company to carry any of its objects into affect or for extending any of the powers of the Company or for effecting any modification of the constitution of the Company or for any other purpose which may seem expedient, any government or authorities, foreign, federal, provincial, municipal, local or otherwise, public or quasi-public bodies, or with any other persons, in any place where the Company may have interests that may seem conductive to the objects of the Company and to obtain from any such government, authorities or persons any rights, privileges and concessions which the Company may think fit to obtain, and to carry out, exercise and comply therewith.

6. To ascertain the bulk supply tariff rates that will secure recovery of operating and other costs and a reasonable return on investment and to petition the appropriate government body for the adoption of or increase in its schedule of bulk supply tariff rates.

7. To provide or procure the provision of such facilities and see as may be necessary or desirable to forecast electricity / energy demand and to satisfy such demand.

8. To engage in reforestation and other works relative version abatement and to acquire land for this purpose.

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

10. 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.

11. To establish warehouses and to carry on the business of warehouse-men, stores, custodian, and to provide facilities for storage of commodities, articles, things, preparation of all kinds and description whatsoever, storage room, bins, godowns, cold storage, and clearing, forwarding, transportation and distribution of merchandise of all kinds.

12. To make know or give publicity to the business and productions of the company by means of advertisement in the press, radio, television and cable television or any other electronic media, pamphlets, handbills, circulars, advertisement posters, cinema, slides, electronic media/computer device or publication of books or by donations or in any other suitable mode.

13. 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 right, copyrights, licenses, 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, develop, grant licenses in respect of or otherwise turn to account any property, rights, and information so acquired, subject to any permission 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 acquire by concession, grant, purchase, barter, license either absolutely or conditionally and either solely or jointly with others any lands, buildings, machinery, plants, equipment, privileges, rights, licenses, 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.

16. To establish, promote or assist in establishing or promoting and subscribe to or become a member of any other company, association of club and subscribe to in part similar to the objects of this company or the establish ment or promoting and subscribe beneficial to the company, as permissible under the law.

17. To guarantee the performance of the costracts and obligations of the company in relation to the payment of any loan, debenture, stock, obligations of securities by or in favour of the company and to guarantee the payment or return on such investments or on any share of the company and to enter into any guarantee, contract of indemnity or suretyship and, in particular to guarantee, support or secure guarantee from banks, financial institutions etc with or without consideration, whether by personal obligation or by mortgaging or charging all or any part of the undertaking, property and assets (present and future) or by both such methods or in any other manner, the performance of any contract, obligation or commitment of, and the repayment or payment of the principal amounts of and any premiums, interest, dividends, and other moneys payable on or in respect of any securities or liabilities of, any person or company.

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18. To acquire, improve, manage, develop, exchange, sell, mortgage, franchise, dispose of or deal with all or any part of the property, rights, patents and concessions of the company.

19. To arrange for local currency and foreign currency loans from banks and financial institutions for the purposes of construction or purchase of office buildings and for the purposes. Of working capital or for any other purpose which the directors deem fit.

20. To pay all costs, charges and expenses incidental to the formation and registration of the company.

21. To sell in any manner, deal with or dispose of the undertaking or property of the company or part thereof for such consideration as the company may think fit.

22. To insure the property, assets, and employees of the company in any manner deemed fit by the company, and to create any reserve fund, sinking fund, insurance fund or any other special fund whether for depreciation or for repairing, insuring, improving, extending or maintaining any of the properties of the company or for any other purpose conducive to the interests of the company, but not to act as an insurance company.

23. To carry out joint venture agreements with other companies within the scope of the objects of the company.

24. To apply, approach, purchase, tender, auction, hold, protect, prolong, work, use or otherwise to acquire, renew or dispose of in any part of the world any patents, copyrights, trade secrets, secret processes, information, know-how, formulas, inventions, trade marks, monos, designs, licenses, concessions and the like, conferring any absolute, exclusive, non-exclusive, limited, temporary or permanent right to use or work the same or any secret or other information as to any invention which may seem capable of being used for any of the purposes of the company or the acquisition of which may seem beneficial to the company and to use, exercise, develop or grant licenses in respect of, or otherwise turn to account, the property, rights, or information so acquired, and to expend money in experimenting upon, testing or improving or seeking to improve any such patents, inventions, rights, designs or information as a propose to acquire.

25. To open, operate and close bank accounts which we with commercial banks, authorized financial institutions, Post office and government avings schemes and arrange for overdraft facilities against securities of company project.

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

27. To draw, make, accept, endorse, discount, execute and issue cheques, promissory notes, bills of exchange, bills of lading, warrants, debentures and other negotiable or transferable instruments but not to act as a banking company.

28. To aid and support any person, association, body or movement, whose object is to provide solution, or settlement, or to prevent any disputes, or labour problems connected with the company or with an industry, trade or business as a whole.

29. To raise or borrow money in local or foreign currency in such manner as the Company shall think fit in pursuance of its objects and, in particular, by commercial papers, bonds, Participation Term Certificates, Term finance Certificates,

including debentures, debenture stock and securities not based on interest for raising redeemable capital, resource funds from banks or financial institutions and to secure, if required, the repayment of any money borrowed, raised or owing by mortgage, charge, pledge, hypothecation or lien upon all or any of the property or assets of the company, both present and future, including its a secure for the time being, and also by a similar mortgage, charge, pledge, hypothecation or lien to secure

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and guarantee the performance by the Company or any other person or company of any obligation undertaken by the Company or any other person or company as the case may be ,but not to act as a finance or banking company.

30. To arrange, manage, promote, motivate, subsidies and organize training programmes for the employees, trainees and apprentices at all levels as may be conducive to the interest of the company and for the purpose to establish training centers, to organize and hold seminars, conferences, workshops, study meetings, group discussions, written tests, lectures, practical training, demonstrations and other devices and for the purpose to incur recurring and non-recurring expenses as may be necessary from time to time.

31. To secure, promote, organize, manage, or enter into collaboration agreement in all its branches with any person, firm, company, corporation, authority, body or other entity to acquire technical know-how, buy back arrangement, procurement of any nature of goods, financial assistance, training and development or for any other purpose whatsoever and subject to the law in force pay such commission, fees, royalty or other charges as may be agreed from time to time.

32. To incorporate, float, promote, constitute or form any subsidiary company or companies or to make any existing company as the subsidiary of the company for the purpose of carrying on any business or branch of a business which the company is authorized to carry on or not, and to enter into any arrangement with such subsidiary company for sharing profits and losses of any business or branch of business as carried on, or to make any other arrangement which may seem conducive with reference to any business so carried on, including power at any time to close any such branch or business.

33. To establish and maintaite or **bits of establishment** and maintenance of any contributory or non-contributory funds for the benefit of, and give or procure the giving of donations, gratuities, pensions, allowances or enformed or or other persons who are or were at any time in the employment or service of the company or of any company which is a holding company, management company or a subsidiary of the company or is allied to or associated with the company or with any such subsidiary or affiliate company, or who are or were at any time directors or officers of the company or of any such other company as aforesaid, and the wives, widows, families and qualified dependents of any such persons, and also to establish, subsidize and subscribe to institutions, associations, clubs or funds calculated to be for the benefit of or to advance the interests and well-being of the company or of any such other company as aforesaid, and make payments to or towards the insurance of any such person as aforesaid and do any of the matters aforesaid, either alone or in conjunction with any such other company as aforesaid.

34. To undertake, carry out, promote, sponsor, discharge, fulfill or assist all types of activities considered to be the social or moral responsibilities of the company to community, class of peoples, section of public or to public at large including activities for promotion of education, national welfare, ecc...mic growth, increase in standard of living, uplifting moral public, etc. by organizing seminars and lectures, publishing books and literature, distributing awards and scholarships, providing subsidies and donations to such persons or bodies on such terms and conditions as the board of directors of the company may think fit from time to time.

35. **Some set update** and hold of investments in shares, modaraba certificates, term finance certificates, musharika certificates, unit trust certificates, mutual fund certificates, debentures, debenture stock, bonds, obligations and securities issued or guaranteed by any company,



government, commission, public body or authority, supreme, municipal, local or otherwise and to dispose of investments as and when required or at the time of winding up of the company subject to any permission required by the law. But not to act as an investment company (Finance Company -

36. To accept shares, modaraba certificates, term finance certificates, musharika certificates, bonds, debentures or other securities of any other company in payment or part payment of any services rendered or for any sale made to or debt owing from any such company, subject to any permission required by the law.

37. To acquire, take over and undertake the whole or any part of business as a going concern along with all assets, liabilities, licenses, quotas, rights, entitlements etc. from any person, firm or company; to enter into partnership or into any arrangements for sharing profits, union of interests, co-operations, joint ventures, reciprocal concessions or otherwise with any person or company carrying on or engaged in, or about to carry on or engage in, any business or transaction which this company is authorized to carry on or engage in or any business or transaction capable of being conducted so as to directly or indirectly benefit this company and to guarantee the contracts of or otherwise assist any such person or company and to take or otherwise acquire shares and securities of any such company and to sell, hold, re-issue, with or without guarantee or otherwise deal with the same.

38. To procure the company to be registered or recognized in any part of the world and to do all or any of the above things in any part of the world, either as principal, agent, trustee, contractor or otherwise, alone or in collaboration with another, and either by or through agents, trustees, sub-contractors, subsidiaries or otherwise.

39. To give any director, official, servant or employee of the company's business or any branch thereof and for the purpose to enter into any agreement or scheme of arrangement as the company may cleem the arc. to procure any servants or employees of the company to be insured against, the received against, the received against and the course of their employment by the company.

40. To give charity and donations to any person, charitage institutions and other organizations as the directors of the company deemed fit.

41. To amalgamate, absorb or merge with any company or companies, firm or firms, association of persons, foreign company or association or body, whether or not having similar objects as of this company and to do all such incidental act, deeds and things as may be necessary to give effect to amalgamation, absorption or merger.

42. To advance money to staff members, customers and others having dealing with the company with or without security upon such terms as may deem expedient.

43. To sell, mortgage or dispose of the undertaking of the company or any part thereof in such manner and for such consideration as the company may think fit.

44. To distribute any of the company's property among the members in specie or in any manner whatsoever in The event of winding up of Company.

45. To do all such other things as are incidental or conducive in the opinion of the board of directors, to the attainment of the above sele objective its a parent from concerned authorities to so permissible under the law.

46. To undertake or execute any trust the undertaking of which seem to the company desirable, either gratuitously or otherwise.

47. To apply for and obtain necessary consents, permissions and licenses 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.

48. It is declared that notwithstanding anything contained in the foregoing object clauses of the memorandum of association nothing contained therein shall be constructed as empowering the company to undertake or indulge in business of banking company, banking, leasing, investment, managing agency or insurance business directly or indirectly as restricted under the law or any unlawful operation. Further that the company shall not launch multilevel marketing, pyramid and ponzi schemes.

49. It is further declared that notwithstanding anything stated in any object clause, the company shall obtain such other approval or license from the competent authority, as may be required under any law for the time being in force, to undertake a particular business.

LIABILITY OF MEMBERS

IV. The liability of the members is limited.

SHARE CAPITAL



V. The authorized share capital of the company is Ruppes, the out Ruppes One Hundred Thousand only) divided in to 10,000 (Ten Thousand) shares of Ruppes 10 (Ruppes Ten) each comprising ordinary shares and preference shares with the power to ficteress or reduce the capital 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 and rules made there under and to attach thereto respectively such preferential, deferred, qualified or special rights, privileges or conditions as may be determined by or in accordance with the articles of association or the regulations of the company for the time being and to vary, modify, abrogate any such rights, privileges or conditions in such manner as may for the time being be provided by the articles of association or regulations of the company.

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Sr.	Name and Surname	NIC No. (in case			T				
No.	(Present & Former) in	of Factor	Father's/	Nationality(Occupation	Residential address in full			
	full (in Right L. ()	or Foreigner,	Husband's Name	ies) with			Number of	Sign	
	run (in block Letters)	Passport No.)	in full	any former			shares		
				Notice			taken by		
				Nationality			each		
1	Muhammad Shakeel	35201 1527000	Chandhey	1				; ;	
		55201-1537699-1	Muhammad Jamil	Pakistani	Business	House No colo	subscriber		
2	Mukhtar Ahmed	35201-1316754-9	Chaudhry Foral	Dalis	Executive	Road, Lahore Cantt	05		
			Din	Pakistani	Business	7-Aziz Bhatti Road, Lahore	05		
3	Faisal Munir	35202-2690216-3	Moha		CXECUTIVE	Cantt.	00		
		1000210-0	Monammad Munir	Pakistani	Business	6-Bawa Park Lipper Mail			
4	Mohammad Munir	35202 2724702 - 0	Thy Regist		Executive	Scheme, Lahore.	05		
		00202 24 24 780-1 7	Lahore Hidayat	Pakistani	Business	6-Bawa Park			
5	Muhammad Ibrohim	<u></u> G	Ullan Mian O		Executive	Scheme, Lahore.	21		
		31303-2451555	Mar Taj	Pakistani	Business			5.	
6		unit	Minemarad		Executive	House No.20, Officers Colony,	03 .		
	umran Mukhtar	35202-2917102	Chaudie Mukbar	Pakistoni		Yar Khan			
	Chaudhary		A GEERA	anstan	Business	133-Upper Mall, Lahore	05		
/	Makhdom Omar	42301-9725732-7	anus Commissio					Jan 1	
	Shehryar		Pulsa ud Di	Pakistani	Business	House No.117/2/1, Street No.9		A	
8	Etihad Sugar Mills Limited		Trukar ud Din		Executive	Off Khayaban-e-Bukhari, Phase-	Ub ·		
	Through Mr. Faisal Munir		-	Pakistani	Company	4-Bawai (Pare E Hanne			
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Dated this	s_15th day of And	2011				I otal number of shares taken	MPANIEQ		
Witness t		2014				LANORS	<i>∀ 9F71€E</i> ⊥		
Editorial La construction de la									
Full Name: Khurram Saleem									
Full Address: Androhi & O. Little and Father's Name: Muhammad Saleem									
1	A Cabriel, 8 Farldkot, Link Road, Lahore Occupation; Advocate								
Here.									
Signatures									

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ETIHAD POWER GENERATION

ARTICLES OF ASSOCIATION

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OF

ETIHAD POWER GENERATION LIMITED

COMPANY LIMITED BY SHARES

I. PRELIMINARY

1. TABLE "A" Not to Apply

The regulations in Table 'A' in the First Schedule to the Companies Ordinance, 1984 shall not apply to the Company except so far as the same are repeated or contained in these articles.

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2. DEFINITIONS

Unless the context otherwise requires the string used in these articles shall have the meanings set out below:

- (a) "Articles" mean these articles of association of the company as originally framed or as from time to time altered by in accologing with the law.
- (b) **"Board"** means the group of directors in a meeting duly called and constituted or, as the case may be, the directors assembled at a board.
- (c) **"Book and paper"**, "book or paper" or "books of account" mean accounts, deeds, vouchers, writings and documents, maintained on paper or computer network, floppy, diskette, magnetic cartridge tape, CD-Rom or any other computer readable media;
- (d) "Buy-back of shares rules" mean the Companies (Buy-Back of Shares) Rules, 1999 or any modification or re-enactment thereof.
- (e) "Company" means ETIHAD POWER GENERATION LIMITED.
- (f) "Central depository" means a central depository as defined in clause (ca) of section 2 of the Securities and Exchange Ordinance, 1969 (XVII of 1969) and registered with the Securities and Exchange Commission of Pakistan under section 32 A of the said ordinance.
- (g) "Central depositories act" means the Central Depository Act, 1997 or any modification or re-enactment thereof.

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- (h) "Central depository regulations" mean the Central Depository Company of Pakistan Limited regulations made pursuant to section 35(1) of the Central Depository Act, 1997 or any modification or re-enactment thereof.
- (i) **"Central depository register"** means a computerised electronic register maintained by a central depository in respect of book-entry securities.
- (j) "Code" means the Code of Corporate Governance.
- (k) "Commission" means the Securities and Exchange Commission of Pakistan established under section 3 of the Securities and Exchange Commission of Pakistan Act, 1997.
- (I) "Directors" mean the directors for the time being of the company including alternate directors and, subsequently elected pursuant to Companies Ordinance, 1984 or as the case may be, the directors assembled at a board.
- (m) "Dividend" includes cash dividend, dividend in species and bonus shares.
- (n) **"Electronic"** includes electrical, digital, magnetic, optical, bio-metric, electro-chemical, wireless or electromagnetic technology.
- (o) **"Electronic transactions ordinance"** means the Electronic Transactions Ordinance, 2002 or any modification or re-enactment thereof.
- (p) **"In Person"** includes attendance and/or voting at a meeting, personally or by video or telephone-conference or other facility whereby all the participants of the meeting can hear and / or see each other unless expressly stated otherwise by the directors.
- (q) **"Instrument of transfer"** includes transfer deeds and any record of fransier of bookentry securities in the central depository register, provided by the central depositories act and the central depository regulations.
- (r) **"Issue of capital rules**" mean Companies (Issue of Capital) Rules, 1996 or any modification or re-enactment thereof.
- (s) "Listing requirements" mean the listing regulations of the stock exchanges.
- (t) "Member" means a person whose name is for the time being entered in the register of members by virtue of his being a subscriber to the memorandum of association of the company or of his holding by allotment or otherwise any share, scrip or other security which gives him a voting right in the company including but not limited to the account holders of a central depository.
- (u) "Memorandum" means the memorandum of association of the company as originally framed or as from time to time altered in accordance with law.
- (v) "Month" means calendar month according to the Gregorian calendar.

- (w) "Office" means the registered office for the time being of the company.
- (x) "Ordinance" means the Companies Ordinance, 1984 or any modification or reenactment thereof for the time being in force.
- (y) **"Preference shares**" not being ordinary shares mean preference shares whether redeemable or irredeemable, cumulative or otherwise with the rights, privileges and conditions attaching thereto as are provided by the articles.
- (z) **"Preference shareholders"** not being ordinary shareholders mean, in relation to the Company, every person to whom the company has allotted, or who becomes the holder of such shares and whose name is entered in the register of members.
- (aa) "Proxy" includes an attorney duly constituted under a power of attorney.
- (ab) **"Record"** includes, in addition to a written or printed form, any disc, tape, sound-track, film or other device in which sounds and / or other data is embodied so as to be capable (with or without the aid of some other instrument or machine) of being reproduced therefrom in audible, legible or visual form.
- (ac) "Register" means, unless the context otherwise requires, the register of members and include the register of debenture-holders or holders of other securities maintained on paper or computer network, floppy, diskette, magnetic cartridge tape, CD-Rom or any other computer readable media; to be kept pursuant to section 147 of the ordinance and / or Central Depository Register under the Central Depositories Act and the Central Depository Regulations.
- (ad) **"Registrar**" means a registrar, defined in section (2 (1) (1) per annual the duty of registration of companies under the ordinance.
- (ae) **"Regulations"** mean the rules of governance of the contrary **Trade** by the board from time to time.
- (af) "Seal" means the common or official seal of the company.
- (ag) "Section" means section of the ordinance.
- (ah) **"Share Capital Rules**" mean the Companies' Share Capital (Variation in Rights and Privileges) Rules, 2000.
- (ai) "Sign" and "Signature" unless otherwise provided in these articles, include respectively lithography, printing facsimile, "advanced electronic signature" which is capable of establishing the authenticity and integrity of an electronic document, as defined by section 2(e) of the electronic transactions ordinance, and names impressed with a rubber or other kind of stamp.
- (aj) "Special Resolution" means the special resolution of the company as defined in section 2(1) (36) of the ordinance.

- (ak) "Stock Exchanges" mean the Islamabad, Lahore and Karachi Stock Exchanges and such other Stock Exchanges as may be established in Pakistan.
- 3. Interpretation

In these articles, unless the context otherwise requires:

- (a) the singular includes the plural and vice versa and words denoting any gender shall include all genders;
- (b) references to any act, ordinance, legislation, the code, the listing requirements, rules or regulations or any provision of the same shall be a reference to that act, ordinance, legislation, the code, the listing requirements, rules or regulations or provisions, as amended, re-promulgated or superseded from time to time;
- (c) the terms "include" or "Including" shall mean include or including without limitation;
- (d) expressions 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, including but not limited to, electronic transmission such as facsimile, and electronic mail or any other electronic process, as prescribed by section 3 of the electronic transactions ordinance.
- (e) words importing persons shall include bodies corporate; and
- (f) words and expressions contained in these articles shall bear the same meaning as in the ordinance.

REGISTERED OFFICE

4. The registered office of the company shall be in the Province of Punjab as the directors shall from time to time appoint.

PUBLIC LIMITED COMPANY

5. The company is a public limited company within the meanings of section the Companies Ordinance, 1984.

BUSINESS

section 2(1) clause (30) of

6. All branches or kind of business which the company is either expressive active implication authorised to undertake may be undertaken by the directors at such time or times as they shall think fit, and further may be allowed by them to be in abeyance, whether such branch or kind of business may have been actually commenced or not, so long as the directors may deem it expedient not to commence or proceed with such branch or kind of business.

II. CAPITAL

SHARES

7. Subject to section 90 of the ordinance and any rules in that regard made under the ordinance, and without prejudice to any special rights previously conferred on the holders of any existing shares or class of shares, any share in the company may be issued with different rights, restrictions and privileges, including but not limited to the following as may be approved by the company by special resolution:

- (i) different voting rights; voting rights disproportionate to the paid-up value of share held; voting rights for specific purposes only; or no voting rights at all;
- (ii) different rights for entitlement of dividend, right shares or bonus shares or entitlement to receive the notices and to attend the general meetings;
- (iii) rights and privileges for indefinite period, for a limited specified period or for such periods as may from time to time be determined by the company;
- (iv) different manner and mode of redemption, including redemption in accordance with the provisions of these articles, subject to sections 85 and 95 (4) of the ordinance, including but not limited to, by way of conversion into shares with such rights and privileges as determined by the company in the manner and mode provided in these articles; and
- (v) different rights and privileges for listing or non-listing of any class of shares

8. The minimum subscription upon which the company may proceed to allot shares shall be Rupees 100,000 (Rupees One Hundred Thousand).

9. Subject to section 95(4)(a) of the ordinance and any rules in that regard made under the ordinance, the company may issue shares which are to be redeemed or any other redeemable security, on such terms and in such manner as may be provided in the said section and rules.

Subject to provisions of the ordinance and these articles and subject to any special rights or 10. privileges for the time being attached to any issued shares, the shares in the capital of the company for the time being, including any new shares resulting from an increase in the authorized capital, shall be under the control of the directors who may allot or otherwise disposes of the same wany of them to such persons (subject to article 43), on such terms and conditions, and with such regional privileges annexed thereto as the resolution creating the same shall direct, and if no alrection be given, as the directors shall determine and at such times and in such manner as the directors that fit ether at par or at a premium or subject to section 84 of the ordinance at a discount, with power to directors to give any person the right to call for and be allotted shares of any class of the company at par or at a premium or, subject as aforesaid, at a discount, such option being exercisable at such time, and for such consideration as the directors think fit. Provided that the shares in the capital of the company shall always be issued as fully paid shares and no shares shall be issued as partly paid shares. The directors shall, as regards any allotment of shares, duly comply with such of the provisions of sections 67 to 73, the central depositories act, the central depository regulations, the issue of capital rules and the share capital rules, as may be applicable to the company.

11. The directors may allot and issue shares in the capital of the company as payment or part payment for any property sold or transferred, or for services rendered, to the company in the ordinary course of its business, and shares so allotted shall be issued as and shall be deemed to be fully paid shares.

12. The board shall, as regards any allotment of shares, duly comply with such provisions σf sections 67 to 73 of the ordinance as may be applicable.

13. The company may at any time pay a commission to any person for subscribing or agreeing to subscribe (whether absolutely or conditionally) for any shares, debentures or debenture stock in the

company or procuring or agreeing to procure subscriptions (whether absolutely or conditionally) for any shares, debentures or debenture stock in the company; Provided, that, if the commission in respect of shares shall be paid or payable out of capital, the statutory requirements and conditions shall be observed and complied with, and the amount or rate of commission shall not exceed such percentage on the shares, debentures or debenture stock in each case subscribed or to be subscribed, as may be determined by the board subject to any limits required by law. The commission may be paid or satisfied, either wholly or partly, in cash or in shares, debentures or debenture stock. The company may also on any issue of shares pay such brokerage fees as may be lawful; Provided that such brokerage fees shall not exceed such percentage of the shares, debentures or debenture stock paid-up as may be determined by the board, subject to any limits required by law.

14. Subject to section 95A of the ordinance and any rules in that regard made under the ordinance, the company may purchase its own shares on such terms and in such manner as may be provided in the said section and rules. Except as aforesaid, no part of the funds of the company shall be employed in the purchase of its own shares.

15. Except as permitted in the ordinance and any rules in that regard made under the ordinance, no part of the funds of the company shall be employed in the purchase of its own shares or in giving, whether directly or indirectly and whether by means of a loan, guarantee, security or otherwise, any financial assistance for the purpose of or in connection with a purchase made or to be made by any person of or any shares in the company.

16. Except as required by law, no person shall be recognized by the company as holding any share upon any trust, and the company shall not be bound by or be compelled in any way to recognize (even when having notice thereof) any equitable, contingent, future or partial interest in any share or any interest in any fractional part of a share or (except only as by these articles or by law otherwise provided or under an order of a court of competent jurisdiction) any other trafts respect of any share except any absolute right to the entirely thereof in the registered an absolute right [content of competent]].

17. Save as herein otherwise provided, the company shall be entired to be registered holder of any share as the absolute owner thereof and accordingly shall not, except as dered by a court of competent jurisdiction or as by statute required, be bound to recognize leven when having notice thereof) any benami, equitable, contingent, future, partial or other classifier right to or interest in such share on the part of any other person.

18. Shares may be registered in the name of persons, any limited company or other corporate body. Not more than four persons shall be registered as joint-holders of any share.

19. If any share or shares stand in the name of two or more persons, the person first named in the register shall, as regards receipt of dividend or bonus or service of notices and all or any other matters connected with the company except voting at the meeting and the transfer of shares, be deemed the sole holder.

RIGHTS PRIVILEGES AND CONDITIONS ATTACHED TO SHARES

20. As regards income, the profits which the company may determine to distribute in respect of any financial year or other period for which the accounts shall be made up, shall be applied in the following order of priority;

- (i) In paying the holders of the preferences shares, the right to a cumulative preferential dividend as determined by the board on the capital paid up thereon payable as regards each financial year out of the profits of the company resolved to be distributed in respect of that year, but shall not be entitled to any further participation in profits; and
- (ii) Subject to the rights of any class of shares for the time being issued, in distributing the balance amongst the holders of the ordinary shares according to the amounts paid up on the ordinary shares held by them respectively.

21. As regards conversion, the company may partly or wholly convert the preference shares at the option of the holders of the preference shares in accordance, respectively, with the terms and conditions of their issue.

22. As regards redemption, subject to section 85 of the ordinance, the company may, upon giving the holders of the shares to be redeemed notice in writing, redeem the whole or any part of the preference shares in accordance, respectively, with the terms and conditions of their issue.

23. As regards capital, on a return of capital in a winding up or otherwise (except upon the redemption of shares of any class of preference shares or the purchase by the company of its own shares), the surplus assets of the company remaining after payment of its liabilities shall be applied in the following order of priority:

- (i) in paying to the holders of the preference shares, the capital paid up on the same without any further right to participate in profits or assets; and
- (ii) subject to the rights of any other class of shares for the time Belog issued, in distributing the balance amongst the holders of the ordinary shares according to the amounts paid up on the ordinary shares held by them respectively.

24. As regards entitlement to bonus or right shares, the holders of preference shares shall not be entitled to bonus or right shares in the event that the company increases to capital by the issue of further shares or otherwise.

25. As regards voting rights, the holders of the preference shares shall not be entitled to receive notice of, attend, or vote at, any general meeting of the company, except as otherwise provided by the ordinance, whereby the holders of such shares would be entitled to vote separately as a class, that is, with respect to voting entitlement of the preference shareholders on matters affecting, respectively, their substantive rights and liabilities. Without prejudices to the foregoing, the holders of preference shares may attend the general meeting of the company as observers with prior permission of the chairman.

CERTIFICATES

26. The certificates of title to shares and duplicate thereof shall be issued under the seal of the company and signed by two of the directors or by one such director and the secretary provided that such signatures may if necessary be printed lithographed or stamped subject to the approval of the directors.

Every member shall be entitled to one certificate for all the shares registered in his name, or, if 27. the directors so approve, to several certificates each for one or more of such shares, but in respect of each certificate for less than one hundred shares, the directors shall be entitled to charge a fee of Rupees 10 or such lesser sum as they may determine. Every certificate of shares shall specify the number and denoting numbers of the shares in respect of which it is issued.

28. The company shall within ninety days after the allotment of any shares, debentures or debenture stock and within forty-five days (or where the transferee is a central depository, within five (5) days) after receipt by the company of the application for transfer of any such shares, debentures or debenture stock complete and have ready for delivery the certificate (such expression shall hereinafter be deemed to include book-entry security as defined in the central depositories act, and the central depository regulations) of all shares, the debentures and the certificate of all debenture stock allotted or transferred, and unless sent by post or delivered to the person entitled thereto within the period aforesaid the company shall immediately thereafter give notice to that person in the manner prescribed in these articles for the giving of notices to members that the certificate is ready for delivery.

29. If a certificate of shares, debenture or debenture stock is proved to the satisfaction of the company to have been lost or destroyed or, being defaced or mutilated or torn, is surrendered to the company, and the company is requested to issue a new certificate in replacement thereof, the company shall, after making such enquiry as it may deem fit, advise the applicant within thirty days from the date of application the terms and conditions (as to indemnity and otherwise and as to payment of the actual expenses incurred on such enquiry and of a fee not exceeding ten rupees) on which the company is prepared to issue a new certificate and a time for compliance therewith or of the reasons why the company is unable to issue a new certificate, as the case may be, and in the former case if the applicant shall within the time allowed comply with the terms and conditions specified, the company shall issue a new certificate to the applicant within forty five days from the date of application.

30. The company shall not be bound to issue more than one certificate in respect of a share or shares held jointly by two or more persons and delivery of a certificate for a share to any one of joint holders shall be sufficient delivery to all. Registration

TRANSFER AND TRANSMISSION

- The directors shall not refuse to register the transfer of the paid shares unless the 31. (i) instrument of transfer is defective or invalid or is not action and by the certificate of the share(s) to which it relates. The directors may as the to recognise any instrument of transfer unless it is accompanied in addition to the softificate of the shares to which it relates, by such other evidence as the directors may reasonably required to show the right of the transferor to make the transfer. The directors may waive the production of any certificate upon evidence satisfactory on them of its loss Or destruction.
 - (ii) If the directors refuse to register a transfer of any shares they shall, within thirty (30) days (or where the transferee is a central depository, within five (5) days) after the date on which the instrument of transfer was lodged with the company, send to the transferee and the transferor notice of the refusal indicating the reason for such refusal; provided that if the directors refuse to register a transfer of shares on account of a defect in or the invalidity of the instrument of transfer, the transferee shall be entitled, after removal of such defect or invalidity, to re-lodge the instrument of transfer with the company.

32. Shares in the company shall be transferred in accordance with the central depositories act and the central depository regulations. If the shares of the company are not registered in the central depository, the same may be transferred through the instrument of transfer. The instrument of transfer of any share shall be in writing in the usual common form, or in the following form, or as near thereto as circumstances will admit:

Folio No. _____ Certificate No. _____

TRANSFER DEED

ETIHAD POWER GENERATION LIMITED

I/We,	of		in
consideratio	n of the sum of Rupees		paid to me/us by
	of		hereinafter called the
transferee(s)), do hereby transfer to the said tra	ansferee(s) the <u>***</u>	* Ordinary/Preference Shares
numbered _	toInclus	ive, in my/our name	in the books of Etihad Power
Generation	Limited to hold unto the said transf	eree(s), his/her/their (executors, administrators and
assigns, sub	eject to the several conditions on which	ch I/we hold the same	at the time of the execution
hereof, and I	l/we, the said transferee(s) do hereby	agree to accept and to	ake the said shares subject to
the same cor	nditions.	6. 100	
As witness o	ur hands the day of		
		12	
Signed by	the above named transferor in the	Transferors	Signature
	presence of: -	Selension	n n 0 m
		NIC#	
Witness			
<u>NIC #</u>			
Occupation		Address	
Address			
Cianad bud	the objection provides the sector of the	T is a f in a la	0.1
Signed by I	processo of:	Iransieree s	Signature
Witness	presence of	Buyers	
		$\frac{110 \#}{0}$	
Occupation		Occupation	
coupation		Address	
Address			

33. No transfer shall be made to a minor or person of unsound mind.

34. All registered instruments of transfer shall be retained by the company, but any instrument of transfer which the directors may decline to register shall be returned to the person depositing the same.

35. The instrument of transfer of any share in the company shall be duly stamped and 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.

36. On giving seven days previous notice in the manner provided in the ordinance and articles, the transfer books and register may be closed during such time as the directors think fit, not exceeding in the whole forty-five days in each year, but not exceeding thirty days at a time.

Any member may make and deposit with the Company a nomination in writing specifying one 37. or more eligible persons who or each of whom, in the event of the death of the member, may be entered in the register as the holder of such number of shares specified in the nomination for such nominee or each such nominee of which the member remains the registered holder, at the date of his death. A person shall be eligible for nomination for the purposes of this article only if he is a spouse, parent, brother, sister or child of the member nominating him and the applicable relationship all should be specified in the nomination in respect of each nominee. A member may at any time by notice in writing cancel, or by making and depositing with the company another nomination before his death vary any nomination already made by him pursuant to this article. In the event of the death of a member any person nominated by him in accordance with this article may, on written application accompanied by the relative share certificates and evidence establishing the death of the member, request the company to register himself in place of the deceased member as the holder of the number of shares for which the nomination in his favour had been made and deposited with the company, and if it shall appear to the directors that it is proper so to do, the directors may register the nominee as the holder of those shares in place of the deceased member.

- (a) in the case of the death of a member who was a join-holder of shares the survivor or survivors shall be the only persons recognized by the company as having any title to his interest in the shares. If the deceased member was a sole holder of shares, the nominee or nominees of the deceased where a nomination under article 37 is effective, and the legal personal representatives, executors or administrators, of the deceased where no such nomination has been made and deposited with the company, shall be the only persons recognized by the company as having any title to his interest in the shares.
- (b) Before recognizing any legal representative or executor of administrator, the directors may require him to obtain a grant of succession certificate or probate or letters of administration or other legal representation, as the case may be, from some competent court in Pakistan having effect in Lahore; provided nevertheless that in any case where the directors in their absolute discretion think fit, it shall be lawful for the directors to dispense with the production of succession certificates or probates or letters of administration or such other legal representation, upon such terms as to indemnity or otherwise as the directors, in their absolute discretion, may consider necessary.

38. The executors or administrators or the nominee appointed under section 80 of the ordinance of a deceased member (not being one of several joint-holders) shall be the only persons recognised by the company as having any title to the shares registered in the name of such member, and in case of the death of any one or more of the joint-holders of all registered shares (such expression shall hereinafter be deemed to include registration as a sub-account holder of a central depository under the central depositories act and the central depositories regulations) , the survivors shall be the only persons. recognised by the company as having any title to or interest in such shares, but nothing

herein contained shall be taken to release the estate of a deceased joint-holder from any liability on shares held by him jointly with any other person. Before recognising any executor or administrator, the directors may require him to obtain a grant of probate or nomination as mentioned above or letters of administration or other legal representation, as the case may be, from some competent court in Pakistan having effect in Lahore. Provided nevertheless that in any case where the board in their absolute discretion think fit, it shall be lawful for the directors to dispense with the production of probate or letters of administration or such other legal representation upon such terms as to indemnity or otherwise as the directors, in their absolute discretion, may consider necessary.

39. Any person becoming entitled to a share in consequence of the death or insolvency of a member may upon such evidence being produced as may from time to time properly be required by the directors and subject as hereinafter provided, elect either to be registered himself as the holder of the share or instead of being registered himself, to make such transfer of the share or instead of being registered himself, to make such transfer of the share 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 that member before his death or insolvency as the case may be.

40. Any committee or guardian of a lunatic or minor member or any person becoming entitled to a share in consequence of the death or bankruptcy or insolvency of any member upon producing such evidence that he sustains the characters in respect of which he proposes to act under this article, or of his title, as the directors think sufficient, shall have the right to be registered as a member in respect of such share, or may, subject to the regulations as to transfer hereinbefore contained, transfer such share.

41. Neither the company nor the directors nor any other officer of the company shall incur any liability for registering or acting upon a transfer of shares apparently made by sufficient parties, although the same may, by reason of any fraud or other cause not known to the company or the directors or any other officer of the company, as aforesaid, be legally inoperative or insufficient to pass the property in the shares proposed or professed to be transferred, and although the transfer may, as between the transferor and transferee, be liable to be set aside, and, notwithstanding that the company may have notice that such instrument of transfer was signed or executed and delivered by the transferor in blank as to the name of the transferee or the particulars of the shares transferree. And in every such oase the particulars of the shares transferee. his executors, administrators and assigns alone shall be entited to be recognised as the holder of such shares and the previous holder shall, so far as the company is concerned, be deemed to have transferred his whole title hereto.

ALTERATION OF CAPITAL

42. The company may by ordinary resolution and subject to compliance with the requirements of section 92 of the ordinance increase the authorized share capital by such sum, to be divided into shares of such amount, as the resolution shall prescribe.

43. Subject to the provisions of section 92 (1) (d), 92(3) and 93 of the ordinance and section $13 \circ f$ the central depositories act, the company may, by ordinary resolution:

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

2.11

- (b) by sub-division of its existing shares or any of them, divide the whole or any part of its share capital into shares of smaller amount than is fixed by the memorandum of association;
- (d) cancel any shares which, at the date of the passing of the resolution, have not been taken or agreed to be taken by any person.

44. The directors may from time to time increase the issued share capital by such sum as they think fit. Except as otherwise permitted by section 86 of the ordinance, rule 5 of share capital rules, the listing requirements and section 14 of the central depositories act, as are applicable to the company and subject to any special rights or privileges for the time being attached to any issued shares, all shares intended to be issued by the directors shall, before issue, be offered to the members strictly in proportion to the amount of the issued shares held by each member (Irrespective of class); provided that fractional shares shall not be offered and all fractions less than a share shall be consolidated and disposed of by the company and the proceeds from such disposition shall be paid to such of the entitled members as may have accepted such offer. Such 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 fit. In respect of each such offer of shares the directors shall comply with the provisions of section 86 of the ordinance and in particular with the provisions of sub-sections (3), (4) and (5) thereof. Any difficulty in the apportionment of shares amongst the members, such difficulty shall, in the absence of any directions given by the company in general meeting, be determined by the directors.

45. Except so far as otherwise provided by the conditions of issue or by these articles, any capital raised by the creation of new shares shall be considered part of the original capital and shall be subject to the provisions herein contained with reference to transfer and transmission and otherwise.

46. Subject to the provisions of sub-section (2) of section 86/of the ordinance, if, ewing to any inequality in the number of new shares to be issued and the number of shares held by a member entitled to have the offer of such new shares, any difficulty shall arise in the appontentment of such new shares or any of them amongst the members, such difficulty shall, in the absence of any direction in the resolution creating the shares or by the company in general meeting, be determined by the directors.

47. The company may, by special resolution, reduce its share capital in any manner, with and subject to, any incident authorized and consent required by law.

48. The share premium account maintained pursuant to section 83(1) of the ordinance may, be applied by the company:

- (a) in writing off the preliminary expenses of the company;
- (b) in writing off the expenses of, or the commission paid or discount allowed on, any issue of shares or debentures of the company;
- (c) in providing for the premium payable on the redemption to any redeemable preference shares or debentures of the company; or
- (d) in paying up un-issued shares of the company to be issued as fully paid bonus shares.

49. Subject to the provisions of section 96 to 105 inclusive of the ordinance, the directors may accept from any member the surrender on such terms and conditions as shall be agreed of all or any of his shares.

VARIATION OF SHAREHOLDERS' RIGHTS

50. Whenever the capital is divided into different classes of shares, all or any of the rights and privileges attached to each class may, subject to the provisions of section 108 of the ordinance, be modified, commuted, affected, abrogated or dealt with by agreement between the company and any person purporting to contract on behalf of that class provided such agreement is (a) ratified in writing by the holders of at least three-fourths in nominal value of the issued shares of the class or (b) confirmed by a special resolution passed at an extraordinary general meeting of the holders of shares of that class and all the provisions hereinafter contained as to general meetings, shall, mutatis mutandis, apply to every such meeting. This article shall not by implication curtail the power of modification which the company would have if this article were omitted.

III. MEETINGS

CONVENING OF GENERAL MEETINGS

51. The statutory meeting of the company shall be held within the period required by provisions of the Companies Ordinance 1984.

52. Except as may be allowed under section 158(1) of the ordinance and listing requirements, the company shall hold a general meeting once at least in every calendar year within a period of four months following the close of its financial year in the town in which the office is situate and at such time and place as may be determined by the directors, provided that to greater interval than fifteen months shall be allowed to elapse between two such general meetings. The company may, for any special reason and with permission of the commission, extend the time which any annual general meeting, not being the first such meeting, shall be held.

53. The company shall hold its annual general meeting in the town in which the registered office is situate; provided that, it may, for any special reason and with permission of the commission, hold the said meeting at any other place. Save as aforesaid, the company metric is general meeting at two (2) or more venues using any technology that gives the members as a whole a reasonable opportunity to participate in the meetings.

54. All general meetings of the company, other than the statutory meeting or any annual general meeting, shall be called extraordinary general meetings, and shall be subject to listing requirements.

55. The directors may, whenever they think fit, and they shall, on the requisition of the holders of not less than one-tenth of the issued capital of the company, forthwith proceed to converte an extraordinary general meeting of the company. 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, and in the case of such requisition the following provisions shall have effect:

- (i) The requisition must state the objects of the meeting and must be signed by the requisitioners and deposited at the office and may consist of several documents in like form each signed by one or more requisitioners.
- (ii) If the directors do not proceed within twenty-one days from the date of the requisition being so deposited to cause a meeting to be called, the requisitioners or a majority of them in value may themselves convene the meeting, but any meeting so convened shall not be held after three months from the date of the deposit.
- (iii) Any meeting convened under this article by the requisitioners shall be convened in the same manner as nearly as possible as that in which meetings are to be convened by the directors but shall be held at the office.
- (iv) A requisition by joint-holders of shares must be signed by all such holders.
- (i) Notice of a general meeting shall be sent in the manner hereinafter mentioned at least twenty one (21) days before the date on which the meeting is to be convened to all such persons as are under these articles or the ordinance entitled to receive such notices from the company and shall specify the place and the day and hour of the meeting and the nature of the business to be transacted thereat.
 - (ii) In the case of an emergency affecting the business of the company, an extraordinary general meeting may be convened by such shorter notice than that specified in article 54(1) as the registrar may authorise.
 - (iii) Where any special business, that is to say, business other than consideration of the accounts, balance sheet and the reports of the directors and auditors, the declaration of dividend, the appointment and fixation of the remuneration of auditors and, where the notice convening the meeting provides for the election of directors, the election of directors (all such matters being herein referred to as ordinary business) is to be transacted at a general meeting, there shall be anterest to the notice of such meeting a statement setting out all such facts as may be material for the consideration of such business including the nature and extent of the interest (whether direct or indirect) of any director, and where the item of business involves approval of any document, the time and place appointed for inspection thereof and to the extent applicable such a statement shall be annexed to the notice also in the case of ordinary business to be transacted at the meeting.
 - (iv) Where a resolution is intended to be proposed for consideration at a general meeting in some special or particular form, a copy thereof shall be annexed to the notice convening such meeting.
 - (v) If a special resolution is intended to be passed at a general meeting, the notice convening that meeting shall specify the intention to propose the resolution as a special resolution.
 - (vi) A notice for a general meeting at which an election of directors is to take place shall state the number of directors to be elected at that meeting and the names of the retiring directors.
 - (vii) The notice of every general meeting shall prominently specify that a proxy may be appointed who shall have the right to attend, demand or join in demanding a poll and

2.1-4

vote on a poll and speak at the meeting in the place of the member appointing him and shall be accompanied by a form of proxy acceptable to the company.

(viii) The company shall comply with the provisions of section 160(1) and section 50 of the ordinance with regard to giving notices of general meetings.

57. The accidental omission to give any such notice to, or the non-receipt of notice by, any of the members shall not invalidate the proceedings at any such meeting.

PROCEEDINGS AT GENERAL MEETINGS

58. No business shall be transacted at any general meeting unless a quorum of members is present at the time when the meeting proceeds to business; save as herein otherwise, provided ten (10) members present in person representing twenty five percent (25%) of the total voting power either of their on account or as proxies shall be a quorum.

59. The chairman of the board of directors shall preside as chairman at every general meeting of the company, or if there is no such chairman, or if he shall not be present in person within fifteen minutes after the time appointed for the holding of the meeting or is unwilling to act, the chief executive shall preside as chairman of the meeting, or if the chief executive is absent or unwilling to act, any one of the directors present in person may be elected to be chairman of the meeting, or if no director be present in person, or if all the directors present in person decline to take the chair, the members present in person shall choose one of their member to be chairman of the meeting.

60. If within half-an-hour from the time appointed for the meeting, a quorum is not present, the meeting if convened upon such requisition as aforesaid shall be dissolved, but 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 such adjourned meeting a quorum is not present within half an hour from the time appointed for it, the meeting shall be dissolved.

61. The chairman may adjourn the meeting from the toture and from place to place, but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjournment took place. When a meeting is adjourned for more than seven days, notice of the adjourned meeting shall be given as in the case of an original meeting. Save as aforesaid it shall not be necessary to give any notice of an adjournment of the business to be transacted at an adjourned meeting.

62. In the case of an equality of votes the chairman shall, both on a show of hands and at the poll, have a casting vote in addition to the vote or votes to which he may be entitled as member.

63. (i) 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 in accordance with paragraph (2) of this article, and unless a poll is so demanded, a declaration by the chairman of the meeting that a resolution has. On a show of hands, been carried, or carried unanimously, or by a particular majority. Or lost, and an entry to that effect in the book or electronic record of the proceeding of the company shall be conclusive evidence of the fact, without proof of the number or proportion of the votes recorded in favour of, or against, the resolution.

(ii) Any of the following persons may demand a poll:

- (a) The chairman of the meeting, or
- (b) Five members having the right to vote on the resolution and present in person or by proxy; or
- (c) Any member or members present in person or by proxy having not less than one-tenth of the total voting power in respect of the resolution.

64. If a poll is demanded, as aforesaid, it shall be taken (subject to section 168 of the ordinance) in such manner and at such time and place as the chairman of the meeting directs, and either at once or after an interval or adjournment of not more than fourteen days from the day on which the poll is demanded, and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was held. The demand for a poll may be withdrawn at any time by the person or persons who made the demand. In case of any dispute as to the admission or rejection of a vote, the chairman of the meeting shall determine the same, and such determination made in good faith shall be final and conclusive.

65. Any poll duly demanded on the election of a chairman of a meeting or on any question of adjournment shall be taken at the meeting and without adjournment. A poll demanded on any other question shall be taken at such time, not being more than 14 days from the day on which the poll is demanded as the chairman of the meeting directs.

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

VOTES OF MEMBERS

67. Subject to section 160 and any rights or restrictions for the time being attached to any class or classes of shares, every member present in person (where all the participants of a general meeting can see each other) shall have, whether on a show of hands or on a poll, votes proportionate to the paid up value of the shares or other securities carrying voting rights held by him according to the entitlement of the class of such shares or securities, as the case may be provided that. The provisions of section 178 shall apply in the case of the election of directors.

68. Without prejudice to articles 69 and 79, on a show of hands, every member present in person shall have one vote and upon a poll every member present in person or by proxy shall have one vote in respect of each share held by him. Provided always that in the case of an election or removal of a director, the provisions of articles 91 and 94 respectively shall apply.

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

70. Any company or other corporation which is a member of the company may by resolution of its directors or other governing body authorise such person as it thinks fit to act as its representative at any meeting of the company or of any class of members of the company, and the person so authorised shall be entitled to exercise the same powers on behalf of the company or corporation which he represents as that company or corporation could exercise if it were an individual member of the company, present in person. The production before or at the meeting of a copy of such resolution purporting to be signed by a director or the secretary of such company or corporation and certified by him as being a true copy of the resolution shall be accepted by the company as sufficient evidence of the validity of the appointment of such representative.

71. Any person entitled under article 39 to any shares may vote at any general meeting in respect thereof in the same manner as if he were the registered holder of such shares, provided that forty-eight hours at least before the time of holding the meeting or adjourned meeting, as the case may be, at which he proposes to vote he shall satisfy the directors of his right to such shares, or the directors shall have previously admitted his right to vote at such meeting in respect thereof. If any member be a lunatic, idiot or non compos mentis, he may vote, whether by a show of hands or at a poll, by his committee, curator bonis or other legal curator and such last mentioned persons may give their votes by proxy.

72. Where there are jointly registered holders of any share, any one of such persons may vote at any meeting either in person or by proxy in respect of such share as if he were solely entitled thereto; and if more than one of such joint-holders be present at any meeting, either in person or by proxy, that one of the said persons so present whose name stands first in the register in respect of such share shall alone be entitled to vote in respect thereof. Several executors or administrators of a deceased member in whose name any share stands shall for the purposes of this article be deemed joint holders thereof.

73. On a poll votes may be given either in person (including without limitation a representative of a company duly authorised under article 68) or by proxy.

74. No objection shall be raised to the qualification of any voter except at the meeting or adjourned meeting at which the vote objected to is given or tendered, and every vote not disallowed at such meeting shall be valid for all purposes. Any such objection made in the shall be referred to the chairman of the meeting, whose decision shall be final and conclusive the shall be referred to the

75. The instrument appointing a proxy shall be in writing under the hand of the appointer (such expression shall exclude any reference to the electronic transactions ordinance in accordance section 31 (1) of the electronic transactions ordinance) or of his altoney duly authorised in writing (such expression shall exclude electronic transmission as prescribed by section 3 of the electronic transactions ordinance) or if such appointer is a corporation funder is ecclude any reference to the electronic transactions ordinance) or an attorney duly authorised by it (Such expression shall exclude any reference to the electronic transactions ordinance). Save as provided by article 80, no person shall be appointed a proxy who is not a member of the company and qualified to vote.

76. Subject to article 73 hereof, the instrument appointing a proxy and the power of attorney or other authority (if any) under which it is signed, or a copy of that power or authority duly notarized, shall be deposited (Such expression shall hereinafter include, where permitted by law, receipt in accordance with section 15 of the electronic transactions ordinance) at the office not less than forty-eight hours before the time for holding the meeting at which the person named in the instrument proposes to vote, and in default the instrument of proxy shall not be treated as valid.

77. A vote given in accordance with the terms of an instrument appointing a proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the instrument or transfer of the share in respect of which the vote is given, provided no intimation in writing of the death, insanity, revocation or transfer of the share shall have been received at the office before the meeting. Provided nevertheless that the chairman of any meeting shall be entitled to require such evidence as he may in his discretion think fit of the due execution of an instrument of proxy and that the same has not been revoked.

78. Every instrument appointing a proxy shall, as nearly as circumstances will admit, be in the form or to the effect following and shall be retained by the Company:

ETIHAD POWER GENERATION LIMITED Proxy Form

|/We,_

being the member of Etihad Power Generation Limited

hereby appoint Mr./Mrs./Miss.

who is a member of the company vide Registered Folio / CDC Participant ID.No.____

or failing whom Mr./Mrs./Miss._

Who is also a member of the company vide Registered Folio / CDC Participant ID.No.______ as my proxy to attend and vote for me and own my behalf at the annual / extra ordinary general meeting of the company to be held on (day) (date) (month) (voat) at

be held on (day) (date) (month) (year) at ______ A.M / P.M and / or at any adjournment thereof

Eolio No	CDC account Number			
	Participants I.D.	Account No.		



WITNESSES:

i. Signature Name Address	ii. Signature Name Address				
CNIC	CNIC				
ate:	Date:				

NOTES

- 1. The proxy form must be signed across Rupees Five revenue stamp and it should be deposited in the company's registered office not less than 48 hours before the time of holding the meeting.
- II. If a member appoints more than one proxy and more than one instruments of proxy are deposited by a member with the company, all such instruments of proxy shall be rendered invalid.
- III. A member entitled to attend may appoint an other member as his / her proxy or may by power of attorney authorize any other person as his / her agent to attend, speak and vote at the meeting. A corporation or a company, as the case may be, being a member of the company, may appoint any of its officials or any other person to act as its representative and the person so authorized shall be entitled to the same powers as if he were and individual share holder.

For CDC account holders / corporate entities:

In addition to the above the following requirements have to be met:

- (i) The Proxy Form shall be witnessed by two persons whose names, addresses and CNIC or Passport numbers shall be mentioned on the Form.
- (ii) Attested copies of CNIC or the passport of the beneficial owners and the proxy shall be furnished with the proxy form.
- (iii) The proxy shall produce his original CNIC or original passport at the time of the meeting.

In case of corporate entity, the board of directors' resolution / power of attorney with specimen signature shall be submitted (unless it has been provided earlier) alongwith proxy form to the company.

Provided always that an instrument appointed a proxy may be in the form set out in regulation 39 of table A of the first schedule to the ordinance.

IV. DIRECTORS

NUMBER OF DIRECTORS

79. Subject to the provisions of these articles and the ordinance, all directors shall be elected by the members in general meeting.

80. The company shall have at least seven directors. Subject to the said minimum, the directors themselves shall determine from time to time in the manner provided in this article the number of directors that the company shall have. The directors of the company shall subject to section 174 of the ordinance fix the number of elected directors of the company not later than thirty are days before the convening of general meeting at which directors are to be elected. The number of elected directors so fixed by the directors shall not be changed except with the prior approval of the company in general meeting.

ALTERNATE DIRECTORS

STATE: 81. When any director intends to be, or is living outside Pakistan, semay with the approval of the directors appoint any person to be his alternate director, and such alternate director during the absence of the appointer from Pakistan, shall be entitled to receive notice of and to attend and vote at meeting of directors and shall be subject to and entitled to the provisions contained in these articles with reference to directors and may exercise and perform all such powers, directions and duties as his appointer could have exercised or performed including the power of appointing another alternate director. An alternate director so appointed shall not be required to hold any qualification. Such appointment shall be recorded in the director minute book. A director may at any time by notice in writing to the company remove an alternate director appointed by him. The alternate director shall cease to be such provided that if any director retires but is re-elected at the meeting at which such retirement took effect any appointment made by him pursuant to this article which was in force immediately prior to this retirement and re-election and which has not otherwise ceased to be effectively shall continue to operate after his re-election as if he had not so retired. An alternate director shall not be deemed to be the agent of the director appointing him but shall be reckoned as one with his appointer. All appointments and removals of alternate directors shall be effected by writing under the hand of the director making or revoking such appointment and left at the office. For the purpose of assessing a quorum hereof an alternate director shall be deemed to be director. Any director may ac ${
m t}$ an alternate director for any one or more directors, as well as being able to act as a director in his own

right. An alternate director may resign as such upon giving thirty (30) days prior notice to the board to this effect. An alternate director need not be a member of the Company.

.82. Notwithstanding article 164, an alternate director, even if not a member, shall, in the absence of a direction to the contrary in the instrument appointing him, be entitled to notice of general meetings of the company and (subject to the provisions of article 73) to vote at such meetings on behalf of his appointer, if his appointer is a member of the company, and generally to represent his appointer.

83. Directors shall have power at any time and from time to time to appoint any person as Technical/Executive Director and such Technical/Executive Director may be appointed only for a fixed period in such special remuneration as may be determined by the board. The number of such directors appointed shall not be counted within minimum or maximum fixed for number of directors in these articles. Such Technical/Executive Directors would be the senior executives of the company and will not have any representation on the board of the company unless specially invited by the members to assist them in the proceedings of the meeting of the board of directors of the company.

CHIEF EXECUTIVE AND OTHER PRINCIPAL OFFICERS OF THE COMPANY

84. The company shall have an office of chief executive which shall be filled from time to time by the directors who may appoint a director or (subject to section 201 of the ordinance) any other person to be the chief executive of the company for a period not exceeding three years and on such terms and conditions as the directors may think fit, and such appointment shall be made within fourteen days from the date on which the office of chief executive falls vacant. If the chief executive at any time is not already a director he shall be deemed to be a director of the company notwithstanding that the number of directors shall thereby be increased and he shall be entitled to all the rights and, privileges and shall be subject to all liabilities of the office of director. Upon the expiry of his period of effice, a chief executive shall be eligible for re-appointment. The chief executive may be removed from office in accordance with the provisions of section 202 of the ordinance notwithstanding anything contained in these articles or in any agreement between the company and the chief executive

85. No person who is ineligible to become a director of the constant, shall be appointed or continue as the chief executive except as permitted by Section 187.

86. The chief executive retiring under article 82 continue to perform his functions until his successor is appointed unless non-appointment of his successor is due to any fault on his part or his office is expressly terminated.

87. The directors may appoint other principal officers of the company including chief operating officer, chief financial officer, head of internal audit and the company secretary (who is to be a full time employee of the company as required by section 204 A), and give such officer such designations and with such terms and conditions as the directors may determine from time to time.

88. A chief executive of the company shall receive such remuneration as the directors may determine and it may be made a term of his appointment that he be paid a pension and/or gratuity and/or other benefits on retirement from his office.

89. The directors may from time to time entrust to and confer upon the chief executive for the time being such of the powers exercisable under these articles by the directors as they may think fit, and may confer such powers for such time, and to be exercised for such objects and purposes, and upon

such terms and conditions, and with such restrictions as they think expedient; and they may confer such powers, either collaterally with, or to the exclusion of, and in substitution for all or any of the powers of the directors in that behalf; and may from time to time revoke, withdraw, alter or vary all or any of such powers.

QUALIFICATION AND REMUNERATION OF DIRECTORS

90. Any director who serves on any committee or who devotes special attention to the business of the company, or who otherwise performs services which in the opinion of the directors are outside the scope of the ordinary duties of a director, may be paid such extra remuneration as the directors may determine from time to time. The remuneration of a director for attending meetings of the board shall from time to time be determined by the directors.

Each director of the company may, in addition to any remuneration receivable by him, be 91. reimbursed his reasonable travelling and hotel expenses incurred in attending meetings of the directors or of the company or otherwise whilst employed on the business of the company.

The qualification of an elected director, in addition to his being a member, where required, 92. shall be his holding shares of the nominal value of Rs. 5,000 at least in his own name, but a director representing the interests of a member or members holding shares of the nominal value of Rs. 5,000 at least shall require no such share qualification. A director shall not be qualified as representing the interests of a member or members holding shares of the requisite value unless he is appointed as such representative by the member or members concerned by notice in writing addressed to the company specifying the shares of the requisite value appropriated for qualifying such director. Shares thus appropriated for qualifying a director shall not, while he continues to be such representative, be appropriated for qualifying any other director. A director shall acquire his share qualification within two (2) months from the effective date of his appointment as director.

93. The continuing directors may act notwithstanding any vacaney in their body so long as their number is not reduced below the number fixed by or pursuant to these articles as the necessary No Color Clauge Commiss quorum of directors.

94. The office of a director shall ipso facto be vacated if:

- (a) he ceased to hold the share qualification, if any, necessary for his appointment; or
- (b) he is found to be a unsound mind by a court of competent jurisdiction; or
- (C) he is adjudged an solvent; or has applied to be adjudicated as an insolvent and his application is pending or is an undercharged insolvent; or
- (d) he has been convicted by a court of law for an offence involving moral turpitude;
- (e) he or any firm of which he is a partner or any private company of which he is a director without the sanction of the company in general meeting accepts or holds any office of profit under the company other than that of a chief executive or legal or technical adviser or a banker in contravention of the provisions of section 188 (i) (c) of the ordinance:
- he absents himself from three consecutive meetings of the directors or from all (f) meetings of the directors for a continuous period of three months, whichever is the longer, without leave of absence from the board of directors; or

- (g) he or any firm of which he is a partner or any private company of which he is a director accepts a loan or guarantee from the company in contravention of section 195 of the ordinance; or
- (h) he acts in contravention of section 214 of the ordinance; or
- (i) by notice in writing to the company he resigns his office; or
- (j) he is removed from office by resolution of the company in general meeting in accordance with section 181 of the ordinance;
- (k) his appointment is withdrawn by the authority nominating him as director;
- (I) he has betrayed lack of fiduciary behaviour and a declaration to the effect has been made by the court under section 217 of the ordinance at any time during the preceding five years.

95. Subject to authorisation being given by the directors in accordance with section 196(2)(g) of the ordinance, a director shall not be disqualified from contracting with the company either as vendor, purchaser or otherwise, nor shall any such contract or arrangement entered into by or on behalf of the company with any company or partnership of or in which any director of the company shall be a member or otherwise interested, be avoided, nor shall any such director so contracting or being such member or so interested be liable to account to the company for any profit realised by any such contract or arrangement by reason of such director holding that office or of the fiduciary relationship so established. A director who, or whose spouse or minor child, is in any way, whether directly or indirectly, concerned or interested in any contract or arrangement or proposed contraction angement with the company shall disclose the nature of such concern or interest in accordance with section 214 of the ordinance that is to say:

- (a) in the case of a contract or arrangement to be entered into, at the measing of the directors at which the question of entering into the contract or arrangement is first taken into consideration or, if the director was not, on the state of that meeting, concerned or interested in the contract or arrangement, at the first meeting of the directors held after he becomes so concerned or interested; and
- (b) in the case of any other contract or arrangement, at the first meeting of the directors held after the director becomes concerned or interested in the contract or arrangement.

A general notice that any director of the company is a director or a member of any other named company or is a member of any named firm and is to be regarded as interested in any subsequent transaction with such company or firm shall, as regards any such transaction, be sufficient disclosure under this article. Provided, however, that any such general notice shall expire at the end of the financial year in which it was given and may be renewed for a further period of one financial year at a time by giving fresh notice in the last month of the financial year in which it would otherwise expire.

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

97. Whereby any contract or resolution of the directors an appointment or a variation in the terms of an existing appointment is made (whether effective immediately or in the future) of a chief executive, whole time director or secretary of the company, in which appointment of any director of the company is, or after the contract or resolution becomes, in any way, whether directly or indirectly, concerned or interested, or whereby any contract or resolution of the directors, an appointment or a variation in the terms of appointment is made (whether effective immediately or in the future) of a chief executive, the company shall inform the members of such appointment or variation in the manner required by section 218 of the ordinance and shall comply with the requirements of that section in regard to the maintaining of such contracts and resolutions open for inspection by members at the office, the provision of certified copies thereof and extracts therefrom and otherwise.

98. In accordance with section 219, the company shall maintain at its office a register or electronic record, in which shall be entered separately particulars of all contracts, arrangements or appointments in which the directors are interested. Such register or electronic record shall be open to inspection to the members during business hours, subject to any reasonable restriction that may be imposed by the company in general meeting.

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

ELECTION OF DIRECTORS

100. The number of directors determined by the directors under articles 78 shall be elected to office by the members in general meeting in the following manner, namely:

- (a) a member present in person or by proxy shall have such number of votes as is equal to the product of voting shares held by him and the number of directors to be elected
- (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 and s
- (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.

If the number of persons who offer them to be elected as directors is not more than the number of vacancies for which elections are being held, such persons being otherwise eligible shall be deemed to have been elected as directors from the date on which the election was proposed to be effective.

101. A director elected under article 98 shall hold office for a period of three years unless he earlier resigns or becomes disqualified from being a director, or otherwise ceases to hold office.

102. A retiring director of the company shall be eligible for re-election.

103. The company in general meeting may remove a director from office by a resolution passed with the requisite number of votes determined in accordance with the provisions of section 181 of the ordinance.

104. Any casual vacancy occurring among the directors may be filled up by the directors within a time period prescribed by the code, and the person so appointed shall hold office for the remaining period of the director in whose place he is appointed. Provided that the directors may not fill a casual vacancy by appointing any person who has been removed from the office of a director of the company under article 101.

105. No person including a retiring director of the company shall be eligible for election to the office of director of the company at any general meeting unless he has, not less than fourteen days before the date of the meeting, left at the office, a notice in writing, and duly signed, signifying his candidature for the office.

106. The company shall keep at the office a register of the directors and officers, containing the particulars required by section 205 of the ordinance and the company shall otherwise comply with the provisions of that section as regards furnishing returns to the registrar and giving inspection of the register.

PROCEEDINGS OF DIRECTORS

107. The directors shall meet together at least once in each quarter of a year for the despatch of business, adjourn and otherwise regulate their meetings and proceedings as they may think fit In accordance with the ordinance, the code and the listing requirements. Questions arising at any meeting shall be decided by a majority of votes and in case of an equality of votes the chairman shall have a second or casting vote.

108. The quorum necessary for the transaction of the business of the directors shall be one-third of the number of directors or four directors, whichever is greater, present in person. An alternate director whose appointment is effective shall be counted in a quorum. If all the directors except one are disqualified from voting, the matter should be decided in general meeting.

109. A director may, and the secretary on the requisition of a director shall, at any time summon a meeting of the directors. Such meetings may be held using any technology consented to by all the directors, including but not limited to telephone and video conferencing. The consent may be a standing one, withdrawable by a director only within a reasonable period of time before the meeting. It shall not be necessary to give notice of a meeting of directors to any director for the time being absent from Pakistan.

110. The board of directors of the company shall from time to time elect one of the directors as 'chairman of the board of directors of the company and determine the period for which he is to hold office and his remuneration. The chairman or in his absence the chief executive shall preside over all meetings of the board of directors, but if at any meeting neither the chairman nor the chief executive is present in person within half an hour of the time appointed for holding the same, the directors present in person may choose one of their number to be chairman of the meeting.

111. A meeting of the directors at which a quorum is present shall be competent to exercise all or any of the authorities, powers and discretion by or under these articles for the time being vested in or exercisable by the directors generally.

2.24

112. The directors may from time to time delegate of their powers to committees consisting of such
two members or more members of their body as they think fit, and may from time to time revoke such delegation. Any committee so formed shall, in the exercise of the powers so delegated, conform to any regulations that may from time to time be imposed upon it by the directors.

113. The meeting and proceedings of any such committee consisting of two or more members shall be governed by the provisions herein contained for regulating the meetings and proceedings of the directors, so far as the same are applicable thereto and are not superseded by any regulations made by the directors under article 110.

114. All acts done by any meeting of the directors or by a committee of the directors or by any person acting as a director of the company shall, notwithstanding that is shall afterwards be discovered that there was some defect in the appointment or continuance in office of any such directors or person acting as aforesaid, or that they or any of them were disqualified or had vacated office, or were not entitled to vote, be as valid as if every such person had been duly appointed or had duly continued in office and was qualified and had continued to be a director and had been entitled to be a director. Provided that nothing in this article shall be deemed to give validity to acts done by any such director after the appointment of such director has been shown to be invalid.

A resolution, other than resolution in respect of any matter specified in section 196(2) of the 115. ordinance circulated through fax or email or any form of electronic transmission to all the directors for the time being entitled to receive notice of a meeting of the directors, passed without any meeting of the directors or of a committee of directors and signed or affirmed through fax or email or any form of electronic transmission, by a majority of all directors in writing under the hands of all directors (or in their absence their alternate directors) for the time being in Pakistan, being not less than the quorum required for meetings of the directors, or as the case may be of the members of the committee, shall be valid and effectual as if it had been passed at the meeting of the directors so the case may be of such committee, duly called or constituted. The resolution in writing of the company may consist of several copies of a document signed by one or more director(s) and takes effect at the date and time on which the last director, necessary for the resolution to be passed signs a copy of the resolution; or a record of several signed electronic messages each indicating the identity of the sender, the text of the resolution and the sender's agreement or disagreement to the resolution, as the case may be and such a resolution takes effect on the date on which the last directors message, necessary for the resolution to be passed, is received.

116. If any director of the company, being willing, shall be called upon to perform extra services or to make any special exertions in going or residing away from his place of business for the time being for any of the purposes of the company or in giving special attention to the business of the company as a member of a committee of the directors, the company may remunerate such director so doing either by a fixed sum or by a percentage of profits or otherwise as may be determined by the directors, and such remuneration may be either in addition to or in substitution for his or their share in the remuneration above provided for the directors.
MINUTES

117. The directors shall cause minutes to be duly entered in books provided for the purpose of or as an electronic record, of,

- (a) all appointments of officers;
- (b) the names of the directors present in person at each meeting of the directors and of any committee of the directors;
- (c) all orders made by the directors and committees of the directors;
- (d) all resolutions and proceedings of general meeting and of meetings of the directors and of the committees of the directors;

and any such minutes of any meeting of the directors or of any such committee or of the company, if purporting to be signed by the chairman of such meeting or by the chairman of the next succeeding meeting, shall be prima facie evidence of the matter stated in such minutes.

POWERS AND DUTIES OF DIRECTORS

118. The directors shall duly comply with the provisions of the ordinance, the listing requirements and the code. In particular and without prejudice to the generality of the foregoing, the company shall comply with the provisions of the ordinance 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, sub-division of shares, and copies of special resolutions and a copy of the register of directors and potifications of any changes therein. All such information may be stored as an electronic record and transmitted accordingly, where possible.

119. The control of the company shall be vested in the directors, and the business of the company shall be managed by the directors who may exercise all such powers of the company and do all such acts and things as may be exercised or done by the company as by the ordinance or by these articles or by a special resolution expressly directed or required to be exercised or done by the company in general meeting, subject nevertheless to any regulations of these articles, to the provisions of the ordinance, and to such regulations being not inconsistent with the aforesaid regulations or provisions, as may be prescribed by the company in general meeting; but no regulation made by the company in general meeting shall invalidate any prior act of the directors which would have been valid if that regulation had not been made.

120. Without prejudice to the general powers conferred by article 117 and to any other powers or authorities conferred by these articles on the directors, it is hereby expressly declared that the directors shall have the following powers, that is to say, power:

(i) To purchase or otherwise acquire for the company any property, rights or privileges which the company is authorised to acquire at such price and generally on such terms and conditions as they think fit, and to sell, let, exchange or otherwise dispose of absolutely or conditionally any part of the property, privileges and undertaking of the company upon such terms and conditions, and for such consideration, as they may think fit.

2.26

- (ii) At their discretion to pay for any property, rights, privileges acquired by or services rendered to the company either wholly or partially in cash or in shares (subject to the provisions of section 86 of the ordinance) bonds, debentures or other securities of the company. Any such bonds, debentures or other securities may be either specifically charged upon all or any part of the property of the company or not so charged.
- (iii) To open account with any bank or financial institution and deposit into and withdraw money from such accounts from time to time.
- (iv) To make, draw, endorse, sign, accept, negotiate and give all cheques, bills of lading, drafts, orders, bills of exchange, and other promissory notes and negotiable instruments required in the business of the company.
- (v) To secure the fulfilment of any contracts, agreements or engagements entered into by the company by mortgage or charge of all or any of the property of the company for the time being or in such other manner as they may think fit.
- (vi) Subject to the provisions of the ordinance, to appoint and at their discretion remove or suspend such agents (other than Managing Agents), managers, secretaries, officers, employees for permanent, temporary or special services as they may from time to time think fit, and to determine their powers and duties and fix their salaries or emoluments and to require security in such instances and to such amount as they think fit.
- (vii) To appoint any person or persons (whether incorporated or not) to accept and hold in trust for the company any property belonging to the company or in which it is interested or for any other purposes, and to execute and do all sight deeds, documents and things as may be requisite in relation to any such trust and to provide for the remuneration of such trustee or trustees.
- (viii) To institute, conduct, defend, compound or abandon any legal proceedings by or against the company or its officers or otherwise concerning the affairs of the company and also to compound and allow time for payment or satisfaction of any debts due and of any claims or demands by or against the company.
- (ix) To refer claims or demands by or against the company to arbitration and observe and perform the awards.
- (x) To make and give receipts, releases and other discharges for money payable to the company and for the claims and demands of the Company.
- (xi) To act on behalf of the company in all matters relating to bankrupts and insolvents.
- (xii) To determine who shall be entitled to sign on the company's behalf bills, notes, receipts, acceptances, endorsements, cheques, releases, contracts and documents.
- (xiii) From time to time to provide for the management of the affairs of the company either in different parts of Pakistan or elsewhere in such manner as they think fit, and in particular to establish branch offices and to appoint any persons to be the attorneys or

agents of the company with such powers (including power to sub-delegate) and upon such terms as may be thought fit.

- (xiv) To invest and deal with any of the moneys of the company not immediately required for the purposes thereof upon such securities and in such manner as they may think fit, and from time to time to vary or realise such investments.
- (xv) To execute in the name and on behalf of the company in favour of any director of the company or other person who may incur or be about to incur any personal liability for the benefit of the company, such mortgages of the company's property (present and future) as they think fit, and any such mortgage may contain a power of sale and such other powers, covenants and provisions as shall be agreed on.
- (xvi) To give to any person employed by the company, a commission on the profits of any particular business or transaction or a share in the general profits of the company, and such commission or share of profits shall be treated as part of the working expenses of the company.
- (xvii) From time to time to make, vary and repeal bye-laws for the regulation of the business of the company, its employees.
- (xviii) To enter into all such negotiations and contracts and rescind and vary all such contracts and execute and do all such acts, deeds and things in the name and on behalf of the company as they may consider expedient for or incretation to any of the matters aforesaid or otherwise for the purposes of the company.
- (xix) To establish, maintain, support and subscribe to any charitable or public ebject, and any institution, society, or club which may be for the penefit of the company or its employees, or may be connected with any town or place, where the company carries on business; to give pensions, gratuities, or charitable aid to any persons who have served the company or to the wives, children, or dependents of such person or persons, that may appear to the directors just or proper, whether any such person, his widow, children or dependents, have or have not a legal claim upon the company.
- (xx) Subject to the provisions of section 227 of the ordinance, before recommending any dividends, to set aside portions of the profits of the company to form a fund to provide for such pensions, gratuities, or compensation; or to create any provident or benefit fund in such or any other manner as to the directors may seem fit.
- (xxi) Subject to the provision of the ordinance to accept from any member on such terms and conditions as shall be agreed a surrender of his shares or any part thereof.
- (xxii) To make advances and loans without security or on such security as they may deem proper and as permissible under the law.
- (xxiii) To make and alter rules and regulations concerning the time and manner of payment of the contributions of the employees and the company respectively to any such funds and the accrual, employment, suspension and forfeiture of the benefits of the said fund

and the application and disposal thereof, and otherwise in relation to the working and management of the said fund as the directors shall from time to time think fit.

- (xxiv) To delegate all or any of the powers hereby conferred upon them to such person or persons as they may from time to time think fit.
- (XXV)Subject to section 213 of the ordinance to authorise the having of an official seal of the company for use abroad.

REGISTER OF DIRECTORS SHAREHOLDINGS

121. In accordance with section 220, the company shall maintain at its office a register or electronic record of the directors, chief executive officer, chief financial officer (chief accountant), company secretary or head of internal audit who is or has been the beneficial owner of listed securities and every person who is directly or indirectly the beneficial owner of not less than ten percent (10%) of the beneficial interest in the company. This register or electronic record shall be open to inspection during business hours subject to sub-sections (5), (6) and (7) of section 220.

POWER OF ATTORNEY

122. The directors may from time to time and at any time by power of attorney appoint any company, firm or person (including any director or officer of the company) or body of persons, whether nominated directly or indirectly by the directors, to be the attorney or attorneys of the company for such purposes and with such powers, authorities and discretions and for such period and subject to such conditions as they may think fit, and any such powers of attorney may contain such provisions for the protection and convenience of persons dealing with any such attorney to delegate all or any of the powers, authorities and discretions vested in him; and without prejudice to the generality of the foregoing any such power of attorney may authorise the attorney to fistitute conduct. defend, compound or abandon any legal proceedings by or against the company whether generally or in any particular case.

AUDIT COMMITTEE

123.



members, including the chairman. Majority of the members of the committee shall be from among the non-executive directors of the company and the chairman of the audit committee shall preferably be a non-executive director. The names of member of the audit committee shall be disclosed in each annual report of the company.

MANAGEMENT COMMITTEE

124. The directors shall establish management committees to comply with the requirements of the code of the corporate governance and their own requirements for effective management and control. The directors shall nominate members for each committee which may be from the board of directors or outside the board.

BORROWING POWERS

125. (1)The directors may exercise all the powers of the company to borrow money and to mortgage or charge its undertaking, property and assets (both present and future),

and to issue debentures, debenture stocks, and other securities, whether outright or as collateral security for any debt, liability or obligation of the company or of any third party.

(ii) In exercising the powers of the company aforesaid the directors may, from time to time and on such terms and conditions as they think fit, raise money from banks and financial institutions and from other persons under any permitted system of financing, whether providing for payment of interest or some other form of return, and in particular the directors may raise money on the basis of the mark up on price, musharika, modaraba or any other permitted mode of financing, and without prejudice to the generality of the foregoing the directors may exercise all or any of the powers of the company arising under section 19(2) of the ordinance.

(iii) In regard to the issue of securities the directors may exercise all or any of the powers of the company arising under sections 19(2), 87 and 120 of the ordinance and in particular the directors may issue any security as defined in section 2(1)(34) of the ordinance or may issue any instrument or certificate representing redeemable capital as defined in section 2(1)(30A) of the ordinance or participatory redeemable capital as defined in section 2(1)(25) of the ordinance.

126. Debentures, debenture-stock, bonds and other securities may be made assignable free from any equities between the company and the person to whom the same may be issued.

127. Any debentures, debenture-stock, bonds or other securities may be issued at a discount, premium or otherwise and with any special privileges as to redemption, surrender, drawing, allotment of shares, attending and voting at general meetings of the company appeintment of directors of the company or otherwise.

128. The directors shall cause a proper register to be kept/in accordance with the provisions of section 135 of the ordinance, of all mortgages and charges specifically affecting the property of the company, and shall duly comply with the provisions of the sections of the ordinance, namely, sections 121 and 122 (Registration of mortgages and charges), section 128 (Endorsement of certificates), section 129 (Filing of prescribed particulars), section 130 (Keeping of a copy of every instrument creating any mortgage or charge by the company at the office) and section 132 (Giving of intimation of the payment or satisfaction of any charge or mortgage created by the company).

129. Every register of holders of debentures of the company may be closed for any periods not exceeding in the whole forty five days in any year and not exceeding thirty days at a time. Subject as aforesaid, every such register shall be open to the inspection of members or debenture holders. But the company may in general meeting impose any reasonable restrictions, so that at least two hours, in each day when such register is open, for inspection.

130. Subject to the provisions of section 76 of the ordinance, no transfer of registered debentures shall be registered unless a proper instrument of transfer duly stamped and executed by the transferor and transferee has been delivered to the company together with the certificate or certificates of the debentures.

131. If the directors refuse to register the transfer of any debentures, they shall, within thirty days from the date on which the instrument of transfer was lodged with the company, send or cause to be sent to the transferee and transferor notice of the refusal.

132. The company shall comply with the provisions of section 136 of the ordinance as to allowing inspection of copies kept at the office in pursuance of section 130 of the ordinance, and as to allowing inspection of the register of mortgages to be kept at the office in pursuance of section 135 of the ordinance.

133. The company shall comply with the provisions of sections 113 and 150 of the ordinance as to supplying copies of any register of holders of debentures or of any trust deed for securing any issue of debentures.

LOCAL MANAGEMENT

134. Subject to the provisions of sections 206 and 207 of the ordinance, directors may from time to time provide for the management of the affairs of the company outside Pakistan or in any special locality in Pakistan in such manner as they shall think fit and the following provisions shall operate without prejudice to the general powers hereby conferred.

- (i) The directors may from time to time and at any time establish any local boards or agencies for managing any of the affairs of the company outside Pakistan or in any specified locality in Pakistan and may appoint any persons to be members of such local board or any managers or agents and may fix their remuneration.
- (ii) The directors may from time to time and at any time delegate to any persons so appointed any of the powers, authorities and discretions for the time being vested in the directors and may authorise the members for the time being of any such local board or any of them to fill up any vacancies therein and to act notwithstanding vacancies and any such appointment or delegation may be made on such terms and subject to such conditions as the directors may think fill and the directors may at any time remove any person so appointed and may annul or vary any such delegation.
- (iii) The directors may at any time and from time to time, by power of attorney under the seal of the company, appoint any person 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 **entices**) and for such period and subject to such conditions as the directors may from the to time think fit; and any such appointment may, if the directors think fit, be made in favour of all or any of the members of any local board established as aforesaid, or in favour of any company or of the members directors, nominees or managers of any company or firm, and any such power of attorney may contain such provisions for the protection or convenience of persons dealing with such attorneys as the directors think fit.
- (iv) Any such delegates or attorneys as aforesaid may be authorised by the directors to sub-delegate all or any of the powers, authorities and discretions for the time being vested in them.

V. ACCOUNTS AND DIVIDENDS

BOOKS OF ACCOUNT

(References to books of account, balance sheet, profit and loss accounts and auditors' report shall hereinafter mutatis mutandis include all electronic forms of record or storage of the company.)

135. The directors shall cause to be kept proper books of account with respect to the matters set out in section 230 of the ordinance.

136. The books of account shall be kept at the office or at such other place as the directors think fit, and shall be open to inspection by the directors during business hours. If the directors decide to keep the books of account at a place other than the office they shall comply with the directions contained in the proviso to section 230(1) of the ordinance.

137. The company shall preserve in good order the books of account of the company in respect of any financial year for a period of ten years following the close of that year or otherwise as provided in the section 230(6) of the ordinance.

138. The directors shall from time to time determine whether and to what extent and at what times and places and under what conditions or regulations the accounts and books of the company or any of them shall be open to the inspection of the members, and no member (not being a director of the company) shall have any right of inspecting any account or book or document of the company except as conferred by law or authorised by the directors or by the company in general meeting.

- (i) The directors shall arrange to place before the annual general meeting of the company in every year a duly audited balance sheet and profit and loss account, conforming to the requirements of section 234, 237 and 238 of the ordinance and made up to a date not more than four months before the date of such meeting and having the auditor's report attached thereto, and a report of the directors conforming to the requirements of section 236 of the ordinance.
 - (ii) As required by section 241 of the ordinance the balance sheet and profit and loss account shall first be approved by the directors and when so approved shall be signed by the chief executive and at least one director but it on account of his absence from Pakistan or other reason the signature of the chief executive cannot be obtained, the balance sheet and profit and loss account shall be signed by at least two directors for the time being in Pakistan, and in every such case a statement signed by those two directors shall be subjoined to the balance sheet and profit and loss account shall be subjoined to the balance sheet and profit and loss account stating the reason why the signature of the chief executive was not obtained.
 - (iii) The directors may authorize the chairman or the chief executive to sign the report of the directors which may then be signed accordingly, but in the absence of any such authority the report of the directors shall be signed as required by section 236(3) of the ordinance in the same manner as the balance sheet and profit and loss account.
- 140. (i) A copy of the balance sheet, profit and loss account and the reports of the directors and auditors shall be sent not less than twenty one (21) days before the date of the annual general meeting to the members and other persons entitled to receive notices of general meetings in the manner in which notices are to be given hereunder and a copy thereof shall be kept for a period of at least fourteen (14) days before the meeting at the office for inspection by members. The company shall send, each stock exchange listing the shares of the company three hundred copies (or such number as may be prescribed from time to time), and to the registrar of companies and to the commission, tive copies (or such number as may be prescribed from time to time),

each of the balance sheet, profit and loss account and the reports of the directors and auditors at the same as they are dispatched to the members and other persons in accordance with this article.

- (ii) After the balance sheet, profit and loss account and the reports of the directors and auditors have been laid before the annual general meeting of the company, three copies thereof (or, such larger number as may be prescribed under section 242(1) of the ordinance) signed by the signatories thereto shall be filed with the registrar within thirty days from the date of the meeting and the company shall also comply with the provisions of section 242(2) of the ordinance where applicable.
- (iii) Subject to provisions of sections 245 and the listing requirements, the company shall, within one month from the close of the first and third quarters and two month from the close of the second quarter, of the year of account of the company, prepare and transmit to the members one copy and to stock exchange listing the shares of the company three hundred copies (or such number as may be prescribed from time to time), each of the profit and loss account for that quarter and of the balance sheets as at the end of that quarter. Such quarterly profit and loss accounts and balance sheets need not to be audited but must be signed in the same manner as the annual profit and loss accounts and balance sheets are required to be signed. The directors shall also send, to the commission and to the registrar three copies (or such number as may be prescribed for the time being under section 245(1) (b) of the ordinance), each of such quarterly profit and loss accounts and balance sheets at the same time as they are sent to the members in accordance with this article.
- (iv) The company may with the consent of shareholders and consultation of respective stock exchange(s), transmit quarterly accounts through web site of the company subject to the approval of the commission.

141. The directors shall in all respects comply with the provisions of sections 230 to 247 of the ordinance, or any statutory modification thereof for the time being in force the provision of the section of the secti

ANNUAL RETURNS

142. The company shall make the requisite annual returns in accordance with the provisions of section 156 of the ordinance.

DIVIDENDS

143. The company in general meeting may declare dividends, but no dividend shall exceed the amount recommended by the directors, provided that the company in general meeting may declare a smaller dividend.

144. No dividend shall be paid otherwise than out of the profits of the year or any other undistributed profits, and in the determination of the profits available for dividends the directors shall have regard to the provisions of the ordinance and in particular to the provisions of sections 83, 235 and 248 of the ordinance.

145. The declaration of the directors as to the amount of the net profits of the company shall be conclusive.

146. The directors may from time to time pay to the members such interim dividends as in their judgement the position of the company justifies.

147. All dividends shall be declared and paid according to the amounts paid on the shares. All dividends shall be apportioned and paid proportionally to the amounts paid or credited as paid on the shares during any portion or portions of the period in respect of which the dividend is paid; but if any share is issued on terms providing that it shall rank for dividend as from a particular date such share shall rank for dividend accordingly.

148. All dividends declared shall be paid within the periods specified in section 251 of the ordinance.

149. No dividend payable in respect of a share shall bear interest against the company.

150. The directors may retain any dividends on which the company has a lien and may apply the same in or towards satisfaction of the debts, liabilities or engagements in respect of which the lien exists.

151. Any general meeting declaring a dividend may resolve that such dividend be paid and satisfied wholly or in part in cash or by the distribution of specific assets, and in particular by the distribution of paid-up shares, debentures, debenture-stock or other security of the company, or paid-up shares, debenture-stock or other security of any other company, or in any one or more of such ways.

152. 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 the reserve undivided profits of the company and available for dividend (or representing premiums received on 157 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 share premium account) be capitalised and distributed amongst such of the members as would be entitled to receive the same of distributed by way of dividend and in the same proportion on the footing that they become entitled therete as capital and that all or any part of such fund be applied on behalf of such members in paying up install any unissued shares, debentures, debenture-stock or other security of the company, which shall be distributed accordingly, and that such distribution or payment shall be accepted by such members in full satisfaction of their interest in the said capitalised sum.

153. For the purpose of giving effect to any resolution under article 149 or article 150, the directors may settle any difficulty which may arise in regard to the distribution as they think expedient and may fix the value for distribution of any specific assets and may determine that cash payments shall be made to any members upon the footing of the value so fixed in order to adjust the rights of all parties and may vest any such cash or specific assets in trustees upon such trusts for the persons entitled to the dividend or capitalised fund as may seem expedient to the directors. Where requisite a proper contract shall be filed in accordance with the provisions of section 73 of the ordinance, and the directors may appoint any person to sign such contract on behalf of the persons entitled to the dividend or capitalised fund, and such appointment shall be effective.

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

155. The directors may retain the dividends payable upon shares in respect of which any person is under article 38 entitled to become a member or which any person under that article is entitled to transfer until such person shall become a member in respect thereof or shall duly transfer the same.

156. Any one of several persons who are registered as the joint-holders of any share may give effectual receipts for all dividend and payments on account of dividends in respect of such share.

157. The dividend in respect of any share shall be paid to the registered holder of such share or to his banker or to a financial institution (as defined in section 2(1) (15A) of the ordinance) nominated by him for the purpose. Unless otherwise directed, any dividend may be paid by cheque or warrant sent through post to the registered address of the member or person entitled thereto, or, in the case of joint-holders, to the registered address of that one whose name stands first on the register in respect of the joint-holding, or to such financial institution or bank as the member or person entitled thereto or such joint-holders, as the case may be, direct, and every cheque or warrant so sent shall be made payable to the order of the person to whom it is sent, or to the order of the institution or bank, directed as aforesaid.

158. All dividends unclaimed for one year after having been declared may be invested or otherwise made use of by the directors for the benefit of the company until claimed and all dividends unclaimed for three years after having been declared may be forfeited by the directors for the benefit of the company, but the directors may annul the forfeiture wherever they may think proper.

RESERVE AND DEPRECIATION FUNDS

159. The directors may from time to time before recommending any dividend set apart any and such portion of the profits of the company as they think fit as a reserve tund to meet contingencies or for the liquidation of any debentures, debts or other liabilities of the company, for equalization of dividends or for repairing, improving, and maintaining any of the property of the company, and for such other purposes of the company as the directors in their absolute discretion think conducive to the interests of the company) as they may think fit, and from time to time deal with and vary such investments, and dispose of all or any part thereof for the benefit of the company) as they think fit, with full power to employ the reserve funds or any part thereof in the business of the company, and that without being bound to keep the same separate from the other assets.

160. The directors may, from time to time before recommending any dividend, set apart any and such portion of the profits of the company, as they think fit, as a depreciation fund applicable at the discretion of the directors, for providing against any depreciation in the investment of the company or for rebuilding, restoring, replacing or for altering any part of the buildings, work, plant, machinery, or other property of the company destroyed or damaged by fire, flood, storm, tempest, earthquake, accident, riot, wear and tear, or any other means whatsoever, and for repairing, altering and keeping in good condition the property of the company, or for extending and enlarging the buildings, machinery and property of the company with full power to employ the assets constituting such depreciation fund in the business of the company, and that without being bound to keep the same separate from the other assets.

161. All moneys carried to the reserve fund and depreciation fund respectively shall nevertheless remain and be profits of the company applicable, subject to due provision being made for actual IOSS or depreciation, for the payment of dividends and such moneys and all the other moneys of the company

not immediately required for the purposes of the company may be invested by the directors in or upon such investment or securities as they may select or may be used as working capital or may be kept at any bank on deposit or otherwise as the directors may from time to time think proper.

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

VI. AUDIT

163. Auditors shall be appointed and their duties regulated in accordance with sections 252 to 255 of the ordinance or any statutory modification thereof for the time being in force.

VII. SEAL

164. 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 (2) directors, or one (1) director and the secretary of the company, shall sign every instrument to which the common seal is affixed.

165. 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 official seal 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 (2) directors, or one (1) director and the secretary of the company, or such other person as the directors may appoint for the purpose, shall sign every instrument to which the official seal is affixed. The provisions of section 213 shall apply to the use of the official seal.

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VIII. NOTICES

- 166. (i) A notice may be given by the company to any member either personally or by sending it by post to him at his registered address or (if he has no registered address in Pakistan) to the address, if any, within Pakistan supplied by him to the company for the giving of notices to him or in electronic form as prescribed by section 3 of the electronic transactions ordinance.
 - (ii) Where a notice is sent by post, service of the notice shall be deemed to be effected by properly addressing, prepaying and posting a letter containing the notice and, unless the contrary is proved, to have been effected at the time at which the letter would be delivered in the ordinary course of post.

167. In accordance with section 15 of the electronic transactions ordinance, a notice dispatched by electronic transmission shall be deemed to be received by the addressee at his place of business or where he ordinarily resides when it reaches the designated information system of the addressee.

168. If a member has no registered address in Pakistan, and has not supplied to the company an address within Pakistan or an electronic address, for the giving of notices to him, a notice addressed to him or to the shareholders generally and advertised in a newspaper, circulating in the Province in which the office is situated and in at least one issue each of a daily newspaper in the English language

and a daily newspaper in the Urdu language circulating in the province in which the stock exchange on which the company is listed is situate, shall be deemed to be duly given to him on the day on which the advertisement appears.

169. Any notice given by advertisement shall be deemed to have been given on the day on which the advertisement shall first appear.

170. A notice may be given by the company to the joint-holders of a share by giving the notice to the joint-holder named first in the register in respect of the share.

171. A notice may be given by the company to the persons entitled to a share in consequence of the death or insolvency of a member by sending it through the post in a prepaid letter addressed to them by name, or by the title of representatives of the deceased, or assignee of the insolvent or by any like description, at the address (if any) in Pakistan supplied for the purpose by the persons claiming to be so entitled or addressing it in a similar manner and dispatching it to a designed electronic address or until any such address has been so supplied, by giving the notice in any manner in which the same might have been given if the death or insolvency had not occurred.

172. Notice of every general meeting shall be given in same manner hereinbefore authorised to (a) every member of the company except those members who (having no registered address within Pakistan) have not supplied to the company either a postal address within Pakistan or electronic address for the giving of notices to them, and also to (b) every person entitled to a share in consequence of the death or insolvency of a member, who but for his death or insolvency would be entitled to receive notice of the meeting. Subject to the provisions of articles 80 and section 255(6), no other persons shall be entitled to receive notices of general meetings.

173. Any notice required to be given by the company to the members or any of them and not expressly provided for by these articles shall be sufficiently given, it given by advertisement.

174. Every person who by operation of law, transfer of other means whatsoever shall become entitled to any share shall be bound by every notice in respect of such share which previously to his name and address being entered on the register shall be dury given to the person from whom he derives his title to such shares.

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175. Any notice or document delivered or sent by pertice or left at the registered address of any member in pursuance of these articles shall, notwithstanding that such member may be then deceased and whether or not the company shall have received notice of his decease, be deemed to have been duly served in respect of any registered shares whether held solely or jointly with other persons by such member, until some other person be registered in his stead as the holder or joint-holder thereof, and such service shall for all purposes of these articles be deemed a sufficient service of such notice or document on his heirs, executors, or administrators, and all persons, if any, jointly interested with them in any such share.

176. The signature to any notice to be given by the company may be written or printed.

177. In the event of a winding up of the company, every member of the company who is not for the time being normally resident in the town in which the office is situate shall be bound, within eight weeks after the passing of an effective resolution to wind up the company voluntarily or the making of an order for the winding up of the company, to serve notice in writing on the company appointing some householder residing in that lown upon whom all summons, notices, process, orders and judgements in

relation to or under the winding up of the company may served, and in default of such nomination the liquidator of the company shall be at liberty on behalf of such member to appoint some such person, and service upon any such appointee, whether appointed by the member or the liquidator, shall be deemed to be good personal service on such member for all purposes, and where the liquidator makes any such appointment he shall with all convenient speed give notice thereof to such member by advertisement in some newspaper circulating in the province in which the office is situate and in at least one issue each of a daily newspaper in the English language and a daily newspaper in the Urdu language circulating in the province in which the stock exchange on which the company is listed is situate or by a registered letter sent through the post and addressed to such member at his address as mentioned in the register, and such notice shall be deemed to be served on the day on which the advertisement shall first appear or on the day following that on which the letter is posted, as the case may be. The provisions of this article shall not prejudice the right of the liquidator to serve any notice or other document in any other manner prescribed by the regulations of the company.

PUBLICATION OF NOTICES IN NEWSPAPERS

178. Subject to such provisions of the listing requirements as may apply specifically to the manner in which certain notices are to be published in the newspaper(s):

- (i) Every prospectus issued by or on behalf of the company or by or on behalf of any person who has been engaged or interested in the formation of the company shall, in its full text or in such abridged form as may be prescribed, be published by the company in at least one (1) Urdu and one (1) English daily newspaper, in accordance with the provisions of sections 53, 57 and 64 not less than seven (7) days or more than thirty (30) days before the subscription list as specified in the prospectus, is due to open. Provided that the company may for specific persons and with permission of the commission, publish the advertisements of a prospectus more than thirty (30) days before the subscription list.
- (ii) The company may, on giving not less than seven (7) days notices by advertisement in a newspaper having circulation in the province, or part of Pakistan not forming part of a province, in which the office of company is situated and in addition, in a newspaper having circulation in the province, or other part as aforesaid, in which the stock exchange(s) on which the company is listed is / are situated, close the register of members or debenture holders, as the case may be, for any time or times not exceeding in the whole forty-five (45) days in a year and not exceeding thirty (30) days at a time, in accordance with section 151.
- (iii) The notice of a general meeting of the company, whether annual or extraordinary general meeting, shall be published in at least one (1) issue each of daily newspaper in English language and a daily newspaper in Urdu language having circulation in the province in which the stock exchange(s) on which the company is listed is / are situated, in accordance with section 158(3) and 159(7).
- (iv) All notices received by the company in pursuance of section 178 (3) for election as a director, shall be transmitted to the members not later than seven (7) days before the date of the general meeting at which the directors are to be elected, by publication in at least one (1) issue each of a daily newspaper in English language and a daily newspaper in Urdu language having circulation in the Province in which the stock

exchange(s) on which the Company's securities are listed is / are situated, in accordance with section 178 (4).

- (v) If a resolution is to be passed at the company's annual general meeting appointing as auditors a person other than a retiring auditors, the company shall, not less seven (7) days before the date fixed for the annual general meeting, publish in at least one (1) issue each of a daily newspaper in English language and a daily newspaper in Urdu language having circulation in the province in which the stock exchange(s) on which the company is listed is / are situated, in accordance with section 253 (2).
- (vi) Notice of any resolution for winding up a company voluntarily under section 358, shall be given by the company within ten (10) days of the passing of the same by advertisement in a newspaper circulating in the province where the office of the company is situated and, in addition, shall also published in at least one (1) issue of a daily newspaper in English language and a daily newspaper in Urdu language having circulation in the province in which the stock exchange(s) on which the company is listed is / are situated, in accordance with section 361 (1).

IX. AMALGAMATION, DIVISION AND RECONSTRUCTION

Subject to and in accordance with the provisions of section 287, the company may reconstruct, 179. amalgamate into an other company or divide into two (2) or more companies in the process of which the whole or any part of the undertaking, property or liabilities of the company or any other company, may be transferred to any other company or the company, respectively, as the case may be. Provided that any sale of the undertaking of the company, the directors, or the liquidator on a winding up, may, if authorised by a special resolution, accept fully paid shares, depentures of securities of any other company, whether incorporated in Pakistan or not, either there existing of the be formed, for the purchase in whole or in part of the property of the company, and the directors (it the profits of the company permit) or the liquidator (in a winding up) may distribute such shares, or securities, or any other property of the company amongst the members without realisation, 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, and for valuation of any such securities or property at such price 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 in case the company is proposed to be or is in the course of being wound up, such statutory rights (if any) under section 367 of the ordinance as are incapable of being varied or excluded by these articles.

X. SECRECY

180. Every director, manager, adviser, auditor, trustee, member of a committee, officer, servant, agent, accountant or other person employed in the business of the company shall, if so required by the directors before entering upon his duties, sign a declaration pledging himself to observe 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 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 articles contained.

181. No member or other person (not being a director) shall be entitled to enter upon the property of the company or to inspect or examine the company's premises or properties of the company without the permission of the directors for the time being or, subject to the provisions of article 119, 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 it will be inexpedient in the interest of the members of the company to communicate.

XI. ARBITRATION

182. Whenever a 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 presents, or of the status of enactment's of the legislature, or touching anything then or thereafter done, executed, omitted or suffered in pursuance of these presents or of the status of enactment's touching any breach or alleged breach or otherwise relating to the premises or to these presents, or to the status or to any of the affairs or officers of the company, the company by written agreement refer to arbitration in accordance with the Arbitration Act 1940 (X of 1940) and every such difference shall be referred 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, one appointed by such party, or in the event of disagreement of the arbitrators, to that of an umpire appointed by arbitrators themselves. The provisions of Arbitration Act 1940 (X of 1940) shall apply to all arbitrations between the company and persons having such difference.

183. The costs of, or incidental to any such reference and award shall be in the discretion of the arbitrator/arbitrators or umpire as the case may be who may determine the amount there of and may award by whom, and to whom, and in what manner the same shall be borne and paid.

XII. WINDING UP

184. If the company shall be wound up and the assets available for distribution among the members, subject to the rights attached to any preference share capital, as such shall be usufficient to repay the whole of the paid-up capital, such assets shall be distributed so that as nearly as may be the losses shall be borne by the members in proportion to the capital paid up on the effares held by them respectively. And if in a winding up the assets available for distribution among the members shall be more than sufficient to repay the whole of the capital paid up at the commencement of the winding up, the excess shall be distributed amongst the members in proportion to the capital at the commencement of the winding up, the shares held by them respectively. But this article is to be without prejudice to the rights of the holders of shares issued upon special terms and conditions.

185. If the company shall be wound, whether voluntarily or otherwise, the liquidator may with the sanction of a special resolution divide among the members in specie or kind any part of the assets of the company, and may with the like sanction vest any part of the assets of the company in trustees upon such trusts for the benefit of the members or any of them as the liquidator with the like sanction shall think fit.

XIII. INDEMNITY

186. Every director or officer of the company and every person employed by the company as auditor shall be indemnified out of the funds of the company against all liability incurred by him as such director, officer or auditor in defending any proceedings, whether civil or criminal, in which judgement is given in his favour, or in which he is acquitted, or in connection with any application under section 488 of the ordinance in which relief is granted to him by the company.

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We, the several persons whose names an endeddresses are subscribed below, are desirous of being formed into a Company in pursuance of this Aria. Association and we respectively agree to take the number of shares in the capital of the Company set opposite our respective names:-

~				1	1		*	
Sr No.	Name and Surname (Present & Former) in	NIC No. (in case	Father's/	Nationality(Occupation	Residential address in full	Number of	Sign
	full (in Block Letters)	or Foreigner,	Husband's Name	ies) with			charge	0.91
	run (in block Letters)	Passport No.)	in full	any former			snares	
				Nationality			taken by	
							each	
1	Muhammad Shakeel	35201-1537699-1	Chandhing				subscriber	
2	Mukhtar Ahmed	35201 1210754 0		Pakistani	Business Executive	House No.69/9, Sher Khan	05	
	and a mined	35201-1316754-9	Chaudhry Fazal	Pakistani	Business	7-Aziz Bhatti Road Laboro		<u> </u>
3	Faisal Munir	0.000	Din		Executive	Cantt.	05	
		35202-2690216-3	Mohammad Munir	Pakistani	Business	6-Bawa Park, Upper Mall	05	1. A.
4	Mohammad Munir	35202 272470			Executive	Scheme, Lahore.	03	Ĺ
			Midayat	Pakistani	Business Executive	6-Bawa Park, Upper Mall	21 •	<u></u>
5	Muhammad Ibrahim	31303-2451555-3	Hail			Scheme, Lahore.		
·			Muhanumad +	Pakistani	Business Executive	House No.20, Officers Colony,	03	
5	Imran Mukhtar	35202-2917102-9	Chatidhry S Mukhtar	Dokistani		Yar Khan		1
	Chaudhary	19950 60	Alision	rakistani	Business	133-Upper Mall, Lahore	05	+
7	Makhdoom Omar	42301-9725732-7	Makhdum	D				Nak
	Shehryar		Rukan ud Din	Pakistani	Business	House No.117/2/1, Street No.9,	06	<u></u>
3	Etihad Sugar Mills Limited				Executive	Off Khayaban-e-Bukhari, Phase-		
	Through Mr. Faisal Munir		-	Pakistani	Company	4-Bawa Park Upper Mall	50	<u>VV</u>
	Chaudhry					Scheme, Lahore CERTIFIED TO	e true cor	
		L						1.15
ated th	is it is a	0				Total number of shares taken	-100	
alou th	day of Apr	<u>a' X</u> 2014				JOINT REGISTRAT	OF COMPANIE	
/itnes s	to above Signatures.				·	U UUMPANY REGIST	RATION OFFICE	2 H

Full Name: Khurram Saleem

Father's Name: Muhammad Saleem

Occupation: Advocate

CNIC: 35202-9380221-3

Full Address: Andrabi & Gabriel, & Faridkot, Link Road, Lahore

Signatures

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Doc-6.

ETIHAD POWER GENERATION LIMITED (EPGL)

[Regulation 3(5) (b)]

Profile of Experience

Etihad Power Generation Limited ("EPGL") a public limited company is establishing a project of 74 MW cogeneration power using latest high pressure technology of 110 bar based on Bagasse and other biomasses. The vision behind establishing EPGL is to create a strong, well-capitalized power generation company which will design, develop and operate a power project operating at highest international standards in an economic and environmental friendly manner within shortest possible time.

The project will be situated at Karamabad, District Rahim Yar Khan adjacent to a group company Etihad Sugar Mills Limited ("ESML").

The cogeneration will be based primarily on Bagasse while ensuring that all requisite measures are in place to ensure that the project is environmentally compliant. During one hundred and thirty five (135) days of crushing season, Bagasse being a by-product of ESML process, will be the primary fuel for the project for power generation. During rest of the year, the un-utilized Bagasse of ESML as well as from outside market (if available) will be utilized for power generation.

CORPORATE EXPERIENCE

ESML holds a Generation License no. SGC/73/2011, for installed capacity of 22.00 MW Gross ISO (Generation license enclosed herewith). ESML generates power through its bye products, consumes most of the power in running its auxiliaries& then sales 06-10 MW to MEPCO.

PROJECT TEAM

This project team is directed by a Project Director, Mr. Zaheer Ahmed Ghangro who has versatile experience in the implementation of similar projects, having total experience in power sector of two and a half decades. Mr. Farhan Javed being the General Manager Projects has versatile experience of more than a decade working in operations and projects of Power and Oil sector of Pakistan. Mr. Usman Ahsan Khawaja, the Project development Manager has extensive experience working at similar positions at different projects. Team of experienced engineers is already involved from the early stages of the execution of the project. This will provide them ample opportunity to familiarize themselves with the equipment and the systems being procured.

Subsequently, at the time of installation at the site, these personnel shall be involved with the critical phases of installation and commissioning. These engineers shall be further trained at the machinery manufacturer's works and at similar plants operating elsewhere. After the plant has been commissioned, these engineers will work at key positions in the organizational structure for the operation and maintenance of the plant. This approach ensures a smooth transition from engineering and procurement to erection and commissioning and finally to operation and maintenance (CVs of project team are enclosed).



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November 28, 2014

Mr. M. Raza Ali GM Finance Etihad Power Gen Limited 91/F Block , Model Town Lahore

UAN

TEL

FAX

62 AN 127 TO

02 - 327 × 0.865

2276 5218

faysal

Subject: Letter of Intent (LOI) for Syndicated Islamic & Conventional Syndicated Finance Facility for Etihad Power Generation Limited for up to PKR 9,000 Million

Dear Mr. Raza

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Following our recent discussions regarding the captioned matter, we, Faysal Bank Limited ("FBL" or "Lead Advisors & Arranger") are pleased to present our indicative & non-binding interest to arrange on best effort basis upto approx PKR 9000 million in a combination of Islamic and conventional mode (the "STF Facility" or the "Transaction") to set up a ~74 MW cogeneration power project namely Etihad Power Generation Limited based on bagasse and other biomasses on latest high pressure technology (110bar).

The parties hereby acknowledge that this letter does not contain all matters upon which an agreement must be reached in order for the facility to be committed. Accordingly this letter is intended solely as a basis for further discussion and is not intended to be and does not constitute a legally binding agreement.

Based on the above, FBL hereby submits its indicative and non committal interest for the Transaction as set but below. This indicative interest is subject to compliance with all regulatory requirements, availability of participating financial institutions, obtaining necessary in-house approvals and upon completion of satisfactory due diligence of the Project and the Transaction.

Borrower	;	Etihad Power Generation Limited ("EPGL" or the "Company").
Facility	:	Islamic and Conventional Syndicated Finance Facility ("SFF")
Purpose	:	To Finance setting up of a 74 mw cogeneration power project in IPGL
Lead Advisors & Arrangers		Faysal Bank Limited ("FBL") & any other Financial Institution that FBL may choose to include.
Currency	• • •	Pakistani Rupee ("PKR")



Facility Amount	ount : Approx up to PKR 9,000 million (on best effort basis) subject to satisfactory due diligence, availability of participating financial institutions, firm credit approvals and regulatory compliance.		
Tenor	: Up to Twelve (12) years including the Grace Period		
Grace Period	: Up to COD or 2 years whichever is earlier.		
Drawdown	In tranches during the Availability Period		
Agent Bank & Security Trustee	: Faysal Bank Limited		
Transaction Legal Counsel	: Transaction legal Counsel will be appointed with mutual consent of Lead Advisors & Arrangers and the Borrower ;		
Security : Security structure will be finalized after completion of due-diligence in consultation with the F.nanciers' Legal Counsel. However, the Fa is also likely to be secured by charge on all Project Assets and assign of all Project Receivables amongst other requirements.			
	The Security structure depicted above is not final and comprehensive. A comprehensive security structure will be enumerated in the detailed term sheet.		
General Terms	 This offer is being submitted on non-committal and best efforts basis and is subject to receipt of internal approvals of Lead Advisors and Arrangers under the Facility; Compliance with the Prudential Regulations of the State Bank of Pakistan unless waivers are in place; All required consents and necessary approvals from regulatory authorities, as & when applicable, will be obtained by IPGL in coordination with Lead Advisors & Arrangers; All required insurances are in full force and effect at all times during the Facility Tenor: 		
Material Adverse Change	The terms and conditions herein and Lead Advisors and Arrangers obligations to arrange the Facility are subject to, in the opinion of the Lead Advisors and Arrangers: (1) there being no material adverse change in the domestic or international money and capital markets, or in the bank syndication market; (2) there being no material adverse change in the business activities and credit standing of the Borrower (or any of its shareholders, or subsidiaries) since the date of last audited financials; (3) there being no material adverse change in the socio-political and economic situation of Pakistan which could adversely affect the successful completion of this transaction.		

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The contents of this letter of intent are for your confidential use only and that neither their existence nor the terms hereof will be disclosed by you to any person other than for the purposes of submitting it to a relevant regulatory body for the purposes of the transaction; These terms are valid for a period of 15 days from the date hereof subject to acceptance by the IPGL, unless mutually agreed for validity extension between IPGL and FBL;

The Facility Documents will be governed by and construed in accordance with the laws of the Islamic Republic of Pakistan and non-exclusive jurisdiction of the Pakistan courts;

Please indicate your acceptance of the LOI hereof, by signing and returning it to the undersigned. This LOI is cpen for your acceptance for a period of 15 days after which it may be extended at mutual discretion.

We expect to be able to support the financing requirement of the Transaction for a mutually beneficial relationship and look forward to receiving requisite information to assist in our due diligence process.

Sincerely yours

For and on behalf of Lead Advisors and Arrangers

Kar

Head Project Finance & Syndications Investment Banking

Accepted for and on behalf of the Company





Name: Designation:



November 27, 2014.

TO WHOM IT MAY CONCERN

This is to certify that at the close of business on November 26, 2014 Pak Rupee Current Account CA-PKR # 0028-1004248589 of M/S ETIHAD POWER GENERATION LIMITED shows a Credit balance of Rs. 4,179,114.48/-(Four Million One Hundred Seventy Nine Thousand One Hundred Fourteen & 48/100 Only).

This certificate is issued on the special request of the customer without any risk or responsibility on the part of the bank or any of its officers.

Bank Alfalah Limited

For & on behalf of Bank Alfalah Limited

Etihad Power Generation Limited Bank Alfalah Limited-A/c # 0028-1004248589 Bank Reconciliation Statement as on 26-Nov-14

Balance as per Book		4,272,620
Add: Amount Credited in Books, Not Debited by Bank	6,491	
Add: Amount Credited by Bank, Not Debited in Books		6,491
		4,279,111
Less: Amount Debited by Bank, Not Credited in Books	100,000	
Less: Amount Debited in Books, Not Credited by Bank		100,000
Balance as per Bank		4,179,111

Amount Debited by Bank, Not Credited in Books

DATE	PARTICULAR	CH #	AMOUNT
25-Nov-14	Funds Received from Etihad Sugar Mills Ltd		100,000
···· · · · · ·	Total		100,000

Amount Credited in Books, Not Debited by Bank					
DATE	PARTICULAR	CH #	AMOUNT		
26-Nov-14	Paid to Usman Khawaja for Reimbursement of Expenses	54515509	6,491		
	Total		6,491		

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CORPORATE DETAILS ETIHAD POWER GENERATION LIMITED

The Company was incorporated on 21st day of April, 2014 and has not yet filed Form A. However, the corporate details are as below:

Corporate Universal Identification No. 0087957

Date of Certificate for Commencement of Business: 21st July, 2014

Registered Office: 4-Bawa Park, Upper Mall Lahore

Chief Executive Officer: Mr. Muhammad Shakil

Board of Directors:

- 1. Ch. Mohammad Munir
- 2. Mr. Faisal Munir
- 3. Mr. Muhammad Shakil
- 4. Brig ® Mukhtar Ahmed
- 5. Mr. Muhammad Ibrahim
- 6. Mr. Imran Mukhtar Ch.
- 7. Mr. Makhdum Omar Shehryar

Company Secretary:Mr. Syed Zafar Abbas Kazmi

Auditors: Anjum Asim Shahid Rahman, Chartered Accountants



ETIHAD POWER GENERATION LIMITED



S. No.	Name of Shareholder	Number of Shares
1	Ch. Mohammad Munir	99.21%
2	Mr. Faisal Munir	0.05%
3	Mr. Muhammad Shakil	0.05%
4	Brig ® Mukhtar Ahmed	0.05%
5	Mr. Muhammad Ibrahim	0.03 %
6	Mr. Imran Mukhtar Ch.	0.05%
7	Mr. Makhdum Omar	0.06%
	Shehryar	
8	Etihad Sugar Mills Limited	0.5%
	Total	100%

Etihad Power Generation Limited Shareholders:

Audited Financial Statements

The major sponsorship (99.5%) of Etihad Power Generation Limited is owned by individuals whose names & respective shareholding is mentioned above. The Audited Financial statements are not applicable/ avaialablein this case hence cannot be provided.





Etihad Power Generation Limited EPC Contractor

Etihad Power Generation Limited (EPGL) 74 MW Project, will be conducted on EPC basis. ZTC (China) will certainly be conducting the contract works on EPC basis. TAPL/HRL Limited will be working as onshore contractor. The profile of experience and references for ZTC are attached herewith.

Best regards.

Very truly yours

UsmanAhsan Project Development Manager Etihad Power Generation Limited



新江透平进出口贸易有限公司 <u>Zhejiang Turbine Import & Export Co., Ltd.</u> 浙江省杭州市石桥路 357号 电话/Tel: (0571) 85780443 357 Shigiao Rd. Hangzhou, China 传真/Fax: (0571) 85780250-

Ref.: 2014/ZTC-EPCL/Tender

Date: 2014.05.12

Mr. Zaheer Ahmed, Project Director, M/s Etihad Power Generation Limited., 4-Bawa Park, Upper Mall, Lahore, Pakistan. Email: <u>zaheer@agec.com.pk</u>

Dear Sir,

<u>Reg.: Purchase of the EPC Tender for 74 MW Co-generation Power Plant by Eithad Power</u> <u>Limited, Pakistan.</u>

This has reference to the NIT for the submission of subject EPC bids, we have received the information about the floatation of this tender and we are keen to participate in this tender.

We are a reputed firm in the business of Power plant solution from China and we sending across our company profile for your ready reference and perusal in the post confirmation copy. We have executed a number of power plants on EPC basis in and around China.

We have also worked with your project consultant M/s Avant-Garde Engineers and Consultants P. Ltd., Chennai, in the past.

You are already aware of our sister concern M/s Hangzhou Steam Turbine Company Ltd., China who is supplier for the 2×31.2 MW Turbine package for the Chiniot Power Limited, Pakistan.

As a matter of fact, M/s Hangzhou Steam Turbine Co. Ltd., China and our Company are under the same parent company Hangzhou Turbine Power Group (HTP), Hangzhou, China. Even for this subject tender, we intend

Further details are available in www.chinaztc.com

With this letter we request your esteemed organization to please send across the tender document for the subject EPC Bidding documents. We are sending across the necessary payment towards the bid purchase charges, thro' our local Pakistan representative Mr. Ahmed Ali Khan.



浙江透平进出口贸易有限公司。

Zhejiang Turbine Import & Export Co., Ltd.

新江省杭州市石桥路 357 号 电话/Tel:(0571)85780443-357 Shiqiao Rd.,Hangzhou, China 传真/Fax:(0571)85780250-

Kindly make note of the following contact to have further correspondence henceforth.

Name of the person	:	Mr. Mao Ning
Email address	:	<u>ztcsales@qq.com</u>
Contact Phone number	:	(0086) 571 8797 3707
Fax number	:	(0086) 571 8798 9896
Address where documents	:	23F, Zhontian Mansion, No 173
to be couriered	:	Yu Gu Road, Hangzhou, China.

We are keen to participate in the subject tender and trust you will give us this opportunity.

Thanking you,

Yours' sincerely, For Zhejiang Turbine Import & Export Company

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Mao Ning, Chief Executive Officer.

- CC: Mr. S Balasubramanian / Mr. S Siva Kumar Avant-Garde Engineers and Consultants (FZC), Sharjah, UAE.
- CC: Mr. Raheel Muneer, Director, Etihad Sugar Mills, Pakistan.



浙江透平进出口贸易有限公司。

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 新江省杭州市石桥路 357 号
 电话/Tel: (0571) 85780443

 357 Shiqiao Rd.,Hanqzhou, China 传真/Fax: (0571) 85780250

Company Profile

Zhejiang Turbine Import & Export CO., Ltd is a wholly-owned subsidiary of Hangzhou Steam Turbine CO., Ltd, the major manufacturer of industrial turbines in China. Turbine has been approved by the Ministry of Commerce and the General Administration of Customs to handle foreign trade business. Our company has set up Board of Directors and Board of Supervisors. The general manager is responsible for its operation. For the moment, there are market development division, power plant engineering division and sales division. We have set up business offices in Shanghai, Qingdao, Tianjin and Shenzhen, and overseas, we have many a business partner. Backed by large financial resources, state of art equipment and high-caliber professionals, we have enjoyed in recent years global sources of suppliers and purchasers, and enjoyed a good reputation among our clients.

Many years of cooperation has resulted in good partnerships with Chinese and foreign famous enterprises including Hangzhou Steam Turbine Co., Ltd, Harbin Turbine Company Limited, Shandong Jinan Power Equipment Factory Co., Ltd, Hangzhou hangfa Electrical Equipment Co., Ltd, Nanyang Explosion Protection Group Co., Ltd, Wuxi Huaguang Boiler Co., Ltd, Hangzhou Boiler Group Co., Ltd, Suzhou Hailu Heavy Industry Co., Ltd, Hangzhou Qiantang River Electric Group Co., Ltd, Zhejiang Supcon Technology Co., Ltd, Hollysys, Sunyard System Engineering Co., Ltd, VOITH TURBO AG, Flendergear box Co., Ltd, etc. Our collaboration partners also include top research institutes in China. Our primary business is the EPC of power plants, and we are capable of contracting EPC, BTG and STG of overseas power projects according to the different requirements of customers.

ZTC has carried out various projects within china and overseas. A list of overseas projects that have been commissioned or under commissioning is attached herewith for your reference.



浙江透平进出口贸易有限公司。

Zhejiang Turbine Import & Export Co., Ltd.

电话/Tel:(0571)85780443。 浙江省杭州市石桥路 357 号

357 Shiqiao Rd.,Hanqzhou, China 传真/Fax (0571)85780250-

LIST OF JOBS EXECUTED BY M/S. ZHEJIANG TURBINE IMPORT & EXPORT CO. LTD IN INDIA FOR EPC, BTG, SUGAR, STG ISLANDS.

LIST OF EPC PROJECTS

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SI.NO	PROJECT / CUSTOMER	RATING	TYPE OF BOILER	SEGMENT	STATUS
1	IND BARATH POWER GENCOM LIMITED	3 X 70 MW	CFBC	ІЬЬ	Unit 1- Commissioned Unit 2- Commissioned Unit 3- Under Commissioning
2	HEMARUS TECHNOLOGIES LIMITED	1 X 20MW	TRAVELLING GRATE	SUGAR	Commissioned
3	IND BARATH POWER KARWAR LIMITED	3 X 150MW	CFBC	IPP	Under manufacturing and Supply
4	BMM ISPAT LIMITED	2 X 70 MW	CFBC	IPP	Under Construction
5	KIRI INDUSTRIES LIMOTED	1 X 80 MW	CFBC	CHEMICAL	Under Construction
6	PT.SINERGY POWER SOURCE Indonesia	2 x 15 MW	CFBC	CORE FIRE	Under Construction

LIST OF BTG PROJECTS

SI.NO	PROJECT NAME/ CUSTOMER	RATING	SEGMENT	STATUS
1.	ADHUNIK METALIKS LIMITED	1X 15 MW	Steel & iron	Commissioned
2.	SINGARAYA HILLS GREEN POWER GENCOM LIMITED	1X 8 MW	Biomass	Commissioned
3.	SHARADAMBIKA POWER PLANT PRIVATE LIMITED	1X 10 MW	Biomass	Commissioned
4.	SANGHI INDUSTRIES LTD.	1X 61.58 MW	Cement	Commissioned
5.	S V POWER PRIVATE LIMITED	1X 63 MW	IPP	Under Commissioning
6.	PENNA CEMENT INDUSTRIES LIMITED	2 X 38.5 MW	Cement	Commissioned
7.	SKS ISPAT LIMITED	1X 30 MW	Steel & iron	Commissioned
8.	CORPORATE ISPAT PRIVATE LIMITED	1X 25 MW	Steel & iron	Commissioned
9.	UTKAL ALUMINA INTERNATIONAL LIMITED	3 X 30 MW	Aluminum	Under erection
10.	BMM ISPAT LIMITED	1X 70 MW	Steel & iron	Under Commissioning



ZTC 浙江透平进出口贸易有限公司. Zheiiang Turbine Import [®] 「

浙江省杭州市石桥路 357 号 电话/Tel:(0571)85780443。

357 Shiqiao Rd.,Hanqzhou, China 传真/ Fax: (0571)85780250-

11.	MADHUCON PROJECTS LIMITED PHASE – I	2 X 150 MW	IPP	Under supply
12.	CAUVERY POWER GENERATION CHENNAI PRIVATE LIMITED	1 x 63 MW	IPP	Under supply
13.	MADHUCON PROJECTS LIMITED PHASE – II	2 X 150 MW	IPP	Under engineering
14.	MADRAS SUGARS LTD	1 x 25 MW	SUGAR	Under engineering
15.	SHOUGANG QIANGANG LIMITED	2 X 50 MW	STEEL	Under Construction
16.	CHONGQING IRON&STEEL CO.,LTD	2 X 50 MW	STEEL	Under Construction

LIST OF SUGAR PROJECTS

SLNO	PROJECT NAME	MW RATING	SECTOR	LOCATION
1	KOTHARI SUGARS & CHEMICALS LIMITED	22	SUGAR	Commissioned
2	NCS SUGARS LIMITED	20	SUGAR	Commissioned
3	DALMIYA SUGARS LIMITED	27	SUGAR	Commissioned
4	SAKTHI SUGARS LIMITED – MODAKURICHI	25	SUGAR	Commissioned
5	SAKTHI SUGARS LIMITED – APPAKUDAL	25	SUGAR	Commissioned
6	SAKTHI SUGARS LIMITED – SIVAGANGA	35	SUGAR	Commissioned
7	RAMGARH CHINI MILLS	25	SUGAR	Commissioned
8	A.B.SUGARS PRIVATE LIMITED	25	SUGAR	Commissioned
9	BHARAT SUGARS LIMITED	25	SUGAR	Commissioned
10	J.H.V.SUGARS PRIVATE LIMITED	20	SUGAR	Commissioned
11	BALRAMPUR CHINI MILLS	10	SUGAR	Commissioned
12	J.H.V.SUGARS LIMITED	25	SUGAR	Commissioned
13	MADHUCON SUGAR AND POWER INDUSTRIES LTD	24	SUGAR	Commissioned
14	RAJASHREE SUGARS & CHEMICALS LIMITED	20.5	SUGAR	Commissioned
15	BANNARI AMMAN SUGARS LIMITED	27	SUGAR	Commissioned
16	E I D PARRY INDIA PRIVATE LIMITED	20	SUGAR	Commissioned
17	VIJAYANAGAR SUGARS LIMITED	32	SUGARS	Commissioned
18	MADRAS SUGARS LIMITED	25	SUGAR	Under Manufacturing
19	HEMARUS TECHNOLOGIES LIMITED	20	SUGAR	Under Commissioning



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LIST OF STG PROJECTS

SINO	PROJECT NAME/ CUSTOMER	RATING	SEGMENT	STATUS
1	KVK BIO ENERGY PRIVATE LIMITED	1 x 15 MW	BIOMASS	Completed
2	FOODS FATS AND FERTILIZERS	1 x 7.5 MW	BIOMASS	Completed
3	AGRAWAL OILS AND EXTRACTORS	1 x 7.5 MW	BIOMASS	Completed
4	HIRA FERRO ALLOYS LIMITED	1 x 20 MW	STEEL & IRON	Completed
5	SHYAM CENTURY LIMITED	1 x 15 MW	STEEL & IRON	Completed
6	MOHAN BREWERIES AND DISTILLERIES LIMITED	1 x 18 MW	BIOMASS	Completed
7	JAIN CARBIDES AND CHEMICALS LIMITED	1 x 20 MW	STEEL & IRON	Completed
8	ORISSA CEMENTS LIMITED	1 x 14 MW	STEEL & IRON	Completed
9	ECOFREN POWER PRIVATE LIMITED	1 x 7.5 MW	BIOMASS	Completed
10	ISA POWER PRIVATE LIMITED	1 x 7.5 MW	BIOMASS	Completed
11	REAL ISPAT LIMITED	1 x 15 MW	STEEL & IRON	Completed
12	SHYAM DRI LIMITED	1 x 30 MW	STEEL & IRON	Completed
13	ISPAT GODAVARI LIMITED	1 x 30 MW	STEEL & IRON	Completed
14	JAGADAMBA STEEL AND POWER LIMITED	1 x 25 MW	STEEL & IRON	Completed
15	ISPAT GODAVARI LIMITED	1 x 25 MW	STEEL & IRON	Completed
Q	GALLENT METALICS LIMITED	1 x 25 MW	STEEL & IRON	Completed
17	MY HOME CEMENT INDUSTRIES LIMITED	1 x 15 MW	CEMENT	Completed
18	RR ENERGY PRIVATE LIMITED	1 x 15 MW	STEEL & IRON	Completed
19	SALASAR SPONGE AND POWER LIMITED	1 x 15 MW	STEEL & IRON	Completed
20	SKS ISPAT LIMITED	1 x 30 MW	STEEL & IRON	Completed
21	RAJSHREE CEMENTS LIMITED	1 x 20 MW	CEMENT	Completed
22	ARKAY ENERGY LIMITED	1 x 8 MW	GAS BASED	Completed
23	KALPATARU POWER TRANSMISSION PRIVATE LIMITED	1 x 8 MW	BIOMASS	Completed
24	LAHARI POWER PRIVATE LIMITED	1 x 9.8 MW	BIOMASS	
25	SOUTH ASIA POWER PRIVATE LIMITED	1 x 9.8 MW	BIOMASS	
26	KOHINOOR STEELS LIMITED	1 x 17 MW	STEEL & IRON	Completed
27	SM POWER PRIVATE LIMITED	1 x 8 MW	BIOMASS	Pre-commissioning
28	ADHUNIK METALIKS LIMITED	1 x 15 MW	STEEL & IRON	Completed



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29	BIRLA WHITE CEMENT INDUSTRIES LIMITED	1 x 7.5 MW	CEMENT	Completed
30	KOTHARI SUGARS & CHEMCIALS LIMITED	1 x 22 MW	SUGAR	Completed
31	NCS SUGARS PRIVATE LIMITED	1 x 20 MW	SUGAR	Completed
32	PHILIPS CARBON BLACK LIMITED	1 x 30 MW	CARBON	Completed
33	RAMSWARUP UDYOG LIMITED	1 x 20 MW	STEEL & IRON	Completed
34	BANSWARA SYNTEX PRIVATE LIMITED	1 x 15 MW	TEXTILE	Completed
35	SHYAM SEL LTDUNIT 1	1 x 8 MW	STEEL & IRON	Completed
36	DALMIYA SUGARS LIMITED	1 x 27 MW	SUGAR	Completed
37	SHALIVAHANA POWER PRIVATE LIMITED	1 x 10 MW	BIOMASS	Completed
38	RAKE POWER PRIVATE LIMITED	1 x 10 MW	BIOMASS	Completed
39	SAKTHI SUGARS LIMITED, UNIT MODAKURCHI	1 x 25 MW	SUGAR	
	SAKTHI SUGARS LIMITED, UNIT APPAKUDAL	1 x 25 mw		
40	SAKTHI SUGARS LIMITED, UNIT SIVAGANGAI	1 x 35 MW	SUGAR	Completed
41	RAMGARH CHINI MILLS LIMITED	1 x 25 MW	SUGAR	Completed
42	JK CEMENT LIMITED	1 x 22 MW	CEMENT	Completed
43	JK CEMENT LIMITED	1 x 15 MW	CEMENT	Completed
44	A.B.SUGARS LIMITED	1 x 25 MW	SUGAR	Completed
45	BHARAT SUGARS PRIVATE LIMITED	1 x 25 MW	SUGAR	Completed
46	J.H.V.SUGARS LIMITED	1 x 20 MW	SUGAR	
47	BALRAMPUR CHINI MILLS LIMITED	1 x 10 MW	SUGAR	Completed
48	MEGHALAYA POWER LTD.	1 x 8 MW	STEEL & IRON	Completed
49	SHYAM DRI LIMITED	1 x 30 MW	STEEL & IRON	Pre-commissioning
50	CONTINENTAL CARBON INDIA LTD.	1 x 15 MW	CARBON	Completed
51	MADHUCON SUGAR AND POWER INDUSTRIES LTD	1 x 24 MW	SUGAR	Completed
52	NIRMA LIMITED	1 x 20 MW	CHEMICAL	Completed
53	RAJASHREE SUGARS & CHEMICALS LIMITED	1 x 20.5 MW	SUGAR	Completed
54	J K WHITE CEMENT	1 x 7.5 MW	CEMENT	Completed
55	JAYKAYCEM LTD.	1 x 25 MW	CEMENT	Completed
56	SRI VIRANGANA STEELS LIMITED	1 x 30 MW	STEEL & IRON	Erection
57	E I D PARRY (INDIA) LIMITED	1 x 20 MW	SUGAR	Completed



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58	SAURASHTRA CHEMICALS LIMITED	1 x 12.5 MW	CHEMICAL	Completed
59	SAURASHTRA CHEMICALS LIMITED	1 x 12.5 MW	CHEMICAL	Pre-commissioning
60	DECCAN CEMENTS LIMITED	1 x 18 MW	CEMENT	Completed
61	PHILIPS CARBON BLACK MUNDRA LIMITED	1 x 17 MW	CARBON	Completed
62	VIJAYANAGAR SUGARS PRIVATE LIMITED	1 x 31.45 MW	SUGAR	Pre-commissioning
63	PHILIPS CARBON BLACK LIMITED – COCHIN	1 x 17 MW	CARBON	Under Engineering
64	ADHUNIK METALIKS LIMITED	1 x 17 MW	STEEL & IRON	
65	BANNARI AMMAN SUGARS LIMITED, NANJANGUD	1 x 20 MW	SUGAR	Under Engineering Stage
66	BANSWARA SYNTEX LTD	1 x 15 MW	TEXTILE	Contract Signing Stage
67	BAZHON WEIAO HUANBAO LIMITED	1 x 15 MW	GARBAGE	Pre-commissioning
68	SHANGHAI QIYAO SCREW MACHINERY COMPANY LIMITED	1 x 4 MW		Under Construction

LIST OF STG AND ACC ISLAND PROJECTS

SI.NO	PROJECT NAME/ CUSTOMER	RATING	SEGMENT	STATUS
1	IND BARATH ENERGIES LIMITED	1 x 25 MW	BIOMASS	Completed
2	BMM ISPAT LIMITED	1 x 25 MW	STEEL & IRON	Completed
3	SHAKTHI SUGARS LIMITED	1 x 25 MW	SUGAR	Completed
4	IND BARATH MAHARASTRA LIMITED	1 x 20 MW	BIOMASS	Completed
5	GRASIM INDUSTRIES LTD., KOTPUTLI	1 x 23 MW	CEMENT	Completed
6	GRASIM INDUSTRIES LTD., KOTPUTLI	1 x 23 MW	CEMENT	Completed
7	THYSSENKRUPP UNIT :ADITYA CEMENTS	1 x 25 MW	CEMENT	Completed
8	THYSSENKRUPP - UNIT: TADAPATRI	1 x 25 MW	CEMENT	Completed
9	THERMAX INDIA UNIT: HIRMI	1 x 25 MW	CEMENT	Completed

ETIHAD POWER GENERATION LIMITED (EPGL)

Plant Details

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1. General Information

(i)	Applicant's Name	Etihad Power Generation Limited
(ii)	Head Office/	4-Bawa Park, Upper Mall , Lahore
	Business Address	91-F, Model Town, Lahore
(iii)	Plant Location	Karamabad, District Rahim Yar Khan, Punjab
(iv)	Type of Generation Facility	Bagasse based Cogeneration Power Plant
(v)	Commissioning/Commercial	30 th July 2016(Expected COD)
	Operation Date	
(vi)	Expected Life of the Facility from	30 years
	Commercial	
	Operation/Commissioning	
(vii)	Expected Remaining Useful Life	30 years
	of the Facility	

2. Plant Configuration

(i)	Plant Size Installed Capacity (Gross ISO)	74 MW(In-season), 74.4MW(off season)
(ii)	Type of Technology	Cogeneration Power Plant with high pressure boilers & Turbo-Generators
(iii)	Number of Units	2 Nos.
(iv)	Unit Make and Model	Boiler – Travelling grate type of M/s.Wuxi, China make Turbo generator - Extraction cum condensing type of M/s. HTC, China make.
(v)	De-rated Capacity at mean site condition	Power Generation: 67.025 MW (Season operation) 67.550 MW (Off-season operation)
(vi)	Auxiliary Consumption	6.975(In-season) 6.850 MW(off season)

3. Fuel/Raw Material Details

(i)	Primary Fuel	Bagasse
(ii)	Alternate Fuel	Nil
(iii)	Fuel Source	Indigenous
	(Imported/Indigenous)	
(iv)	Fuel Supplier	M/s. Etihad Sugar Mills Ltd., Rahim Yar Khan
(v)	Supply Arrangement	Through conveyor belts/loading trucks/tractor
		trolleys etc.,
(vi)	Sugarcane Crushing Capacity	520.8 tonnes per hour
(vii)	Bagasse Generation Capacity	164.1 tonnes per hour
(viii)	Bagasse Storage Capacity	60 days
(ix)	Number of Storage Tanks	In open Yard
(x)	Storage Capacity of each tank	Not Applicable
(xi)	Gross Storage	60 days
ETIHAD POWER GENERATION LIMITED (EPGL)

4. Emission Values

(i)	Sox	361.9 kg/hr	
(ii)	No	Less than 80 ppm	
(iii)		11% to 13%	
(iv)	СО	Traces	
(v)	PM	50 mg/n.cu.m	

5. Cooling System

(i)	Cooling Water Source/Cycle	RCC Cooling tower of induced draft counter
		flow type. Make up water will be drawn from
		the bore wells.

6. Plant Characteristics

(i)	Generation Voltage	11,000 V		
(ii)	Frequency	50 Hz		
(iii)	Power Factor	0.8		
(iv)	Automatic Generation Control	Through AVR		
	(AFG)			
(v)	Ramping Rate	Will be furnished after the receipt of data from		
		the equipment supplier.		
(vi)	Time Required to Synchronize to	1. During cold start (i.e. when plant	370	
	Grid and Loading the Complex	is started later than 72 hours after	Minutes	
	to Full Load from Cold Start	shutdown)		
		2. During warm start (i.e. when	260	
		plant is started at less 36 hrs after	Minutes	
		shutdown)		
		3. During Hot start (i.e. when plant	90	
		is started at less than 12 hrs after	Minutes	
		shutdown)		





















Information as Per 3.5(g)(i)

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

For the proposed Cogeneration plant, EPGL intends to use the proven latest technology. While the gasification of Bagasse still not attained full scale commercial exploitation, the only technology available for using the Bagasse is through the combustion route. The technology chosen is the conventional thermal power plant technology based on the Rankine Cycle. 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 EPGL, the Cogeneration cycle is based on the parameters of 110 bar(a) and 540°C at the boiler outlet. It is currently being used in many countries for the Cogeneration projects. This 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 a few Cogeneration plants operating in 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 condensing turbo generators. Considering the off-season operation of the plant, the Cogeneration power plant boilers will be designed for firing the saved Bagasse and a few other compatible biomass fuels.

Considering 135 days of crushing operation and an overall capacity utilization of 90%, the sugar plant will generate around 555,860 MT of Bagasse. Much of the Bagasse, about 431,150 MT will be used for running the Cogeneration plant during the crushing period. The season operation of the Cogeneration plant leaves a surplus of about 124,710 MT and the same could be used for the operation of the power plant for a period of about 51 days during the maintenance periods and during the offseason. The number of operation days in the off-season could be enhanced if suitable compatible bio-mass fuel is identified. Even if the bio-mass fuel is available during the seasonal operation, it could be used along with Bagasse and more quantum of Bagasse could be saved for more number of operation in the off-season.

The power requirement of the sugar mill during the season operation, excluding the power requirements of the Cogeneration power plant is expected to be 16.25 MW. During the off-season period, the power requirement is estimated to be 1 MW, mainly

ETIHAD POWER GENERATION LIMITED (EPGL)

for meeting the power required for the off-season maintenance of the sugar plant machinery and for meeting the colony and office power requirements.

The gross power generation in the Sugar mill, during the season, after the implementation of the Cogeneration program will be 74,000 kW. The sugar mill power consumption, as seen earlier, is 16,250 KW. The auxiliary power consumption of the Cogeneration plant during the season operation of the plant is estimated to be 6,975 kW. Considering the above, the exportable power to the national Grid comes to 50,775 kW. The energy export from the Cogeneration plant, which includes the export to the sugar mill and to the national grid, will be 67,025 kW, during the seasonal operation.

During the off-season operation, the gross generation in the plant will be 74,400 kW, either with Bagasse or biomass as the fuel. The auxiliary power consumption will be 6,850 kW and the power supplied to the sugar mill for the maintenance and for meeting load requirements will be 1 MW. The power supplied to the grid will be 66,550 kW. However, the exportable power from the Cogeneration power plant works out to 67,550 kW, during the off-season operation, either with Bagasse or biomass fuel as the fuel.

The plant and equipment for the new proposed Cogeneration system will consist of the high pressure boilers, extraction condensing turbo generators, water cooled condensing system, Main and auxiliary cooling water system, water treatment plant system, condensate and feed water system, compressed air system and electrical system consisting of switchgears, LT distribution panels, Variable Frequency Drives, step up transformer to export the power, step down transformers for meeting the in-house power requirement, outdoor switchyard equipment etc.

The water requirement of the Cogeneration plant is proposed to be met mostly by the ground water through deep bore wells. The ground water aquifers get charged by the nearby Chenab River. The present raw water requirement of the sugar mill is being met by the drawl from these sources. The water from the bore wells will be stored in a new water reservoir, and drawn for usage in the Cogeneration plant. A water treatment plant based on the reverse osmosis principle is proposed for the treatment of the entire feed water for the Cogeneration plant. There will be an adequately designed pre-treatment system with Multi grade filter and Ultra filtration system upstream of the RO plant.



ENVIRONMENT PROTECTION DEPARTMENT



National Hockey Stadium Ferszepur Road, Labore

NO. DD (EIA)/EPA/F-650(IEE)/0210/2014/ 15/9 Dated: 0.3 / 10 / 2014

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Mh: Shakeel. Proponent, M/s Etihad Power Generation Limited, 4-Bawa Park, Upper Mall, Lahore.

Subject

DECISION OF EPA PUNJAB FOR THE INSTALLATION OF 2X37-MW HIGH PRESSURE CO-GENERATION POWER PLANT M/S ETIHAD POWER GENERATION LIMITED LOCATED AT MOUZA KARAMABAD DISTRICT RAHIMYARKHAN

(Under Section 12 of PEPA, 1997 (Amended 2012) read with IEE/EIA

Regulations, 2000)

ş.	Description of Project:	2x37-MW High Pressure Bagasse Fired Cogeneration Power Project (Power Plant).
~	Location of Project:	The project site is located at Mouza Karamabad Neur M/S Etihad Suger Mills, District Rahimyarkhan.

3. Date of Receiving 06.08/.2014

4. After review of the IEE Report, Site Inspection Report by DOE and other relevant record, the Environmental Protection Agency, Punjab accords approval for the construction phase of the Project subject to the following conditions:

- (i) The proponent shall ensure compliance of National Environmental Quality Standards (NEQS).
- (ii) Mitigation measures suggested in the IEE Report and Environmental Management & Monitoring Plan (EMMP) shall be strictly adhered to minimize any negative impacts on soil, ground water, air and biological resources of the project area.
- (iii) Monitoring shall be carried out during the entire period of the project activities and monitoring reports of the whole operation shall be submitted to EPA. Punjab on monthly basis to this office.
- (iv) The proponent shall install pollution abatement equipment / treatment plant i.e Electrostatic Precipitator, cyclone & fabric filters etc. in compatible with NEQS.
- (v) The proponent shall also install Mercury Control System best available in the worked as per requirement of Minamata Convention ratified by Pakistan in October, 2013.
- (vi) The proponent shall install waste water treatment plant and shall dispose of wastewater after proper treatment in conformity with the NEQS.
- (vii) Arrangements shall be made for safe disposal of solid and hazardous waste. The solid waste shall be retained within the unit boundary / premises and shall be disposed off in an environment friendly way at a suitable disposal facility.
- (viii) The proponent shall ensure that strict and efficient health and safety measures are in place for protection of workers backed by a comprehensive emergency response system.
- (ix) The proponent shall provide proper firefighting arrangements.
- (x) The proponent shall take measures for proper storage of fuel.
- (xi) At least 90% unskilled and to the extent possible skilled jobs shall be given to locals after providing them proper training.

- Compensation shall be provided to inhabitants in case of loss of agricultural land. crop, property, etc in accordance with the rates that are agreed upon. All conflicting issued regarding compensation, etc. should be settled anticable before or during the project activities.
- The proponent shall plant at least 30,000 trees of minimum height 6-7 feet especially of indigenous species in and around the project area on available space exiti) in consultation with District Officer (Environment) within six months. The proponent will also make necessary arrangements for the maintenance and protection of theses trees.
- (X15) The proponent shall appoint an Environmental Manager and shall convey the name of the Environmental Manager (having at least qualification of BS Environmental Sciences along with his complete Mulling Address and Phone Numbersi
- (xv) The proponent shall take effective measures for safe transportation of Fuel.
- extit. The proponent shall install on line Air Pollution Monitoring Analyzers for major
- pollutions like particulate matter CO, SO, NO, HC and Mercury

The proponent shall be hable for correctness and validity of information supplied d. to this department by the consultant.

The proposent shall be liable for compliance of Regulations 13, 14, 17 and 18 of IEL LIA Regulations, 2000, regarding approval, confirmation of compliance, entry, inspections

and monstering. This approval is accorded only for the construction phase of the project. The proposent shall obtain approval for operational phase of the project in accordance with Regulation 13(2) (b) and Regulation 18 of the IEE/EIA Regulations, 3000.

Any charge in the approved project shall be communicated to EPA, Penjab and shall be commenced after obtaining the approval.

This approval shall be treated as null and void if all or any of the conditions mathemed above is are not complied with. This approval does not absolve the proponent of the duty to obtain any other approval or concent that may be required under any law in force and is subjudice to legal proceedings in any legal for a ' court.

This approval shall be valid (for commencement of construction) for a period of three years from the date of issue under Regulation to of IEI - ELA Regulations 2000 g.

(AMEN HANIF) ASSISTANT DIRECTOR (EIA) for Director General, EPA, Punjab Phy # 042-99232228

NO & DATE EVEN

A copy is forwarded for information to:

- The Director (North), EPA, Punjab, Labore.
- 2 The District Officer (Environment), Rahimyarkhan w.r.t his letter No. Hop DOE RYK dated 22.09.2014. He is requested to ensure compliance of the above mentioned conditions i measures under intimation to this office.

(AMEN HANIF) ASSISTANT DIRECTOR (EIA) for Director General, EP X. Punjub

Doc - 17



Dated: November 26, 2014

STATUS: INTERCONNECTION TRANSMISSION ARRANGEMENT FOR POWER EVACUATION

The Final Grid Interconnection Study report for Etihad Power Generation Limited of 74 MW capacity has been submitted to Chief Engineer CPPA/NTDC Lahore on 31st October 2014 and subsequently forwarded to concerned power company "MEPCO" (i.e. copy of letters are attached).

Please note that the Power Generated from Etihad Power Generation Limited shall be disbursed to Multan Electric Power Company (MEPCO). The nearest NTDC grid facility available for interconnection to Etihad Power is R.Y.Khan-New 500/220/132 kV Grid Station. A double circuit on rail conductor and a double circuit on lynx conductor between R.Y.Khan-New and Khanpur is being operated which passes about 15 km away from the location of Etihad Power. This has been shown in attached Sketch-1.

Etihad Power will generate at 11 kV voltage level from where it will be stepped-up to 132 kV using two 50/60 MVA transformers. The most feasible interconnection scheme with MEPCO is looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid as shown in attached Sketch-2. Etihad Power is about 16 km from R.Y.Khan-New 500/220/132 kV Grid Station, and the looping distance would be 15 km. The proposed scheme will require two breaker bays of 132 kV at Etihad Power to connect with the 132 kV circuits with R.Y.Khan-New and Khanpur.

The proposed scheme successfully passed the dynamic stability checks for near and far faults for the most stringent cases. 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. Based on all above these points it is recommended to be adopted.

After submitting the detailed report to NTDC all clarifications have been made. If there would be any change in above plan that will be communicated to NEPRA in due course of time.

Yours Sincerely, AHOE General Manager (Project) Etihad Power Generation Limited

ETIHAD POWER GENERATION LIMITED ADDRESS: 91-F, MODEL TOWN, LAHORE, PAKISTAN TEL: +92-42-35926485-87 | FAX: +92-42-35926490

Report No. PPI-109.2-Final/14



INTERCONNECTION STUDY

For Study of Evacuation of Power from Etihad Power Generation Ltd. near R.Y.Khan, Punjab



Final Report (October 2014) 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 www.powerplannersint.com

Executive Summary

- The Final Report of interconnection of the Cogeneration Power Plant by Etihad Power Generation Ltd. with MEPCO grid system is submitted herewith in the light of the comments provided by NTDC in letter by No. GMPP/CEMP/TRP-333/Etihad Power/4212-15 dated 26-09-2014.
- Etihad Power would like to go for high pressure cogeneration with the aim of exporting power to the national grid during the crushing season in winter and little while after it.
- The study objective, approach and methodology have been described and the plant's data received from the Client is validated. The network of Etihad Power at 11 kV has been modeled. It is being operated with the 11 kV Bus Bars split to limit the short circuit levels.
- The nearest NTDC grid facility available for interconnection to Etihad Power is R.Y.Khan-New 500/220/132 kV Grid Station. A double circuit on rail conductor and a double circuit on lynx conductor between R.Y.Khan-New and Khanpur is being operated which passes about 15 km away from the location of Etihad Power as shown in Sketch-1 in Appendix-A.
- Etihad Power will generate at 11 kV voltage level from where it is stepped-up to 132 kV using two 50/60 MVA transformers. The most feasible interconnection scheme with MEPCO would be looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid as shown in Sketch-2 in Appendix-A. Etihad Power is about 16 km from R.Y.Khan-New 500/220/132 kV Grid Station and the looping distance would be 15 km.
- The proposed scheme will require two breaker bays of 132 kV at Etihad Power to connect with the 132 kV circuits with R.Y.Khan-New and Khanpur.
- In view of planned COD of the Etihad Power in January 2017, the above proposed interconnection scheme has been tested for steady state conditions through detailed load flow studies for the peak conditions of January 2017 for maximum thermal power dispatches in the grid during the crushing 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 night peak conditions of January 2017. In addition, the extended term scenario for the year 2020-21 has also been analyzed 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 export up to 67 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 Etihad Power 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 Etihad Power.
- The maximum short circuit level of Etihad Power 132 kV is 8.85 kA and 5.82 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. The maximum fault levels at local 11 kV bus bar have been found to be 43.28 kA/35.06 kA (3-Ph/1-Ph) respectively. The 1-phase short circuit contribution of generators at Etihad have been limited to approximately 100A via use of NGRs connected to the Generators at 11 kV level as per the data given by the client. It is recommended to have standard size switchgear of short circuit rating of 50 kA for 11 kV.
- The dynamic stability analysis of proposed scheme of interconnection has been carried out. The stability check for the worst case of three phase fault right on the 132 kV bus bar of Etihad Power substation followed by the final trip of one 132 kV Etihad to Kanpur 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. Also the stability check for the case of three phase fault right on the 11 kV bus bar of Etihad Power substation followed by the final trip of one Generating Unit of 37 MW, has been performed for fault clearing of 10 (200 ms). The system is found

strong enough to stay stable and recovered with fast damping. 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 proposed scheme of interconnection has no technical constraints or problems, it fulfills all the criteria of reliability and stability under steady state load flow, contingency load flows, short circuit currents and dynamic/transient conditions; and is therefore recommended to be adopted.

Report Contents

- 1. Introduction
 - 1.1. Background
 - 1.2. Objectives
 - 1.3. Planning Criteria

2. As umptions of Data

- 2.1 Etihad Power Data
- 2.2 Network Data

3. Study Approach & Methodology

- 3.1 Understanding of the Problem
- 3.2 Approach to the Problem

4. Development of Scheme of Interconnection

- 4.1 The Existing and Ongoing Network
- 4.2 The Scheme of Interconnection of Etihad Power

5. Detailed Load Flow Studies

- 5.1 Base Case Load Flow January Peak 2017, Without Etihad Power
- 5.2 Load Flow January Peak 2017 with Etihad Power
- 5.3 Load Flow January Night Peak 2017 with Etihad Power
- 5.4 Peak Load Case 2020: Extended Term Scenario
- 5.5 Conclusion of Load Flow Analysis

6. Short Circuit Analysis

- 6.1 Methodology and Assumptions
- 6.2 Fault Current Calculations without Etihad Power
- 6.3 Fault Current Calculations with Etihad Power interconnected
- 6.4 Conclusion of Short Circuit Analys's

7. Dynamic Stability Analysis

- 7.1 Assumptions & Methodology
 - 7.1.1 Dynamic Models
 - 7.1.2 System Conditions
 - 7.1.3 Presentation of Results
 - 7.1.4 Worst Fault Cases

7.2 Dynamic Stability Simulations' Results with Etihad Power

- 7.2.1 Fault at 132 kV Near Etihad Power
- 7.7.2 Fault at 132 kV Near Etihad Power (Stuck Breaker)
- 7.2.3 Fault at 11 kV Etihad Power
- 7.2.4 Fault at 132 kV Khanpur (Far-End Fault)
- 7.2.5 Fault at 132 kV Khanpur (Far-End Fault Stuck Breaker Case)

7.3 Conclusion of Dynamic Stability Analysis

8. Conclusions

Appendices

Appendix –A:

- Sketches for Chapter-4
- Single Line Diagram of 11 kV bus bar
- NTDC Generation Plan
- NTDC Transmission Plan
- NTDC Load Forecast

Appendix –B: Plotted Results of Load Flow for Chapter – 5

Appendix -C: Results of Short Circuit Analysis for Chapter - 6

Appendix –D: Plotted Results of Stability Analysis for Chapter – 7

Appendix -E: Dynamic Data for Etihad Power Generation Ltd.

POWER PLANNERS INTERNATIONAL

PAGE 6 OF 30

1. Introduction

1.1 Background

Etihad Power Limited would like to go for high pressure cogeneration with the aim of exporting power to the National Grid. The site of proposed project is located at a distance of about 15 from R.Y.Khan-New 500/220/132 kV Grid Station.

The electricity generated from this project would be supplied to the grid system of MEPCO through 132 kV grid available in the vicinity of this project. The nearest grid facility is a 500/220/132 kV R.Y.Khan-New as shown in Sketch-1 in Appendix-A

1.2 **Objectives**

The overall objective of the Study is to evolve an interconnection scheme between Etihad Sugar Power Plant 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:

- To develop scheme of interconnections at 132 kV for which right of way (ROW) and space at the terminal substations would be available.
- 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 Etihad Power.
- 4. To check if the interconnection withstands dynamic stability criteria of post fault recovery with good damping.

1.3 <u>Planning Criteria</u>

The planning criteria required to be fulfilled by the proposed interconnection is as

follows: Steady State:	
Voltage	± 5 %, Normal Operating Condition
	± 10 %, Contingency Conditions
Frequency	50 Hz Nominal
	49.3 Hz to 50.2 Hz variation in steady state
	49.4 - 50.5Hz, Min/Max Contingency Freq. Band

Short Circuit:

10

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 loosing 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 Etihad Power is considered to be two. As per the data provided by the client the following assumptions have been made:

2.1 Etihad Hower data

Generator data:	
Installed capacity of power plant	= 37 MW (x2)
Lump sum maximum generating capacity	= 74 MW
Net export to the system	= 67 MW
Power factor	= 0.80 lagging, 0.95 leading
Lump sum MVA capacity	= 92.5 MVA
Inertia Constant, H (assumed)	= 2.6233 MW-sec/MVA
Generating Voltage	= 11 kV

2.2 Network data

The system data of NTDC has been used as per permission granted by NTDC vide their letter No. GMPP/CEMP/TRP-333/Etihad-RYK/4117-20 dated 22-09-2014.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 Etihad Power Limited are as shown in Sketches in Appendix-A. The system data of MEPCO has been used as available with PPI.

PAGE 9 OF 30

3. <u>Study Approach and Methodology</u>

3.1 <u>Understanding of the Problem</u>

Etihad Power would like to go for high pressure cogeneration with the aim of exporting a net maximum of 67 MW supply to the grid during the off-season in winter and little while after it. The site of proposed project is located at a distance of about 15 km from R.Y.Khan-New 500/220/132 kV Grid Station. The proposed Power Project is going to be embedded in the transmission network of MEPCO through the nearest available 132 kV network.

Due to the location of Etihad Power, the most feasible interconnection scheme with MEPCO would be looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid as shown in Sketch-2 in Appendix-A. Etihad Power is about 16 km from R.Y.Khan 500/220/132 kV Grid Station and the looping distance would be 15 km. The adequacy of MEPCO network of 132 kV in and around the proposed site of Etihad Power 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 2017 after the commissioning of Etihad Power by January 2017, 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 2017 has been selected for the study because it represents the maximum thermal dispatch conditions during the crushing season after the COD of Etihad Power Project. Thus the loading on the lines in the vicinity of Etihad Power will be maximum allowing us to judge the maximum impact of the plant on the transmission system in its vicinity. In addition, cases for night peak of January 2017 and extented term scenario of the year 2020-21 have also been studied for load flow analysis.

- 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 leasible scheme.
- Recommend the technically most 1, asible scheme of interconnection.

POWER PLANNERS INTERNATIONAL

PAGE 11 OF 30

4. <u>Development of Scheme of Interconnection</u>

4.1 The Existing and Ongoing Network

The existing 132 kV network available around Etihad Power is shown in Sketch-1 in Appendix-A.

Due to the layout of the network in the vicinity of Etihad Power, the most feasible interconnection scheme with MEPCO would be looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid as shown in Sketch-2 in Appendix-A. Etihad Power is about 16 km from R.Y.Khan 500/220/132 kV Grid Station and the looping distance would be 15 km.

There is a strong 220 kV and 500 kV network in the vicinity connecting R.Y.Khan 500/220/132 kV grid station with Guedu-New 500 kV grid station and Multan 500/220/132 kV grid station. A strong system helps in stable operation of *u* power plant.

4.2 The Scheme of Interconnection of Etihad Power

Keeping in view of the above mentioned 132 kV network available in the vicinity of the site of the Etihad Power, the interconnection scheme has been developed by looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid as shown in Sketch-2 in Appendix-A. Etihad Power is about 16 km from R.Y.Khan 500/220/132 kV Grid Station and the looping distance would be 15 km. The network of Etihad Power has been modeled at 132 kV and 11 kV. The 11 kV Bus Bar of Etihad Power have been split to control the short circuit levels.

POWER PLANNERS INTERNATIONAL

PAGE 12 OF 30

5. <u>Detailed Load Flow Studies</u>

5.1 Base Case Lad Flow January Peak 2017, Without Etihad Power

A base case has been developed for the peak load of January 2017 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 2017 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-B. The system plotted in this Exhibit comprises of 132 kV network feeding R.Y.Khan, 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	R.Y.Khan-New to Khanpur 132 KV Single Circuit Out
Exhibit-0.2	NY.Y.Khan-New to R.Y.Khan 132 KV Single Circuit Out
Exhibit-0.3	Sadiqabad to R.Y.K han 132 KV Single Circuit Out
Exhibit-0.4	Khanpur to Feroza 132 KV Single Circuit Out
Exhibit-0.5	Hamza-PP to Khanpur 132 KV Single Circuit Out
Exhibit 0.6	Bahawalpur-New to Samasata 132 KV Single Circuit Out
Exhibit-0.7	Bahawalpur-New to Mubarakpur 132 KV Single Circuit Out
Exhibit 0.8	Mubarakpur to Ahmadpur-East 132 KV Single Circuit Ou

We see that in all the cases the power flows on all circuits remain within their rated limits. Also the bus voltages are within the acceptable operating range. Some load shedding is required for the outages in Exhibit -0.7 and Exhibit -0.8 to avoid overloading.

5.2 Load Flow January Peak 2017 with Etihad Power

The scheme of interconnection modeled in the load flow for Etihad Power is looping in-out cne circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid. Etihad Power is about 16 km from R.Y.Khan 500/220/132 kV Grid Station and the looping distance would be 15 km

Load flow studies have been carried out for January 2017 because it represents the maximum thermal dispatch conditions in the grid during the crushing season after the COD of Etihad Power Ltd. Thus the loading on the lines in the vicinity of Etihad Power 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 Etihad Power intercc inected as per proposed scheme are shown in Appendix-B.

The results of Normal case of Peak January 2017 are plotted in Exhibit 1.0. 'Ve 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 ± 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	Etihad to Khanpur 132 KV Single Circuit Out
Exhibit-1.2	Etihad to R.Y.Khan-New 132 KV Single Circuit Out
Exhibit-1.3	R.Y.Khan-New to R.Y.Khan 132 KV Single Circuit Out
Exhibit-1.4	Sadiqabad to R.Y.Khan 132 KV Single Circuit Out
Exhibit-1.5	Khanpur to Feroza 132 KV Single Circuit Out
Exhibit-1.6	Hamza-PP to Khanpur 132 KV Single Circuit Out
Exhibit-1.7	Bahawalpur-New to Samasata 132 KV Single Circuit Out
Exhibit-1.8	Bahawalpur-New to Mubarakpur 132 KV Single Circuit Out
Exhibit-1.9	Mubarakpur to Ahmadpur-East 132 KV 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. Some load shedding is required for the outages in Exhibit – 1.8 and Exhibit – 1.9 to avoid over-loadings.

5.3 Load Flow January Night Peak 2017 with Etihad Power

MEPCO system has a large solar power generation, Quaid-e-Azam Solar, which supplies about 800 MW power to the system during daytime. Load flow studies have been carried out for the night peak scenario of January 2017 to study the impact of the plant in the absence of this huge solar power generation in the area. The normal case for the night peak scenario of January 2017 is shown in Exhibit – 2.0. 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 ± 5 % off the nominal.

5.4 <u>Peak Load Case 2020: Extended Term Scenario</u>

We have also studied the future scenario or June 2020 to assess the impact of the plant in the extended term of 5 years after its installation as per NTDC requirement.

The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 5 % off the nominal.

We find no capacity constraints on 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 – B as follows;

Exhibit-3.1	Etihad to Khanpur 132 KV Single Circuit Out
Exhibit-3.2	Etihad to R.Y.Khan-New 132 KV Single Circuit Out
Exhibit-3.3	R.Y.Khan-New to R.Y.Khan 132 KV Single Circuit Out
Exhibit-3.4	R.Y.Khan to Sadiqabad 132 KV Single Circuit Out
Exhibit 3.5	Khanpur to Feroza 132 KV Single Circuit Out
Exhibit3.6	Khanpur to Hamza-PP 132 KV Single Circuit Out

Exhibit-3.7 Exhibit-3.8 Exhibit-3.9 Exhibit-3.10 Samasata to Bahawalpur-New 132 KV Single Circuit Out Bahawalpur-New to Mubarakpur 132 KV Single Circuit Out Mubarakpur to Ahraadpur-East 132 KV Single Circuit Out Bahawalpur-New 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 ± 10 % off the nominal for contingency conditions' criteria

We find that there are no capacity constraints in the proposed connectivity scheme of Etihad Power.

5.5 Conclusion of Load Flow Analysis

The proposed interconnection scheme of Etihad Power by looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid is adequate to evacuate up to 67 MW export of electrical power from Etihad Power under normal and contingency conditions tested for peak load conditions of January 2017, Night peak load of January 2017 and extended term scenario of the Year 2020-21. 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.

PAGE 16 OF 30

6. <u>Short Circuit Analysis</u>

6.1 <u>Methodology and Assumptions</u>

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 2016-17 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 Etihad Power

In orde: to assess the short circuit strength of the network of 132 kV without Etihad Power 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 Etihad Power and later on how much the contribution of fault current from Etihad Power may add to the existing levels,.

The results are attached in Appendix -C.

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-New, R.Y.Khan, Khanpur, Feroza and surrounding bus bars and are shown plotted in the Exhibit 4.0 attached in Appendix-C. Both 3-phase and 1-phase fault currents are

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

The tabular output of the short circuit calculations is also attached in Appendix-C for the 132 kV bus bars of our interest i.e. the substations connecting in the 132 kV circuits lying close to R.Y.Khan-New, R.Y.Khan, 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.

Maximum Short Circuit Devels without Ethau Tower				
Substation	3-Phase fault current,	1-Phase fault current,		
	kA	kA		
R.Y.Khan 132 kV	11.20	11.57		
R.Y.Khan-New 132kV	14.37	13.95		
Khanpur 132 kV	10.48	10.52		
Hamza-PP 132 kV	6.71	5.56		
Liaqa(pur 132 kV	4.35	4.23		
Samasata 132 kV	5.21	5.32		
Bahawlpur-New 132 kV	6.29	6.55		
Mubarakpur 132 kV	4.16	4.62		
Ahmadpur-East 132 kV	3.72	4.35		
Feroza 132 kV	4.82	4.86		
Mwqrshia 132 kV	4.63	4.30		
Khanbela 132 kV	3.14	3.03		
Bahawalpur 220 kV	12.61	10.81		

Table-6.1 Maximum Short Circuit Levels without Etihad Power

6.3 Fault Current Calculations with Etihad Power interconnected

Fault currents have been calculated for the electrical interconnection of proposed scheme. Furthermore NGRs limiting the 1-phase fault contribution of the Generators at the 11 kV Bus Bars of Etihad Sugar Mills to approximately 100A have been assumed. Fault types applied are three phase and single-phase at 132 kV bus bars of Etihad Power itself and other bus bars of the 132 kV substations in the electrical

vicinity of R.Y.Khan-New, R.Y.Khan, Kompur, 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 Etihad Power are placed in Appendix-C. Brief summary of fault currents at significant bus bars of our interest are tabulated in Table 6.2

	3-Phase fault current,	1-Phase fault current,
Substation	kA	kA
EtihadPP-1	43.28	35.06
Etihad PP-2	43.28	35.06
Etihad 132 kV	8.85	5.82
R.Y.Knan 132 kV	11.83	11.98
R.Y.Khan-New 132kV	15.87	14.75
Khanpur 132 kV	11.20	10.85
Hamza-PP 132 kV	6.92	5.62
Liaqatpur 132 kV	4.40	4.25
Samasata 132 kV	5.22	5.33
Bahawlpur-New 132 kV	6.31	6.56
Mubarakpur 132 kV	4.17	4.62
Ahmadpur-East 132 kV	3.73	4.36
Feroza 132 kV	4.90	4.90
Mwqrshia 132 kV	4.74	4.34
Khanbela 132 kV	3.16	3.04
Bahawalpur 220 kV	12.62	10.82

 Table-6.2

 Maximum Short Circuit Levels with Etihad Power

Comparison of Tables 6.1 and 6.2 show slight increase in short circuit levels for threephase and single – phase faults due to connection of Etihad Power 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 Etihad Power 132 kV is 8.85 kA and 5.82 kA for 3phase and 1-phase faults respectively. It would be advisable to go for standard size switchgear of short circuit rating of 31.5 l.A. 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 maximum fault levels at local 11 kV bus bars have been found to be 43.28 kA/ 35.06 kA (3-Ph/1-Ph). It is recommended to have standard size switchgear of short circuit rating of 50 kA for 11 kV. It would provide large margin for any future increase in short circuit levels due to future generation additions and network reinforcements in this area.

6.4 <u>Conclusion of Short Circuit Analysis</u>

The short circuit analysis results show that for the proposed scheme of interconnection of Etihad Power 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 Etihad Power 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 Etihad Power 132 kV is 8.85 kA and 5.82 kA for 3-phase and 1-phase faults respectively. Therefore industry standard switchgear of the short circuit rating of 31.5 kA would be fine to be installed at 132 kV switchyard of Etihad Power 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.

The maximum fault levels at local 11 kV bus bars have been found to be 43 28 kA/ 35.06 kA (3-Ph/1-Ph). It is recommended to have standard size switchgear of short circuit rating of 50 kA for 11 kV to accommodate future increase in short circuit levels due to future generation additions a d network reinforcements in this area.

FOWER PLANNERS INTERNATIONAL

PAGE 20 OF 30
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	IEEETI
Speed Governing System	TGOVI
Inertia Constant (assumed)	H = 2.6233 MW-sec/MVA

7.1.2 System Conditions

The proposed scheme of looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposec' Etihad Power 132 kV grid 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-D. Each simulation is run for its first one second for the steady state conditions of the system prior to fault or disturbance. This is to establish the pre fault/disturbance conditions of the network under study were smooth and steady. Post fault recovery has been monitored for nine seconds. Usually all the transients due to non-linearity die out within 2-3 seconds after disturbance is cleared in the system.

7.1.4 Worst Fault Cases

Three phase faults are considered as the worst disturbance in the system. We have considered 3-phase fault in the closest vicinity of Etihad Power i.e. right at the 132 kV bus bar of Etihad Power 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 between Etihad and Khanpur.

7.2 Dynamic Stability Simulations' Results with Etihad Power

7.2.1 Fault at 132 kV Near Etihad Power

We applied three-phase fault on Etihad Power 132 kV bus bar, cleared fault in 5 cycles (100 ms) followed by trip of a 132 kV single circuit between Etihad Power and Khanpur 132 kV substation. We monitored different quantities for one second pre-fault and nine cycles after clearance of fault (post-fault) conditions and plotted the results attached in Appendix – D and discussed as follows;

Fig. 1.1 Bus Voltages

The bus voltages of 11 kV bus bar of Etihad Power and 132 kV bus bars of Etihad, R.Y.Khan, Sadiqabad, Khanpur and Feroza are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 1.2 Frequency

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

Fig. 1.3 MW/MVAR Output of Generators of Etihad Power

The pre-fault output of Etihad Power is 74 MW and it gets back to the same output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a new value.

Fig. 1.4 Speed and Mechanical Power of Generators at Etihad Power

The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed as of before fault. The transients in mechanical power also damp quickly and settle to a new equilibrium.

Fig. 1.) MW Flow on Etihad Power to R.Y.Khan-New 132 kV circuit

Followed by clearing of fault, the trip of a 132 kV single circuit from Etihad Power to Khanpur causes the entire output of Etihad Power to flow on the intact 132 kV circuit between Etihad Power to R.Y.Khan-New. We plotted the flows of MW and MVAR on this intact circuit and see that the power flows on this circuit attains to steady state level with power swings damping down fast.

Fig. 1.6 Rotor Angles

The rotor angles of the generators of Etihad Power 11 kV, Hamza 11 kV, RYK-PP 11 kV. Liberty 132 kV and Guddu 220 kV are plotted relative to machines at Guddu-New 500 kV. The results show that the rotor angle of Etihad Power gets back after the first swing and damps down quickly. Similarly the rotor angles of other machines swing little after the fault and damp fast efter clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.2.2 Fault at 132 kV Near Etihad Power (Stuck Breaker)

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We applied three-phase fault on Etihad Power 132 kV bus bar, cleared fault in 9 cycles (180 ms) followed by trip of a 132 kV single circuit between Etihad Power and Khanpur 132 kV substation. We monitored different quantities for one second pre-fault and nine cycles after clearance of full (post-fault) conditions and plotted the results attached in Appendix – D and discussed as follows;

Fig. 2.1 Bus Voltages

The bus voltages of 11 kV bus bar of Etchad Power and 132 kV bus bars of Etchad, R.Y.Khan, Sadiqabad, Khanpur and Feroza are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 2.2 Frequency

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

Fig. 2.3 MW/MVAR Output of Generators of Etihad Power

The pre-fault output of Etihad Power is 71 MW and it gets back to the same output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a new value.

Fig. 2.4 Speed and Mechanical Power of Generators at Etihad Power

The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed as of before fault. The transients in mechanical power also damp quickly and settle to a new equilibrium.

Fig. 2.5 MW Flow on Etihad Power to R.Y.Khan-New 132 kV circuit

Followed by clearing of fault, the trip of a 132 kV single circuit from Etihad Power to Khanpur causes the entire output of Etihad Power to flow on the intact 132 kV circuit between Etihad Power to R.Y.Khan-New. We plotted the flows of MW and MVAR on this intact circuit and see that the power flows on this circuit attains to steady state level with power swings damping down fast.

Fig. 2.6 Rotor Angles

The rotor angles of the generators of Etihid Power 11 kV, Hamza 11 kV, RYK-PP 11 kV, Liberty 132 kV and Guddu 220 kV are plotted relative to machines at Guddu-

New 500 kV. The results show that the roter angle of Etihad Power gets back after the first swing and damps down quickly. Similarly the rotor angles of other machines swing little after the fault and damp fast after clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.2.3 Fault at 11 kV Etihad Power

We applied three-phase fault on Etihad Power 11 kV bus bar, cleared fault in 10 cycles (200 ms) followed by trip of one Generating Unit of 37 MW. We monitored different quantities for one second pre-fault and nine seconds after clearance of fault (post-fault) conditions and plotted the results attached in Appendix – D and discussed as follows;

Fig. 3.1 Bus Voltages

The bus voltages of 11 kV bus bars of Etihad Power and 132 kV bus bars of Etihad, R.Y.Khan, Khanpur and Feroza are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 3.2 Frequency

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

Fig. 3.3 MW/MVAR Output of Generators of Etihad Power

The pre-fault output of Etihad Power is 74 MW and it gets back to the same output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a new value.

Fig. 3.4 Speed and Mechanical Power of Generators at Etihad Power

The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed as of before fault. The transients in mechanical power also damp quickly and settle to a new equilibrium.

Fig. 3.5 MW Flow on Etihad Power to R.Y.Khan-New 132 kV circuit Followed by clearing of fault, trip of one Generating Unit of 37 MW causes a decrease in the output of Etihad Power. We plotted the flows of MW and MVAR on the intact 132 kV circuit between Etihad Power to R.Y.Khan-New and see that the power flows on this circuit attains to steady state level with power swings damping down fast.

Fig. 3.6 Rotor Angles

The rotor angles of the generators of Etihad Power 11 kV, Hamza 11 kV, RYK-PP 11 kV, Liberty 132 kV and Guddu 220 kV are plotted relative to machines at Guddu-New 500 kV. The results show that the rotor angle of Etihad Power gets back after the first swing and damps down quickly. Similarly the rotor angles of other machines swing little after the fault and damp fast after clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.2.4 Fault at 132 kV Khanpur (Far-End Fault)

We applied three-phase fault on far 132 kV bus bar of Khanpur to study the impact of a disturbance in the grid on the performance of the plant. The fault is cleared in 5 cycles (100 ms) as standard clearing time for 132kV systems, followed by trip of 132 kV single circuit between Khanpur to Feroza. We monitored different quantities for one second pre-fault and nine cycles after clearance of fault (post-fault) conditions and plotted the results attached in Appendic – D and discussed as follows;

Fig. 4.1 Bus Voltages

The bus voltages of 132 kV bus bars of Knanpur, Etihad Power, R.Y.Khan, Sadiqabad and Feroza and 11 kV bus bar of Etihad Power are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 4.2 Frequency

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

Fig. 4.3 MW/MVAR Output of Generators of Etihad Power

The pre-fault output of Etihad Power is 74 MW and it gets back to the same output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a new value.

Fig. 4.4 Speed and mechanical power of Generators at Etihad Power

The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed as of before fault. The transients in mechanical power also damp quickly and settle to a new equilibrium.

Fig. 4.5 MW Flow on Khanpur to Hamza-PP 132 kV circuit

The outage of 132 kV single circuit between Khanpur to Feroza causes significant loading on the intact 132 kV circuit from Khanpur to Hamza-PP. Fig. 4.5 shows the

transier ts of MW and MVAR flows on Khanpur to Hamza-PP 132 kV circuit which settles the transients quickly and acquire new steady state levels soon.

Fig. 4.6 Rotor Angles

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The rotor angles of the generators of Etihad Power 11 kV, Hamza 11 kV, RYK 11 kV, Liberty 132 kV and Guddu 220 kV are plotted relative to machines at Guddu-New 500 kV. The results show that the rotor angle of Etihad Power gets back after the first swing and damps down quickly. Similarly the rotor angles of other machines swing little after the fault and damp fast after clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.2.5 Fault at 132 kV Khanpur (Far-End Fault-Stuck Breaker Case)

We applied three-phase fault on far 132 kV bus bar of Khanpur to study the impact of a disturbance in the grid on the performance of the plant. The fault is cleared in 9 cycles (180 ms) as standard clearing time for 132kV systems, followed by trip of 132 kV single circuit between Khanpur to Feroza. We monitored different quantities for one second pre-fault and nine cycles after clearance of fault (post-fault) conditions and plotted the results attached in Appendix – D and discussed as follows;

Fig. 4.1 Bus Voltages

The bus voltages of 132 kV bus bars of Khanpur, Etihad Power, R.Y.Khan, Sadiqabad and Feroza and 11 kV bus bar of Etihad Power are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 4.2 Frequency

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

Fig. 4.3 MW/MVAR Output of Generators of Etihad Power

The pre-fault output of Etihad Power is 74 MW and it gets back to the same output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a new value.

Fig. 4.4 Speed and mechanical power of Generators at Etihad Power The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed as of before fault. The transients in mechanical power also damp quickly and settle to a new equilibrium.

PAGE 26 O.3 30

Fig. 4.5 MW Flow on Khanpur to Mamza-PP 132 kV circuit

The outage of 132 kV single circuit between Khanpur to Feroza causes significant loading on the intact 132 kV circuit from Khanpur to Hamza-PP. Fig. 4.5 shows the transients of MW and MVAR flows on Khanpur to Hamza-PP 132 kV circuit which settles the transients quickly and acquire rew steady state levels soon.

Fig. 4.6 Rotor Angles

The rctor angles of the generators of Etinad Power 11 kV, Hamza 11 kV, RYK 11 kV, Liberty 132 kV and Guddu 220 kV are plotted relative to machines at Guddu-New 500 kV. The results show that the rotor angle of Etihad Power gets back after the first swing and damps down quickly. Similarly the rotor angles of other machines swing little after the fault and damp fast after clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.3 <u>Conclusion of Dynamic Stability Analysis</u>

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 Etihad Power. Therefore there is no problem of dynamic stability for interconnection of Etihad Power; it fulfills all the criteria of dynamic stability.

POWER PLANNERS INTERNATIONAL

PAGE 27 OF 30

8. <u>Conclusions</u>

Etihad Power would like to go for high pressure cogeneration with the aim of exporting power to the national grid during the crushing season in winter and little while after it.

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- The study objective, approach and methodology have been described and the plant's data received from the Client is validated. The network of Etihad Power at 11 kV has been modeled. It is being operated with the 11 kV Bus Bars split to limit the short circuit levels.
- The nearest NTDC grid facility avail ble for interconnection to Etihad Power is R.Y.Khan-New 500/220/132 kV Gric Station. A double circuit on rail conductor and a double circuit on lynx conductor between R.Y.Khan-New and Khanpur is being operated which passes about 15 km away from the location of Etihad Power as shown in Sketch-1 in Appendix-A.
- Etihad Power will generate at 11 kV voltage level from where it is stepped-up to 132 kV using two 50/60 MVA transformers. The most feasible interconnection scheme with MEPCO would be looping in-out one circuit on rail conductor between R.Y.Khan-New 132 kV and Khanpur 132 kV Grid Station at the proposed Etihad Power 132 kV grid as shown in Sketch-2 in Appendix-A. Etihad Power is about 16 km from R.Y.Khan-New 500/220/132 kV Grid Station and the looping distance would be 15 km.
- The proposed scheme will require two breaker bays of I32 kV at Etihad Power to connect with the 132 kV circuits with R.Y.Khan-New and Khanpur.
- In view of planned COD of the Etihad Power in January 2017, the above proposed interconnection scheme has been tested for steady state conditions through detailed load flow studies for the peak conditions of January 2017 for maximum thermal power dispatches in the grid during the crushing 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 night peak conditions of January 2017. In addition, the extended term scenario for the year 2020-21 has also been analyzed 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 export up to 67 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 Etihad Power 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 Etihad Power.
- The maximum short circuit level of Etihad Power 132 kV is 8.85 kA and 5.82 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. The maximum fault levels at local 11 kV bus bar have been found to be 43.28 kA/35.06 kA (3-Ph/1-Ph) respectively. The 1-phase short circuit contribution of generators at Etihad have been 1 limited to approximately 100A via use of NGRs connected to the Generators at 11 kV level as per the data given by the client. It is recommended to have standard size switchgear of short circuit rating of 50 kA for 11 kV.
- The dynamic stability analysis of proposed scheme of interconnection has been carried out. The stability check for the worst case of three phase fault right on the 132 kV bus bar of Etihad Power substation followed by the final trip of one 132 kV Etihad to Kanpur circuit emanating from this substation, has been performed for ault 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. Also the stability check for the case of three phase fault right on the 11 kV bus bar of Etihad Power substation followed by the final trip of one Generating Unit of 37 MW, has been performed for fault clearing of 10 (200 ms). The system is found strong enough to stay stable and recovered with fast damping. The stability of system for far end faults of 3-phase occurring at 132 kV bus bar have also been

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checked. The proposed scheme successfully passed the dynamic stability checks for near and far faults for the most stringent cases.

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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• FOWER PLANNERS INTERNATIONAL

PAGE 30 OF 30

DOC 12

1. Introduction of the Applicant

Etihad Power Generation Limited ("EPGL") a public limited company is establishing a project of 74 MW cogeneration power of latest high pressure technology of 110 bar based on Bagasse and other biomasses. The vision behind establishing EPGL is to create a strong, well-capitalized power generation company which will design, develop and operate a power project operating at highest international standards in an economic and environmental friendly manner within shortest possible time.

The project will be situated at Karamabad, District Rahim Yar Khan adjacent to the Etihad Sugar Mills Limited ("ESML").

The cogeneration will be based primarily on Bagasse while ensuring that all requisite measures are in place to ensure that the project is environmentally compliant. During one hundred and twenty (135) days of crushing season Bagasse being a by-product of ESML process, will be the primary fuel for the project for power generation. During rest of the year, the un-utilized Bagasse of ESML as well as from outside market (if available) will be utilized for power generation.

2. Salient Features of the Proposed Facility

Project Capacity	In season - 74 MW (Gross) – 67.025 MW (Net) Off season – 74.4 MW(Gross) – 67.55 MW (Net)
Project Location	Karamabad, District Rahim Yar Khan, Punjab
Land Area	25 acres
Construction Period	24 months
Power Purchaser	CPPA/NTDC and ESML/bulk consumers
Steam Turbines	2 x [37] MW condensing and extraction
Boilers	2 x [190] ton per hour 110 bar& 540 °C high pressure/temperature travelling grate boilers
Plant factor	45%
Upfront Levelized Tariff	US Cents 10.62 per KWH or PKR 10.407 per KWH

The broad parameters of the project are as under:

3. Proposed Investment

The total cost for the project is USD 120 Million approx., which is expected to be financed in a debt to equity ratio of 75:25.

4. Social and Environmental Impact of the Proposed Facility

The Bagasse based Grid connected cogeneration has the following specific advantages:

- The Bagasse based cogeneration is environmentally benign and it does not add to the existing pollution levels of the environment. This is mainly because of the carbon recycling. Thus there is a justification for these projects from the point of view of sustainable development.
- Saves on the consumption of the fossil fuels. There is no need to transport the fuel to the generating station as the cane in any case is transported to the factories and the Bagasse is generated in the sugar mills.
- As the Bagasse based cogeneration plants will be located invariably in the rural areas, far away from the utility plants, the transmission and distribution losses are minimized. In addition, these plants increases the quality of power supplied to the rural areas.

The Project Cost and sources

The total cost of the Project would be approximately USD 120 Million

To finance the design, engineering, construction and commissioning of Company's 74 MW (gross) cogeneration power project based on bagasse (the "Project"), Faysal Bank Limited ("FBL") has submitted its expression of interest (EOI) to act as Mandated Lead financier for the arrangement of local currency financing of PKR 12.6 billion (copy of Expression of Interest is enclosed).

The Project will be financed via 75:25 debt:equity ratio.

ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names	4 Half 2, 201	4 Half 1, 2015	Half 2, 2015	Half 1, 201	6 Half 2, 2016
1	Etihad Power Project	576 days	Fri 5/16/14	Fri 7/29/1	16				MJJJAISIO	DNDJFM	AMJJASO
2	Issuance of LOI	10 days	Fri 5/16/14	Thu 5/29/1	14	AEDB					
3	Initial Environment Examination Approval from EPA	45 days	Mon 8/4/14	Fri 10/3/1	14	EPA		EPA			
4	Grid Connectivity Approval	70 days	Wed 9/3/14	Tue 12/9/1	14	NTDC		NTDC			
5	Consent to Power Purchase	5 days	Wed 12/10/14	Tue 12/16/1	14 4	NTDC		NTDC			
6	Generation Licence Approval	60 days	Fri 11/28/14	Thu 2/19/1	15	NEPRA					
7	Upfront Terrif Acceptance	30 days	Wed 12/17/14	Tue 1/27/*	15 5	NEPRA					
8	Issuance of LOS	20 days	Fri 2/20/15	Thu 3/19/1	15 6	AEDB)B		
9	EPA finaliztion and signing	7 days	Fri 3/20/15	Mon 3/30/1	158	NTDC		.NT	DC		
10	IA finalization and signing	7 days	Tue 3/31/15	Wed 4/8/1	159	AEDB		Å A	EDB		
11	EPC Contractor finalization	120 days	Tue 5/20/14	Mon 11/3/1	14	Etihad	G	Etihad			
12	Financial Agreement	90 days	Mon 11/10/14	Fri 3/13/1	15			Cining Ci			
13	Financial Close	5 days	Mon 3/16/15	Fri 3/20/1	15 12			₩.			
14	Site infrastructure development	90 days	Mon 12/1/14	Fri 4/3/1	15	Etihad		Et Et	ihadi		
15	Construction Phase	350 days	Mon 3/23/15	Fri 7/22/1	16 13	Etihad		×			Etibod
16	Reliability and Commisioning Test	3 days	Mon 7/25/16	Wed 7/27/1	16 15						Ethau
17	Commercial Operation Date	2 days	Thu 7/28/16	Fri 7/29/1	16 16						
Project Date: V	Etihad Project Task ved 11/26/14 Split		Progre Milest	ess -	¢	Summary Project Summary	To the second	External Tasks	80 933 + + 2 \$ 15 5 10 10 10 4 4 4 5 5 5 5 5	Deadline	Į.
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(Information Under Regulation 3(5)(h))

- 1. Type Technology, Model, Technical Details and Design of the proposed Facility
- 2. Expected Life of the Facility
- 3. Location of the Facility
- 4. Type and Detail of Services to be provided

INTRODUCTION

Currently Pakistan has an installed electric generating capacity of about 20,000 MW, with the demand far exceeding this installed capacity and the access to electricity in Pakistan is about 62%. With a fast-growing economy and demography, the projection for the demand in 2030 is forecast to be 100,000 MW. This calls for a tremendous growth rate in the power sector. The Government of Pakistan is making all out efforts to increase the generation capacity by tapping all conventional and non-conventional sources of electricity generation. Born out of this Government's initiative to augment the generation through non-conventional energy sources is the "Framework for Power Cogeneration 2013 Bagasse and Biomass" promulgated in March 2013. The Government of Pakistan has recognized that Bagasse based Cogeneration can play a significant role in the country's efforts to augment the electricity generation.

The Government's pro-active policy on power Cogeneration created a lot of interest in the sugar Industry in Pakistan. The sugar Industry, suffering due to the vagaries of nature and global market fluctuations had been looking for support from the Government on the cogeneration initiative. However after the initial euphoria, the policy aimed at laying down clear guidelines about tapping the bagasse based Cogeneration potential, did not evoke much of interest. The major probable reasons, why there was not much of enthusiasm, were the minimum size of 60 MW and the treatment of the Cogeneration plants as IPPs. With no sugar mill coming forward to implement the Cogeneration program, the sugar industry has taken up the matter with the Government and the new initiative by the industry and the Government has brought about a new policy in 2013, which promises great hopes for bagasse based Cogeneration in Pakistan.

For the implementation of the Cogeneration program, a new company called the "Etihad Power Generation Limited" (EPGL) adjacent to its group company Etihad Sugar Mills Limited ("ESML"). EPGL will be undertaking the power project development, construction and operation activities. EPGL will sell power to ESML for latter's operation and get bagasse in return from ESML. EPGL will sign the power purchase agreement with the off-taker and sell the surplus power to the off-taker.

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

For the proposed Cogeneration program EPGL is interested in going in for the proven latest technology. With the gasification of bagasse still not attained full scale commercial exploitation, the only technology available for using the bagasse is through the combustion route. The technology chosen is the conventional thermal power plant technology based on the Rankine Cycle. 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 EPGL,

the Cogeneration cycle is based on the parameters of 110 bar(a) and 540° C 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 a few Cogeneration plants operating in 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 EPGL proposes 2x190 TPH capacity boilers and 2x37 MW extraction condensing turbogenerators. Considering the off-season 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.

Considering 135 days of crushing operation and an overall capacity utilization of 90%, the sugar plant will generate around 555,860 MT of bagasse. Much of the bagasse, about 431,150 MT will be used for running the Cogeneration plant during the crushing period. The season operation of the Cogeneration plant leaves a surplus of about 124,710 MT and the same could be used for the operation of the power plant for a period of about 51 days during the maintenance periods and during the off-season. The number of operation days in the off-season could be enhanced if suitable compatible bio-mass fuel is identified. Even if the bio-mass fuel is available during the seasonal operation, it could be used along with bagasse and more quantum of bagasse could be saved for more number of days of operation in the off-season.

The power requirement of the sugar mill during the season operation, excluding the power requirements of the Cogeneration power plant is expected to be 16.25 MW. During the off-season period, the power requirement is estimated to be 1 MW, mainly for meeting the power required for the off-season maintenance of the sugar plant machinery and for meeting the colony and office power requirements.

The gross power generation in the Sugar mill, during the season, after the implementation of the Cogeneration program will be 74,000 kW. The sugar mill power consumption, as seen earlier, is 16,250 KW. The auxiliary power consumption of the Cogeneration plant during the season operation of the plant is estimated to be 6,975 kW. Considering the above, the exportable power to the national Grid comes to 50,775 kW. The energy export from the Cogeneration plant, which includes the export to the sugar mill and to the national grid, will be 67,025 kW, during the off-season operation.

The plant and equipment for the new proposed Cogeneration system will consist of the high pressure boilers, extraction condensing turbogenerators, water cooled condensing system, Main and auxiliary cooling water system, water treatment plant system, condensate and feed water system, compressed air system and electrical system consisting of switchgears, LT distribution panels, Variable Frequency Drives, step up transformer to export the power, step down transformers for meeting the in-house power requirement, outdoor switchyard equipment etc.

The water requirement of the Cogeneration plant is proposed to be met mostly by the ground water through deep bore wells. The ground water aquifers get charged by the nearby Chenab River. The present raw water requirement of the sugar mill is being met by the drawl from these sources. The water from the bore wells will be stored in a new water reservoir, and drawn for usage in the Cogeneration plant. A water treatment plant based on the reverse osmosis principle is proposed for the treatment of the entire feed water for the Cogeneration plant. There will be an adequately designed pre-treatment system with Multigrade filter and Ultra filtration system upstream of the RO plant.

2. Expected Life of the Proposed Facility

The expected life of the proposed facility is thirty (30) years from the commissioning operation date.

3. The Location of the Proposed Facility

The proposed plant of EPGL is located in an excellent cane growing area of the Punjab Province. Located in Mouza Karamabad in Rahim Yar Khan District, the plant will has good access by road. The proposed plant is about 20 km from the city of Rahim Yar Khan. The nearest air port is at Rahim Yar Khan and the nearest sea port is Karachi at a distance of about 600 km. The proposed plant is well connected by road to Islamabad and Lahore through national high way (map of the proposed facility is attached).

4. Type and Details of Services Proposed to be provided

The bulk of the power generated in the proposed Cogeneration plant is meant for export to the grid. The power generation in the new Cogeneration TG will be at 11 kV level. The power plant's internal consumption requirement will be met by stepping down the voltage level to 415 V. Similarly the sugar mill's requirements will be met by stepping down the voltage from 11 KV to 6.6KV and 415 V. However considering the stability and the uninterrupted export of power, the exportable power will be stepped up to 132 kV and paralleled with the national grid at 132 kV level. In the case of EPGL's Cogeneration plant, the export to the grid will be carried at the MEPCO's Rahim Yar Khan to Khanpur 132 KV feeder through loop-in-loop-out arrangement.

Bagasse based Cogeneration is considered by many countries as an environment friendly way of augmenting the generation capacity. The Government of Pakistan has estimated a potential of around 3,000 MW of Cogeneration power from the existing sugar mills and has decided to fast track these projects. ESML's sugar mill with 12,500 TCD of crushing per day will be able to sustain the generation of 74 MW of power in EPGL's Cogeneration plant for a period of about 135 days, with the bagasse generated in the mill. The proposed Cogeneration plant of EPGL, when implemented, 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 both the sugar mill and the country.

INFRASTRUCTURE

Rail and Road Facilities

The Plant is located at Karamabad, District Rahim Yar Khan on the banks of river Chenab. Road connectivity to the plant is very good. In addition the nearest Railway station at Rahim Yar Khan, it is also the nearest airport from EPGL's plant.

Staff Colony

The land for construction of staff colony has been acquired and construction shall be completed with the completion of the plant.

Amenities

All amenities like water, electricity and telephone are available in the plant.

Doc 22

PROPOSED SITE FOR ETIHAD POWER GENERATION LIMITED

The power plant would be situated adjacent to Etihad Sugar Mills Limited (ESML) at Karamabad, District Rahim Yar Khan. The proposed area for the construction is shown below in Google Satellite map at (28.570556, 70.322778).



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SAFETY PLAN

A comprehensive safety plan would be implemented to provide a safe and protected working environment to the staff working at the facility.

Key features of safety plan are given below:

A. Safety Awareness

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

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

B. Training for Use of Safety Gears and Equipment

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

C. Assurance of Use of Safety Gears and Equipment

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

D. Safety Procedures and Practices

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

E. Emergency Alarm & Fire Suppressions System

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

F. Emergency Help Call Numbers

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

G. Shutdown of Operating Systems or Equipments

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

H. First Aid Facilities and Staff

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

I. Ambulances

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

J. Fire Bridge

To meet any type of fire emergency, fire brigade will be established for immediate response without any delay.

K. Mock Fire Drills

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

L. Fire Fighting System

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

The complete fire protection system shall compromise of following:

- Stand pipe & hose system for building and structure (internal)
- Yard main, hydrants and monitors of plant site (external)
- Fire alarm and signaling
- Portable fire extinguishers
- Water spry fixed systems

The system shall be designed generally as per NFPA (National Fire Protection Association) standards as listed below:

S. No.	Description	Design Code/Standard
1	Stand Pipe & Hose System	NFPA 14
2	Yard Main, Hydrants and Monitors	NFPA 24
3	Fire Alarm and Signaling	NFPA 72
4	Portable Fire Extinguishers	NFPA 10
5	CO2 Extinguishing System	NFPA 12
6	Dry Chemical Powder Extinguishing System	NFPA 17
7	Low-Medium and High Expansion Foam	NFPA 11
8	Installation of Stationary Pump for Fire Fighting	NFPA 20
9	Water Spry and Fixed Fire Protection System	NFPA 15
10	Fire Hose	NFPA 1961
11	Fire Hose Connection	NFPA 1963

- 21

EMERGENCY PLAN

A comprehensive emergency plan would be implemented to meet type of emergencies to ensure zero injuries, damages and loss of any life or property.

Key features of the emergency plane are given below.

A. Awareness Regarding Different Types of Emergencies

All the staff working at the facility will be given detail briefing regarding different types of emergencies so that they would be able to identify an emergency situation to take necessary measure of safety and protection in the situation.

B. Trainings to React an Emergency Alert Alarm

All the staff working at the facility will be provided necessary trainings regarding how to react and emergency alert –alarm.

C. Use of Safety Gears and Equipments

The staff working at the facility will be provided information, guidance and training to use the safety gears and equipments.

D. Emergency Escape Procedure and Routs

The staff working at the facility will be made aware of Emergency escape routes and procedure for a quick and safe escape. Pictorials and deals will be pasted at locations to show the Emergency exit etc.

E. Emergency Escape Procedures and Rout Map

Emergency escape procedure and routes maps will be displayed on prominent places in the facility.

F. Assembly Area

The staff working at the facility will be briefed about the designated save assembly areas in the case of various types of Emergencies for their counting.

G. Emergency Alarm

Access to Emergency alarm will be made to raise the Emergency alarm in case of any type of Emergency.

H. Emergency Escape Help Call Numbers

Emergency help call numbers will be displayed in bold on prominent places in the facility.

I. Emergency Control Team

A team of trained and responsible members of the staff will be formed which will be responsible to take all necessary measures and decisions to tackle with and control any type of Emergency

K. Emergency Rescue and Relief Team

Another team comprising of experienced and responsible members of the staff will be formed to provide relief and support to the members of the staff is required during the Emergency situation.

L. Shutdown of Operating System or Equipments

The Emergency Control Team shall be responsible to ensure immediate shutdown of the operational systems and equipments if required in the Emergency situation Necessary equipment will also be installed for Emergency shutdown of the operating system and equipment.

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

M. Protection of Data and Record

Duplicate of all necessary data and record will be prepared and placed some safe place for its safety and security of the data and record.

N. Emergency Equipment

Emergency Equipment like fire extinguishers will be provided at the facility to tackle with the different types of Emergency.

O. Ambulances

Availability of Ambulance service at the facility will be ensure for quick shifting to the staff members to hospitals in case of any accident and health hazards.

P. Emergency Response Preview

The management of the facility shall be conduct regular frequent meeting to review the Emergency response facilities and procedures.

Training & Development

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

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

The basis, for the training shall be the Plant's operating and Maintenance Manual Particulars Book, which is compiled from the manufacturers' instructions, the contract documents and the drawings. In addition, the information gathered from the visits to the other operating plants and to the manufacturers works will also be included in the training. Supervision and co-ordination of the training program will require full time attention of a senior executive of the plant, and also the consultant's assistance may be taken. The training program will 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 will be based on the requirements of the individual maintenance functions, like mechanical, electrical, instrumentation etc. The Engineers and the Technicians will be sent to the manufacturers' works to witness the production and be associated with the erection of plant and equipment.

The Power plant would 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. would be done to improve the availability of the plant.

Installation of 2 X 37 MW High Pressure Co-generation Power Plant by Etihad Power Generation Limited at Mouza Karamabad, District Rahim Yar Khan



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INITIAL ENVIRONMENTAL EXAMINATION (IEE)





Prepared by:



Suite 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore-Pakistan **Phone:** + 92 42 35887517, 35925693; **Fax:** +92 42 35855508 **Email:** ectech_ectech@yahoo.com June-2014

Installation of 2 X 37 MW High Pressure Co-generation Power Plant by Etihad Power Generation Limited at Mouza Karamabad, District Rahim Yar Khan

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1.0	EXECUTIVE SUMMARY	
1.1	Introduction	i
1.2	Purpose of the report	ii
1.3	Category of the project	ii
1.4	Raw Materials	ii
1.5	Waste Handling	ü
1.6	Gaseous Emissions	iii
1.7	Environment Management Plan	iii
1.8	Public consultations	iii
1.9	Conclusion	iii
2.0	INTRODUCTION	1
2.1	Purpose of the report, identification of the project, and proponent	3
	2.1.1 Purpose of the report	3
	2.1.2 Identification of the project& the proponent	4
	2.1.2.1 The project	4
	2.1.2.2 Identification of the proponent	4
	2.1.2.3 Contact Person	4
	2.1.2.4 Environmental Consultants	5
	2.1.3 Location of the project	5
	2.1.4 Nature and size of the plant	5
2.2	Study Team	6
2.3	Extent of the IEE study, scope of the study	9
3.0	DESCRIPTION OF THE PROJECT	11
3.1	Type and category of the project	11
3.2	Category of the project	11
3.3	Objectives of the project	11
3.4	Advantages of the Site	12
3.5	Alternatives considered (Site Selection), and reasons for their rejection	13
	3.5.1 Environmental considerations	13
	a- Emissions/pollutants	13
	b- Waste water disposal facility	13
	c- Land Availability	13
	d- Location of the Plant	13
	e- Project Implementation Stages	13
	f- Layout of the Plant	14
	g- Raw Materials	14
- -	h- Major Equipment	14
3.6	Details of restoration and rehabilitation at the end of the project life	14 1 r
3.7	Land use in the project area	15
3.8	Regulatory framework	15
3.9	Deregulation of the economy	12

CONTENTS



3.10	Import policy	15
3.11	Infrastructure facilities	15
3.12	Incentives	16
3.13	Legal Framework	16
	3.13.1 National Environmental Regulatory/Legal Requirements	16
	3.13.2 National Conservation Strategy (NCS) – Pakistan	16
	3.13.3 Pakistan Penal Code (1860)	17
	3.13.4 Pakistan Environmental Protection Act, 1997	18
	3.13.5 Policy and Procedures for the Filing, Review and Approval of	
	Environmental Assessments	18
	3.13.6 Guidelines for the preparation and review of Environmental Reports	
	(November 1997/2000)	19
	3.13.7 Guidelines for Public Consultations	19
	3.13.8 National Environmental Quality Standards (NEQS)-1993, Amended	
	August 2000	19
	3.13.9 National Environmental Quality Standards for Ambient Air-	
	November- 2010	20
	3.13.10 National Standards for Drinking Water Quality - November, 2010	20
	3.13.11 National Environmental Quality Standards for Noise - November, 2010	20
	3.13.12 Sectoral Guidelines for Environmental Reports	20
	3.13.13 Guidelines for Sensitive and Critical Areas	20
	3.13.14 National Resettlement Policy and Ordinance	21
	3.13.15 Forest Act, 1927	21
	3.13.16 Industrial Relation Ordinance, 2002	21
	3.13.17 Punjab Industrial Relations Bill 2010	22
	3.13.18 Industrial Relations Ordinance 2011 Promulgation	23
	3.13.19 Other Relevant Laws	23
	3.13.20 National Electric Power Regulatory Authority (NEPRA) Act 1997	25 22
	3.13.21 Power Policy 1998	25
	3.13.22 Provincial Local Government Ordinances, 2001	24
~ ~ ~	3.13.23 Factories Act, 1934	24
3.14	Applicable International Environmental and Occupational Safety and	76
	Health Laws and Regulations	20
2.45	International and National Non-Governmental Organizations	26
3.15	International Framework	26
3.16	Environment Related Relevant International Agreements in Pakistan's context	20
4.0	DESCRIPTION OF THE ENVIRONMENT	
	(AREA AFFECTED BY THE PROJECT)	28
4.1	Spatial and temporal boundaries adopted for the various aspects of The study	28
4.2	Existing (baseline) condition of the biophysical and socio-economic environment,	,
	trends and anticipated future environmental conditions should the project not	
	go ahead	28



4.3	Environmentally sensitive areas of special or unique value	29
	4.3.1 Physical Resources of the Project Area	29
	 Topography and Geology 	29
	• Soils	30
	Climate	30
	Temperature	31
	Rainfall	31
	• Water	31
	a) Underground Water	31
	b) Surface Water/Wet Lands	32
4.4	Ecological Resources	32
	4.4.1 Fishery and Aquatic Biology	32
	4.4.2 Biodiversity	32
	4.4.3 Forestry	32
	4.4.4 Wildlife	33
	4.4.5 Flora	33
	4.5.6 Fauna	34
	4.5.7 Scientific Institutions	34
4.5	Socio-Economic	34
	4.5.1 Cultural and Other Heritage	35
	4.5.2 Existing Socio-Economic Baseline Conditions	35
	Population and Communities	35
5.0	SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND	38
	MITIGATION MEASURES	
5.1	Baseline/ Zero Environmental Monitored Data	38
5.2	Environmental problems during construction and mitigation measures	38
	5.2.1 Environmental problems due to project location	38
	5.2.2 Environmental problems related to design	38
	5.2.3 Third party quarterly monitoring	38
5.3	Environmental problems resulting from construction	38
	5.3.1 The pollution from these activities could be in the form of	39
5.4	Environmental problems resulting from project operations	39
	5.4.1 Noise levels	39
	5.4.2 Boiler Stack Emissions	40
	5.4.3 Ash Handling	40
	5.4.4 SO ₂ emissions	40
	5.4.5 NOX emissions	40
	5.4.6 Particulate Matter (PM) emissions	40
	5.4. / Effluents	40
5.5	Environment Management Plan / Mittigation / Compensation	<u>л</u> 1
	Measures during Construction Phase	41



5.6	Environment Management Plan /Mitigation / Compensation	
	Measures During Operation Phase	44
6.0	ENVIRONMENTAL MONITORING PROGRAM AND INSTITUTIONAL	46
	REQUIREMENTS	
6.1	EMP along with other requirements is described as below	46
	6.1.1 Assigning responsibility for implementation (by name or position)	46
6.2	Monitoring program to assess performance	47
6.3	Reporting and reviewing procedures	47
6.4	Training needs	47
6.5	Environmental Monitoring	48
6.6	Environment quality monitoring laboratory	48
6.7	Fire Protection System	48
7.0	GRIEVANCE REDRESSING MECHANISM-FORMAL AND INFORMAL CHANNELS	49
7.1	Formal Channel	49
	7.1.1 Environmental Legislation	49
	7.1.2 Punjab Environmental Protection (Amendment 2011) Act and	
	Environmental Management	49
	7.1.3 Enforcement of PEPA and Liability	49
7.2	Grievance Redress Mechanism- Informal	52
	7.2.1 Compensation for Environmental Damages	52
	7.2.2 Constitution of the Committee	53
	7.2.3 Time Schedule for Redressing the Grievance	53
8.0	PUBLIC CONSULTATIONS	54
9.0	CONCLUSIONS	56
10.0	RECOMMENDATION	57

.



ANNEXURES

ANNEXURE-I Pakistan Environment Protection Act 1997 & (Amendment 2011)	58
ANNEXURE-II Guidelines for the preparation and Review of Environmental Reports (October 1997/2000)	89
ANNEXURE-III National Environmental Quality Standards (NEQS) 2000–Pakistan	136
ANNEXURE-IV National Environmental Quality Standards for Ambient Air November- 2010- Pakistan	142
ANNEXURE-V Project Implementation Stages	148
ANNEXURE-VI Plant Layout	150
ANNEXURE-VII Guidelines for Self – Monitoring and Reporting by Industry (SMART) Final Report March 1998	151
ANNEXURE-VIII Ambient Air Gaseous Monitored Data	161
ANNEXURE-IX Ambient Air Particulate Matter Monitored Data	162
ANNEXURE-X Noise Levels Monitored Data	163
ANNEXURE-XI Laboratory Analysis Report of Ground Water Sample	164
ANNEXURE-XII Public Consultants	165

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IEE Etihad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

1.0 EXECUTIVE SUMMARY

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Pakistan currently faces severe power shortages, which result in frequent long drawn out load shedding. Frequency plus duration of the load shedding is also on the increase. Irregularity and unavailability of power has led businesses to fail and Pakistani families to struggle. 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.

As a result of a wide space between available energy and the demand, industries are now required to install their own private power plants to ensure continuous supply of electricity otherwise they are facing loss in their business.

In this background M/s Etihad Power Generation Limited is planning to install power plant of 74 MW (2 X 37 MW turbo generators). Conventionally, the sugar mills use low pressure boilers (24 bars) for generating power and process steam. Now Etihad Power Generation Limited will use 110 bars, 2 X 190 TPH High pressure Boilers.

This IEE report pertains to the installation of 2 X 37 MW Co-generation power plant using Bagasse as fuel. The power plant will be stand-alone bagasse cogeneration facility that will be constructed adjacent to the existing Etihad Sugar Mills Limited (ESML). This power plant will be installed at Mouza Karamabad, District Rahim Yar Khan at KLP Road, 20 Km from City of Rahim Yar Khan. This area falls within the jurisdiction of the EPA, Punjab, Lahore. Accordingly, the report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab, Lahore for its Environmental Approval (EA).

Bagasse is the matted cellulose fiber excess from sugarcane that has been processed in a sugar mill. Previously, bagasse was burned as a means of solid waste disposal. However, as the cost of fuel oil, natural gas, and electricity increased after the energy crisis in 1970, special attention was paid to alternative fuels in an efficient way. Consequently, conception of bagasse combustion changed and it has come to be regarded as a biomass fuel rather than refuse.

Another important aspect is the increasing demand of bagasse as raw material for paper, furniture, and other industries. For all these reasons, the saving of this product has become one of the main objectives of the sugar cane industry.

The actual affinity is to use bagasse as fuel, especially for Co-generation of electric power and steam, to increase its contribution to the country's energy supply.


1.2 Purpose of the report

According to the Punjab Environmental Protection Act (amendment 2011) ,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."

1.3 Category of the project

The power plant is to produce 2 X 37 MW electricity from bagasse as a fuel, therefore, according to the 'Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000" the project falls in "**Category B**" requiring IEE to be submitted to **EPA, Lahore** for getting Environmental Approval (EA).

This IEE report has been prepared, according to the "Guidelines for the preparation and review of Environmental Reports, October 1997/2000"-

As the project will utilize existing land adjacent to the Etihad sugar mill, the total estimated cost of the project is around 100 million US \$.

The report takes into account the environment related rules, regulations and laws.

1.4 Raw Materials

The only 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 mainly produced by Etihad Sugar Mills. Bagasse has a heating value between 3,000 and 4,000 British thermal units per pound (Btu/lb) on a wet, as-fired basis. Most bagasse has moisture content between 45 and 55 percent by weight.

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

1.5 Waste Handling

All Waste water generated will be taken to the effluent treatment plant based on reverse osmosis principle and will be bring to the levels as required by the NEQS Pakistan. Ash Handling System will be installed. Bagasse ash from the boiler will be disposed off as manure / fertilizer and also made available to other growers in the region. Any solid waste requiring recycling or reuse will be sold in the market to the contractor and all the adequate record will be maintained.

1.6 Gaseous Emissions

Emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) are lower than conventional fossil fuels due to the characteristically very low levels of sulfur and nitrogen associated with bagasse.

The most significant pollutant emitted by bagasse-fired boilers is particulate matter, caused by the turbulent movement of combustion gases with respect to the burning bagasse and resultant ash. Stack PM will be controlled by the use of electrostatic precipitators for each boiler to meet the permitted dust concentration as required by NEQS.

Noise level of 75 dB (A) and 65 dB (A) will be maintained at the boundary walls of the project as required in the NEQS. Further Noise level of Maximum 85 dB (A) will be maintained at 1.0 m from the equipment.

1.7 Environment Management Plan

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.

1.8 Public consultations

Public consultations were also held with the stake holders to know their views about 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.

1.9 Conclusion

In conclusion it was found that the project is fully justified for the installation at the earliest in view of the so frequent and long drawn out load shedding.



IEE Ethad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

2.0 INTRODUCTION

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2.0 INTRODUCTION

Pakistan is currently going through severe power shortages, which result in frequent long drawn out load shedding. Frequency as well extent of the load shedding is also on the raise. Unreliability and unavailability of power has led businesses to fail and Pakistani families to struggle. The power deficiency 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 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 overcome 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.

Out of the total installed power generation capacity of Pakistan of 23,412 MW in 2010-11; 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.

Indigenous supply of fossil fuels is not only becoming short in supply, but also their fast price hike in the international markets is swelling import bills of the fossil fuels. Lacking adequate environmental controls, use of fossil fuels has already caused a lot of damage to the environment of the country.

Pakistan is an energy deficit country. 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.

With increasingly more disparity between energy supply and demand, and keener 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.

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.

The cane being crushed by the sugar mill has high fiber content and cane bagasse percentage on the average is 31.5%. The sugar mill crushes for a period of 135 days/year.

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 industries 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 cogeneration power plant will be stand-alone cogeneration facility installed adjacent to Etihad Sugar Mills Limited, with present crushing capacity of 12,500 TCD.

The High Pressure Cogeneration Power Plant (2x37 MW) under reference of the project will utilize the entire surplus bagasse from Etihad Sugar Mill Limited further the sugar mill is planning to enhance its production to 15,000 TCD to enhance the production of energy. The purposed power plant site is located adjacent to Etihad Sugar Mill Limited.

Ground water availability is very good and quality is quite suitable for meeting all water needs of the project.

The purposed cogeneration power plant will be in a position to run even for offseason using bagasse saved during operational phase from Sugar Mill. If Etihad Power Generation Limited wants to operate the plant for more number of days the operation of the plant should be supplemented with compatible bio-mass fuel like rice husk, wood chips etc.



Part of the power requirement of the sugar mills is being supplied by the steam turbine drives (for the mills and shedders) and the balance requirement is being met from in house power generation.

Under the present arrangement the sugar plant completes its steam requirements by three (3) number of 80 TPH capacity boilers and one (1) of 40 TPH capacity boiler, all with the outlet steam parameters of 24 bar (a) and 340 Deg.C The complete electrical power requirements are met with two (2) numbers of 5 MW backpressure turbo generator and One (1) number of 6 MW turbo generator. In addition there are steam turbine drives to drive the mills, the shredder and two (2) numbers of 250 kW capacity boiler feed water pumps. All the power and the drive turbines exhaust the steam at a pressure of 2 bar (a) and at a temperature of about 160 Deg.C. Under the Cogeneration program, these existing low pressure boilers, the turbo generators and the drive turbines will be retired. The entire steam generation will be in the new high pressure boilers and the complete power generation will be in the new high pressure turbo generators. The entire quantity of the steam and power requirements of the sugar plant will be met by the new Cogeneration plant. The drive turbines will be replaced by electric motors.

The total power requirement of the sugar plant is about 16,250 KW during the season excluding auxiliary power requirements of the cogeneration plant.

The Cogeneration plant, will have high pressure 2 X 190 TPH boiler and 2 X 37 turbo generators. The surplus power, after meeting the in house requirement, will be exported to the National Grid. This IEE report covers the activities related to this high pressure cogeneration power plant (2x37MW).

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-2011) 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 2 X 37 MW high pressure 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.

This IEE report has been prepared, according to the "Guidelines for the preparation and review of Environmental Reports, October 1997/2000"-ANNEXURE-II 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 2011**) Act, Section12.

2.1.2 Identification of the project& the proponent

2.1.2.1 The project

In view of excessive shortage of electricity in Pakistan, all segments of life be it industry, commerce, social, domestic or else are facing lot of hardships. M/s. Etihad Power Generation Limited is set up by Etihad Sugar mills which are in the process of installing 2 X 37 MW high pressure co-generation power plant using Bagasse as Fuel from Etihad Sugar Mills).

M/s. Etihad Power Generation Limited would like to go for high pressure co-generation in Etihad Sugar Mills with the aim of exporting power to electricity grid both during crushing season and off season. This is how the supply of reliable and economic power to the National Grid to meet ominous power demand of the country will be ensured and on the other hand the process steam demand of the sugar mill will continue to be met.

2.1.2.2 Identification of the proponent

The project proponent is M/s. Etihad Power Generation Ltd. With corporate office address:

Etihad Power Generation Limited, 4-Bawa Park, Upper Mall, Lahore.

2.1.2.3 Contact Person

Mr. Muhammad Shakeel Chief Executive Officer. Etihad Power Generation Limited, 4-Bawa Park, Upper Mall, Lahore. Ph: 042-35758114 Fax: 042-35751610 Email ID: shakeel@tapl.com.pk



2.1.2.4 Environmental Consultants

ECTECH–Environment Consultants, Suite No. 4, 2nd 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.

2.1.3 Location of the project

This power plant will be installed adjacent to the Etihad Sugar Mills, Mouza Karam Abad, District Rahim Yar Khan. The site for installation of the power plant is shown hereunder.



2.1.4 Nature and size of the plant

M/s. Etihad Power Generation Limited is planning to install high pressure 2 X 190 TPH boilers and 2 X 37 MW turbo generators to produce total 74 MW of electricity by using bagasse as fuel mainly at Etihad Sugar Mills limited. The power plant will cover a total of 24 acres adjacent to Etihad Sugar Mills limited. The total estimated cost of the power plant is US\$ 100 million approx.



2.2 Study Team

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

Name of the EIA/IEE team	Qualification and brief experience	Position in the EIA Team and role*
Dr. Muhammad Hanif	A-Qualifications:	- Project Team Leader
	2-Dh D (Chemistry) Charles University Crech	-Principal author of the FIA
	2-FILD. (Chemistry) Chanes Oniversity, Czech	report
Consultants	2 Post Destarate Alex Humboldt Foundation	- Coordination supervision
Consultants	Soniar Past Dectorate Fallow, Cormany: 1974-75	guidance and co author of
ADEX Environment	B Experience / past Positions:	the FIA report
Laboratory	1-Director General (B) PCSIR Labs Complex Labore	-Over all monitoring of the
Laboratory	2-Director General (Ry) Concease complex, Eanore:	project work supervision.
	Ministry of Environment Local Government and	guidance and participation
	Rural Development, Govt: of Pakistan	in all activities to ensure
	3- (ex.) Consultant Environment, Category-A.	guality of work.
	Asian Development Bank	
	A- (ex.) Consultant Environment UN—ESCAP	
	5- Worked on World Bank Funded Project.	
	6- Author of the National Environment Quality	
	Standards (NEOS)	
	7- Author of:	
	i -104 Scientific Research papers	
	ii- Over 60 technical end project reports on	
	environment.	
	8- Carried out EIA for 28 projects and reviewed over	
	15 EIA reports.	
	9Among many others, EIA carried out on behalf of	
	the Asian Development Bank regarding Katmandu	
	Valley (Nepal) Industrial Sites.	
	10 -EIA-Saindak Gold/copper Project, Pakistan.	
	11-EIA Pakistan Steel, Karachi;	
	12-ESIA Report (According to OPIC Environmental	
	Handbook Format) for D.G. Cement Company	
	Limited, Kallar Kahar, District Chakwal, Pakistan.	
	- ESIA Report (According to OPIC Environmental	
	Handbook Format) for Lucky Cement Limited,	
	Pezu, District Lakki Marwat, North West Frontier	
	Province, Pakistan.	
	- ESIA Report (According to OPIC Environmental	
	Handbook Format) for D.G. Cement Limited, Kallar	
	Kahar/ Khairpur Project, District Chakwal Pakistan.	
	- ESIA Report (According to OPIC Environmental	

Table showing the persons performing this study:



	Handbook Format) for Chakwal Cement Company	
	Limited, District Chakwal Pakistan.	1
	- ESIA Report (According to OPIC Environmental	
	Handbook Format) for Packages Limited, Lahore.	
Mr. Muhammad Saif-Ur-	-B.Sc. (Chemical Engineering), Punjab Uni, Lahore,	-Senior Team Member
Rehman	Pakistan.	-Project on site monitoring
	-M.Sc. (Applied Environmental Sciences),	& related activities.
	Punjab Uni. Lahore, Pakistan.	-Co-author of the EIA
	- Special B.Sc. Final Year thesis was completed on	report.
	Environmental Management Practices and Waste	-Collection of demographic
	Water Treatment Technologies.	data.
	-General Manager, APEX Environment Lab.	-Preparation of
	-Chief Engineer Monitoring, ECTECH	environmental
	-Experience in Environment:	management plan.
	For the last over 10 years working in the field of	
	environment on the following subjects:	
	- Prepared 10 EIA reports, in the field of cement,	
	textile, oil & gas, power generation, fertilizer, power	
	alcohol and chemical industry.	
	-Designing, fabrication, installation and operation	
	of Waste Water Treatment Plants; So far three	
	plants have been installed.	
	- Carrying out environmental Audit: Around 18	
	industrial units have been completed so far.	
	- Lab. Testing of effluents and water: For the last 5	
	years lab. testing services have been provided.	
	-Full time participation in the assignments under	
	serial 12 – under Dr. M. Hanif's contributions.	
Mr. Muhammad Anees	B.A; L.L.B; Expert on Environment Law	Guidance on various
	- Full time participation in the assignments under	aspects of Environmental
	serial 12 – under Dr. M. Hanif's contributions (legal	Law as applicable to EIA.
	aspects).	Environmentalist.
		Preparation of
		Environmental
		management plan,
Mr. Muhammad	M.Sc. (Env. Sciences), University of the Punjab,	On site monitoring and lab.
Mujahid	Lahore	testing of samples and data
,	M.Phil (Env. Sciences), University of the Punjab,	processing.
	Lahore	- Report writing.
	- Senior Lab. Analyst,	-Preparation of
	APEX Environment Laboratory &	environmental
	Senior Monitoring Engineer	management plan
	-Senior Environmentalist	- Environmental
	ECTECH-Environment Consultants	monitoring
	-Environmental monitoring of over 25 projects for	- Lab. Testing of pollutants
	EIA reports plus help in writing these reports. Also	5
	participated in	
	- EIA Report (According to OPIC Environmental	



	Handbook Format) for 10 projects.	
Ar. Hasnain Sabir (GCU Lahore)		On site monitoring and lab. testing of samples and data processing. - Report writing. -Preparation of environmental management plan
Mr. Adnan Latif	 B.S (Env. Sciences), University of the Punjab, Lahore M.Phil (Env. Sciences), University of the Punjab, Lahore Senior Lab. Analyst, APEX Environment Laboratory & Senior Monitoring Engineer Senior Environmentalist ECTECH-Environment Consultants Environmental monitoring of over 25 projects for EIA reports plus help in writing these reports. Also 	-On site monitoring and lab. testing of samples and data processing. - Report writing. -Preparation of environmental management plan - Environmental monitoring
	- EIA Report (According to OPIC Environmental Handbook Format) for 10 projects. - IEE reports of 15 projects.	- Lab. Testing of pollutants - Data processing/handlin
Mr. Naeem Abbas	M.Sc. Environmental Sciences (University of The Punjab) Lab. Analyst, APEX Environment Laboratory Monitoring Engineer ECTECH-Environment Consultants -Environmental monitoring of over 12 projects for EIA reports plus help in writing these reports.	On site monitoring and lab. testing of samples and data processing. -Report writing. -Preparation of environmental management plan
Mr. Zohaib Ahmad	M.Sc Chemistry (Analytical) (University of Gujrat)	Lab. Analyst, APEX Environment Laboratory Monitoring Engineer ECTECH-Environment Consultants
Mr. Haroon Khalid	B.S Hons Environmental Sciences (University of Gujrat)	Lab. Analyst, APEX Environment Laboratory Monitoring Engineer ECTECH-Environment Consultants

*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.

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2.3 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 Public Consultations/Scoping

8.0 Conclusions

IEE - Ethhad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

3.0 DESCRIPTION OF THE PROJECT

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3.0 DESCRIPTION OF THE PROJECT

3.1 Type and category of the project

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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 find/explore other sources which could fully or partially replace the fossil fuels presently in use.

Etihad Power Generation Limited is planning to install 2 X 37 MW high pressure cogeneration power plant using Bagasse as fuel adjacent to Etihad Sugar Mills at Mauza Karamabad, Rahimyar khan. Bagasse is the matted cellulose fiber residue from sugarcane that has been processed in a sugar mill. The saving of this product has become one of the main objectives of the sugarcane industry. The actual tendency is to use bagasse as fuel, especially for cogeneration of electric power and steam, to increase its contribution to the country's energy supply.

Where the high pressure Cogeneration power plant is to be installed is located within the jurisdiction of the EPA, Government of the Punjab, Lahore.

3.2 Category of the project

The high pressure Cogeneration power plant will produce 2 X 37 MW electricity. The capacity of the plant is very small and all environmental impacts are well controlled. The project, according to the 'Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000" the project falls in "**Category B**" requiring IEE to be submitted to the E PA Punjab for getting Environmental Approval(EA).

3.3 Objectives of the project

Pakistan is energy deficient. 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 6,000MW. 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 "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:

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

Planed Electricity Generation & Installed Capacity MW

According to the Planning Department, **Government** of Pakistan(**daily Jhang, 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 gap between production and demand of electricity for a long time to come. It means load shedding will remain a constant feature in the country.

Therefore, Under the Cogeneration program, Etihad Power Generation Limited has planned to replace existing low pressure boilers with the new high pressure boilers to enhance the capacity of power generation up to 74 (2 X 37) MW with the aim of exporting power to electricity grid both during crushing season and off season. The power plant will be connected to the national grid through a loop in, loop out arrangement at the 132 kV transmission line of MEPCO's Rahimyar Khan to Khanpur feeder that is located at a distance of about 15 km from the sugar mill.

This is how the supply of reliable and economic power to the national Grid to meet ominous power demand of the country will be ensured and on the other hand the process steam demand of the Sugar Mill will also be met.

3.4 Advantages of the Site

Bagasse, which is a byproduct of the sugar production process, will be used as fuel for the power plant which is left over after crushing sugar cane at sugar industry. To meet the requirement of steam for power generation, it is convenient that the site should be located adjacent to the existing premises of the sugar mill. Accordingly, the project has been selected at the present site.

3.5 Alternatives considered (Site Selection), and reasons for their rejection

Logistically the cogeneration plant has to be located close to the sugar plant as the steam and Power for the operations of sugar plant has to be supplied from the turbine extractions and through HT panels of the cogeneration plant, and the bagasse from the sugar plant has to be supplied to the cogeneration plant. For this reason, proposed cogeneration plant will be located adjacent to the ESML complex.

3.5.1 Environmental considerations

a- Emissions/pollutants

The plant is to operate according to the Environment Management Plan. Necessary safeguards are to be provided to minimize all type of pollutants. Therefore, emissions are to remain within the prescribed limits of the National Environmental Quality Standards (NEQS) ANNEXURE-III, National Environmental Quality Standards for Ambient Air (NEQSAA) effective 1st January 2013 ANNEXURE-IV and National Environmental Quality Standards for Noise (NEQSN) effective 1st July, 2012 ANNEXURE-IV. Therefore, power plant can be installed at any available piece of land, without any danger of adverse impacts on environment and human health. Accordingly, the site selected for the power plant is quite suitable.

b- Waste water disposal facility

All Waste water generated will be taken to the effluent treatment plant based on reverse osmosis principle and will be bring to the levels as required by the NEQS Pakistan The treated water will be used for irrigation and sprinkling within the boundary limits of Sugar Mill and any surplus amount will be discharged into the nearby drain after due permission from the competent authority of the drain.

c- Land Availability

Sufficient land is available for the power plant installations adjacent to the Etihad Sugar Mills, Mouza Karam Abad, Rahim Yar Khan. On the basis of above main considerations the site selected for the Power Plant is quite suited.

d- Location of the Plant

As described the plant is planned to be installed adjacent to the Etihad Sugar Mills, Karam Abad, Rahim Yar Khan

e- Project Implementation Stages

Project Implementation Stages along with their time frame are given hereunder:



- Basic Study
- Tendering
- > Receipt of offers, evaluation, discussions and Purchase
- > Order placement
- Manufacturing and delivery
- > Erection and other work at site
- > Commissioning, trial run and testing

The detail of implementation stages is given under ANNEXURE-V.

f- Layout of the Plant

The plant layout is attached as ANNEXURE-VI.

g- Raw Materials

The 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 Etihad Sugar Mills.

h- Major Equipment

The following are major items included among the main equipment:

- > High pressure boilers
- Extraction condensing turbogenerators
- water cooled condensing system
- Main and auxiliary cooling water system
- Water treatment plant system
- Condensate and feed water system
- > Compressed air system
- Electrical system consisting of switchgears
- > LT distribution panels
- Variable Frequency Drives
- > Step up transformer to export the power
- > Step down transformers for meeting the in-house power requirement
- > Outdoor switchyard equipment etc.

3.6 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 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.

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.

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.

3.7 Land use in the project area

The project site is situated in the Mouza Karam Abad, District Rahim Yar Khan. Most of the area is agricultural with different villages in surrounding.

3.8 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:

3.9 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.

3.10 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.

3.11 Infrastructure facilities

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



3.12 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
- c- Normal tax rates

3.13 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.

3.13.1 National Environmental Regulatory/Legal Requirements

After the 18th 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 National Disaster Management (MoNDM) has been created which shall be controlling: Pakistan Environmental Protection Council; Pakistan Environmental Protection Agency; Pakistan Environmental Planning and Architectural Consultants Limited; Global Environmental Impact Study Centre; and federal policy, legislation, plans, strategies and programmes with regard to disaster management including environmental protection and preservation, coordination, monitoring and implementation of environmental agreements with other countries, international agencies and forums. Therefore, wherever the name of the previous Ministry of Environment (MoE) in mentioned it deemed to mean the MoNDM.

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.

3.13.2 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 Pak-EPA, through the Provincial EPAs, is 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. Pak-EPA is also authorized to delegate powers to its provincial counterparts, the provincial EPAs. One of the functions delegated by the Pak-EPA to provincial EPA is the review and approval of Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) reports of the projects undertaken in their respective jurisdictions.

3.13.3 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

17



quarantine rule or causing adulteration of food or drink or drug, or fouling water or making the atmosphere noxious to health etc.

3.13.4 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.

3.13.5 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.

3.13.6 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)

3.13.7 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

3.13.8 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) [attached as ANNEXURE– VII 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 attached as ANNEXURE – III.

3.13.9 National Environmental Quality Standards for Ambient Air- November- 2010

The Ministry of Environment, Government of Pakistan vide its Notification, Islamabad, the 18^{th} October, 2010 under S.R.O. 102 (1)/2010 established standards which provide the maximum allowable limits, in the ambient air, of Sulphur Dioxide (SO₂), Oxides of Nitrogen as (NO_x) and as (NO), Suspended Particulate Matter-(SPM), Respirable Particulate Matter-PM₁₀, Respirable Particulate Matter-PM_{2.5}, Lead and Carbon Monoxide (CO) [ANNEXURE-IV]

3.13.10 National Standards for Drinking Water Quality - November, 2010

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

3.13.11 National Environmental Quality Standards for Noise - November, 2010

The Ministry of Environment, Government of Pakistan vide its Notification, Islamabad, the 18th October, 2010 under S.R.O. 102(1)/2010 established standards for Noise [ANNEXURE-IV]. 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.

3.13.12 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

3.13.13 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.



3.13.14 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 resettlementrelated 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.

3.13.15 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.

3.13.16 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.

3.13.17 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.

3.13.18 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.

3.13.19 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

3.13.20 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.

3.13.21 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.

3.13.22 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.

3.13.23 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



3.14 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.

3.15 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.

3.16 Environment Related Relevant International Agreements in Pakistan's context

Pakistanis 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 TerritorialSea 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 on July 23, 1976	Signed
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	Signed

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IEE - Etihad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

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. There are mango orchards spread over long distances. Wheat, cotton, sugarcane and pulses are the major cash crops.

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.

Rahim Yar Khan, the district head quarter of the project area is connected with other parts of the country by roads, railway and even airport. These facilities provide good opportunities to the people to mix up with the public of the other parts of the country. The airport even provides good air link to other countries. The economy of the district is growing quite fastly.

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.



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 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 is to doubly ensure environmental protection of all the segments of the environment.

4.3 Environmentally sensitive areas of special or unique value

(Physical resources of the project area: 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.

Mouza Karam Abad is irrigated area, where the project is located, falls in the Bahawalpur Plain. The Bahawalpur Plain area along eastern side of the river Sutluj is included/grouped with 'DOABAS" because the riverine tract is followed by upland identical with Bars of the DOABAS. Its north-eastern part is covered and meander flood plain, the central part is sandy plan of which large area is leveled and being irrigated. Along its southern border is Ghaggar channel, Bhawalnagar, Bahawalpur and Rahim Yar Khan areas are the best areas for cotton, while sugar cane and wheat are also grown in large quantities. Cholistan desert extends up to around 50 km along the main railway line on the South- east side.

The project site is plain. Under ground water being sweet in most of the areas, it is used for irrigation through tube wells. Perineal 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 fertile land of the Mouza Karam Abad falls in the Sub recent River Plains and consists of areas between Old River Terraces and the recent times floodplains of the rivers. There is a great similarity in the nature of sediments, depositional pattern and their configuration to that of the "BAR" areas. As regards their age, they far too younger and have been deposited only during Sub recent times. It is this age difference which is responsible for weaker development in these soils. Because of illuviation or eluviation of clay, calcic horizon, vertic characteristic and features are absent in the soils of this area. The soils are developed to only moderate depths. Orchicepipedon and cambic horizon are found in the soils. In local language these soils are called "Bangar Soils"

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. Annual Rain fall in the project area is 50-70 mm. Pakistan has four seasons namely:



- Cold Weather Season—December to March.
- > Hot Weather Season—April to June.
- Monsoon Season -- July to September

• Temperature

Mean monthly temperature during July = $35 - 40^{\circ}$ C Mean monthly temperature during January = $10 - 15^{\circ}$ C

i- Hottest Month

M.Min. = 29.0° C M.Max. = 49.1° C

ii- Coldest month

M.Min. = $4.7 \,^{\circ}C$ M.Max. = $18^{\circ}C$

Rainfall

Rainfall (July to December)	= 100 – 150 mm
Rainfall (December to March)	= 50-80 mm
Mean annual rainfall	= 100 - 160mm

• Seismcity

Zone category:	III Moderate Hazard
Seismic factor ground acceleration:	g/15 – g/20
Possible damage:	Minor

• Water

The land mass of Distict Rahim Yar Khan Where the project site is located can be safely divided into two parts- the fertile land and the desert of Cholistan. The Mouza Karam Abad town where the Sugar Mill and project site is located falls in the fertile part of the land which is one among the food baskets of Pakistan. Canal water and underground sweet water are the two main sources of water for irrigation.

a) Underground Water

The total land mass of 14, 83,000.0 acres of Rahim Yar Khan District is irrigated from the underground sweet water through tube wells numbering 39771 and canals.


This underground water 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.

b) Surface Water/Wet Lands

There are no wet lands in the area in the true sense. However, Sadiq Branch Nahr also feed the fairly large part of the irrigated lands. The River Indus flows at a distance of about 40Km away from the project site.

4.4 Ecological Resources

4.4.1 Fishery and Aquatic Biology

The Indus River flowing at a distance of about 40 Km contains fish which is sold on yearly basis to private contractors for its commercial exploitation. The famous fish varieties in the Indus River water include Roho (Labeorohita), Thaila (catlacatla), Mallri and Singara.

There are no fish farms at least within 15 km radius of the project site or any other source of fish in the entire area.

4.4.2 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 theBiodiversity. The biodiversity of the area, with this background, is discussed as under:

4.4.3 Forestry

There are no forests within about 30 km radius of the project site. Plantation, grasses and shrubs along road, rail, canal and river sides exist. Similarly, in general trees, grasses and shrubs exist on the cultivable land. For detailed account of important trees, grasses and shrubs of the area refer to under caption "Flora".

4.4.4 Wildlife

The cultivable lands are thickly populated. 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 scultivable lands include snakes, wild rats, goh and lizards, foxes, pigs, jackals, wild pigeons, sparrows, crows, owls and doves.

4.4.5 Flora

The land is fertile. Major cash crops include sugar cane, cotton, wheat and pulses. Trees, grasses and shrubs found both in the irrigated areas and Cholistan desert are listed as below:

botannean nanne	Local name	Botanical name
Acacia Arabia	White siris	Albizziaprocera
Acacia modesta	Nim	Azadirachtaindica
Albizzialebbek	Aam	Mangiferaindca
Cassia fistula	Jal or Wan	Salvadoraoleodes
Odiamixa	Frash	Tamarix articulate
Dalbergiasisso	Arjan	Terminaliaarjuna
Eugenia jambolana	SHRUBS:	
Ficusretusa	Babri	Acacia jacquemontii
Fecusbengalenisis	Jawanh	Alhaji-camelorum
Meliaazdarach	Karir	Capparisaphylla
Morus alba	Phog	Calligonumpolygonodes
Populusspp	Aak	Alotropisprocera
Phoenixdactylifera	Khar	Haloxilonrecurvum
Prosopisspicigera	Lani	Salsolafeetida
Prosopisglandulosa	Lana	Suaedafroticora
Pongamiaglabra		
	<u>GRASSES</u> :	
Cynodondactylon	Siriala	Hetropogoncontortus
Cymbopogonjwara	Gam mali	Panicumantidotale
ucusa		
Cenchrusciliaris	Sanwakt	Panicumcolnum
Elionurushirsutus	Kana	Saccharummunja
Eragrosticcynosurio des	Kundar	Typhaangusti-folia
	Acacia Arabia Acacia modesta Albizzialebbek Cassia fistula Ddiamixa Dalbergiasisso Eugenia jambolana Eicusretusa Eecusbengalenisis Meliaazdarach Morus alba Populusspp Phoenixdactylifera Prosopisglandulosa Pongamiaglabra Prosopisglandulosa Pongamiaglabra Cynodondactylon Cymbopogonjwara ucusa Cenchrusciliaris Elionurushirsutus Eragrosticcynosurio des	Acacia ArabiaWhite sirisAcacia modestaNimAlbizzialebbek AamCassia fistulaJal or WanOdiamixaFrashOalbergiasissoArjanEugenia jambolanaSHRUBS:EicusretusaBabriEecusbengalenisisJawanhMeliaazdarachKarirMorus albaPhogPopulussppAakProsopisglandulosaLaniProsopisglandulosaLanaPongamiaglabraGRASSES:CynodondactylonSirialaCymbopogonjwaraGam maliucusaSanwaktElionurushirsutusKanaEragrosticcynosurioKundar

4.5.6 Fauna

The area where the project site is located is thickly covered with crops. Very few wild animals found in the area, like jackals, Black Cobra, lizards and porcupine etc. However The Cholistan desert in Rahim Yar Khan District is quite rich in wild life treasure. It will be worth mentioning that due to pouching, hunting and loss of habitat on account of over grazing, some of the wild life is decreasing in number. 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. Camels 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.

Serial #	Name	Serial #	Name
1	Wild hare	12	Chinkara
2	Partridge	13	Lizards
3	Sand grazer	14	Goh
4	Carnisaureus (Jackal)	15	Wild rats
5	Falcon	16	Wolf
6	Hubara bustard	17	Snakes
7	Paracol cat	18	badger(haena)
8	Great Indian Bustard	19	Valpusvalpus (Fox)
9	Luggar	20	Ovisorientalis (Urial)
10	Black buck	21	Susscrofa (Wild boar)
11	Hystrixindica (Porcupine)		

The major wild life in Cholistan desert is listed as below:

4.5.7 Scientific Institutions

Blakiwali is a small town close to the Project Site some 0.5 Km away. In the city of Rahim Yar Khan, there are a number of educational institutes up to degree levels. These institutes have scientific laboratories of preliminary status for teaching. There are no high profile scientific institutes in real sense in the city of Rahim Yar Khan or around. Among these institutes are Govt. Khawaja Fareed Degree College, Punjab College, Superior College, Sheikh Zayed Medical College, Agriculture development and research centre, and Islamia University Sub campus.

4.5 Socio-Economic

The project area is virtually agriculture. Land is fertile and land holdings are supportive of the fact that large number of people fairly reasonable proportion of the big land holding farmers is well to do.



A large number of people in the area belong to the poor segment of the Society. The work as farmers, most of them do not have their own piece of land; but work as a laborer for the other land lords and well to do farmers. Feudal system (Sardari Nazam) exists in the area. Even politically some people are highly placed in Government quarters. Their role in the politics of Pakistan is significant. A segment of the people belongs to middle class, while there are a fairly large number of the people who live below the poverty line.

Awareness about importance of education is growing and the same is reflected by the large number of students in educational institutes within the city and in other cities of learning. Road, rail and air links at a distance of 40-50 Km are facilitating the people to mix up with the people of other parts of the country due to which a part of the people's life style in every walk of life is fast on the change. Easy access to print and electronic media are also playing great role in modifying life style.

Most of the population belongs to villages. With this background and large cross section of the urban population still stick to social customs of the old past. Old traditional life style is being followed in almost all walks of life. Elders belong to respected group and they play vital role in decision making. Most of the old generation is uneducated. Old customs are loved and practiced especially in villages and among fairly large proportion of the urban population. Arranged marriages are liked and they are quite successful. Joint family system prevails. The people especially in villages are very hospitable.

4.5.1 Cultural and Other Heritage

There is no worth mentioning cultural or other heritage around. However, Bhong Mosque is really a wonder of the present times in the area. Religious harmony is also a major character of these communities. The industrial set up in the area may have a diversified impact on the socio-economic environment of the area.

4.5.2 Existing Socio-Economic Baseline Conditions

> Population and Communities

The project site is situated at 20 km from Rahim Yar Khan city at Mouza Karam Abad. There are many small and big villages around which are given here under:

Middle and primary Schools are available in most of the villages near the project site. For intermediate and onward education students have to go to Rahim Yar city mostly.

Medical facilities in most of the villages are lacking and those available are of very preliminary nature. Dispensary is present in Blakiwali villege 0.5 KM to the project site.





Peoples belonging to the different castes and religious sects live in complete harmony with each other. People belonging to the different tribal origins are Khore, Balochi, Kanjan, Sheikh, Vadher, Bochrey, Jholan, Khumbney, ChaCher, Solangi, Larr, Mothey, and Chogley in the area.

Underground water through tube wells and hand pumps and canal water is used for drinking and other house hold purposes. Approximate population of the villages near the project site, their approximate distances from the project site, availability of health and education facilities are given here under.



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Name of the Village	Number of Houses (approximat e)	App. population (Nos.) (approximate)	Educatio n facility	Medical care availability	Gas availabilit Y	Electricity availability	Potable water availability
1-Blakiwali	150	1000	Primary School	Hospital	No	Yes	Yes
2-Abdullah Pur	200	2000	Primary School	Private Dispensary	No	Yes	Yes
3-Basti Basa	100	1000	No	-		Yes	Yes
4-komb bacacha	100	1000	Primary School	_	_	Yes	Yes
5-Kot Shahbaz	300	3000	Primary School	_	_	Yes	Yes
6-Seth Ramzan Di Basti	100	1000	Primary School	_	-	Yes5	Yes

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IEE Etihad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

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-VIII, IX, X, and XI.

5.2 Environmental problems during construction and mitigation measures

5.2.1 Environmental problems due to project location

The project aims at installation of high pressure Cogeneration power plant using Bagasse as fuel at site adjacent to Etihad Sugar Mills limited. As no new land is being procured and an Environmental Management Plan is to be followed covering all activities during construction phase, no environmental problems are envisaged due to the project location.

5.2.2 Environmental problems related to design

The plant is to be designed in a way that it complies with the required limiting `values as set under the NEQS, NEQSAA (effective from 1^{st} January 2013) & NEQSN (Effective from 1^{st} July, 2012).

Under the conditions no environmental problem worth mentioning relating to design are envisaged.

5.2.3 Third party quarterly monitoring

Third party Bi annual monitoring will further ensure compliance with the required standards.

5.3 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.

5.3.1 The pollution from these activities could be in the form of

- Gaseous emission of SO₂, NO_x 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.
- The scheduled traffic plan, of the 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 to be operational during construction (EMPc), will further ensure that environmental problems to accrue during construction are well managed within the required limits of the NEQS Pakistan, NEQSAA (effective 1st January 2013) & NEQSN (Effective 1st July, 2012).

5.4 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.

5.4.1 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 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_x and SO_2 and Particulate Matter (PM) emissions will be used. Hereunder, more details are given.

5.4.2 Boiler Stack Emissions

Boiler stack emissions of concern are primarily nitrogen oxides (NO_x) , carbon monoxide (CO) and particulate matter (PM) and sulphur dioxide 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.

5.4.3 Ash Handling

The Electro Static Precipitator will be installed for ash handling; the bagasse ash will be used as manure / fertilizer on to growers in the region. Total ash generated will be 2.36 MT/Hr which contains proportion of wet ash and dry ash. Temporary storage of the ash on site shall be done in enclosed silos. Transportation of ash from the site to will be done using best environmental practices to avoid any spillage into the environment.

5.4.4 SO₂ emissions

After the plant startup, SO_2 emissions will be 449.3 kg/ hr as the sulphur content in the fuel is very less.

5.4.5 NOx emissions

After the plant startup, NOx emissions will be less than 80 ppm due to the very low level of nitrogen content in bagasse.

The maximum stack emissions of SO_2 and NOx will not exceed the permissible limits of the NEQS Pakistan.

5.4.6 Particulate Matter (PM) emissions

Particulate matter emissions will be approximately 500 mg/n.cu.m and will be controlled with Electostatic precipators installed in the plant to remain within the prescribed limits of the National Environmental Quality Standards (NEQS)-Pakistan limits.

5.4.7 Effluents

All Waste water generated will be taken to the effluent treatment plant based on reverse osmosis principle and will be bring to the levels as required by the NEQS Pakistan. The treated water will be used for irrigation and sprinkling within the sugar mills boundary walls and any leftover will be discharged into the nearby farms / sewer after due permission from the competent authority of the drain.



Potential	Mitigation/ Compensation Measures Impact
Air Quality	 Vehicles transporting loose construction material to be Covered with tarpaulins.
	2. Limit on speed and movement of vehicles, where considered appropriate speed-breakers should be installed
	 Use low emissions trucks/vehicles for material transport where possible
	 Routine service and maintenance of vehicles and machines to reduce ongine emissions
	 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.
	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.
	 Spraying exposed soil with water to reduce PM emissions. Water to be applied at a rate to maintain a moist surface,
	 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.
	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
	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.
Water Supply	 During construction, non-potable water would be supplied by Trucks to provide dust control.

5.5 Environment Management Plan /Mitigation / Compensation Measures during Construction Phase

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2. Potable drinking water for construction workers would be provided by a water service to be contracted by the site contractor.
 Any liquid material and lubricants (e.g. hydrostatic Testing. Water and wastewater) that accumulate during the construction phase should not infiltrate into the soi 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. 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. Monitoring of the characteristic of waste water collected in the septic or other tanks should be carried out or routine basis. 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. 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. On site storage of fuel, engine oil and lubricants (if any) shall be in locked tanks, sealed and shadow-roofed area. 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.
 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. 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

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Installation of Co-Generation Power Plant at Etihad Sugar Mills. Rahim Yar Khan

	environmentally sustainable way.
Soil	 Construction activities must be limited to the designated areas. Refilling of excavated soil should be done as far as possible. Where possible reuse of excavated soil should be done. 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).
Fauna and flora	 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 Develop green strips of suitable vegetation, along the access road to improve the landscape shape.
Noise	 Power mechanical equipment like bulldozers, air compressors, Concrete pumps, excavators, concrete mixers etc. shall only be used with low sound power, whenever possible. Optimize transportation management to avoid needless truck trips; avoidance of truck movements in residential areas at least during night time. The building machinery equipment shall be well- maintained and serviced regularly during construction phase. Silencers or mufflers on construction equipment shall be used. Whenever possible, mass construction material and excavated soil shall be stored in direction of the nearest habitat as noise barrier. 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. Workers on the construction site should be equipped with ear protection in particular those directly exposed to higher noise levels.

instructions for reuse / handling of such wastes in environmentally sustainable way.



Potential	Mitigation /Compensation measures Impact
Landscape	 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	 Continuous monitoring of ambient air for SO₂, NOx, and PM to be carried. National Ambient Air Quality Standards (NAAQS) -2010 will also be applicable Standards.
Surface Water	 Waste water treatment, as described in this report, to be carried out continuously and monitored.
Ground Water	 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	 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.
	 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	 Equipment will be acoustically shielded and /or lagged as far as possible. A noise measurement campaign during full operation at operation start should be implemented to verify the real noise levels are in line with NEQS-Pakistan.

5.6 Environment Management Plan /Mitigation / Compensation Measures During Operation Phase

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- 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 NEQS Pakistan.

Ash handling 1-Bottom Ash and fly ash generated by burning bagasse in the boiler will be used as manure / fertilizer is 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.

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 Pakistan Environmental Protection Act - 1997. 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.



IEE Ethhad Power Generation Ltd. 2x37 MW Bagasse Based Cogeneration Power Plant

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 2 X 37 MW high pressure Cogeneration power plant using Bagasse as fuel at site adjacent to Etihad Sugar Mills Ltd. 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- Pakistan.

6.1 EMP along with other requirements is described as below

6.1.1 Assigning responsibility for implementation (by name or position)

For effective environment management, responsibilities are set for each operation as follows:

Official concerned	Responsibility		
1-General Manager/Plant	i-Over all in-charge of all the Environmental		
Incharge	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		
	rectification.		
	v-He will work as bridge between the Government		
	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, attached as ANNEXURE-VII 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 needs

Environment Monitoring staff will trained in the required in the field of environmental issues relating to the power plant.



6.5 Environmental Monitoring

Environmental monitoring will be carried out by the staff to be engaged for the purpose.

6.6 Environment quality monitoring laboratory

The environmental monitoring laboratory will be set up at the project site.

6.7 Fire Protection System

Fire Protection system of the of the proposed plant will consist of

- Hydrant system for all areas of the plant
- High velocity water spray system
- Automatic fire detection and alarm system
- Manual fire alarm system
- Portable fire extinguishers



IEE Etihad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

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

7.1.1 Environmental Legislation

The Punjab Environmental Protection (Amendment 2011) 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 2011) 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 2011) Act and Environmental Management

The Punjab Environmental Protection (Amendment 2011) 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 2011) 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 2011) 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-2011.

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 results in loss of credibility, popularity and even financial aid from the international forums.

With the eights 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 on or a land owned or administrated by a local council, unless done in accordance with the provisions of the Punjab Environmental Protection (Amendment 2011) 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 impressments 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 deem 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 intension 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

7.2.1 Compensation for Environmental Damages

As described under Section 17- Penalties, Subsection-(5), (f) of the Punjab Environmental Protection (Amendment 2011) 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 Lahore District Government	Ex-Officio
		Member
•	Head of the District Local Self Government	Ex-officio
		Member
•	A dignitary of the project area	Member
	(enjoying confidence of the people of the project area)	
•	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

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IEE Etihad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

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-XII.

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 they will get rid of the torture of so frequent and long drawn out load shedding.
- Their domestic and social life will be on its original track.
- Students will be relaxed for study.
- The commercial and common man's working activities relating to the running of hotels, restaurants, shops will provide them once again chances for earning of their livelihood and thus getting all downstream advantages.
- All commercial, industrial and other business and life will come to normal. Thus the people will once again start their routine programs.
- Social functions being restricted for shortage of power will get life to the happiness of these functions.
- 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.



- The people have high expectations and hope from the plant activity and its management.
- 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 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. These positive impacts include improvement in female status, employment and business opportunities, infrastructure development, generating income resources and improving quality of life.

IEE - Etihad Power Generation Ltd., 2x37 MW Bagasse Based Cogeneration Power Plant

9.0 CONCLUSIONS

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9.0 CONCLUSIONS

The project aims at Installation of 2 X 37 MW high pressure Cogeneration power plant by Etihad Power Generation Limited using Bagasse as fuel and at site adjacent to Etihad Sugar Mills Limited, **Mouza Karam Abad, District RahimYar Khan.**

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 at the end of this IEE report that

- The project has inbuilt mechanisms to control all type of pollutants like gaseous, PM, solids and noise levels and to keep them well within the required limiting values of the NEQS Pakistan.
- The use of renewable and indigenous Bagasse as fuel in high-pressure cogeneration system will provide much-needed electricity to the grid as well as meeting the steam and power requirement of the sugar mill
- Effluent will be treated and reused at the project site.
- 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,
- 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.