

HEAD OFFICE:
MATIARI HOUSE, C-48, K.D.A. Scheme-1, Karachi-753.
Direct Phone: +92-21 34390448-9 PABX No: +92-21 34.
34529698, 34536614 Fax:+92-21 34541734 E-mail: matol@s.
FACTORY: Deh Pannu Nasar Pur Road, Dist. Matiari Pakistan

MPL/311 /2018

July 5, 2018

Mr. Ifkhar Ali Khan,
Director
Registrar Office,
National Electric Power Regulatory Authority,
Islamic Republic of Pakistan
NEPRA Tower, Attaturk Avenue, G-5/1,
Islamabad

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TE) LIMITED FOR GRANT OF M (Lic)

SUBJECT:

APPLICTION OF MATOL (PRIVATE) LIMITED FOR GRANT OF GENERATION LICENCE IN RESPECT OF 6.2 MW THERMAL

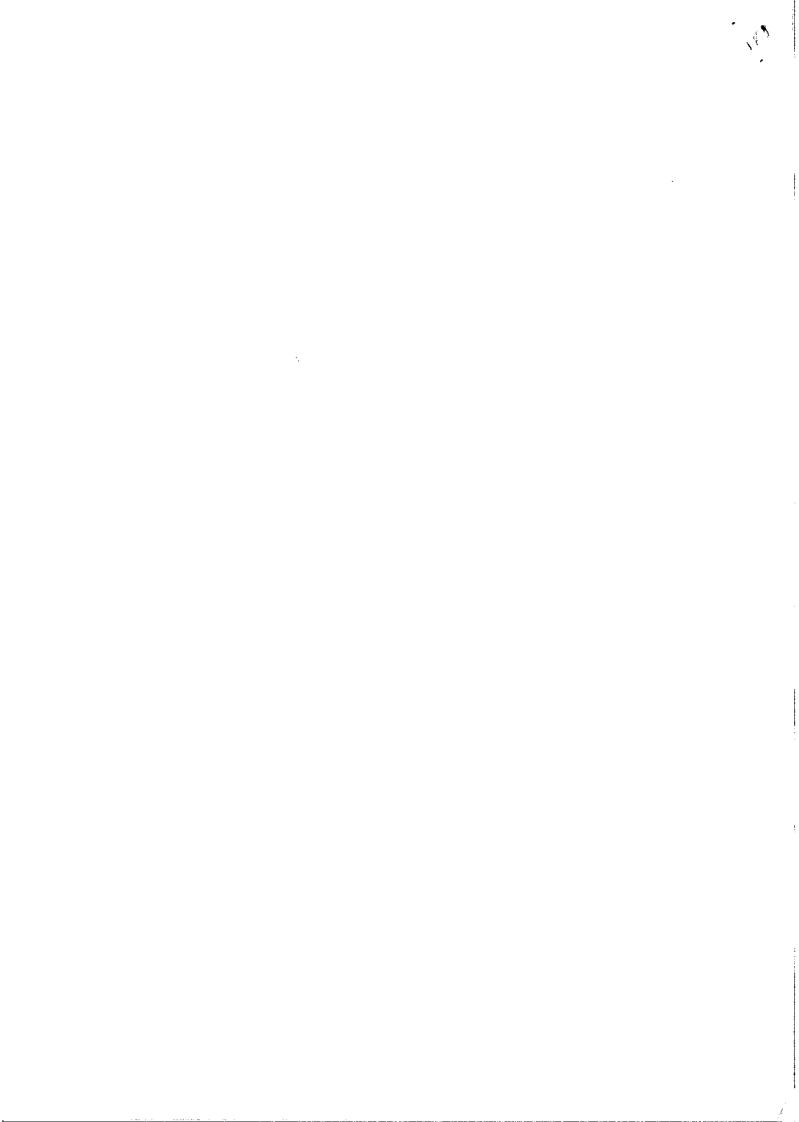
POWER PLANT DISTRICT MATIARI

Dear Sir

Reference your letter# NEPRA/R/LAG-30/10036, dated 3<sup>rd</sup> July,2018 on the subject.

- 2. It is to inform that we did not receive your letter # NEPRA/R/LAG-30/8906, dated 6<sup>th</sup> Jue,2018 and same is now received along-with your above referred letter of 3<sup>rd</sup> July,2018.
- 2. A Pay Order # 19662220, dated 6<sup>th</sup> July, 2018 amounting to Rs. 9,066/= (Rupees Nine Thousand Sixty Six Only) on account of short amount is enclosed.
- 3. As desired, the following documents are attached:
  - i) Authorization from Board Resolution/Power of Attorney for submission of subject application as required pursuant to Regulation 3(5)(a)(i) of the Regulations.
  - ii) Certified true copy of Certificate of Incorporation (Col) duly certified by SECP, as required pursuant to Regulation 3(5)(a)(i) of the Regulations.
  - iii) Certified true copies of Memorandum and Articles of Association (MoA), duly certified by SECP, as required pursuant to Regulation 3(5)(a)(ii) of the Regulations.
  - iv) Latest financial statements of the company as required pursuant to Regulation 3(5)(A)(iii) of the Regulations.

the Ches & Registration Dy, No.: 68





HEAD OFFICE:
MATIARI HOUSE, C-48, K.D.A. Scheme-1, Karachi-75350 Pakistan.
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- v) Supply of Voltage (11Kv/132kV) Voltage distance and name of nearest grid (single diagram) as required pursuant to Regulation 3(5)-A(x) of the regulation.
- vi) Plant Efficiency:
  - a) Designed Efficiency of the plant (%)
  - b) Gross Efficiency of power plant at Mean Site Conditions (%)
  - c) Net Efficiency of plant at Mean Site Conditions (%)
- 4. Required following information/documents:
  - vii) Proposed Power Purchaser and quantum of surplus power to be supplied by MPL
  - viii) Draft Interconnection Study
  - ix) Draft Environmental Study
- 5. An early response is requested.

Yours faithfully, For Matol (Prvt) Limited

(Dost Mohammad Baloch)
Resident Director

# LIST OF DOCUMENTS

#	DESCRIPTION
<i>i</i> )	Authorization from Board Resolution/Power of Attorney
<del></del> ;	Certified true copy of Certificate of Incorporation (CoI) duly
ii)	certified by SECP, as required pursant to Regulation 3(5)(a)(i) of
	the Regulations.
	Certified true copy of Memorandum and Articles of Association
iii)	(MoA), duly certified by SECP, as required pursant to Regulation
	3(5)(a)(ii) of the Regulations.
iv)	Latest Financial Statement.
v)	Type of Technology.
vi)	Number of units (No.)/size (MW)
vii)	Year Make/Model. Operation date and expected remaining life
viii)	Installed capacity, de-rated capacity, Auxiliary Consumption, Net Capacity
ix)	Fuel (Oil/Gas): type, imported/indigenous, supplier, logistics, pipeline etc. In case of Gas fuel, a Gas Sale Agreement (GSA) signed between the applicant and Gas supplier
x)	single line diagram
xi)	Plant characteristics: generation voltage, frequency, power factor, automatic generation control, ramping rate, alternative fuel time(s) required to synchronize to grid.
Xii	
xiii	Draft Interconnection study - Annexure-A
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xiv	1 G/ 1 Annorman D
Xii	required to synchronize to grid.  Proposed Power purchaser





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# RESOLUTION PASSED BY CIRCULATION BY THE BOARD OF DIRECTORS OF MATOL PRIVATE LIMITED ON 23RD DECEMBER 2015

RESOLVED that Syed Shafqat Ali Shah, Chief Executive of the Company is authorized to obtain Licence from NEPRA for Generator of Electricity by using Bio-Gas and to supply Grid Station and to projects of Matiari Group.

FURTHER RESOLVED that any two of the following are authorized to sign the agreement and other documents are required for this purpose.

Syed Reza Ali Shah, Director

Syed Taimur Ali Shah, Director

Mr. Dost Mohammad Baloch, Resident Director

FURTHER RESOLVED that Mr. Dost Mohammad Baloch is authorized to make correspondence and to sign letters, receive notices etc for this purpose.

FURTHER RESOLVED that the Company Secretary Mr. Iqbal-ur-Rahman, is authorized to furnish a certified true copy of this resolution to NEPRA for their record.

Certified true copy

(IQBAL-UR-RAHMA

Company Secretary

## THE COMPANIES ACT, 2017

### COMPANY LIMITED BY SHARES

### MEMORANDUM

### AND

### ARTICLES OF ASSOCIATION

OF

MATOL (PRIVATE) LIMITED

### SECURITIES & EXCHANGE COMMISSION OF PAKISTAN GOVERNMENT OF PAKISTAN



Compulor Registration.
No. 404/405
CERTIFICATE OF INCORPORATION
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(Under section 32 of the Companies Ordinance, 1984, PXII of 1984)
(S. E. A. E.)
Company Registration No. 15.09675 OF 2003-2004
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I hereby certify that MATOL (PRIVATE) LINGUIST & FOR
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The said of the sa
is this day incorporated under the Companies Ordinance, 1984 (XIII) 1984) and that
the company is limited by SHARES AS A PRIVATERCOMPANY
KARACHI.
Given under my hand at
this — day of — NOVEMBER
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Fre Rs. 390,000/- Certified to be True Copy
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Assistant Registrar of Fersion 18
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REGISTRAR
OF COMPANIES
Maria
CAO-1
S. No. 3174. df July 2003
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THE COMPANIES ACT, 2017

### MEMORANDUM OF ASSOCIATION

MATOL (PRIVATE) LIMITEL

COMPANY LIMITED BY SPARE

The name of the Company is Matel (Private) Lim

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To carry on business as distillers, compounders, processors and (2)rectifiers of athanol and other industrial alcohols and memphilad spirits and allied products.

To buy, sell, manufacture, make up, prepare, repair, after, exchange, hire firmort export and deal in all kinds of substances, articles and things which may be required for the purposes of any of (3) the businesses aforesald or commonly supplied or dealt in by persons erigaged in any such business or which may seem beneficial to, or capable of being profitably dealt with by, the Company.

To carry on research and development work and experiments in (4)

To carry on research and development work and experiments in relation to any new material or substance or the application of any chemical or other process to any material or substance and to undertake, establish provide and conduct scientific technical and industrial research or otherwise sponsor or subsidise such laboratories and experimental workshops or projects for such research on a commercial scale.

To erect build a construct improve, maintain, develop, after, enlarge pull down, remove replace, work, manage and control environmental scale buildings offices factories mills, works, workshops, warehouses, showrooms, machinery, engines roadways, tramways, retways, branches or sidings, bridges, reservoirs, watercoursest whoreves, electric works and other works and conventences which not you calculated directly or indirectly to advance the interests of the company, and to join with any other person or company and doing any of these things for the purposes of the business of the Company as stated in clause it of the objects of the Company.

To set up a progress and manage one or more power plants are to company as stated in clause it of the objects of the Company.  $\langle 5 \rangle$ 

coercies and manage one or more power plants are all and supply netectivity to industrial, and other rough destribution networks established cowned and the domnary itself or by any other person, body foromore or same accommutation or authority and for hat purpose to acquire land, whether freshold machinery and equipment, and construct, libitall, machinery and sequipment, and construct, libitall, maintain thereon power houses, clylif and mechanical micropass and other racinities as may from time to say for the allalmont of the objects of the Company mission concerned authorities.

descension consuscion presionien Cultivate, impate and otherwise work or use le farm cultivate, irrigate and otherwise work or use which the Company has any rights and to dispose of all with any farm or other products, whether animal or any such lands, and to lay out sites for and arry on permanent camps, towns and villages on any occarry on all or any of the business of farmers, carried in agricultural equipment, growers of and be and sirw and purveyors and vendors of dairy farmers, millers, seedsment and provisions of all kinds, and to the any poods usually traded in any of the above to scarry on any dulier businesses which may be carried on by the Company in connection therewith.

Nich Janica surved to survey business by (0). To own acquire, construct, establish, Install, itay out, improve, maintain, work, manage, operate, carry out, control, or aid in, contribute or, subscribe to the construction, erection, maintenance and improvement or working of, any reads, ways, trainways, railways, aerodromes and landing fields, docks, what we, piers, bridges, jettles, breakwaters, dredging facilities, mootings, hardour aboliments, viaduots, aqueducts, canals, water courses, wells, lanks, storage installations, retinenes, piers, pipelines, conveyors, telegraphs, telephone, communication appendits, and systems,

wireless, gas works, steam works, electric lighting and power works, power houses, hydroelectric plants, laboratories, factories, mills, power houses, hydroelectric plants, laborationes, lacticines, frills, foundries, workshops bollers, machine shops, warehouses shops, stores, fuel stores hangers, garages, guard lowers, machinery equipment and other appliances, hotels, close, restaurants, lodging houses, baths, places of workshop, hospitals, dispensaries, places of muserment, pleasure grounds, parks, gardens, reading rooms, dwelling houses, office and other buildings works and conveniences which may be calculated, directly or indirectly, to advance the Company's interests and to contribute to, subsidise or

advance the Company's interests and to contribute to, subsidise or otherwise assist or take part in the construction. Improvement, maintenance, working management, carrying out of control thereof, and to take any lease and enter into any working agreement in respect thereof.

To purchase, build, charter, affright; thre enduet but for hire, or to chartering end affreightment and otherwise to obtain the passession of, and use operate and dispose of and endially of turn to account shins, lighters, barges, tups, attractes boats and vessels of all kinds, automobiles, ordes, motor trucks and tracters, alplanes, belicopters, legamotives, wagons, tank cars, and other forms of transport and rolling stock, and otherwise to provide for and approvide the same in the conveyance of property and merchantids of all kinds and the transportation of personnel, employees; customers. (9) the same in the conveyance of property and mercanial kinds and the transportation of personnel, employees, customers, which is a confirmative and state of the conveyance of personnel, employees, customers, and the conveyance of property and the conveyance of property and the conveyance of personnel, employees, customers, and the customers of personnel, employees, and the cu and visitors and to purchase or otherwise to acculre any stage and visitors and to purchase or otherwise to acculre any stage lighter, barga, tup, launch, boat or vessel of any kind, automobilio, lorry, motor truck or fractor, amiliane helicopter, locamotive, wagen, tank car, and other form of transport.

To own, purchase acquire, thire, build, erect, install, establish, operate, use, manage repair, maintain, and dispose of factories, machinery, plants liaboratories, equipment, apparatus, and operations and operations for the manufacturing, formulating packing processions. refining, storage, selecand distribution of the products every kind and description.

2. 地名中国维尔尼 高兴会

To purchase, take ant/or let on hire or in exchange or otherwise acquire, any lands and to lay out, improve and prepare the same for building or commercial purposes to salk mortgage, on let the same for to construct, atter, pull down decorate, maintain, turnish sit up and improve buildings, to lay out, construct, and paye reads site is alleys, paths and walks, to draw, morrove and landspape grounds and enter into contracts and arrangements of all kinds with buildars property owners, tenants and others and to dayance request to them (11)

To build, construct, alter, maintain, enlarge, ptill downs emove or replace, and to work, manage and control any buildings offices factories, miles shops machinery, engines coadway trainways, railways, branches or sidings bridges, reservoirs, valerations wherever, electric works and other works and conveniences which (12)may seem calculated directly or indirectly to advance the interests of the company, and to join with any other person or company in doing any of these things.

(13). To carry on business or branch of a business, which the Company is authorised to carry on, by means, or through the agency of any subsidiary company or companies, and to enter into any arrangement with such subsidiary company for taking the profits and bearing the losses of any business or branch as carried on or for financing any such subsidiary company or guaranteeing its liabilities or to make any other arrangement which may seem deelrable with reference to any business or branch so carried on, including power

at any time and either temporarily or permanently to close any such "branch of business.

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(14) To purchase, acquire take on lease or lenancy, selli-dispose of, mortgage of let any estate or interest in and lo take and acquire options over any property. Immovable and movable, or highest of any faid, and to develop improve time on account, mortgage, sell of cotherwise dispose of the same in additionance as may be thought expedient.

(15) To manage improve, develop sell, exchange mortgage, pledge, hypothecate, assign, transfer, or deal with all or any part of the property and assets immovable and movable compress or incorporeal, tangible or intangible, and any right little and interest therein or the Company, including rights, licendes, privileges, concessions and frenchises as may seem expedient. concessions and franchises as may seem expedient.

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firm or person, which may seem calculated the prejudice the interests of the Company as at the other.

(18) To enter into any arrangements of a capacity of authority supreme municipal years or observable and seem and to obtain from such government or extract any capacity seem and obtain from such government or extract any capacity are represented to comply with any such arrangements. Specific seems and such concessions and licences, and to make the concessions and licences, and to make the capacity to be registered or recognised in any part of the sound.

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- To enjer into partnership or any arrangement for sharing profits, uplon of interests, co-operation, joint adventure, reciprocal concessions, or otherwise with any company, association, firm or concessions, or otherwise with any company association, firm or person carrying on or engaged in; or about to carry on or engage in any business or transaction which this Company is authorised to carry on or engage in, or any business or transaction capable of being conducted so as directly for indirectly to benefit the Company, and to guarantee the contracts of or otherwise assists any such company, association time of person, and to purchase, take, or otherwise acquire, shares and securities of any such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association, firm or person, and to such company or association.
- (2.1) To amalgemate with any other company having objects altogether or in part similar to those of the Company

Section of the section

- To acquire and undertake the whole or any part of the business property and liabilities of any person or company carrying on obsproposing to carry on any business which the Company is authorised to carry on or possessed of property suitable for the purposes of the Company, or which can be carried on in conjunction therewith or which is capable of heing conducted so as directly or indirectly to benefit the Company.
- 18 花山 北村 都 安全, 山 山 和 柳 藤玉雪 To establish or promote or concur in establishing or promoting any company or companies for the purpose of acquiring all or any of the property. rights and liabilities of the Company of for any other purpose which may seem directly or indirectly calculated to beneath the Company, to amalgamate or consolidate or merge with a view to effecting union of interest either in whole or in part, with or independent of the companies, association, firms or persons, and to page or guarantee the placing of, subscribe for or otherwise acquire all or any part of the shares, debentures or other securities or any succidence companies, associations, firms or persons.
- To sell, mortgage or otherwise dispose of the property assets of undertaking of the Company of any part thereof for shares, stock, depending or office securities or obligations of any institution, corporate or governmental body person or company, whether or not having objects altogether or in part similar to those of the Company, or for any other consideration.
- To invest and deat with the money of the Company not immediately required in such manner as may from time to time be thought it. (25)
- To give credit to such persons or companies and on such terms as (26)may seem expedient.

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To receive money on loan end to burrow money in such manner as the Company shall think iit, and in particular by the issue of debentures or debenture stock (perpetual or otherwise) and to (27)secure the repayment of any money borrowed or owing, by mortigage, charge of lien upon all or any of the property or assets of the Company (both present and tuture), and also by a similar mortigage charge to secure 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 of the purpose of or in company with the burghteest of case may be for the purpose of or in connection with the business of the Company.

(28) Towpey, sellsty, see compromise env. claims made against the Company which it may seem, expedient to pay satisfy or compromise notwitistanding that the same may not be valid in law.

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To remunerate Directors, officials, agents, employees and servants of the Company and others and to establish and support or aid in the establishment and support of associations, finitialities, finds, irrusts and conveniences, calculated to benefit employees or exemployees of the Company, or the dependants or connections of such persons and to grant pensions or all times and allowances, and to provide houses, amenitles and conveniences of all kinds and to make payments towards issuance and to subscribe or guarantee money for charitable or benevolent objects or for any exhibition or for apy public, general or useful purpose and to the purpose of this paragraph the words employees and extending the purpose of this paragraph the words amployees and extending the purpose of the paragraph the words amployees and extending the purpose of the paragraph the words amployees and extending the purpose of the paragraph the words amployees and extending the purpose of the paragraph the words amployees and extending the purpose of the paragraph the words amployees and extending the purpose of the paragraph the words amployees and extending the purpose of the paragraph.

respectively, present and former directors and others wars, agents, employees, trainees and servants.

To pay out of the funds of the Company of the Company and registration of the Company of the issue of the company of the company

To bay for any rights or property acquired by the Company and to remunicipals any person or company whicher by cash payment or by the alloiment of shares, debentures or care securities of the Company credited as paid up in full.

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(33) To adopt such means of making known the services and products of life! (Company as may saem expedient and in particular by undertaking educational training and exercise ecop programmes and particular by end by advertising in the press, by circulars and establish of works of an interest, by publication of boars are periods as and by granting prizes, rewards and donations.

(34) To get insured against loss of demage on any or in the exit or at sea or otherwise and insurable property of the Company and to insure against or in respect of any liability on the part of the Company, to pay compensation to any workers imposed by any act of legislature and to insure any servants of the company against or in respect of fidelity or otherwise in the course of tree employment by the company against or the expect of fidelity and to effect insurance for the curses of federalitying

fidality or otherwise in the course of their employment by the Company and to effect insurance for the purpose of ademinifying the Company in respect of claims by reason of envisor fisks or didelity insurances and to pay premiums on environments.

(35) Totol or become members of any association company on society formed on to be formed tig, the protection of advancement of the interests of the Company or its employeds of otherwise engaged in any trade of business and to promote suscribe to or subsidies any essociation, company or society.

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(37) To accept gifts of ceah or of any movable of infinovable property of whatsoever nature from any person, persons, corporation or corporations for the purposes of the Company.

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(38) To act as agents except managing agents, brokers, commission agents representatives or consultants of and to provide services to any business or concern that the Company may find convenient or adventageous.

and the more

- (39) To undertake, assist and participate in confine car and industrial operations and undertakings in any part of the world and tooth singly and in connection with other persons firms, associations and companies and corporations.
- to carry out all or any of the objects of the Company new is all or any of the above things in any part of the Worldward should principals, agents, confractors, or otherwest and either confunction with others, and either the or through sub-confractors or otherwise.
- (41) To distribute among the Members in specie any property of the Company in the event of winding up, or any proceeds of sale or disposal of any property of the Company, but so that no distribution amounting to a reduction of capital be made except with the sanction (if any) for the time being required by law.
- (42) To do all such other things as may be deemed in regard conductive to the attainment of the above objects or any of them.

### AND IT IS HEREBY DECLARED THAT

- (i) the word "Company" says when used in reference to this Company, in this clause shall be deemed to include any syndicate, partieship or other body of persons, whether incorporated or not incorporated, and whether domicited in the country of the Company's incorporation or otherwise.
- (ii) the Company shall not engage in any other business including the business of banking as defined in the Banking Companies Ordinance 1962 or the business of insurance as defined in the insurance Act 1938 or the business of an investment linance company or the business of leasing of the business of managing agent or commercial builder and developer and in any event the Company shall not engage in any unlawful business.
- (iii) notwithstanding anything stated in any object clause, the Company shall obtain such other approval of licence from the competent authority, as may be required under any law for the time being in force, to undertake a particular business.

The liability of the Members is limited.

Syed Shafgat Ali Shaf

Chief Executive

The authorized capillatof the company is Rs. 950.000.000/-(Rupees nine hundred fifty million only) allyided into 95.000.000 Ninety five million) ordinary shares of Rs. 10/- (Rupees Ten only) each with powers to increase and reduce the capital of the company and to divide the shares in the capital for the time being into several classes. In accordance with the provisions of the Companies Act, 2017.

Wa, the several persons whose names and addresses are hereto subscribed, are destrous of peing formed into a Company in pursuance of his Memorandum of Association, and we respectively agree to take the number of Ordinary Shares in the capital of the Company set opposite our respective names.

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THE COMPANIES AGE 2017 (Private Company Limited by Shares ARTICLES OF ASSOCIATION:

# OF MATOL (PRIVATE) LIMITED PRELIMINARY

1. The Regulations contained in Table "A" to the First Schedule to the Companies Act, 2017 (the "ACT") shall be the regulations of MATOL (PRIVATE) LIMITED (the "Company") so far as these are applicable to a private company.

### PRIVATE COMPANY

- 2. The Company is a "Private Company" within the meaning of Section 2(1)(49) of the Act and accordingly:
  - i. No invitation shall be made to the public to subscribe for the shares or dehentures of the Company.
  - ii. The number of the members of the Company (exclusive of persons in the employment of the Company), shall be limited to fifty, provided that for the porpose of this provision, where two or more persons hold one or more shares in the company jointly, they shall be treated as single member; and
  - iii. The right to transfer shares of the Company is restricted in the manner and to the extent hereinappearing.

### INTERPRETATION

- 3. Unless the context otherwise requires, words or expressions contained in these regulations shall have the same meaning as in the Act; and words importing the singular shall include the plural and vice versa, and words importing the masculine gender shall include feminine, and words importing persons shall include bodiescorporate.
  - (a) "section" means section of the Act;
  - (b) "the Act" means the Companies Act, 2017; and
  - (c) "The Company" means MATOL (PRIVATE)LIMITED
  - (d) "the seal" means the common seal or official seal of the company.
  - (e) "Commission" means Securities and Exchange Commission of Pakistan(SECP).
  - (f) "Board" means the Board of Directors for the timebeing.

- (g) "Board Meeting" means a meeting of the Directors duly called and constituted or as the case may be the Directors assembled at a Board (1997) (199
- (h) "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.
- (i) "Special Resolution" shall have the meaning assigned thereto by the Act. "The Office" means the Registered Office for the time being of the Company.
- (j) "Chief Executive" in relation to a company means an individual who, subject to control and directions of the board, is entrusted with whole, or substantially whole, of the powers of management of affairs of the company and includes a director or any other person occupying the position of a chief executive, by whatever name called, and whether under a contract of service or otherwise.
- (k) "Company Law" means the repealed Companies Act. 1913 (Act #913) Companies Ordinance, 1984(XIIVII) of 1984), Companies Ordinance, 2016 (VI of 2016) and also includes this Act unless the context provides otherwise;
- (1) "Company Secretary means any andividual appointed to perform secretarial and appointed to perform secretary and declared as such your qualifications and experience, as may be specified;
- (m) "The Directors" shall mean the Directors for the time being and shall include all with redirectors.
- (n) "Memorandum" means the memorandum of association of a company as originally framed or as altered from time to time in pursuance of company law or of this Act;

#### BUSINESS

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

#### SHARES "

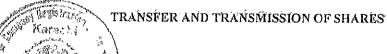
- 5. In case of shares in the physical form, every person whose name is entered as a member in the register of member shall, without payment, be entitled to receive, within thirty days after allotment or within fifteen days of the application for registration of transfer, a certificate under the seal specifying the share or shares held by him and the amount paid upthereon:
  - Provided that if the shares are in book entry form or in case of conversion of physical shares and other transferable securifies into book entry form the company shall, within ten days after an application is made for the registration of the transfer of any shares or other security to a central depository, register such transfer in the name of central depository.
- 6. The company shall not be bound to issue more than one certificate, in respect of a share or shares in the physical form, held fointly by several persons and delivery of a certificate for a share to one of several joint holders shall be sufficient delivery total.

- 7. If the share certificate in physical form is deficed, lost or destroyed, it may be renewed on payment of such fee, if any, not exceeding one hundred tupees, and on such terms, if any, as to evidence and indepunity and payment of expenses incurred by the company in investigating title as the directors think fit.
- 8. Except to the extent and in the manner allowed by the section 86, no past of the funds of the company shall be employed in the purchase of, or in loans upon the solithing the company's shares.



The authorized capital of the company is Rs. 950,000 (DO)- The part of the million only) divided into 95,000,000 (Ninety five million) of the part of Rs. 10/- (Rupees Ten only) each with powers to increase and reduce the capitate of the company and to divide the shares with capitate for the time being into the sess in accordance with the provisions of the companyes. Act. 2017.

Syed Shafqat Ali Shah : Chief Executive



10. RESTRICTION ON TRANSFER OF SHARES BY THE MEMBERS

- (1) A member desirous of selling any shares held by him, shall intimate to the board of his intention through a notice.
- (2) On receipt of such notice, the board shall, within a period of ten days, offer those shares for sale to the members in proportion to their existing shareholding:
- (3) The letter of offer for sale specifying the number of shares to the interplet is entitled, price per share and specifying the time limit, within which the offer if not accepted, be deemed as declined; shall be dispatched to the members through registered post of courier authorigh electronic mode.
- (4) If the whole or any part of the shares offered is declined or is not lakely freshard may offer such shares to the other members in proportion to their shareholding.
- (5) If all the members decline to accept the offer or if any shares are left over the shares may be sold to any other person as determined by the member, who initiated the offer.
- (6) For the purpose of this section, the mechanism to determine the price of shares shall be such, as may be specified.
- 11. The instrument of transfer of any share in physical form in the company shall be executed both by the transferor and transferee, and the transferor shall be deemed to remain holder of the share until the name of the transferee is entered in the register of members in respectthereof.
- 12. Shares in physical form in the company shall be transferred in the following form, or in any usual or common form which the directors shallapprove:-

### FORM AND TRANSMISSION OF SHARES

(1st schedule to the Companies Act, 2017)

share (or share) with distinctive numbers fro inclusive, in the MATOL (PRIVATE) LIMI executors, administrator and assigns, subject to same at the time of the execution hereof, and I, the said share (or shares) subject to the condition.  As witness our hands this	TED to hold upto the said transferer, his the several conditions on which I sheld the the said transferee, do hereby agree to the naforesaid.
Signature  Transferor  Full Name, Father's /Husband's  Name  CNIC number (in case of foreigner, Passport Number.)  Nationality  Occupation and Usual Residential  Address	Signature
Witness I:  Signature  Date  Name, CNIC Number and full address	Witness 2:  Signature  Date  Name, CNIC Number and full address
refuse to transfer any share unless the director may also suspend the reg immediately preceding a general meetion rights of the shareholders by givin	n regulation 14 and 15, the directors shall not the transfer deed is defective or invalid. The distration of transfers during the ten days and or prior to the determination of entitlement g seven days' previous notice in the manner, in case of shares in physical form, decline to ess

(a) a fee not exceeding fifty rupees as may be determined by the directors is paid to the company in respect thereof;and

- (b) the duly stamped instrument of transfer is accompanied by the certificate of the shares to which it relates, and such other evidence as the directors may reasonably require to show the right of the transferor to make the transfer.
- (2) If the directors refuse to register a transfer of shares, they shall within fifteen days after the date on which the transfer deed was lodged with the company send to the transferee and the transferee and the transferee who shall, after removal of such defect or invalidity be entitled to relodged the transfer deed with the company:

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

### TRANSMISSION OF SHARES

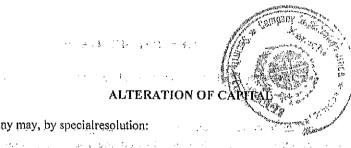
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suspend the registration of between the matter.

- 14. The executor, administrators, heir, or nominees, as the case may be, of a deceased sole holder of a share shall be the only person recognize by the company to deal with the share in accordance with the law. In the case of a share registered in the names of two or more hotters, the survivors or survivor; or the executor or administrators of the deceased sorvivor; shall be the only persons recognised by the company to deal with the share in accordance withlaw.
- 15. The shares or other securities of a deceased member shall be transferred on application duly supported by succession certificate or by lawful award, as the case may be for avour of the successors to the extent of their interests and their names shall be entered to the register of members.
- 16. A person-may on acquiring interest in a company as member, represented by shares, at any time after acquisition of such interest deposit with the company a nomination conferring on a person, being the relatives of the member, namely, a spouse, father, mother, brother, sister and son or daughter, the right to protect the interest of the legal heirs in the shares of the deceased in the event of his death, as a trustee and to facilitate the transfer of shares to the legal heirs of the deceased subject to succession to be determined under the Islamic law of inheritance and in case of non-Muslims members, as per their respective law.
- 17. The person nominated under regulation 16 shall, after death of the member, be deemed as a member of company till the shares are transferred to the legal heirs and if the deceased was a director of the company, not being a listed company, the nomined shall also act as director of the company to protect the interest of the legal heirs.
- 18. A person to be deemed as a member under regulation (4, 15 and 16 to share by reason of the death or insolvency of the holder shall be entitled to the same dividends and other advantages to which he would be entitled if he were the registered holder of the share and exercise any right conferred by membership in relation to meetings of the company.

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- 19. The company may, by special resolution:
  - (a) increase its authorized capital by such amount as it thinks expedient;
  - (b) consolidate and divide the whole or any part of its share capital into shares of larger amount than its existingshares;
  - Committee and the second section of (c) sub-divide its shares, or any of them, into shares of smaller amount than is fixed by the
  - (d) cancel shares which, at the date of the passing of the resolution in that behalf, have not been taken or agreed to be taken by any person, and diminish the amount of its share capital by the amount of the share socancelled.
- 20. Subject to the provisions of the Act, all new shares shall at the first instance be offered to such persons as at the date of the offer are entitled to such issue in proportion as nearly as the circumstances admit, to the amount to the existing shares to which they are entitled. The offer shall be made by letter of offer specifying the number of shares offered, and limiting a time within which the offer, if not accepted, will deem to be declined, and attenute expiration of the time, or on the receipt of an intimation from the person to whom the offer is made that he declines to accept the shares offered, the directors may dispose of the same in such manner as they think most beneficial to the company. The directors may likewise so dispose of any new shares which (by reason of the ratio which the new shares bear to shares held by persons writted to an offer of new shares) cannot, in the opinion of the directors, be conveniently offered linker this regulation.
- the management of the sound property of the second of the The new shares shall be subject to the same provisions with reference to transmission and otherwise as the shares in the original sharecapital.
- 22. The company may, by specialresolution---
  - en sette finansk i komponistisk i som i store finansk store en statisk i kreden kalender i state vet som et fi Protest tre finansk i kredit en store tre store i store tre store en store en store i krediter i store vet som e (a) consolidate and divide its share capital into shares of larger amount than its existing shares;
  - introduction of the control of the c (b) sub-divide its existing shares or any of them into shares of smaller amount than is fixed by the memorandum of association, subject, nevertheless, to the provisions of section85;
  - (c) cancel any shares which, at the date of the passing of the resolution, have not been taken or agreed to be taken by anyperson.
- 23. The company may, by special resolution, reduce its share capital in any manner and with, and subject to confirmation by the Court and any incident authorised and consent required, bylaw.

#### **GENERAL MEETINGS**

- 24. The statutory general meeting of the company shall be held within the period required by section 131.
- 25. A general meeting, to be called annual general meeting, shall be held, in accordance with the provision of section 132, within sixteen months from the date of incorporation of the company and thereafter once at least in every year within a period of one hundred and twenty days following the close of its financial year.
- 26. All general meeting of a company other than statutory meeting or an annual general meeting mentioned in section 131 and 132 respectively shall be called extra ordinary generalmeetings.
- 27. The directors may, whenever they think fit call an extra-ordinary general meeting, and extra-ordinary general meetings shall also be called on such requisition or in default, may be called by such requisitionists, as provided by section, 130. 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 extra- ordinary general meeting in the same manner as nearly as possible as that in which meeting may be called by the directors.
- 28. The company may provide video-link facility to its members for attending general meeting at places other than the town in which general meeting is taking place after considering the geographical dispersal of its members:

### NOTICE AND PROCEEDINGS OF ANNUAL GENERAL MEETING

- 29. Twenty-one days' notice at the least (exclusive of the day on which the metice is served or deemed to be served; but inclusive of the day for which notice is given) meeting and, in case of special business; the general nature of that business, shall be given in manner provided by the Act for the general meeting to such parson as the under the Act or the regulations of the company, entitled to receive such notice from the company; but the accidental omission to give notice to, or the no-receipt of notice beginning to such participants.
- 30. All the business transacted at a general meeting shall be deemed special other than the business stated in sub-section (2) of section (34 namely, the consideration of maintain statement and the reports of board and auditors, the declaration of any dividend, the election and appointment of directors in place of those retuing, and the appointment of the auditors and fixing of their remuneration of the auditors and fixing of their remuneration of the auditors and fixing of their
- of the Norbusiness shall be transacted at any general meeting liness a quorum of mellibers is present at that time when the meeting proceeds to business. The quorum of the general meeting shallbe two members present personally, or through video-link who represent not less than twenty-five percentrolational voting power either or their own account or asproxies; then twenty-five
  - 32. If within half an hour from the time appointed for the meeting a quorum is not present, the meeting if called upon the requisition of members, shall be dissolved, in any other case, it shall stand adjourned to the same day. In the next week at the same time and place, and if at the adjourned meeting a quorum is not present within half an hour from the time appointed for the meeting, the members present, being not less than two, shall be adjourned.

- 33. The chairman of the board of directors, if any, shall preside as chairman at ever general meeting of the company, but if there is no such chairman, or if at any meeting he is not present within fifteen minutes after the time appointed for the meeting, or is unwilling to act as chairman, any one of director present may be elected to be chairman, and if none of directors is present, or willing to act as chairman, the members present shall choose one of their number to be chairman.
- 34. The chairman may, with the consent of any meeting at which a quorum is present (and shall if so directed by the meeting), adjourn the meeting from time to time but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjournment took place. When a meeting is adjourned for fifteen days or more, notice of the adjourned meeting shall be given a findle case of an original meeting. Save as aforesaid, it shall not be necessary to give any notice of an adjournment or of the business to be transected at an adjournedmeeting.
- 35. (1) At any general meeting a resolution pilitio vote of the meeting shall be decided on a show of hands unless a poll is (before of on the declaration of the result of the show of hands) demanded. Unless a poll is so demanded, a declaration by the chairman that a resolution has, on a show of hands, been carried unanimously; or by a particular majority) or tost, and an entry to that effect in the book of the proceedings of the company shall be conclusive evidence of the fact, without proof of the number or proportion of the votes recorded in favour of, or against, that resolution.
  - (2) At any general meeting the company shall transact such business: as may be notified by the commission, only through a postal ballot.
- 36. A pool may be demanded only in accordance with the provision of section 43.

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- 37. If a poll is duly demanded, it shall be taken in accordance with the manner laid down in sections 144 and 145 and the result of the poll shall be deemed to be the resolution of the meeting at which the poll wasdemanded.
- 38. A poll demanded on the election of chairman or on a question of adjournment shall be taken at once.
- 39. In the case of any equality of votes, whether on a show of hands or on a poll, the chairman of the meeting at which the show of hands takes place, or at which the poll is demanded, shall have exercise a second or casting vote.
- 40. Except for the businesses specified under sub-section (2) of section 134 to be conducted in the annual general meeting, the member of a private company or a public unlisted company (having not more than fifty members), may pass a resolution (ordinary or special) by circulation signed by all the members for the time being entitled to receive notice of a meeting. The resolution by circulation shall be deemed to be passed on the date of signing by the last of the signatory member to such resolution.

VOTES OF MEMBERS

41. Subject to any rights or restrictions for the time being attached to any class or classes of shares, on a show of hands every member present in person shall have one vote except for election of directors in which case the provision of section 159 shall apply. On a poll every member shall thave voting rights as laidedown in section 134 contents and the color of and a section 134. the first of the temperal first the second of the second o 42. In case of Joint holders, the vote of the senior who tenders a vote, whether in person or by proxy or throught ideo link shall be accepted to the exclusion of votes of the other Joint holders; and for this purpose seniouty, shall be determined by the order in which the names stand in the register of members: 43. A member of sound mind, or in respect of whom an order has been made by any court having jurisdiction in linacy, may vote, whether on show of hands or on a poll or through video link, by his committee or other legal guardian; and any such committee or guardian may, on a poll, vote byproxy. 44. On a poll votes may be given either personally of through video link, by proxy or through postal Provided that nobody corporate shall vote by proxy as long as a resolution accordance with the provisions of section 138 is in force. The will be the second 45. (1) The instrument appointing a proxy shall be in writing under the hard of his attorney duly authorised inwriting. (2) The instrument appointing a proxy and the power-of-attorney or affect authority (2) under which it is signed; or a notarially certified copy of the power or authorsty, shall be deposited at the registered office of the company not less than forty-eight hours before the time for holding the meeting at which the person named in the instrument proposes to vote and in default the instrument of proxy shall not be treated asvalid. 46. An instrument appointing a proxy may be in the following form, or a form as near thereto as may . Bet a transpersion of the excitation is not a court rate to notice a like a configuration there is not a INSTRUMENT OF PROXY MATOL (PRIVATE) LIMITED ione de Loroppie a leas ant deursa of m<sub>3</sub>/occide contributed to angle at member of the Matol (Private) Limited, hereby appoint to senters of which with the last a deliberable of the high the comment of the light free to may be) many arms general meeting of the company to be theld on the days of the day of a in mentioner of 20 deviand at any adjodrament thereof into a much south and not enclaised the ra regres on to tail hill of collegia to fillight of because of translation of thats assembly as

germs of an instrument of proxy shall be

notwithstanding the previous death or insanity of the principal or revocation of the proxy or of the authority under which the proxy was executed, or transfer of the share in respect of which the proxy is given, provided that no intimation in writing of such death, insanity, revocation or transfer as aforesaid shall have been received by the company at the office before the commencement of the meeting or adjourned meeting at which the proxy issued.

### DIRECTORS

- 48. The following subscribers of the methograndian of association, shall be first directors of the company, so, however, that the number of directors shall not in any case be less than that specified in section 154 and they shall hold office until the election of directors in the first annual general meeting:
  - 1. Syed Shafqat Ali Shah
  - 2. Syed Zulfiqar Ali ShahJamote
  - 3. Mr. Hameedullah KhanParacha

Sa' 1.

- 4. Mr. MasoodAhmed
- 5. Mr. Feroz F.Golwalla
- 49. The remuneration of the directors shall from time to time be determined by the company in general meeting subject to the provisions of the Act. Every director shall be entitled to a fee of Rs.5,000/- for attending every meeting.
- 50. Save as provided in section 153, no person shall be appointed as a director unless he is a member of the company.

### POWERS AND DUTIES OF DIRECTEORS

- 51. The business of the company shall be managed by the directors, who may prove expenses incurred in promoting and registering the company, and may be regular powers of the company as are not by the Act or any statutory modification thereof to the being in force, or by these regulations, required to be exercised by the company in general meeting, subject nevertheless to the provisions of the Act or to any of these regulations, and such regulations being not inconsistent with the aforesaid provisions, as may be prescribed by the company in general meeting shall invalidate any prior act of the directors which would have been valid if that regulation had not been made.
- 52. The directors shall appoint a chief executive in accordance with the provisions of sections 186 and 187.
- 53. The amount for the time being remaining undischarged of moneys borrowed or raised by the directors for the purposes of the company (otherwise than by the issue of share capital) shall not at any time, without the sanction of the company in general meeting, exceed the issued share capital of the company.
- 54. The directors shall duly company with the provisions of the Act, or any statutory modification thereof for the time being in force, and in particular with the provisions in regard to the registration of the particulars of the mortgages, charges and pledge affecting the property of the company or created by it, to the keeping of a register of the directors, and to the sending to the registrar of an annual list of members, and a summary of particulars relating thereto and notice of any consolidation or increase of share capital, or sub-division of shares, and copies of special

resolutions and a copy of the register of directors ad notifications of any changestherein.

- 55. The directors shall cause records to be kept and minutes to be made in book or books with regard the late the decision of the other plants are server for a fine because on the
  - (a) All resolutions and proceedings of general meeting(s) and the meeting(s) of directors and Committee(s) of directors, and every member present at any general meeting and every director present at any meeting of the directors or Committee of directors shall put his signature in a book to be kept for the purpose; The state of the s
  - (b) Recording the flames of the persons present at each meeting of the directors and of any committee of the directors, and the general meeting; and

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Alkorders made by the directors and Committee(s) of directors:

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

### THE SEAL

56. The directors shall provide for the safe custody of the seal and the seal shall highly affixed to any instrument except by the authority of a resolution of the board of dierion of the board of directors authorized in that behalf by the directors and in the presence of at least away prectors and of the secretary or such other person as the directors may appoint for the purpose and those two directors and secretary or other person as aforesaid shall sign ever instrument to which the seal of the company is so affixed in their presence.

### DISQUALIFICATION OF DIRECTORS

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

Provided, however, that no director shall vacate his office by reason only of his being a member of any company which has entered into contracts with, or done any work for, the company of which he is director, but such director shall not vote in respect of any such contract or work, and of the does so vote this vote shall not becounted mantor on the recommendation of the re

### PROCEPDINGS OF DIRECTORS AND AND THE TOTAL OF THE PROCESSION OF TH

58. The directors may meet together for the dispatch of business, adjourn and otherwise regulate their meetings, as they think fit. A director may and the secretary on the requisition of a director shall, at any time, summon a meeting of directors. Notice sent to a director through email whether such director is in Pakistan or outside Pakistan shall be a validnotice who and in the latters of are a country of each translation of the following the properties of the first to reproduce

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- 59. The directors may elect a chairman of their meetings and determine the period for which he is to hold office; but, if no such chairman is elected, or if at any meeting the chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to actas chairman, the directors present may choose one of their member to be chairman of themeeting.
- 60. At least one-third (1/3<sup>rd</sup>) of the total number of directors or two (2) directors whichever is higher, for the time being of the company, present personally or through video-link, shall constitute a quorum.
- 61. Save as otherwise expressly provided in the Act every question at meetings of the board shall be determined by a majority of votes of the directors present in person or through video-link, each director having one vote. In case of an equality of votes or tie, the chairman shall have a casting vote in addition to his original vote as adjusted.
- 62. The directors may delegate any of their powers not required to be useful on their meeting to committees consisting of such member or members of their flody as use, think fit; any committee so formed shall, in the exercise of the powers so delegated conform to any testing that may be imposed on them by the directors.
- 63. (1) A committee may elect a chairman of its meetings; but, if no set the time appointed for holding the same or is unwilling to act as chairman, the members present may choose one of their number to be chairman of themseting.
  - (2) A committee may meet and adjourn as it thinks proper. Questions arising at any meeting shallbe determined by a majority of votes of the members present. In case of an equality of votes, the chairman shall have and exercise a second or casting vote.
- 64. All acts done by any meeting of the directors or of a committee of directors, or by any person acting as a director, shall, notwithstanding that it be afterwards discovered that there was some defect in the appointment of any such directors or persons acting as aforesaid, or that they or any of them were disqualified, be as valid as if every such person had been duly appointed and was qualified to be adirector.
- 65. A copy of the draft minutes of meeting of the board of directors shall be furnished to every director within seven working days of the date of meeting.
- 66. A resolution in writing signed by all the directors for the time being entitled to receive notice of a meeting of the directors shall be as valid and effectual as if it had been passed at a meeting of the directors duly convened andheld.

#### FILLING OF VACANCIES

- 67. At the first annual general meeting of the company, all the directors shall stand retired from office, and directors shall be elected in their place in accordance with section 159 for a term of threeyears.
- 68. A retiring director shall be eligible forre-election.
- 69. The directors shall comply with the provisions of sections 154 to 159 and sections 161, 162 and 167 relating to the election of directors and matters ancillarythereto.
- 70. Any casual vacaging occurring on the board of directors may be filled up by the directors, but the person so ellosen shall be subject to retirement at the same time as if he had become a director on the day on which the director in whose place he is chosen was last elected asdirector.
- The same of the sales of the sales of the 71. The company may remove a director but only in accordance with the provisions of the Act.

### DIVIDEND AND RESERVE

- 72. The company in general meeting may declare dividends but no dividend shall except recommended by thedirectors.
- 73. The directors may from time to time pay to the members such intering divident directors to be justified by the profits of the company.
- 74. Any dividend may be paid by a company either in cash or in kind only out of its profits. The payment of dividend in kind shall only be in the shape of shares of fisted company held by the distributing company.
- 75. Dividend shall not be paid out of unrealized gain on investment property credited to profit and
- 76. Subject to the rights of persons (if any) entitled to shares with special rights as to dividends, all dividends shall be declared and paid according to the amounts paid on the shares.
- aportion in continuous at his an arribabilit official appricant. It is a site of he directors may, before recommending any dividend, set aside out, of the profits of the company such sums as they think proper as a reserve on reserves which shall, at the discretion of the directors, be applicable for meeting contingencies, or for equalizing dividends, or for any other purpose to which the profits of the company may be properly applied, and pending such application may, at the like discretion, either be employed in the business of company or be invested in such investments (other than shares of the company) as the directors may, subject to trer in utile provisions of the Act promiting to time think fit the reason with the learning the corresponding to the corresponding to

2) The directors may carry forward any profits which they may think prudent not to

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- 78. If several persons are registered as joint-holders of any shares, any one of them may give effectual receipt for any dividend payable on the shares.
- 79. (1) Notice of any dividend that may have been declared shall be given in manner hereinafter mentioned to the persons entitled to share therein but, in the case of a public company, the company may give such notice by advertisement in a newspaper circulating in the Province in which the registered office of the company issituate.
  - (2) Any dividend declared by the company shall be paid to its registered shareholders or to their order. The dividend payable in cash may be paid by cheque or warrant or in any electronic mode to the shareholders entitled to the payment of the dividend, as per their direction.
- 80. The dividend shall be paid within the period laid down under the Act.

ACCOUNTS

81. The directors shall cause to be kept proper books of account as required under section

- 82. The books of account shall be kept at the registered office of the company of at enclosure place as the directors shall think fit and shall be open to inspection by the directors during business hours.
- 83. The directors shall from time to time determine whether and to what extent and at what time and places and under what conditions or regulations the accounts and books or papers of the company or any of them shall be open to the inspection of members not being directors, and no member (not being a director) shall have any right of inspecting any account and book or papers of the company except as conferred by law or authorized by the directors or by the company in general meeting.
- 84. The directors shall as required by section 223 and 226 cause to be prepared and to be laid before the company in general meeting the financial statements duly audited and reports as are referred to in those sections.

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- 85. The financial statements and other reports referred to in regulation 80 shall be made out in every year and laid before the company in the annual general meeting in accordance with sections 132 and 223.
- A copy of the financial statements and reports of directors and auditors shall, at least twenty-one days preceding the meeting, be sent to the persons entitled to receive notices of general meetings in the manner in which notices are to givenhereunder.
- 87. The directors shall in all respect comply with the provisions of sections 220 to 227.
- 88. Auditors shall be appointed and their duties regulated in accordance with sections 246 to 249.

### NOTICES

- 89. (1) A notice may be given by the company to any member to his registered address or if he has no registered address in Pakistan to the address; if any, supplied by him to the company for the giving of notices to him against an acknowledgement or by post or courier service or through electronic means or in any other manner as may be specified by the Commission.
  - (2) Where a notice is sent by post, service of the notice shall be deemed to be effected by properly addressing prepaying and posting a letter containing the hotice and unless the contrary is proved, to have been effected at the time at which the lefter will be delivered in the ordinary course of post.
- 90. 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.
- A notice may be given by the company to the person entitled to a share in consequence of the death or insolvency of a member in the manner provided under regulation 85 addressed to them by name, or by the title or representatives of the deceased, or assignees of the insolvent, or by any like description, at the address, supplied for the purpose by the person claiming to be soontitled.
- 92. Notice of every general meeting shall be given in the manner hereinalter authorized to we every member of the company and also to (b) every person entitled to a share in consequence of the death or insolvency of a member, who but for his death or insolvency would be entitled to receive notice of the meeting, and (c) to the auditors of the company for the time being and every person who is entitled to receive notice of generalmeetings.

#### DISPUTE

93. In the event that a dispute, claim or controversy arises between the Company, its management of its shareholders, or between the shareholders inter-se, or the directors inter-se, all steps may be taken to settle the dispute and resolve the issue through mediation by an accredited mediator before taking recourse to formal to formal dispute resolution such as arbitration or litigation.

#### WINDING UP

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- 94, ..., (1) In the case of members, voluntary winding up, with the sanction of a special resolution of the company, and, in the case of creditors, voluntary winding up, of a meeting of the creditors, the liquidator shall exercise any of the powers given by sub-section (1) of section 337 of the Act to a liquidator in a winding up by the Court including inter-alia divide amongst the members, in species of kinds the whole or any part of the assets of the company, whether they consist of property of the same kind of for.
- This is a property of the purpose aforesaid; the liquidator may set such value as he deems fair upon any property to be divided as aforesaid and may determine how such division shall be carried out as between the members of different classes of members.
- (3) The liquidator may, with the like sanction, vest the whole or any part of such assets in trustees upon such trustees for the benefit of the contributories as the liquidator, with the like sanction, thinks fit, but so that no member shall be compelled to accept any shares or other securities whereon there is anyliability.

#### INDEMNITY

95. Every office or agent for the time being of the company may be indemnified out of the assets of the company against any liability incurred by him in defending any proceedings whether civil or criminal, arising out of his dealings in relation to the affairs of the company except those cought by the company again him, in which judgment is given in his favour or in which is acquired, or in connection with any application under section 492 in which relief is granted to him to the Court.

We, the several persons whose names and addresses are hereto subscribed, are destrous of being formed into a Company in pursuance of this Articles of Association, and we respectively agree to take the number of Ordinary Shares in the capital of the Company set opposite our respective names.

Name: And Spriance (present and former) in full (in Block) letters	Hüşhənd'ə Navie İn full	Nationality with any former Nationality	Occupation	Mesidemial address In full	Number 50 of shares taken by	Significes
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### Wilness to the above Signatures:-

Full Nante (in Mock Letturs)	Father's Name	Occupation	Full Address	. Nationality	Signature	PS - « Commence group .
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### Environmental Management Plan



# 5-4 CRITERIA/METHODOLOGY TO DETERMINE THE SIGNIFICANCE OF THE IDENTIFIED IMPACTS

The criteria can be determined by answering some questions regarding the factors a ecting the signi cance. Typical examples of such factors include the following:

Exceeding of threshold limit: Signi cance limit may increase if threshold is exceeded e.g., particulate matter emissions exceed the permissible threshold.

E ectiveness of mitigation: Signi cance may increase as the e ectiveness of mitigation measures decreases. e.g., control technologies, which may not assure consistent compliance to the requirements.

Size of study area: Signi cance may increase as the zone of e ects increases. Incremental contribution of e ects from action under review: Signi cance may increase as the relative contribution of an action increases.

Relative contribution of e ects of other actions: Signi cance may decrease as the signi cance of nearby larger actions increase.

Relative rarity of species: Signi cance may increase as species becomes increasingly rare or threatened.

Signi cance of local e ects: Signi cance may increase as the signi cance of local e ects is high. Magnitude of change relative to natural background variability: Signi cance may decrease if e ects are within natural assimilative capacity or variability.

Creation of induced actions: Signi cance may increase as induced activities also highly signi cant.

Degree of existing disturbance: Signi cance may increase if the surrounding environment is pristine., For determining signi cance of impacts, it is important to remember that secondary and higher order e ects can also occur as a result of a primary interaction between a project activity and the local environment. Wherever a primary e ect is identified, the practitioner should always think if secondary or tertiary e ects on other aspects of the environment could also arise.





### Environmental Management Plan



- P Pressures pollutants emanating from driving forces i.e., emission
- S State quality of environment i.e., air, water & soil quality
- I Impact Impact on health, eco-system, materials, biodiversity, economic damage,
- R Responses action for cleaner production, policies (including standards/guidelines), targets, etc.

Tools may be grouped into management based tools, process based tools and product based tools, which are given below:

Environment reports including the above elements gives a comprehensive picture of speci-c target area in order to take appropriate measures for improvement. Such reports capture the concerns, which could be considered in EMP.

### 5.3 ENVIRONMENTAL IMPACTS

Environmental impacts resulting from proposed actions can be grouped into following categories:

- Bene cial or detrimental
- Naturally reversible or irreversible
- Repairable via management practices or irreparable
- Short term or long term
- Temporary or continuous
- Occurring during construction phase or operational phase
- Local, regional, national or global
- Accidental or planned (recognized before hand)
- Direct (primary) or Indirect (secondary)
- Cumulative or single

The nature of impacts could fall within three broad classications i.e., direct, indirect and cumulative, based on the characteristics of impacts. The assessment of direct, indirect and cumulative impacts should not be considered in isolation or considered as separate stages.



# 5.5 ENVIRONMENTAL IMPACTS ASSOCIATED WITH ETHANOL PRODUCTION Water Quality

Managing water quality issues for an ethanol facility is a complex task. The level of pollutants in the wastewater is dependent on the quality of supply water, the number of cycles the water is recycled in the process, the chemical additives used, and to the classication of receiving water to which the wastewater is discharged. The supply water is typically ground water from wells located on site or wells from a municipal supply. The wastewater is typically discharged to a ditch or lagoons. Since ethanol facilities are typically located in agricultural areas, most are not connected to municipal wastewater treatment plants (MWWTP) and must have their own treatment processes.

The receiving waters have classications that are denied by the intended use of the water. The SEPA water quality rules set standards to protect these uses. For the receiving waters associated with ethanol facilities, this includes sh, plants, crops, wildlife, livestock, and industrial use.

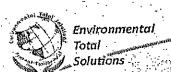
Currently, a limited distillery in Pakistan has industrial e uent treatment facilities rest is discharging directly to surface water. Non-contact utility water ows in heating or cooling loops throughout the plant and is used multiple times. Most plants discharge non-contact utility wastewater, from the treatment systems used for the boiler and cooling tower. This is regulated under SEPA Pollutant Discharge Elimination System.

Ethanol plants must also manage storm water runo from the site to ensure industrial activities do not impact water quality during storm events. These discharges are usually controlled by maintaining Storm water Pollution Prevention Plan and implementing best management practices to control soil erosion.

The following pollutants are typical parameters of concern from an ethanol facility discharging wastewater in Minnesota. They are listed by the relative challenge they present the plant in controlling their discharge.

## Total Dissolved Solids (TDS)

Total Dissolved Solids is a summary parameter that measures various inorganic water contaminants that exist as ions in solution. The major cations typically are calcium,







magnesium, sodium, and potassium; the major anions typically are carbonate, bicarbonate, chloride, sulfate, and nitrate. The environmental impact from dissolved salts depends on the speci-c contaminants in the water, in both absolute and relative amounts. TDS is used in this report as an encompassing term to cover issues related to this greater set of various dissolved salts pollutants.

## **Excessive Phosphorus**

Excessive Phosphorus levels can speed up the aging process of lakes and streams by stimulating algae growth which reduces the amount of dissolved oxygen in the water. The water treatment chemicals used to prevent scale and corrosion formation in the cooling water system are typically organo-phosphonates and are the primary sources of phosphorus discharges from ethanol facilities. Use of organophosphonates in water treatment chemicals is not unique to ethanol facilities but common in many industrial applications. Managing phosphorus discharges has typically not been a challenge for ethanol facilities and phosphorus monitoring is becoming more common for ethanol plants. Phosphorus trading is a mechanism for an ethanol facility to meet their discharge requirements without installing treatment equipment at their own facility. Presently phosphorus trading appears to be more economical than on-site treatment but the cost for trading will rise as phosphorus discharge limits become more restrictive in order to protect overall watershed quality.

### Residual Chlorine

Residual Chlorine is a contaminant that results from the water treatment chemicals that are added at the facility to control bacterial growth. Exceedance of the discharge standard can be toxic to sh in the receiving water. Exceedances appear to be related to the monitoring procedure or controls on the cooling water treatment system. The typical standard requires the daily maximum to remain below 0.04 mg/l.

# 5-Day Carbonaceous Biological Oxygen Demand (CBOD<sub>5</sub>)

5-Day Carbonaceous Biological Oxygen Demand (CBOD<sub>5</sub>) is a minimum discharge standard for most municipal and industrial wastewater discharges to surface water. CBOD<sub>5</sub> is an indicator of organic material in the wastewater and higher levels of CBOD<sub>5</sub> will reduce available oxygen levels for sh and plant life in the receiving water. Typically, this has not been a wastewater problem for ethanol facilities.





## Total Suspended Solids (TSS)

Total Suspended Solids (TSS) is a minimum discharge standard applied to most municipal and industrial wastewater discharges to surface water. The typical standard requires the monthly average to remain below 30 mg/l characteristically; this has not been a wastewater problem for ethanol facilities.

Table 5.1: The sources of wastewater generation

S. No	Possible Wastewater Sources	Activities
1.	Raw material supply	Over ow of storage tanks Mixing vessels
2	Synthesis	When water is added as reactant solvent
		Reaction water during the condensation reaction process
: • • •		Water present in the raw material
		Process purges and bleeds
		Quenching of organic vapor streams
. 3.	Product separation and	Solvent recovery
	re nement	Regeneration of ion exchange resins
		Spent neutralizing agents
		Product washing
4	Product storage and	Tank over ow
	handling	Spills during loading and unloading operations
		Leakages from tanks and pipe systems
		Spillages from drums
5.	Emission	Neutralizing agents
	abate	Air abatement systems
		Dewatering of sludges
]		Water bleed from seal drums and knock-out drums
		scrubbing water from scrubbers
		wastewater from strippers
		quench water from barometric condensers
		water separators of the overhead drums of distillation
		columns, etc
6.	Energy/utilities	Hydrocarbon contamination of water cooling systems
	911	Bleed on boiler feed water
		Bleed on water demineralization plant
		Cooling system blow down
		Steam condensate contaminated with raw material,
		product or waste
17.	 Infrastructure	Cleaning operations
7.		





Fire ghting water

Rain water run-o from roofs and hard standing

Di use sources (e.g., leaks, spills from process equipment)

Oil from mechanical equipment (compressors, etc)

Contamination of condensate from steam ejectors used to

create vacuum

Water gland seals on vacuum pumps Vapour condensates

in pipe runs

General site e uents from o ces, canteens, laboratories

and workshops

Water-curtains for hydrocarbons containment and /or

acid gases absorption

# 5.6 WASTEWATER PREVENTION AND TREATMENT TECHNOLOGIES

# General prevention techniques

Before considering wastewater treatment techniques, it is struccessary to fully exploit all the opportunities for preventing, minimizing and reusing wastewater. However, water use, e uent generation and e uent treatment are all intrinsically linked and should be considered in combination. A typical exercise in preventing wastewater may include the following steps:

Step 1: Identify wastewaters - The rst step is to identify all wastewater sources from a process and to characterize their quality, quantity and variability. Pareto analysis is useful to identify those sources that use most water and contribute most wastewater. Further clarication is provided by the preparation of plans that show all drain networks, points of arising, isolation valves, manholes and points of discharge.

Step 2: Minimize water ows - The overall aim is to minimize the use of water in the process in order to obviate e uent production or, if that is not possible, to produce more concentrated e uents. It will be necessary to identify the minimum quantity of water that is needed (or produced) by each step of the production process and then to ensure that these requirements are implemented by such practices as:

- Use of water-free techniques for vacuum generation (e.g., use the product as a sealing liquid in vacuum pumps, use dry pumps)
- Employ closed loop cooling water cycles
- Use management tools such as water-use targets and more transparent costing of water
- Install water meters within the process to identify areas of high use.







Step 3: Minimize contamination - Wastewaters are created by contamination of process water with raw material, product or wastes; either as part of process operation, or unintentionally. The following techniques can prevent this contamination:

## Process operation:

- Use indirect cooling systems to condense or cool steam phases (not direct injection systems)
- Use purer raw materials and auxiliary reagents (i.e., without contaminants)
- Use non-toxic or cooling water additives with lower toxicity (e.g., chromium based additives).

## From spills:

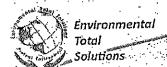
- Fit secondary containment to vessels and pipe-work that pose a high risk of leaks.
- Provide spill clean-up material (adsorbents, drain plugs, etc) at strategic points around the installation and prepare spill contingency plans
- Use separate collection systems for process e uent, sewage and rainwater (although there may be cases where the blending of e uent streams o ers treatment advantages)

Step 4: Maximize wastewater reuse - Even when wastewaters are produced/generated they do not necessarily have to be sent to a treatment plant. To identify options for re-use it is ret necessary to de ne the lowest water quality that can be used for each activity in the process

Wastewater reuse may be achieved by re ning and reusing (rather than disposing of) mother liquors; reusing wastewater in the process (e.g., for raw material make-up) and reusing waste water for other purposes (e.g., equipment cleaning).

## Abatement techniques

The selection of the appropriate treatment technologies requires detailed consideration of the physical and chemical nature of all the wastewaters. The chosen treatment technique may involve a combination of physical, chemical and biological methods. The following paragraphs give brief, generic descriptions of typical wastewater streams that originate from petrochemical processes and the possible treatment techniques







Acid/alkaline e uents: A suitable neutralizing agent can be added to adjust pH. Wherever possible, other wastes (and not virgin raw materials) should be used for neutralization: In some cases the acid dosing of e uents may release toxic gases.

Mixtures of oil/organics and water: The two phases can be separated using such techniques as tilted plate separators, American Petroleum Institute (API) separators, air otation, coalescing agents or hydrocyclones.

Biodegradable organics: Biodegradable material (as measured by BOD) may be biologically degraded, normally using aerobic microbial activity (but anaerobic activity has applications as a pre-treatment technique). The treatability of e uent will depend on the presence of inhibitory materials, the absence of necessary nutrients, the pollutant concentration and pollutant variability. The steam or air stripping of volatile components may be required in preparation for biological treatment.

High organic load: Conventional aerobic or anaerobic biological treatment may not be applicable to e uents with high organic concentrations if they are toxic or di cult to degrade. It may be necessary to use various forms of extreme oxidation such as incineration or wet oxidation. All techniques have significant capital and operating costs.

Recalcitrant organics: Recalcitrant organics are organics that are not estimated by biodegradation but may be removed estimated pretreatment or incineration. This refers to single substances and to tributary estimated with BOD: COD <4. Some long chain aliphatics, aromatics and highly chlorinated compounds are discult to biodegrade and may need to be treated by activated carbon adsorption, other adsorption techniques, hydrolysis, and stration or advanced oxidation techniques. The amenability to biological treatment can be improved by steam or air stripping to remove the volatile components. Where the volatiles are chlorinated species the ose gases are passed to an incinerator.

Suspended solids: Solids may need to be removed as a precursor to further treatment or as a polishing step prior to discharge. The techniques include settlement, otation, precipitation and litration. The solids produced by these techniques will need to be dewatered and dried prior to disposal. Removal e ciencies can be improved by the use of coagulants and occulants.





Metals: Metals may occur in e uents, for example, through the use of catalysts. Metals generally need to be removed by separate treatment, because they cannot be removed e ciently in biological treatment plants. The impact of heavy metals on a biological treatment facility must be evaluated with regard to inhibitory e ects, sludge deterioration e ects and residual pollutant levels in the e uent. Whenever unacceptable e ects are expected, the individual wastewater stream needs separate treatment or central (combined) special treatment, using such treatment methods as chemical precipitation (creating a sludge that may allow metal recovery), ion exchange, electrolytic recovery or reverse osmosis. Metals also make the reuse of biosludge (e.g., in agriculture) more di-cult.

Control and treatment technologies used in petrochemical industries can be divided into two broad classes:

- In-plant source control
- End-of-pipe treatment

In-plant source control a ords two major bene ts:

- The overall reduction of pollutant load that must be treated by an end-of-pipe system
- The reduction or elimination of a particular pollutant parameter before dilution in the main wastewater stream.

In addition to above, it has been found that highly contaminated spent caustic waste generated in the petrochemical industries is also considered as wastewater. In case better management options such as resource recovery are available, the stream may be even sent osite.

## In-plant processes

All in-plant treatment options require segregation of process waste streams under consideration. If there are multiple sources of a particular pollutant or pollutants, it/they require segregation from the main wastewater sewer. However, similar sources can be combined for treatment in one system.

In-plant practices are the sole determinant of the amount of wastewater to be treated. There are two types of in-plant practices that reduce—ow to the treatment plant. First, there are reuse practices involving the use of water from one process in another process. Second, there are recycle systems that use water more than once for the same purpose. Reduction in





water usage sometimes may be more cost-e ective in reducing the quantity of wastewater discharged than water reuse or recycle. Good housekeeping is one inexpensive method of wastewater reduction. Many of the wastewater streams are suitable for reuse within the plant. Some of the in-plant measures are:

- Dilution Steam Generator (DSG) and associated facility in cracker units
- Elimination of once-through barometric condenser water
- Sewer segregation to separate uncontaminated storm water runo and once-through cooling waters
- Elimination of contaminated once-through cooling water, either by replacement of the
  once-through cooling system with an air-cooled/cooling tower recycle system or by
  careful monitoring of the once-through cooling system and tightening of the system to
  reduce losses of hydrocarbons to the cooling water.
- Replacement of water-cooled equipment with air-cooled equipment wherever practical
- Use of treated process wastewater as cooling water, scrubber water, and in went to the water treatment plant
- Use of closed cooling water systems on compressors and pumps
- Reuse of boiler condensate as boiler feed water, etc.
- However, reuse of wastewater requires investigation on a plant-by-plant basis to determine the technical and economic feasibility.
- Wastewaters emanating from end-of-pipe treatment facilities, particularly those
  having tertiary treatment are generally of such quality that reuse can be quite
  attractive.

In general following are the major reuse options:

• Properly treated wastewater can be recycled as make-up to the cooling-tower system.

There are a number of factors determining the least costly system including:

- Cost of fresh water
- Level of contaminants in treated e uents and acceptable level in the cooling tower
- Cycle of concentration with and without recycle of e uent
- Chemical treatment program required for recycling (particularly for plants which have already minimized cooling tower blow-down)
- Recovery and reuse of condensate streams
- Reuse for re water systems







Physical-chemical tertiary treatment refers to treatment processes that are non-biological in nature. There are two types of physical-chemical processes; those that reduce the volume of water to be treated (evaporation, reverse osmosis, *etc*) and those that reduce the concentration of pollutants (activated carbon).

## End-of-pipe treatment

Chemical industries are based on adaptation of following end-of-pipe treatment scheme:

- Primary treatment including equalization, oil removal
- Biological treatment
- To further improve the quality of treated wastewater, processes de ned as tertiary processes are to be used for removal of special troublesome pollutants. Tertiary processes generally considered for petrochemical wastewater include membrane separation processes, and activated carbon.

Further, the control technology can be utilized to achieve following objectives:

- Reduction in e uent ow
- Reduction in concentration of pollutants

Improvement can be de ned in terms of further reduction of water ows in plant and the addition of physical chemical treatment step (activated carbon) end-of-pipe.

For the purpose of suggesting levels of control technologies, for the petrochemical based production units, a framework involving following treatment levels may be considered:

- Level I: Primary Treatment
- Level II: Secondary Treatment
- Level III: Advanced Secondary treatment
- Level IV: Tertiary treatment
- Level V: Advanced Tertiary Treatment
- Level VI: Zero Discharge

#### **Emissions from Ethanol Plants**

By their very nature, virtually every manufacturing or processing facility transforms raw materials into a value added product and in that process; organic and chemical changes take place that result in emissions of some sort. Ethanol production is no di erent in that regard.





## 5.7 EMISSIONS FROM THE ETHANOL PLANTS

### Sources of air emissions

Atmospheric emissions from Ethanol Plants can roughly be divided into ducted and non-ducted (di use, fugitive) emissions. Only ducted emissions can be treated. As far as di use and fugitive emissions are concerned, the objective of control is their prevention and/or minimization (e.g., by capturing them in a ducted system). Atmospheric emissions in the petrochemical industry are:

### **Ducted emissions**

- Process emissions released through a vent pipe by the process equipment and inherent to the running of the plant
- Flue gases from energy-providing units, such as process furnaces, steam boilers, combined heat and power units, gas turbines, gas engines
- Waste gases from emission control equipment, such as incinerators or absorbers, likely to contain unabated pollutants or pollutants generated in the abatement system
- Tail gases from reaction vessels and condensers
- ... Waste gases from catalyst regeneration
- Waste gases from solvent regeneration
- Waste gases from vents from storage and handling (transfers, loading and unloading) of products, raw materials and intermediates

Process innovations in ethanol plant design are creating a clear trend toward enhanced emission control. However these plants are required to meet stringent provincial and federal regulations during both construction and operation. Ethanol plants must stay within air emission limits specified in the permits or "cease operation" orders from environmental regulatory agencies. Emissions from ethanol production may vary slightly depending on the process, design and feedstock. A variety of emission control technologies are used to control potential air pollutants from ethanol plants. Dust control equipment monitors the presence of tiny particles (particulate matter less than 10 microns in diameter, PM10) in the air created during the handling, milling and drying processes.

Volatile organic compounds (VOCs) are produced during fermentation, distillation and drying. Potential emissions of VOCs are measured and controlled through plant design regardless of the bio-fuel technology used. Combustion from boilers in the plant generates





carbon monoxide, nitrogen oxides, and sulfur oxides. If co-product drying is in place, carbon monoxide may also be a result. Other emissions may result from activities outside the actual production process including:

- Hydrogen sul de and VOCs released from the wastewater treatment process
- PM<sub>10</sub> from the cooling towers
- Fugitive PM<sub>10</sub> and VOC emissions from haul road tra c and equipment leaks,
   respectively
- PM10, NOx, SOx, CO and VOCs from emergency equipment

Table 5.2: Atmospheric Emission Sources and Types of Pollutants from chemical Processes

·	<u> </u>		
.No.	Possible Emission Sources	'Activities '	Pollutant Type
	Raw material	<ul> <li>Impurities removal from raw</li> </ul>	■ VOCs,
	supply	materials	Particulates
	Synthesis	Reaction equipments such as	VOCs,
		<ul> <li>purges, inert vents, process</li> </ul>	■ Sox,
:		scrubbers	NOx,
		<ul> <li>Vents associated with catalyst</li> </ul>	■ COx
٠		<ul><li>preparation and regeneration</li></ul>	
•	•	<ul> <li>Pressure relief valves, bursting</li> </ul>	
		discs, etc.	<u> </u>
	Product	<ul> <li>Separation equipments</li> </ul>	<ul><li>Particulates,</li></ul>
	separation	(distillation	Cox,
	and re nement	<ul> <li>columns, stripping columns,</li> </ul>	. VOCs
		crystallisers, condensers, etc.)	
		<ul> <li>Drying and handling of solids</li> </ul>	
	Product storage	<ul> <li>Loading and unloading of</li> </ul>	· VOCs,
	and	<ul> <li>containers and vessels, storage</li> </ul>	* Particulates,
. 3	handling	tanks, spills, etc	Blanket gases,
			Evaporative
			losses
	Emission	Waste gas combustion units	<ul><li>Dioxins;</li></ul>
	abatement	<ul> <li>Wastewater stripping</li> </ul>	Particulates,
		<ul> <li>Wastewater collection systems</li> </ul>	<ul> <li>Combustion</li> </ul>
. •		and treatment facilities	gases,
		<ul> <li>Solid waste storage and</li> </ul>	• VOCs
: 		treatment	
	Energy/utilities	<ul> <li>Combustion units</li> </ul>	<b>≭</b> COx,
•			■ NOx,
•			■ SO <sub>2</sub> ,
			<ul> <li>Particulates,</li> </ul>





	* Dioxins,
	Acid gases
	Heat
Infrastructure • Equipments and ttings	Fugitive losses
■ Cooling towers	<b>▼</b> (VOCs
<ul> <li>Analyzers and sample port</li> </ul>	
<ul> <li>Equipment evacuation and</li> </ul>	
cleaning workspace ventila	tion

### VOCs

VOC emissions are of signicant environmental concern because some have the POCP, Ozone Depletion Potential (ODP), and Global Warming Potential (GWP), toxicity, carcinogenicity and local nuisance from odor. The prevention of VOC emissions is therefore one of the most important issues of concern.

The term VOC covers a diverse group of substances and includes all organic compounds released to air in the gas phase, whether hydrocarbons or substituted hydrocarbons. Their properties, and hence need for control, vary greatly and so systems have been developed to categorize VOCs according to their severity to cause harm

Table 5.3: Measures for emission control

Sources of Air	Measures for Emission Control			
Pollutants				
Channelized emissions	Pollution control equipment absorption/adsorption/incineration			
	etc.			
Vent o	Inventorization procedures to prevent continues releases through			
	rupture disks			
Purge gases	Recovery/Flaring treatment, etc.			
Equipment leaks	General VOC /Hazardous air pollutants			
Loading				
Strange Tanks				
ETP				

## Combustion emission control

A quick review of the control technologies for NOx and hydrocarbons reveals following:

Table 5.4: Control Technologies for Emissions

	Technology	Achievable,Limit		Remarks	
		Nitrogen oxides	 ·		]
, -1	Low NOx Burner	120-150 mg/Nm³			





	·	
Ultra low NOx	75-100 mg/Nm³ at the stack	
SNCR	50-80% Nox Reduction	
SCR	85-95% Reduction	
	Nox <50 mg/Nm <sup>3</sup>	
	Ammonia <5 mg/Nm³	
Particulate matter/	odor/ hydro carbons/volatile (	organic compounds
	< 1 mg/m3	carbons and volatile
		organic compounds
High E ciency air Iter (HEAF)	<0.1 mg/m3	
	Fines and aerosols up to 99%	
De mister/mist lter Adsorption	95-99% reduction	for Indicative application range 110000- 200000 Microgm
Bio- Iter	odor and some VOC's	
220		

In regions where sensitivity due to NOx levels is high, selective catalytic reactors or selective non-catalytic reactors may be used. However, in this case the pollution due to ammonia need not be undermined

# Emission control technologies

Emission of VOCs /organic HAPs may occur from the following:

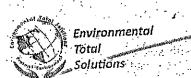
- Process vents
- Storage vessels & transfer racks
- Equipment & tting (Fugitive emissions)

Various types of control technologies used for treatment of VOCs / HAPs emissions are:

- Combustion Devices (Incinerators/Flares/Heaters)
- Recovery/Recapture Devices (Condensers/Adsorbers, etc)
- Speci c techniques for transfer racks/storage emissions

Combustion is the universally applicable technique for control of organic HAP, and VOCs emissions. Properly designed combustion devices can achieve e ciencies of 98 percent reduction in organic HAPs or VOCs emissions.

Recovery and recapture devices employ same types of unit operations viz., adsorption, condensation, etc. However, they di er in the end use of the recovered material for example







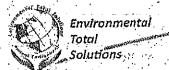
the recovered material from recovery type of devices are use/reuse or sold whereas material from recapture devices is primarily disposed o .

# 5.8 SOLID WASTE

Key pollutants in wastes can be derived from process; materials for construction, corrosion/erosion mechanisms, maintenance materials, etc. Some of the possible waste generation sources are given in Table 5.5.

Table 5.5: Waste generation Sources

S.No. Possible	Pollutant Type
Emission Sources	进去产品的现在分词 化二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十
1. Raw material O -s	peci cation raw materials
supply	
	Spent catalysts because of chemical deactivation,
	physical degradation or fouling, etc.
	Organic residues during shutdown of wastes
2. Synthesis •	Oxides of iron and other metals due to corrosion and
	erosion
	products inside the equipment
	A CONTROL OF THE CONT
•	Activated carbon, molecular sieves, lter media,
	desiccants, ion exchange resins, etc. during spent
	puri cation
•	Unwanted by-products
•	Process residues such as heavy organic residues from
Product separation	distillation columns (e.g. tars and waxes), sludges in
3 and re nement	vessels).
•	Spent reagents such as organic solvents - these may be
	valuable
	to recover/re-use, or to use a fuel to capture the calori c
	value
•	O -speci cation products
	Waste packaging
Product storage	Product polymerization in tanks
and handling	Froduct potymentzation in tanks
5. ♦	Adsorbents used for spill clean-up Solids produced by
	the abatement of air pollutants (e.g. dust from
Emission	electrostatic precipitators, bag Iters)
abatement .	Solids produced by the abatement of water pollutants
	(e.g. catalyst solids settled from wastewater, liter cake







6. Energy/utilities	<ul> <li>Ashes/sots from furnaces, heaters and other combustion</li> <li>equipment</li> </ul>
	Decommissioned plant equipment Construction     materials (e.g. metal, concrete, insulation)
7. Infrastructure	General site wastes from o ces, canteens and laboratories Spent cleaning agents (e.g. phosphoric acid)
	Spent oils (lubrication, hydraulic, etc).
	Spent heat transfer uids

## 5.9 WASTE PREVENTION TECHNOLOGIES

The form of wastes may range from discrete solid items to highly uid sludge with signi cant water content. The nature of wastes is very dependent on the process. Wastes may be hazardous due to the presence of toxic organic substances or heavy metals.

### Waste prevention

Waste is an important issue in the chemical industry and there are generally strong economic and environmental incentives to reduce waste generation. Waste audits are used to gather information on the source, composition, quantity and variability of all wastes. As a rule of thumb, prevention techniques should be adopted according to the waste management hierarchy, namely:

- Prevent waste generation at source: Those wastes that are generated by incomplete
  conversion, degradation or destruction of the raw materials (e.g. tars, unwanted
  byproducts) can be an indicator of process ine ciency and are avoided by process
  integrated measures that optimize the use of raw materials, operating conditions or
  even the process route.
- Minimize any unavoidable generation of waste: Many process agents (e.g. acids, caustic, clay, solvents) generate waste (e.g. spent acid, spent caustic, spent clay, spent solvents). These are high-volume, low-value waste streams that are often polluted by the process chemicals and are discult to treat in a cost-esective way. If the use of such process agents is necessary, the aim is to minimize the consumption (e.g. by extending catalyst life) and to solvents outlet for the generated waste.
- Recycling of waste either internally or externally: Spent catalysts are commonly
  regenerated, especially if they contain precious or toxic metals, but this should only be
  after catalyst deactivation has been minimized by optimizing the process conditions.







### Waste control

The choice of treatment technique is very speci c to the process and the type of waste generated. Waste generation is so speci c to the processes operated that it is not possible to identify generally achievable emission levels. In addition, many plants do not treat their own waste and instead contract-out to specialized companies.

Wherever the control techniques are operated, there is a need for systems to manage the storage, handling, transportation and disposal/destruction of waste. Waste is usually classified according to the amount or concentration of 'dangerous' components (e.g. heavy metals, persistent organic chemicals) and the physical/chemical properties of the waste (e.g. pyrophoric, leaching).

As a general rule of thumb, the following techniques are to be used to treat the waste types.

Catalysts: Catalysts have a nite life because of chemical deactivation, physical degradation or fouling. Catalysts are often based on expensive, exotic metals and this provides an economic incentive for catalyst regeneration (either on or o site). Inert catalyst supports are land led when they are physically no longer useful.

Spent puri cation media: Media such as activated carbon, molecular sieves, lter media, desiccants, and ion exchange resins are used to purify the product of impurities. Wherever possible the media may be regenerated, but land ll disposal and incineration (under appropriate conditions) may also be used.

Organic process residues: The heavy organic residues from distillation columns, vessel sludges *etc*. may be used as feedstock for another process or as a fuel to capture the caloric value. Where this is not possible, they are incinerated (under appropriate conditions).

Spent reagents: Where spent reagents (e.g., organic solvents) cannot be recovered or used as a fuel, they are normally incinerated (under appropriate conditions).

## Waste treatment technologies

For the purpose of suggesting a management plan for improvement of practices three levels of technology for treatment and disposal of petrochemical wastes can be identified:

• Level I: Technology currently employed by typical facilities





- Level II: Better technologies currently employed on a commercial scale
- Level III: Technology necessary to provide adequate health and environmental protection

It is to be noted that environmental adequacy is to be evaluated under varied geologic and climatologic conditions and the technology in this context should primarily prevent environmental stress on ground water supplies. Following tables contain a description of three levels of treatment and disposal technology associated with some of the waste streams generated by the petrochemical industry. Engineering experience and judgment are combined with knowledge of basic principles in the assessment of these treatment and disposal technologies. However, these are not to be construed as comment on actual practices or suggestions for complying with requirements. Hazardous waste management is a complex task requiring investigation in eld for evaluating performance and developing action plans. A brief description of these technologies also follows.

Table 5.6: Technology Levels for API (Oil/Water) Separator Sludge

	the state of the s				
	Fac				
Waste Description		containing large quantit			
	settled to the bottom of the separator. A considerable diversity of				
	wastewater streams are routed to this unit in uencing waste				
	generation rates, waste characteristics and potential hazards				
Generation rate		Highly variable			
Physical and	High in water content t	the chemical characterist	ics of material is		
chemical properties	dependent				
	on the oil which is rout	ed to the units. Organic	are of concern		
	Level I	Level II	Level III		
Treatment/	Deoiling/ dewatering	Same as Level I	Oil recovery process		
Disposal Technology	using centrifuge		to ensure absence of		
	Storage in pit		leachable hazardous		
			organic constituents		
			Land-farming in		
			hydrogeologically		
			secure area, and		
	,		assisted by specially		
			cultured		
* * * * * * * * * * * * * * * * * * * *			microorganism and		
1			protected by berm to		
			pond any storm		
			runo Solidi cation		
	_ <del></del>	the same of the sa	<del></del>		





		10000000000000000000000000000000000000	Secured land II
Adequacy of	Insu cient	Insu cient	Adequate
technology	information .	information	Adequate
	Inadequate		
Problems	Residual oil which	Minimal	Minimal
	may have hazardous		Minimal
	constituents		
	Migration of		
<i>".</i>	constituents		
Monitoring &	(1), (2) Minimal	(1) Minimal at	(1) Use observation
Surveillance	at present	present	wells,
			Monitor for
			hazardous
			constituents
			(2) Air pollution
			monitoring
	<del></del>		

## Waste storage

Wastes awaiting disposal must be stored in an environmentally acceptable manner. Storage must not give rise to secondary environmental problems such as odor or pollution of groundwater due to rainwater percolation through or run-o from the site. Storage should preferably be in closed vessels, containers or bags, on a site surrounded by a bund wall or toe wall, with drainage to a prepared system. Special precautions are required for pyrophoric materials to eliminate the disk of the problems are required for pyrophoric gas.

## Recycle and reuse

In the last decades, the quantity of waste from the industry which is recycled and reused has grown in many countries and continues to do so. The methods applied vary with the type of waste, *e.g.*, for sludges, recovery of oil during treatment. The aim of recycle and reuse methods is to reuse the waste for its original purpose or to and an alternative use for it to avoid its and disposal. Therefore, waste production is reduced while natural resources are conserved and/or protected.

Most of the reuse practices reported in the environmental statements are for o site recovery from waste stream. Industries opting for this route are required to take due care to avoid secondary pollution from recyclers facility. The material is to be sold only to authorized agencies with necessary approvals







## 5.10 WASTE PRE-TREATMENT-SLUDGE REDUCTION PROCESSES

The sludge recovered from the various e uent treatment processes vary widely in their properties. Depending on the disposal route adopted, this sludge is often treated before disposal.

Treatment methods are used for two main purposes:

- To reduce the quantity of waste requiring disposal
- To recover the oil for recycling

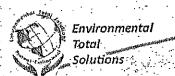
A large proportion of petrochemical wastewater sludge is being treated for one or both of the above reasons. The choice of whether to treat and if so, which treatment to use depends on many factors including the composition of the sludge and the choice of mode of disposal.

Centrifuges have been used widely by Indian industries. Centrifugation exploits the difference in density between solids and liquids (or two liquid phases) to separate them by applying centrifugal force. Two main types of decanter centrifuge can be applied at petrochemical wastewater facilities: 2-phase, which yields a solids cake plus a single equent stream (mixed oil and water); and 3-phase which, as the name suggests, yields separate oil and water streams, as well as the cake. The applications in ETP have been used for decanter centrifuges. Advantages of decanter centrifuges include resource recovery, exibility and high volume reduction. With good operation, cake suspended solid contents of up to 20% can be achieved.

Dewatering/de-oiling is used to decrease the quantity of sludges for disposal and to recover oil from them.

## Waste disposal methods

All disposals must be carried out at suitably authorized facilities in accordance with the conditions laid down by the State Pollution Control Boards. In the event that recovery or reprocessing is involved, company management should be satis ed that secondary waste generated by these processes is also disposed o at suitably authorized sites. This is particularly true for petrochemical industries reporting disposal of oily sludge/solvents by selling to third parties. It is recommended that companies verify waste disposal techniques after reprocessing and ask these parties to obtain authorization under Hazardous Waste Management Rules.





## Land II

The key consideration in the operation of land lls is the protection of groundwater from contamination by the materials contained in the land ll. Since many States are going for centralized Treatment Storage & Disposal Facilities (TSDF) for hazardous wastes, petrochemical industries, if permitted, can dispose of residuals at these facilities. For details please refer Technical EIA Guidance Manual for TSDF.

## Incineration of petrochemical waste

Incineration is high temperature oxidation which converts process residues, oily sludges, etc., into gaseous products and solid residues (ash) which are less voluminous than the original materials. There are many type of incinerators available providing a potential disposal route for many petrochemical wastes. The variety of wastes for disposal requires versatile incinerators, or the use of a range of types. For destruction of speci c toxic pollutants incineration is an integral part of the process, whereas for rejects from various sources within the petrochemical based production units, may be handled in a common incinerator facility. For details, please refer Technical EIA Guidance Manual for TSDF.

## 5.11 BEST PRACTICES RELATED TO ENGINEERING AND WARNINGS

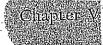
Important elements are the exhaust air extraction systems for relevant parts (where the highest concentrations are expected) system of the production. To improve the exhaust system, it makes sense to maintain extraction at optimum design rate, to partially enclose machinery when feasible and to mark areas with high chemicals emission.

# C.1 General safety management

The e ectiveness of good work practices is entirely dependent on the knowledge and the cooperation of employers and employees. Therefore the employer must take all necessary steps to ensure that:

- Each employee receives adequate instruction and training in safe work procedures, the proper use of all operational equipment, the correct use of protective devices and all emergency procedures;
- Each employee periodically receives refresher sessions and drills to maintain a high level of competence in safe work practices and emergency procedures;





- Each employee is provided with proper tools equipment,
   and personal protective clothing or devices; and
- Each employee is given adequate, responsible supervision to assure that all safety requirements and practices are followed.

Only properly trained individuals should be permitted to access to areas in which exposures to elevated chemicals are likely. All such areas should be clearly identied by appropriate posted warnings.

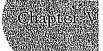
For the prevention of injuries from contact by chemicals based resins and adhesives with the eyes, skin or other sensitive tissues, good work practices include, but are not limited to, the wearing of personal protective garments and equipment as recommended

Work practices, procedures and protective equipment and devices should be developed and utilised so that the likelihood of employees su ering injurious contact with chemicals-based resins and adhesives is minimal. The wearing of personal protective garments and equipment is necessary for additional, positive protection in those activities and accidental situations where exposures are likely in spite of other precautions.

The following work practices and procedures should be observed by all employees:

- Respiratory and clothing protection and equipment should be worn in accordance with recommendation and requirements;
- Tanks, machines, pumps, valves, and lines must be drained and ushed thoroughly with water before doing maintenance or repair work on them. Care must be exercised to avoid contact with the drained or Care must be exercised to avoid contact with the drained or ushed uid;
- Employees shall properly utilise ventilation, enclosures, remote controls, and other engineering or administrative controls provided.





## C.2 Training

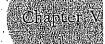
All employees who are assigned to workplaces where there is exposure to chemicals should participate in a training program The work area supervisor or a designated person shall provide training to employees at the time of initial assignment, Whenever a new exposure to chemicals is introduced into work area and periodically thereafter. The Training program should at least include the following

 A discussion of the contents of related regulations and the contents of the applicable Material Safety Data Sheet(MSDS)

The purpose for and a description of the medical surveillance program required including:

- A description of the potential health hazards associated with exposure to chemicals and a description of the signs and symptoms of exposure to chemicals. As a minimum, speci c health hazards that the employer shall address are as follows: cancer, irritation and sensitization of the skin and respiratory system, eye and throat irritation, and acute toxicity;
- Instructions to immediately report to the work area supervisor and to Occupational Health upon the development of any adverse signs or symptoms that the employee suspects are attributable to chemicals exposure;
- A description of operations in the work area where chemicals is present and an explanation of the safe work practices appropriate for limiting exposure to chemicals in each job;
- The purpose for, proper use of, and limitations of personal protective clothing and equipment;
- Instructions for handling spills, emergencies, and clean-up procedures;
- An explanation of the importance of engineering and work practice controls for employee protection and instructions





in the use of these controls;

 A review of emergency procedures including the speci c duties or assignments of each employee in the event of an emergency.

C.3 Minimise
working
time in areas
with
elevated
chemicals
Emission.

To the extent feasible, the working time in areas with elevated chemicals emission shall be minimised. Rotation of the work can be implemented to minimise chemicals exposure.

C.4 Special
requirements
during repair
and
control of
machinery

Workers who have to control and repair in areas with elevated chemicals emissions should have personal protective equipment and should be trained and instructed regularly.

C.5 Chemicals
monitoring
in the work
area

By monitoring the concentrations of chemicals in a company, it is possible to ensure that the environment is healthy and to identify leaks. Any technological change or process or task modi cation justi es a new evaluation to determine that the work environment remains acceptable.

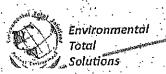
C.6 Medical surveillance

The purpose of a medical surveillance programme is to prevent or detect a disease at the subclinical or presymptomatic stage, in order to take appropriate action to reverse the e ects, or to slow down the progression of the disease towards the clinical status. In addition, the objective is not only to detect adverse e ects in employees, but also to relate the indings to the e ectiveness of exposure control measures.

C.7 Recordkeeping

Exposure Monitoring records should be kept and include:

- The date of measurement;
- The operation being monitored;
- The methods of sampling and analysis and evidence of







their accuracy and precision;

- The number, durations, time, and results of samples taken;
- The types of protective devices worn;
- The names, job classi cations, social security numbers, and exposure estimates of the employees whose exposures are represented by the actual monitoring results.



# ENVIRONMENTAL MANAGEMENT PLAN

### 6.1 GENERAL

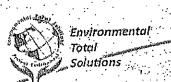
Operation of molasses based distillery is now a standard procedure and pollution problems and proper mitigation measures are known as well as available

Environmental impact in the study area is any alteration of environmental conditions or creation of new set of environmental conditions, adverse or bene cial, caused or induced by the impact of project. The additional impacts of various activities of the proposed project on the environment such as air, water, soil, land use, ecology, and socio-economic were identified. The study also includes the measures to be incorporated in the project to mitigate these impacts. The resultant impacts were assessed for their significance based on the background environmental quality in the area and the magnitude of the impact. All components of the environment were considered and wherever possible impacts were evaluated in quantitative/qualitative terms. Standard techniques and methodologies have been adopted to predict impacts on various environmental components. Estimated impacts have been superimposed over the baseline (pre-project) status of environmental quality to derive post, project scenario of the environmental conditions. The resultant (post-project) quality of environmental parameters is reviewed with respect to the permissible limits. The impacts thus predicted helps to minimize adverse impacts on environmental quality during and after project execution by suitably designed Environmental Management Plan.

The environmental impacts can be categorized as primary and secondary. Primary are those which are directly attributed to the project and secondary impacts are those which are indirectly induced due to primary impacts and include those associated with investment & socio-economic status. The project impact may be broadly divided into two phases.

During operation Phase: These impacts are continuous warranting permanent measures for mitigation and monitoring.

Construction and operation phase of the project comprises of various activities, each of which will have an impact on some or other environmental parameters.







Various impacts during operational phase on various environmental parameters have been studied to estimate the impact on environment as discussed below.

This section reviews the environmental impacts as well as the impacts on the built environment, particularly with regard to demand on the existing infrastructure (road, electricity, water supply, etc.) due to the implementation of the Distillery and Fertilizer Blending Plants at La Baraque These impacts are analysed within the framework of an Environmental Management Plan at various stages during the Project cycle, namely at conceptual development, construction and operation stages.

## 6.2 MANAGING EMISSIONS FROM ETHANOL PLANTS

By their very nature, virtually every manufacturing or processing facility transforms raw materials into a value-added product—and in that process, organic and chemical changes take place that result in emissions of some sort. Ethanol production is no di erent in that regard. Process innovations in ethanol plant design are creating a clear trend toward enhanced emission control. Nearly 190 ethanol plants have been permitted for production in the U.S. These plants are required to meet stringent local, state and federal regulations during both construction and operation. Ethanol plants must stay within air emission limits specified in the permits or face fines or "cease operation" orders from environmental regulatory agencies. Emissions from ethanol production may vary slightly depending on the process, design and feedstock. A variety of emission control technologies are used to control potential air pollutants from ethanol plants.

Dust control equipment monitors the presence of tiny particles (particulate matter less than 10 microns in diameter, PM10) in the air created during the corn delivery, handling, milling and drying processes.

Volatile organic compounds (VOCs) are produced during fermentation, distillation and drying. Potential emissions of VOCs are measured and controlled through plant design regardless of the bio-fuel technology used. Combustion from boilers in the plant generates carbon monoxide, nitrogen oxides, and sulfur oxides If co-product drying is in place, carbon monoxide may also be a result. Again, technologies are in place to calculate and control emissions in compliance with applicable permits—all targeted to reducing the emission pro le of these bio-re neries.







Other emissions may result from activities outside the actual production process including:

- Hydrogen sul de and VOCs released from the wastewater treatment process
- . PM1ofrom the cooling towers
- Fugitive PM10 and VOC emissions from haul road tra c and equipment leaks,
   respectively
- PM10, NOx, SOx, CO and VOCs from emergency equipment

### 6.3 WATER

Concerns about increased demands on water supplies existed well before the advent of the ethanol industry. Growing population in cities, urban sprawl into rural areas, and increased agricultural and recreational demand have placed a premium on water As a relatively new industrial water user, ethanol production has been the focus of a disproportionate share of the water debate even though it ranks near the bottom of industrial water usage rankings

### Water Use in Ethanol Plants

Like virtually all manufacturing and processing facilities, thanol plants use water to do what they do. Depending on plant design and process, water use ranges from 1.5 to 4 gallons for each gallon of ethanol produced. The overall industry average is between 3.5 gallons—down from nearly 6 gallons just a few years ago. Older plants tend to be toward the top of this range, but many are making signi cant investments in key processing equipment to reduce water demand.

Newer plants have more sophisticated, water-conscious designs that put them at the lower end of the water demand scale. Additionally, the water discharged from ethanol plants is heavily regulated; assuring that water is environmentally neutral when it leaves the plant. In an ethanol plant, water is primarily related to energy production: the boiler system that drives the plant and the cooling of process water and equipment.

The U.S. Department of Energy's National Renewable Energy Laboratory estimates 70% of the water demand at an ethanol plant goes to these functions, with the rest entering the fermentation process. If distiller's grains are dried, the water is returned to the atmosphere through evaporation. If the distiller's grains are shipped wet to local livestock operations, the moisture in the product helps reduce additional water requirements of the animals. Because the quality of water coming into a plant can vary, it's more efficient to focus on managing and







reusing the wastewater generated during the ethanol process, which is more consistent and reliable. This is typically "blow down" residual water from boilers and cooling towers or from centrifuges that remove some water from wet distillers grains before shipment."

Some plants are implementing creative ways to reduce water usage including use of "gray" municipal wastewater, return of water to farmers for crop irrigation, management of mineral levels in water supplies—even the development of zero-discharge technology that eliminates waste stream disposal issues altogether. In many areas, ethanol plants must purchase water rights from other users in order to achieve a net-zero increase in water demand.

# 6.4 OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PLAN

The objectives of the Environmental Management Plan are:

The identication of potential impacts resulting from the activities associated with the operation of a Metol (Pvt) Distillery, and the mechanism of these impacts.

The identication of Impact Receivers

- Negative impacts can be generated during the Operational Stage, as a result of:
- Raw materials and chemical spills;
- Release of untreated process e uents with signi cant organic and inorganic loads;
- Solid waste generation;
- Gaseous pollutant emissions;
- Noise pollution, etc.

Hence the main environmental objective of the Environmental Management Plan is therefore to eliminate or abate the negative impacts of the Project on the ecological integrity of its Natural Environment, as well as on its Built Environment. Mitigating Measures deemed necessary to eliminate/mitigate impacts on the Project Environment at operational phases are reviewed in this Chapter.

## Sources of Impacts

Impacts, in general, could be generated by the Project:

# By Activity / Environmental interactions during Operational Phase

They will be identi ed and assessed in this Chapter. The Proponent have decided to presented plans to address these impacts to ensure that the project will, upon implementation of the special measures agreed, comply with applicable laws and regulations.





The information about how these potential impacts will be addressed by the Proponent is described in this section.

## 6.5 IMPACTS AT PROJECT CONCEPTUAL STAGE

## Site selection, history and Present Status

The Distillery is located within the sugar cluster at Matiari. Operation do not result in economic displacement neither it a ect sites of ecological or cultural signic cance. The site location of the Distillery is dictated by the source of raw material (molasses) that is provided by the sugar mili continuously during the crop season and the availability of steam from HESCO. The land is leased/owned by Matol Pvt. Limited Company and a full range of services (electricity, access, industrial and potable water supply) exists within the project area. Furthermore the operation of the Distillery complex do not results in the loss of natural habitats.

## **Aesthetics and Visual Impacts**

At present, the Site forms part of the sugar cluster that includes the sugar mill, the sugar re nery and its Plantation white sugar storage shed, Power station and its associated infrastructure (including the high voltage electricity transmission lines).

At present, the Site does not have any wilderness quality or any species of ora or fauna that would have been at threat or any invasion of any natural habitats as such. In the near vicinity of the Site, there is no un-spoil environment: terrestrial and freshwater. Land in the surrounding vicinity is under cane cultivation mainly at present Impacts during Operation Phase

## Gaseous emissions

The Distillery process operation generates carbon dioxide as the main greenhouse gas from the fermentation section. Steam losses as well as volatile organic compounds losses can be expected but should be minimal.

No Particulate matter per se will be generated during the Distillery operation.

# 6.6 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

Ethanol is a ammable product and hence its manufacture and storage requires a risk screening. On site storage of ethanol is a compound that:







- Is ammable but needs external ignition or heat source to burn;
- Exerts pressure if burn in enclosed spaces;
- If burnt completely produces non-toxic byproducts;

If burnt partially, could produce carbon monoxide Risk screening consists of three stages:

- Preliminary and chemical risk screening;
- Chemical risk screen for major hazards;
- Standards and physical risk screen.

## Preliminary and chemical risk screening

The preliminary risk screening indicates that ethanol distillery process and the raw materials are used at distilleries that operate in Matiari already. Moreover ethanol manufacture from cane molasses is carried out worldwide. Furthermore the ethanol production in Matiari has already been the object of a strategic environmental assessment. The number of bene ts is associated from the project including generation of employment in rule area.

## Chemical Risk Screen Major Hazards

The Ethanol Distillery produces fuel grade alcohol that is a ammable compound. However on the plausibility of catastrophic event that could occur, the following information shows that operation of such project type pose a minor risk. No major accident has been reported. Safety and emergency procedures are available to respond and counter consequences of major accidents.

## Chemical Risk Screen: Standards

The whole Distillery Installation design is risk-based engineering design. Operation and maintenance standards are also incorporated in the design. Furthermore the project site avoids special crisks to local populations and natural systems.

## Physical Risk Screen

Physical risks pertain to transportation, ooding hazards, natural disasters and other onsite and o site hazards. Transportation risks at operation stage transport of raw materials and nished product. Movement of workers to and from site will require private utility vehicles (vans, bus) or/and public transport (bus). The increase in vehicular trace will be minimal as the trace situation on the local roads is considered to be light and moderate.







## Flooding hazards

The Site is not prone to ooding and project presence will not cause any ooding hazard.

### Natural disasters

The Site is not lying on coastal area. Therefore the presence of distillery in the area is quite safe with respect to natural disaster. However outdoor structures as well as buildings are designed to withstand cyclonic gusts.

The Distillery working environment is not exposed to hazards such as high temperatures, pressures, radiation etc. Furthermore there are no high speed machineries in the proposed Distillery.

## **Hazard Analysis**

Ethanol is not a listed compound in the Ecological Risk Assessment Screening threshold based on chemical toxicity by the USEPA. However under the Basel Convention, ethanol is included in the list of Substances with Hazardous Characteristics because of its ammability. It Pakistan, ethanol is a regulated compound under both the Dangerous chemical control Act 2004 and the Hazardous Act 2007.

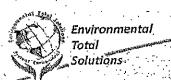
### **Emergency Plans**

The risk associated with bulk storage of alcohol is ammability. Well designed storage tanks and pipe lines are provided with containment to collect any spillage. It has tred with spillage detection and spill collection system. The safety set up of the Distillery Plant will include enter-alia:

- Fire detection system
- Fire ghting equipment; and
- A trained emergency response team
- Emergency plans have been implemented at Alcohol Plant

### 6.7 CONCLUSIONS

The technologies in ethanol manufacture and treatment of waste by products are considered as mature technologies which do not require complex procedures nor necessitate complex tasks. Moreover Distilleries have been in operation successfully for decades in Pakistan. The Design of transport and storage facilities for ethanol has been the subject of constant improvements worldwide over the years. Hence the risks associated with the transport and







storage facilities for ethanol is limited. With all precautionary measures in place during the operation of the Distillery Plant will be a low risk undertaking. It is recommended that a detailed risk assessment be carried out taking into account the other operating entities within the industrial cluster namely the power station, sugar re-nery and sugar mill.

### Impacts of Generation of Vinasse

## Origin and Impact

Vinasse is a byproduct of molasses fermentation and distillation. The rate of production of Vinasse is 30m³/h and the characteristics can be summarized as follows:

- Low pH of around 3.0;
- High COD and BOD<sub>5</sub> concentration;

Presence of nitrogen and phosphate as well as potassium that make Vinasse attractive for reuse as a fertilizer The application of vinasse to the sugar cane—elds is limited to the cane harvest period and since vinasse will be produced by the Distillery also during the inter-crop season. Storage and reuse of vinasse (as is) produced as a fertilizer cannot be stored for extended period without some form of vinasse treatment. Since vinasse can upon uncontrolled fermentation generate foul odors with the production of odorous compounds such as butyric and propionic acids in su—cient concentrations to in—uence the surroundings and cause odor nuisances. Moreover due to its high concentration of biodegradable matter, Vinasse can a ect aquatic life and cause eutrophication of a water receiving body.

### Mitigating Measures

Several mitigation measures have been identied in the Management of Vinasse including its prolonged storage; these are described below.

#### Elimination of Odor Generation from Vinasse

As indicated previously, Vinasse is potentially the main source of foul odor due to its propensity to produce odorous compounds such as butyric and propionic acids among others under anaerobic conditions.

To eliminate the risks of Vinasse fermentation, Vinasse should be processed into CMS as it is being generated during the distillation process. Vinasse from the Distillation column is pumped to the Vinasse tank that feeds the Evaporator Unit. The Evaporator unit consists of







ve evaporators with four-duty and one in cleaning in place. Furthermore all pumps have standby units and consequently the evaporator unit is kept functional during the ethanol manufacture. Hence Vinasse is not kept in storage for processing for more than 2-3 hours.

## Stop the Operation of the Distillation Section

In the event that there is any mechanical failure with the Evaporator Unit, the distillation process is stopped. The above measures in e ect avoid prolonged storage of Vinasse and eliminate the risks of generation of odorous compounds.

## Management of the CMS storage Tanks

Origin and Nature of Impact the CMS storage tanks will contain concentrated molasses solids (CMS) throughout the year. The concentration of vinasse through the evaporation process to produced CMS in e ect removes the volatile acids which reappear in the acid condensates. Removal of volatile acids reduces or eliminates the propensity of CMS to generate foul odors. The CMS contains organic matter and compounds with high associated organic pollutants that can in the long term contaminate ground or receiving waters if there is a direct discharge.

### The Impact

Organic and inorganic pollutants associated with CMS can rapidly deplete the available oxygen of the receiving waters and has adverse e ects on sh and other aquatic life. Contamination of the underground water can occur if a prolonged seepage takes place in a porous substratum.

### Mitigating Measures

The design features of the CMS storage tanks as well as the construction methodologies are central to minimize the negative impacts identied above. The following measures have been incorporated in the design of the CMS storage tanks as mitigation measures:

Ingress of storm water each tank is tted with a oating cover made of HDPE with water collection drains. The water is then pumped to the existing irrigation water channel via a exible hosing piping network

### Air evacuation system

The emptying and lling of the tanks with CMS can cause movement of air entrapped under the HDPE cover. Air chimneys are placed along both lengths of the HDPE cover to allow





movement of entrapped air. The air chimneys will consists of vertical PVC pipes of diameter gomm tted with ne wire mesh-Installation of Leak Detectors Leak detectors are installed below the Aqua-tan bottom impermeable liner in a slotted PVC pipe and embedded into a sand bedding liner.

The incorporation of a leakage detection systems helps to overcome any potential problems of robustness and durability of the Aqua-tan bottom liners for the two tanks. The leak detector system is installed over a specified area so that the location of any leaks can be zoned. These detectors will give an instant warning of the failure of the impermeable membrane and hence appropriate remedial action can be taken. Due to the high viscosity of 3000-3500 c<sup>2</sup>St. (c.f. viscosity of water at 20°C: 1cSt), the in Itration rate will be very low and hence movement into the soil will be very slow if any. This feature will allow reasonable time for remedial actions to be taken.

### 6.8 ORIGIN AND NATURE OF IMPACT

In a Distillery volatile organic compounds (VOC) are generated during the various processes.

The main possible sources of odorous emissions are:

### Fermentation

Emissions during fermentation process that could cause odors are ethanol and several trace volatile organic compounds (VOC). Carbon dioxide (CO<sub>2</sub>) produced during fermentation can act as a carrier for the organic compounds.

Distillation Emissions during the distillation process that could cause odors are ethanol, Aldehydes and several trace volatile organic compounds (VOC). Storage and ethanol loading: Ethanol and VOC odors could come from the storage and ethanol loading facilities. However these emissions would be minimal and are unlikely to have signicant odor impacts.

### Storage of vinasse

Vinasse has a propensity to generate odorous compounds due to biological reactions such as fermentation. The main odorous compounds as well as their odorous threshold limit (OTL) are given in Table below.





Table: List of Odorous compounds and their threshold limits

COMPOUND	OTL (mg/l)	COMPOUND	O'l'L(mg/l)
Ammonia	3.55 X 10- <sup>3</sup>	Skatole	1.0 X 10 <sup>-4</sup>
Acetic acid	2.49 x 10- <sup>3</sup>	p-Cresol	.4.5 X 10 <sup>-6</sup>
Hydrogen sulfide	6.39 x 10 <sup>-6</sup>	Iso-butyric acid	2.97 X 10 <sup>-2</sup>
Propionic acid	3.08 x 10 <sup>-2</sup>	Tri-methyl amine	, 2.00 X 10 <sup>-6</sup>

The relevancy of the above data should be taken within the context of the proposed activity

Mitigation Measures For odor control, the design of various processes has either included equipment per se or additional processes to minimize odorous compounds. Fermentation Equipment Nearly 50 percent of the carbon dioxide gas produced daily by the fermentation section will be further processed into food grade carbon dioxide and bottled in the CO, Bottling Plant.

The rest of the carbon dioxide will be released to the atmosphere via a scrubber which removes VOC as well as ethanol from the exhaust CO<sub>2</sub>.

#### Distillation

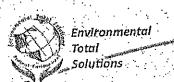
All distillation columns are equipped with condensers that in e ect condense vapors (including organic compounds) to the liquid state. Hence releases of vapors are unlikely during normal operation.

## Storage of vinasse

To reduce the risks of odor generation from fermentation of vinasse, a CMS Evaporation Plant is installed as part of the Distillery to convert vinasse into concentrated molasses solids (CMS). CMS will be stored in storage tanks—tted with a oating cover. In the event of a prolonged break down of the CMS Evaporation Plant, the Distillation process will stop so as to prevent any prolonged accumulation of vinasse.

## The Impact

Organic and inorganic pollutants associated with process e uents of the Distillery can rapidly deplete the available oxygen of the receiving waters and has adverse e ects on sh and other aquatic life. Odor nuisances can also result if anaerobic conditions develop with release of





noxious gases such as hydrogen sulfide Mitigating Measures Several mitigating measures have been identie ed and are described below.

# Direct Reuse of Process E uents

The design of the Distillery processes has incorporated the direct reuse of process e uent streams. Table below summarizes the process streams that will be recycled directly and the process streams that will reappear as process e uents.

<u> </u>		·	100		Comments
Item	Source	Flow	Temp	Composition	Comments
No	<b>公司公司公司公司</b> 第二十二章	m//day			Recycle of acid
	Cleaning of	40	60-65	Acid condensate,	
	evaporators		•	Vinasse	condensate
	(1 e ect daily), 2 rinses	-		& CMS residues	
	Cleaning of	10	60-б5	Acid condensate,	E. uent reused
¥	Fermentors &			beer &	as
	prefermentors	٠.		yeast residues	process water
	pretermentors				for,
		.*			fermentation
	Classical of origination	10	60-65	Acid condensate,	Recycle of acid
2.	Cleaning of evaporator		00 00	Vinasse	condensate -
	platforms			& CMS, nitric acid &	
	The state of the second			caustic soda residues	ë uent
		•	. 1 4 1	Children of day 1 control	
3.	Acid Condensate	526	70	Volatile acids	Reappears as
) · · ·	Alcid Collaboration	. *	•		e uent
			• •		
<del></del>	Flegmasses – water	176	100	7 – 9 pH.	Re appears as :
. 4					e uent
	from	•			
	recti er		<u></u>		

1. Cleaning of spills	10	 30	spills residues	Recycle of acid
	· · · · · · · · · · · · · · · · · · ·			reappears as e uent
2. O2 Sçrubber water	24	35	water with about 0,2% alcohol.	Reuse as process water for fermentation
3. Vacuum water	2	 30	Water containing alcohol	Reappears as e uent
TOTAL EFFLUENT FLOW	. 704 .	 (item 4 +i	tem 5+ item 8	

Direct Reuse of process streams will reduce inter alia:

- The water demand for the Distillery;
- The risks of pollution through discharges;
- Losses of ethanol;
- Acid and alkali requirements for cleaning purposes;





The combined ow of process e uents

As a result of the direct reuse of some process e uent streams, the anticipated quality of the combined process e uent will be reduced considerably with respect to the pollutants such as COD, BOD5, volatile organic acids as shown in Table reproduced below.

Design characteristics for Combined Process E uents

Unit	Value
°C	70
mg/l	3125
mg/l	4700
mg/l	2400
mg/l	<100
	2-5-3-5
mg/l	$<$ d $^{49}$
	°C  mg/l  mg/l  mg/l  mg/l

### 6.9 TREATMENT OF PROCESS EFFLUENTS

The wastewater treatment strategy is also given in the said section. The strategy will be implemented in several phases as follows:

Depending on the characteristics of the wastewater and their associated pollutant loads (COD, BOD5, etc.), following options is in place.

Anaerobic digestion with production of renewable energy from biogas generation with Anaerobic digestion without production of renewable energy from biogas generation with or without Aerobic polishing of the e-uents so that the treated ef-uent conforms to its reuse for irrigation For the same ow, the concentration of in uent COD of the wastewaters will con-rm the energy recovery component of the strategy.

Monitoring of the water quality of the treated e uent is recommended that the quality of the process e uent streams be monitored to ensure that the plant produces consistent e uent quality. A water quality monitoring plan will be elaborated for the combined process e uent. The parameters that need to form part of the water quality monitoring are: COD; BOD; total kjedahl nitrogen, phosphorus, total suspended solids, total dissolved solids, temperature and



pH. The frequency of monitoring shall be at least once daily when plant is operational. A monthly analysis by an independent laboratory shall also form part of the monitoring plan.

#### Nature of the Impact

Negative impacts on the local surface and underground waters may result from domestic e uents, if these are allowed to reach the local water table and surface waters with their inherent pollution loads.

With reference to the Recommendations for Quality Limits of E uents for discharge in the water table or surface, discharge of untreated sewerage will not be allowed. This impact must therefore be mitigated.

#### Mitigating Measures

The simplest way of eliminating biological pollution would be to treat the sewerage produced by means of a septic tank with the appropriate retention time and with correctly dimensioned and designed leaching elds. Thus the e uents ultimately released from the leaching eld will have the quality described in Table 6.4.3.4.1.1 above. The above system will operate e ciently as long as regular maintenance of the system is also carried out. Maintenance consists mainly of ensuring that there is no/little sludge carry over to the leaching eld; hence a de-sludging of the septic tank at least once every year is recommended.

### Noise from Distillery

Origin and Nature of Impact Noise generated in the Distillery during its operation is not significant and below ambient noise levels. The main sources of industrial noise in the site vicinity at present are from the sugar factory during the crushing season (December to April), the Power Station (nearly all year round). As the Distillery consists of only pumps and fans as moving equipment the resulting ambient noise level will be below the maximum permissible levels.

Noise surveys are regularly conducted around the distillery. Intensity of Impact Noise levels as sound pressure, db(A) should be taking into account as the varying sensitivity of human hearing or sound at di erent frequencies. Sound pressure levels are not additive, the mean square of the pressures are added and then reconverted to sound pressure level values. If there are any di erences in the sound levels from two sources the combined level will exceed the higher of the two levels but always by less than 3 dBA and the noise levels at stations closer to







the stacks did not exceed 70 dB(A) in the case of any other area and at any time as stated in the standard.

The noise level at residential area) should be always below the maximum permissible limit (For residential areas, the maximum permissible limit during both day and night times are 60 and 55dBA respectively).

### Mitigation Measures

Most of the process equipment of the Distillery (e.g. compressor for the CO<sub>2</sub> bottling Plant) will be housed inside an enclosed building and this will attenuate the noise level generated by the processing equipment.

The plant is located even further away from the residential areas of thereby contributing in spatial attenuation of any noise from the site. At design stage measures were taken into account to attenuate the noise level such as the use of noise proo ng measures (such as Flexible couplings to dampen transmission of engine shaft tensional vibration, Flexible hoses and bellows for connection to external piping networks, adopt anti-vibration mounts, sound deadening casings and silencers for noisy machinery particularly those located outside of buildings As part of the environmental monitoring plan, noise monitoring will be carried out, at operational stage, around the Distillery twice per year. It must be noted that as part of the Environmental Monitoring Plan, Noise survey is conducted regularly around the sugar cluster (re nery, Power Station and sugar mill).

### The Impact

Some of the Plant and Equipment of the Distillery will be located on concrete platforms and occupied by buildings with water collecting structures like roofs, paved areas, etc. Storm water build-up contaminated with dust, hydrocarbon spillage from tra c (Lorries and other heavy vehicles) on paved (asphalted) accesses and parking areas, etc.

#### Mitigating Measures

The Site will be provided with a peripheral drain, to intercept all runo. All loaded runo induced by rainfall or not, will be intercepted, collected and treated before release to the environment. The discharge of the storm water will be in the existing drain. The treatment process will involve placing a hydrocarbon separator, a mud/silt trap and trash rack in the runo collector prior to discharge the said drain.





### 6.10 IMPACTS ON PUBLIC ROAD INFRASTRUCTURE

Origin and Mechanism of the Impact The implementation of the Distillery, CO<sub>2</sub> Bottling Plant and CMS Fertilizer Blending will increase the road tra—c in the vicinity of the Project Site. However with regard to the Distillery Plant, the tra—c due to the movement of molasses will not change as the molasses produced by the sugar mill (about 45,000 tons per milling season) will be used by the Distillery but an additional 45 ocotonnes of molasses will need to be transported to the Distillery from other sugar factories. Hence the tra—c due to movement of molasses will not change. Additional tra—c at operational stage will be due to the road transport of:

- Transport of employees to and from Site
- Other Distillery consumables
- Movement of ethanol tankers from Metol to the Karachi port
- Movement of CO<sub>2</sub> tankers from Metol to soft drinking companies

#### Mitigating Measures

The additional trace due to the operation of the Distillery complex has no signicant negative impacts on the regional network.

#### Chemicals

Chemicals represent a health and safety hazard to employees and if discharged into the environment can cause impairment on the quality of the receiving medium.

#### Mitigation Measures

In the immediate, the priority shall be focused on the development of a Chemical Management Plan. The Plan should take also the provisions in the Dangerous Chemicals Control Act 2004 particularly identication, handling, storage, disposal, health and safety measures, etc. All chemicals shall be stored in a locked chemical storage room, which will be designed to contain any spills that might occur. The chemicals will be transferred manually from this room directly to the particular section of the plant where they are used, thereby eliminating the possibility of large spills in the main processing areas. Passive/active ventilation will be installed in the room. A Spill Prevention and Management Plan will be developed and implemented in chemical storage areas. An inventory sheet shall accompany all chemicals brought into the plant. Copies of all inventory sheets shall be kept in key locations throughout the factory, and these include the Material Safety Data Sheets (MSDSs) for each







chemical. The MSDSs provide handling and treatment information in the event of an accident or spill. Plant employees shall receive training on the chemical inventory sheets, as well as the function and hazards of each chemical used in the factory. Chemical supplies shall be handled appropriately to minimize hazards. Health and safety is handled appropriately throughout the plant, with proper equipment guarding and use of personal protective equipment (PPE). For all chemicals, warning labels on containers and Material Safety Data Sheets (MSDSs) in English/Sindhi/Urdu are required with delivery of chemicals. Precautions described in the MSDSs shall be incorporated into the hazard assessment. A Hazardous materials audit shall be carried out. Hazardous or toxic chemicals should be stored and handled in accordance with manufacturer's recommendations. Material Safety Data Sheets will be used to monitor and control the use of all chemicals. Suppliers of equipment and raw materials will be involved in the development and presentation of training on the safe use of all equipment. Equipment and raw material suppliers will be consulted during the commissioning of the plant to ensure that equipment is properly installed and operated.

### 6.11 GREENHOUSE GAS EMISSIONS

The carbon dioxide produced during the fermentation process is released to the atmosphere at ethanol plant. It is estimated that the release of CO<sub>2</sub> during the fermentation process is between —— to — tones CO<sub>2</sub> per day. With the operation of carbon dioxide bottling plant at Metol, nearly 40percent of the carbon dioxide (—— tones CO<sub>2</sub>/year) will be recuperated and transformed into food grade carbon dioxide for the soft drink industry both for the local market. This new source renewable source of carbon dioxide for the local soft drink industry will also have a positive impact. The introduction of blended gasoline for the local market will reduce the greenhouse gas emissions from the local transport sector as the net emissions from bio-fuels are generally less than petroleum.

#### Refrigerants

Source and Origin of Impact Ammonia as refrigerant will be used in the compressor unit of the CO<sub>2</sub>Bottling Plant. It is estimated that about ——kg of ammonia will be required. Ammonia leaks may occur due to faulty seals at compressors, valves etc. Ammonia has a low threshold detection limit (3 to 5ppm) and can be detected by smell due to its pronounced and distinguishable odor.





### Potential Impacts

The e ect on the respiratory system is violent and only very small quantities can be breathed safely. About 0.35 volumes per 100 volume of air are the strongest concentrations one can sustain for any length of time. Hence any release of ammonia represents a potential negative. impact for human beings:

### Mitigating Measures :

The risks of ammonia release in su ciently large volume are minimal. This is so because ammonia technology for refrigeration is well established. Process Control to prevent such release from occurring, is considered as the state-of-the art in process control. Similar process control will be implemented at the proposed facility. Process Control includes ammonia leak detectors and automatic safety valves.. In the event of small leakages of ammonia, breathing apparatus and special out ts are available to workers, particularly when repairs are undertaken. On the natural environment ammonia release has no direct impact.



# Conclusion

### 7.1 INTRODUCTION

M/s. Matol Distillery Ltd. (MDL) is operating a fully integrated 100 KLPD distillery plant at Deh Pannu, Nasarpur Rd., District Matiari in the ptovince of Sindh, Pakistan on 122 hectares land.

### 7.2 PRESENT STATUS OF TREATMENT AND DISPOSAL

Matol Distillery Ltd. has taken certain measures to reduce environmental pollution, and recycling system of waste water.

#### Waste water treatment

#### Recommendations

.For 60% of remaining Oil & Grease they have to add gravity bage wall system or di used air blower system or both, if required, in existing system.

### **Biogas Plant**

They installed Pilot Plant (Biogas technology Pilot Plant for wastewater management, to generate energy and to reduce the volume of COD.

### Waste heat recovery system

Heat that usually factory emits is captured and pumped back into system although it is not 100% and it reduces carbon emission from the atmosphere.

The stack temperature after economizer is still above 200 centigrade which can be brought down to 120 centigrade by increasing the economizer size or by introducing air heater in the combustion. The height of the stack is 26 meters.

The plant has excess exhaust steam above 13 tons per hour load during power sharing which is between 17  $\sim$  18 tons per hour (excess of 4  $\sim$  5 tons per hour). The urgency is felt for waste heat recovery system like de-aerator system on Boiler Feed water etc.





### Green belt development plan

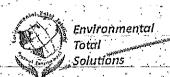
Matol Distillery Ltd l is grown number of plants in and around facility. Which have an ability to grow in low pH soil and toxic environment.

### Fire ghting facility

Matol does not have HSE Department and for that reason registing facility is being handled through security which is not recommended.

#### 7.3 OBSERVATION

- 1. There are no protected forests, sanctuaries, archeologically important structures or other sensitive locations in the vicinity of the factory except the canal near village deh pannu. Therefore, the proposed industry will not have adverse e ect on the environment or the eco system.
- The boiler and turbo generator to be provided in the power plant are of highe ciency and maximum built in safety.
- 3. Fresh water requirement to the proposed industry is 1891 m3/d. The industry has obtained permission to draw water needed for the proposed project.
- 4. E uent generated from the proposed sugar plant will be treated in ETP of 720 m<sub>3</sub>/d capacity & the distillery unit in MEE or biomethanisation plant. The domestic sewage will be stabilized in septic tank & the over ow from septic tank will be treated in sugar plant ETP.
- 5. Air emissions from the project will be the ue gases from 130 & 18 TPH boilers. Boiler is red with bagasse, agro waste, coal or concentrated spent wash. Suspended particulate matter is the main pollutant in ue gas, Boilers are proposed to be provided with adequate stack heights (82 & 45m for 130 & 18 TPH boilers) and ESP, wet scrubber to control pollution from the flue gases.
- 6. Boiler ash contains plant micronutrients. This is mixed with press mud and supplied to the farmers for use in sugarcane lands as soil conditioner cum nutrient.





- 7. This industry does not produce any toxic products and does not have signi cant adverse e ect on the quality of land, water and air. The industry has taken all the necessary preventive measures to mitigate even the small e ects which may be caused by industrial activities.
- 8. The industry adopted an e ective environment management system and environment management plan to protect the environment. Due priority is given for greenery development and rain harvesting in the factory premises and around. Environmental management plan and suggested measures for pollution control are proposed for protection of environment and to seek environmental clearance to the project:

#### 7.4 FINDINGS

- Matol limited is located on land that is designated rural;
- Sheds are naturally ventilated and have potential for increased odor and dust on neighborhood i.e. at surface;
- The site is suitable for ethanol production as it is Situated in sugar cane cultivated area and there are numbers of sugar mills nearby areas and connected to road links
- The minimum quantity of CO<sub>2</sub> emitted from the fermented is washed in CO<sub>2</sub> scrubber and the clean CO<sub>2</sub> air alone is being vented to atmosphere. Hence in this project, there is not being any chance of air Pollution. For better atmosphere the proper ventilation will be provided in the structure. In addition the boiler stack is 15m;
- Settled Yeast Sludge is collected, dried and used as a fuel; however it creates odor nuisance needs to be look after.
- The Potash rich ash from boiler is collected and disposed as fertilizer rich in potash and phosphate;
- There is no hazardous waste generated from the facility; except sludge
- The noise pollution is totally under control after the installation of a new
   3MW Turbine generator set.







- Occupational health and safety performance has been evaluated against internationally published exposure guidelines, of which examples include the Occupational Safety and Health Administration of the United States (OSHA), it is observed that there are no major issues of concern in the facility at present and performance is as per guide lines;
- Even though the factory is taking a lot of care to avoid pollution, some of the points like proper treatment of industry e uent and drainage facility.
- The factory has planted quite large number of trees in the factory premises indicates its concern towards environment. However, it is recommended that they should plant those types of plants recommended in audit report which help in reducing ash and gases emitted from the factory;
- Factory is not consuming Sui gas as a fuel which indicates the conservation of energy and friendly attitude towards environment. Water consumed since for in-house, domestic and Plantation is constant and su cient quantity of the water they are recycling and using in Boilers. This indicates their seriousness towards friendly environment;

#### 7.5 PRESENT STATUS IMPLEMENTAION PLAN UPDATE

Matol, since its inception, is trying to contain the hazardous or ill effects by taking different steps which are stated below:

#### Anaerobic digesters

Matol have installed digesters and provided training to its staff in acquiring this proven technology. By adopting this technology the concentration of BOD and COD is reduce approximately by 65%. It also helped in controlling the temperature, pH and sulfur content of the effluent released from the digester is under control within SEQS permissible limits.

#### Efforts in hand

Matol is in consultation with foreign solution providers viz Mr. Kevin Bao, U & D Environmental Science and Technology Co., Ltd Chine, Mr. Kweehuat of M/s Sound







Global Limited, Singapore, Susan Ge, Trade Manager, LinHai Geyin Import and Export Co. Ltd. China and Mr. Rajan Sunil, W.O.G. Technologies, Singapore.

#### Green belt

The purpose of a green belt around the industrial site is to capture the fugitive emissions, attenuate the noise generated and improve the aesthetics. Matol has planted large number of trees around there lagoons and adequate attention has been paid for their maintenance and protection based on the geology, soil condition and topography of the site area.

#### Lagoons

Lagoons are shallow, often elongated bodies of water separated from a larger body of water. Matol has developed an open channel around the lagoons and aerators to increase aerobic digestion of the treated spent wash.

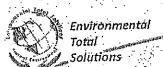
#### 7.6 WASTEWATER TREATEMENT

One of the most important environmental problems faced by the world is management of wastes. Now-a-days emphasis is laid on waste minimization and revenue generation through byproduct recovery. Pollution prevention focuses on preventing the generation of wastes, while waste minimization refers to reducing the volume or toxicity of hazardous wastes by water recycling and reuse, and process modi cations and the byproduct recovery as a fall out of manufacturing process creates ample scope for revenue generation thereby o setting the costs substantially.

The cost of e uent treatment in distilleries is likely to be compensated substantially by availability of methane gas. E uent application will reduce the nutrient requirement through fertilizers. However, high salt load, mainly potassium and sulfur, into the soil system may hamper the sustained crop yields due to continued long-term application of e uents. Therefore the e ect on crop productivity has to be visualized on long-term and sustainable basis.

#### Recommendations

For betterment of the industry the following recommendations are suggested:





### Water consumption in distilleries (In plant control-reduce/recycle)

Tresh water requirement for process and non-process applications in distilleries need to be reduced by recycling Spent Wash and low strength waste water after proper treatment. The low strength waste water includes spent lees, air blower water, vacuum pump water, pump gland cooling water, evaporation process condensate, cooling tower /boiler blow down, etc. It is therefore suggested that non-process water and process water streams may be segregated and treated separately. Technologies that are available may be deployed for treatment/polishing of low strength waste water generated in distilleries. The treated low strength waste water may be recycled in process and non-process applications helping to reduce fresh water requirement in distilleries.

### Raw material quality

i. Fermentation is the most crucial step of distillery plant operation and is dependent on quality of raw material, appropriate strain of yeast being used and process control facilities. Availability of good quality of molasses is bene cial to the sector. Distilleries may not be treated as e uent treatment plants of sugar mills and there is a need for both these industries to work in close cooperation for mutual bene t. It is recommended that molasses with High Brix, better TRS & less volatile acids be made available to distillery.

#### Fermentation process

Yeast based Fermentation process using Saccharomyces cerevisiae, for ease of handling and process economics still remains the rst choice for industrial ethanol production, though many other classes of microorganisms have been studied over the years. Industrial yeast strains have been developed over the decades by public and private institutes in the country. A Yeast strain that can withstand osmotic stress conditions due to high viscosity and total sugar content in molasses feed stock and can adapt easily by modifying their metabolic activities to avoid substantial viability loss is preferred by the industry. However, the Indian distilleries generally prefer to use their own isolated strains rather than procuring the high e ciency strains at a cost, perhaps





due to lack of authentic data and cost bene t ratio worked out at operational scales by the developing institutions.

#### Therefore:

- i. Collation of authentic and dependable data on available Yeast strains developed in various public and private laboratories for attributes indicated above may be considered. Authentication for industrial use of these strains need be established through a pilot study conducted in industrial setting.
- the conditioning of molasses by addition of di erent additives like EDTA, Potassium Ferrocyanide and Zeolites etc. capable of neutralizing the inhibitory e ects of undesirable components in molasses have been considered. Besides, the addition of a minimum inhibitory concentration of acids to molasses will stop bacterial growth and increase ethanol yields as well as avoid the need for antibiotics for infection control. Fermentable substrates (molasses) may be supplemented with nutritional elements/factors for promoting the yeast growth. Low cost commercial enzyme complex of amylases, cellulases and amylopectinases is recommended for use to allow the conversion of nonfermentable substances into fermentable compounds. Cost bene it for such additives need be established for various types of molasses used by distilleries.
- iii. high sugar concentration in the fermentation feed stock leads to high alcohol accumulation which in turn retards the overall process and productivity. Therefore, apart from using a high alcohol tolerant yeast strain, the entire process for up and down stream can be integrated in such a manner that ethanol is recovered from fermentation broth as it is produced. A fed batch or semi-continuous fermentation process with continuous alcohol distillation through a loop reactor can be a useful alternative process. However, it needs to be tried and tested in an industrial setting, even though a number of reports for its advantage are available in public domain.





### Treatment of Spent Wash

A closer examination of the constituents of the Molasses and Spent wash reveals that most of the constituents are carried from the Molasses. The excess calcium, phosphorous and sulfates are the result of clarication and sulfates are used in the sugar production. The rest of the elements come from the sugar cane. The spent wash is rich in Potassium, Nitrogen, and phosphorus and good for soil. Therefore e orts must be made to fruitfully utilize the spent wash for agricultural applications. The following measures could be considered:

- i. The COD of the spent wash in some cases can increase to about 2,00,000 to 2,50,000 mg/L due to the installation of integrated evaporation. This concentrated Spent Wash can be an-aerobically digested (Thermophilic and mesophilic digestion) to reduce the COD. Even if the anaerobic digestion system works for higher COD spent wash, COD of the digested e uent will be at the level of 70,000 to 1,00,000 mg/L as COD treatment e ciency is usually in the range of 60 to 65%. Therefore, research e orts must be made to substantially reduce the COD and BOD to meet the permissible norms. Sulfates in the spent wash will also increase in the same ratio as COD due to the installation of integrated evaporation system. Due to this, sul de level in the digester will increase beyond the inhibition level and a study is required to understand the process stability of anaerobic digester under these conditions.
- ii. Lately pulsed corona technology is being used to enhance the anaerobic biodegradability. This technology may be tried for biomethanated spent wash. A research project is necessary to understand the dynamics of pulsed corona technology for the enhancement of biodegradability of biomethanated-spent wash.
- iii. The possibility of treating raw spent wash using anaerobic membrane bioreactor (AnMBR) needs to be studied so that in the single digester biogas and pure water could be generated simultaneously. Reject from the membrane could be used directly with press mud for composting.





iv. Generation of electricity from wastewater employing MFC is emerging as one of the futuristic technology. Therefore, it is suggested that MFC technology may be tried for spent wash to understand whether distilleries would bene t from such technologies.

### Controlled land application of Biomethanted spent washes (BMSW)

Controlled application of BMSW may be bene cial for reclamation of sodic soil as BMSW has large quantity of Ca & Mg compared to Na, and if the soil is well drained soluble salts of Na can easily leach out from surface soil. Pre sowing application of BMSW followed by two irrigations can leach out soluble salts from surface soil for better germination and growth of the crop.

For preseason sugarcane crop the recommended dose of NPK is 340:170:170 based on the nutrient contents in BMSW. The calculations for BMSW quantity to be applied to full the nutrient requirement are as below:-

The present protocol of controlled land application of BMSW is based on N content in BMSW (@1.0 kg N/m3) and RDN to be applied per ha. The quantum of BMSW is very high and can create water permeability and salt accumulation in clay soils and also ground water pollution in coarse textured soils.

Tables: Following are the some suggestions based on the contents of BMSW and the quantity of BMSW to be applied in sugarcane.

A) BMSW application on the basis of N requirement (340 kg /ha) of sugarcane

N content	Total . BMSW to .	Nutrients add BMS	ed through W (kg/ha)	170 m3		Othe	r essentia	l nutrients			Na added
in.	be added	N.	P	K.	Ca	Mg	ŞO₄	Mn	. Zn	Cu.	- (kg/ha)
BMSW	for 340					. :				1- / /	1 1 1.4
	kg/ha N					-			· · · · ·	1 2 2 2 2 2 2	7 7 7 7
1 kg /m³	340 m <sup>3</sup>	340	.272	3050	1360	680	1088	1.7	1.7	0.34	340
					ļ <del>.</del>					1	
Remark .		, No additional	Excess by	Excess							
รรองกุอออกกัร ธ	88888888888888888888888888888888888888	use of Notices	102 kg No need	.bγ 2890kg	1501 1650	910 BE135	ngiveeffet.	19881188B	100001		10:00
BUNGARA CON	Letter Bullet	terruizers	X24 62 18 18 18 18 18 18 18 18 18 18 18 18 18	7 305 4300 305 4	willed	0098114881	afafestoafas	solijadsjuga	કો <b>ઇઇઇઇઇઇઇઇઇ</b> ઇઇ	Merrelly	160 101 801
			extra P	need to			· .	: 5.			
1	:			add		l `.	l		<u> </u>		







P	Total BMSW	) BMSW app Nutrients ad-				Othe	r essentia	al nutrients	(Kg/ha)		Na .added (kg/ha)
content	to be	- N	Р	·K	Ca	. Mg	.SO4	Mn	Zn	Cu	(kg)na)
BMSW	added for 170		}							<u>.</u>	·
1.0	kg/ha ? 170 m³	170	1.70	1700	680	340	544	0.85	0.85	0.17	170
kg/m³ Remark		Additional use of 170	No additiona	Excess by 1530 kg							
		kg N through Urea is	fertilizers	2000 Kg							

In some cases, RDP of sugarcane and P content in BMSW (@1.0 kg P/m3) is considered the BMSW requirement will be 170 m3 and if RDK of sugarcane and K content in BMSW (@9.0 kg K/m3) considered, quantum will be 19 m3.

It is recommended to consider BMSW application rate on the basis of K content in e uent and K requirement of crop and the soil type which will be less in quantum, easy to use and fewer problems in soil. However, continuous use of BMSW will create water permeability and lead to salt accumulation in soil. Therefore, limited use of BMSW with permissible BOD is desirable for controlled land application.

C) BMSW application on the basis of K requirement (170 kg /ha) of sugarcane

. N	Total	Nutrients adde	d through 68 (kg/ha)	m3 BIMSW		Other	essential	nutrient	s (Kg/ha	)	Na added
content   in	BMSW to be	. N	P	K	Ca	Mg	SO <sub>4</sub>	Mn.	Zn :	Cu	(kg/ḥa
BMSW	added for 170.		· · ·				!				
9 kg/ m³	kg/ha K 19 m³	19	19	171	76	. 38:	60.8	0.095	0.095	0.019	19
Remark s		Additional use of 306 kg N through Urea is required.	Additional use of 151 kg P through SSP is required.	No additional use of K — fertilizers required	,						

A long term comprehensive research project on these aspects should be undertaken to verify the above hypothesis in various types of soils in di erent agro-climatic zones of Pakistan for di erent crops along with national agricultural institutes. Help can be





sought regarding the use of BMSW for ferti-irrigation in countries like, Brazil and Australia.

Reviewing the magnitude of pollution potential of distillery wastewaters and the experiences gained over years on recovery of residues and treatment of wastewater the following recommendations are made:

In-plant control measures for conservation and reuse of water and good housekeeping for prevention of spillage and leakages should be the prerequisite.

- For recovery from the treatment of distillery spent wash, depending on the availability and cost of land in a particular area, simple treatment in anaerobic lagoon to generate biogas followed by treatment in aerated lagoon or oxidation ditch may be considered. Where the availability and cost of land are the main constraints, activated sludge type of aeration treatment in a deep oxidation ditch would be more economical than the conventional or extended aeration sludge process.
- For the treatment of distillery spent wash, removal and/or recovery of yeast should be prerequisite to reduce the load and eliminate certain undue problems in the waste treatment/recovery plants. This recovered yeast can be utilized as a good cattle feed. Recovery of spent grains and yeast and their utilization as animal feed and feed supplement might be encouraged not only for reducing the pollution load form the wastewaters but also in providing for a reasonable return on their capital investment of the industry.
- Where the availability of land is a severe constraint, evaporation and incineration of distillery spent wash to recover potash would appear to be the only choice. In spite of high capital investment required for such type of plants, heat recovery would defray signi cantly the organization and maintenance costs and contribute towards conservation of energy.
- In the countries like ours, where indigenous sources of potash are scarce or not available, recovery of potash from crude ash by evaporation and incineration of





spent wash would appear to be an economically attractive alternative. If heat recovery is simultaneously used, the payback period of the plant can be substantially reduced.

- Anaerobic digestion of spent wash in a closed digester followed by its treatment under an activated sludge process, especially in an oxidation ditch to reduce costs, might be adopted as the most cost-e ective system for the distilleries which are located away from sugar factories. Moreover, the treated e uent can be conveniently used for irrigation of cane elds or other crop lands, subsequently.
- Biogas generated from the distillery e uents, can be e ectively utilized in production plant boilers thus saving about 50 to 60 percent fuel/steam. The treated e uent having almost all the potash retained in it may be utilized for irrigation purposes.
- The utilization of the distillery e uent in agricultural elds will not only enrich these further with essential plant nutrients like nitrogen, phosphorous and potash but also compensate the expenditure on fertilizers for crop growth. This practice will result in revenue generation and further lead to o setting the costs substantially.
- Similarly spent wash utilization in bio-earth composting, where adequate land is available, being a simple process and not involving any heavy machinery is also one of the cost e ective methods of disposal. Moreover it is feasible alternative for utilization of treated e uent; as the same generates revenue thus o setting the costs and further leading to reduction in payback period.
- The storage and transportation of bio-fuels are areas in which risk assessment and management need further attention.
- Ethanol production facilities tend to be in rural areas that have little medical infrastructure. It is therefore recommended to increase medical capacity in these areas? It is also recommended to add 3 to 4 lagoons in present set up to increase the e-uent retention and it will help in reducing COD.



Install 8 aerators in the Lagoons which will further reduce COD by 3,000 mg/liter. Install one or more post digester to further reduce COD by another 2000 mg – 3000 mg/liter Complete ETP plant comprising UASB, and AHR combined system together with balancing tank and equalizer by 2017-18 which is expected to expected to bring COD level to required level.

#### 7.7 CONCLUSIONS

The Matol distillery plant of 100 KLPD capacities at Matiari is technically sound and environmental friendly. The conclusions of the project report may be drawn from the following points:

- This industry is manufacturing Alcohol which is in good demand for growing infrastructural facilities in Pakistan and abroad.
- This project is very necessary in view of making useful material available to Pakistan developmental activity for community, defense and as a foreign exchange saver/ earner product.
- Baseline environmental status, anticipated environmental impacts and mitigation measures have been prepared and included in the report to ensure there is no damage to the existing environment
- To check post project scenario a post project monitoring program is included in environment management plan
- All the activities of distillery units will be con ned to the acquired area of
- Distillery operations from both processes will be zero discharge projects.
- The by-products (bagasse, press mud and molasses) produced from sugar manufacturing process will be used in distillery process for manufacturing of Recti ed spirit, Alcohol, Ethanol, Electrical Power and biogas etc.
- The unit will generate power from renewable resources bagasse.
- Being agro based industry it will o er ready market for local sugar cane growers
- Preference is given to local population for employment as well as in awarding works contract to ensure small scale industries are promoted in the area.
- In view of such several advantages the management requested
- public to award their approval for the project





### Concluding remarks

- \* The facility meets the objective of environment compliance:
- Compliance with regulations;
- E ectiveness of pollution control and prevention;
- Steps are taken for reducing water consumption;
- Conformance to a environmental management system;
- Plant control measures are provided for good housekeeping and proper management practices.
- To achieve, the standard required as per consent guidelines of EPA for industrial e uent certain modi cation are rewired as suggested earlier including anaerobic treatment of waste water in addition to lining of the lagoons.

Overall, the distillery plant activities are satisfactory with respect to air emission and noise level. This can be further improving if proposed, described and recommended mitigation and environmental management measures are implemented as per report. The administration of the facility should also comply with all relevant statutory requirements and standards and submit e uent. Air noise emission reports as per requirement.

"From the renewable energy approach, in terms of reducing GHG and introducing a new technology into the country, the project is positive

### 7.8 OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

Opportunities for improvement simply re ect an auditors opinion, acceptance of these opportunities would strengthening HSE management system, but not imply, non conformance.

- Recording periodically the liquid waste, air emission and noise pollution;
- Installation of ∫ ow meter for the measurement of e√uent ∤ow;
- Various records and forms should be maintained to keep a record of health and safety performance;





- \* Strategies are made for collection, segregation and proper disposal of all sort of waste;
- Dedicated area for waste management in facility premises for collection;
- Maintaining proper records for various types of waste
- Various records and forms should be maintained to keep a record of health and safety performance;
- Display of health, safety and environment posters.
- Each employee working in the unit area must be provided with, and required to wear, adequate clothing and equipment for the task and the area of the work (Gloves, Safety Goggles, Respiratory protective equipment, etc).



# SEOS FOR MOTOR VEHICLE AND NOISE

	he Motor Vehicle Ordinano	ce (1965) and Roles (1969)
Parameter	Standards (maximum	Measuring method
	permissible limit)	
Noise	85dB(A)	Sound-meter at 7.5meter from the source

Í	Proposed National E	nvironment	al Quality Sta	andard for No	ise	
S.	Category of Area	Effective	e from 1 <sup>st</sup>	Effective fi	from 1 <sup>st</sup>	
No.	/ Zone	Janua	гу, 2009	January,	2010	
		Day	Night	Day	Night	
1	Residential area	. 6	5	5	4	
2	Commercial area	7	6	6	5	
3	Industrial area (C)	8	7	7	6	
4	Silence Zone (D)	.5	4	5	-4	
Note: 1	Day	time hours	6,00 a. m to	10.00 p. m		
. ,2 .	Night	time hour	s: 10.00 p. m t	o 6.00p. m		
3	Silence zone; Zo	one which a	re declared a	s such by con	petent	
	authority. An are	a comprisi	ng not less th	an 100 meter	s around	
	hospital	s, education	nal institution	ns and courts		
4	Mixed categorie	es of areas r	nay be declar	ed as one of t	hë four	
	above-mentio	ned catego	ries by the co	mpetent autl	ority.	
*dB(A)	Time weighted av	erage of th	e level of sou	nd in decibel	on scale	
Leq	A wh	ich is relata	able to humai	n hearing.		





# <u>ANNEXURE-II</u>

#### SEOS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS

	Table 3.5: National Environmental Indust	Quality St. rial Effluer		al & Liquid	
S,	Parameter	Into	Into Sewage	Into uni	it
#		Inland '	Treatment	Sea	
1.		Waters			*
1 🗸	Temperature or Temp. increase	<3	3	<b>3</b> 0	C
2 🗸	pH value (H+)	6-9	6-9	6-9	1971. 1
3 ,	Biological Oxygen Demand	80	250	80 mg	<u>5/L</u>
/	(BOD) <sub>5</sub> at 20 <sup>o</sup> C				
4. V	Chemical Oxygen Demand (COD)	150	400	400 mg	<u>:/1</u> :
5	Total Suspended Solids (TSS)	200	400	200 mg	
6	Total Dissolved Solids (TDS)	. 3500	3500	3500 mg	
7 \	Oil and Grease	10	. 10.	_10 mg	
8	Phenolic Compounds (as Phenol)	0.1	0.3	0,3 <b>m</b> g	
`_9_	Chloride (as Cl-)	1000	1000	SC mg	
10	Fluoride (as F-)	10	10	10 mg	
11	Cyanide (as CN-)total	1.0	1,0	1.0 mg	z/1
12	An-ionic detergents (as MBAS)	20	20	20 mg	g/1
13	. 2-	600	1000	SC mg	
14	Sulphide (S2-)	. 1.0	1.0	10 mg	<u>z/1                                    </u>
15	Ammonia (NH3)	40	40	40 mg	<u>z/1·</u>
16	Pesticides	0.15	0.15	0.15 mg	
17	Cadmium	0.1	0.1	0.1 mg	<u>r/l</u>
18	Chromium (trivalent and	1.0	1.0	1.0 mg	
10	Copper	1.0	1,0	1.0 mg	<u>r/l</u>
20	Lead	0.5	0.5	0.5 mg	
21	Mercury	0.01	0.01	0.01 mg	<u>z/1</u>
22	Selenium	0.5	0,5	0.5 mg	
23	Nickel	1,0	1.0	1.0 mg	
24	Silver	1.0	1.0	1:0 mg	z/l
25	Total toxic metals	2.0	2,0	2.0 mg	
26	Zinc	5.0	5:0	5.0 mg	<u>z/1·</u>
27	Arsenic	:1.0	1.0	1.0 mg	
28.	Barium	1.5	1.5	1.5 mg	į
29	Iron	8.0	8.0	8.0 mg	
30	Manganese	1.5	1.5	15 mg	
31	Boron	6.0	6.0	6.0 mg	
32	Chlorine	1.0	1.0	1.0 ms	<u>7/1</u>



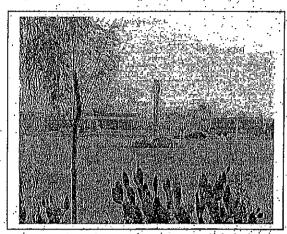


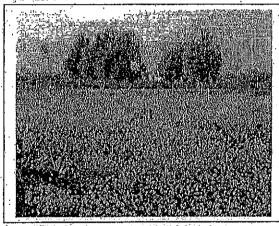


# ANNEXURE-III

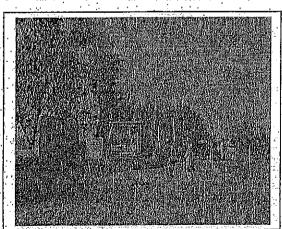
### SOCIO-ECONOMIC CONDITIONS OF THE PROJECT AREA

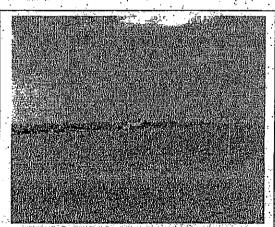






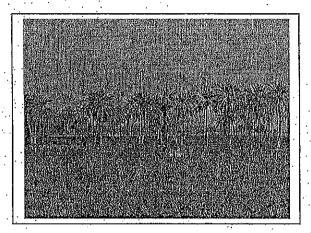


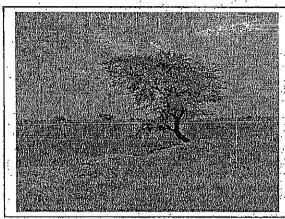






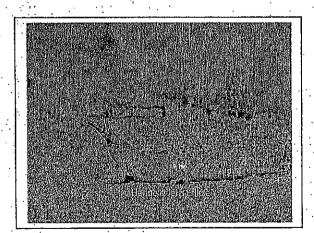
# <u>ANNEXURE-IV</u> FLORA AND FAUNA OF THE AREA









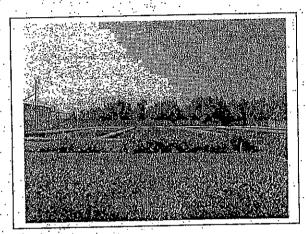


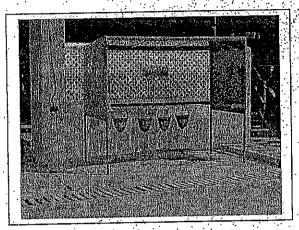


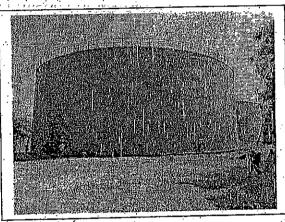


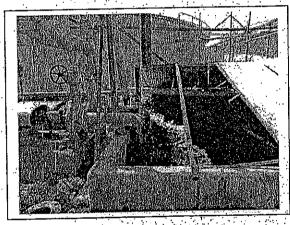
# ANNEXURE-V

# **VARIOUS LOCATIONS OF DISTILLERY**

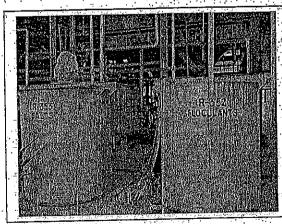












### ANNEXURE-VI

# HAZARDS/ASPECTS IDENTIFCATION, RISK ASSESSMENT AND DETERMINING CONTROLS

#### Objectives

This procedure defines the method of performing the risk assessment in order to identify the possible environmental aspects and safety hazards in the organization.

#### 1. Scope

This procedure applies to all over the organization for risk assessment of health, safety and environment.

### 2. Responsibilities

All departmental heads are responsible to ensure that hazards and associated risks controlling in their respective areas of work with the help of Manager HSE are identified.

### 3. Procedure

- > Related Departmental/Sectional Heads in consultation with Officer HSE will identify the possible environmental aspects/ safety hazards in their specific area
- > For each activity (routine and non routine), a Job Hazard Analysis (JHA) will be carried out which covers the following information:
  - a. A clear description of the activity,
  - b. The frequency and duration of the activity,
  - c. The number of people involved (simultaneously and in total),
  - d. The location / environment where the activity is carried out,
  - e. Equipment / installation / resources used, and their maintenance,
  - f. Procedures, instructions and information available,
  - g. Training given to the operators / executives,
  - h. Job Supervision by,
  - i. Related hazards identified during the process and PPEs to be used.





O

Failure Mode and Effect Analysis (FMEA)/Hazard Identification and Risk Assessment (HIRA) will be used to analyze the identified or possible environmental aspects/ safety hazards which covers the following:-

- j. The type and description of hazards that are deemed to be present.
- k. Potential Root Causes, Current Process Control Measures,
- l. The exposure to the potentially hazardous situation (the time during which the activity is carried out),
- m. The probability of the hazard be realized,
- n. The magnitude / importance of the consequences (both injuries and damages),
- o. The Risk Rating is calculated, based on the P, C, E, and existing control measures are verified and actions are taken in case of Risk Rating is more than 64.
- Officer HSE has developed the internal standards for the sound level in the organization, which is 85 db maximum.
- All the environmental aspects are compared with the NEQS and internal standards, if any aspect is outside the limit of the NEQS and internal standard than it is considered as "Significant Environmental Aspect".
- Similarly in case of any violation of Pakistan factory Act 1934 (chapter-3, health and safety), hazard is considered as significant and intolerable,
- Significant environmental aspect/ hazard can also be declared if there is any abnormal oil leakage or other things like that.
- The complete study of environmental aspects/ safety hazards is carried at least once in 12 months, but it can be carried out in between in case of any significant change in raw material, machinery or launch of new product.

### 4. Risk Rating

The risk assessment will be performed by following approach of Failure Mode and Effect Analysis/HIRA.

# Exposure

Ranks	scription	
5 Continuous		
4 Once in 24 hours/Daily		
3 Once in one week		٠.
2 Once in one month		:
r Few time per year		•

# Probability

eriod of time; expected to occur
r Department.
Department.
(

### Consequences

Ranks	Description
5	Can cause death, serious injury. Serious damage to the environment. (Not
	reversible). Serious damage to work place. Violation of regulatory laws.
4	Moderate injury, Moderate damage to the environment (Not reversible).
	Moderate damage to work place.
3	Small injury but notice able, low damage to the environment (Reversible)
	but notice able. Low damage to work place but notice able.
2	Small injury but not noticeable, low damage to environment (Reversible)
	but not noticeable. Low damage to work place but NOT noticeable.
1	No Effect

After determining the Probability, Consequence and Exposure, the risk priority number (RPN) is calculated from the following table:



Risk Priority Number (RPN) = Probability X Consequence X Exposure

RPN	Risk Estimation	Measures
<27	Lowrick to Fig.	Acceptable / no action needed
27 - 64	Moderateansk - c	Only Control measures are required
		Action to be taken on priority. It is
>64		considered as Significant and intolerable,
		objectives are required along with targets.
		Re-evaluation is also required.

### 6. Related Documents/Records

ISO 14001 Standards

Job Hazard Analysis

(HSE-FRM-009)

HSE Failure Mode and Effect Analysis / HIRA

(IMS-FRM-015)



### ANNEXURE-VII

#### EMERGENCY RESPONSE PLAN

### SEISMIC OPERATION

### Purpose and scope of the document

The objective of this Medical Emergency Evacuation Plan is to explain the line of action to be followed in case of a medical emergency on MATOL operation and to define the responsibilities of different persons. All the concerned MATOL employees will act as a team on both the ends i.e. Karachi Head office and distillery location.

Once issued, the plan will be used as a guideline to deal with all the medical emergencies and will be practiced through drills on quarterly basis. Under no condition the plan should be changed without the information of Management in Karachi, and any change should be followed, in not more than 24 hrs, by the written report of the reason of the change from documented guidelines.

To cover the medical problems on the MATOL operational site, MATOL will set a well-managed medical system, with contacts at reliable health facilities to take care of grave medical emergencies.

### The brief description is as follows:

MATOL operational site doctor shell is responsible for providing the medical coverage for minor health problems on the field. He is also responsible for providing first aid in case of a medical emergency and to giving suggestion to management regarding evacuation of a diseased person in case of medical emergency.

### Medical emergency location

Medical emergencies for example uncontrolled high-grade fever, severe dehydration, flaring up of gastric ulcer, burns etc. All such emergencies will be referred to the nearest hospital. Surgical emergencies for example acute abdomén, trauma, fractures etc. All such emergencies will also be referred to the nearest hospital.

#### Insect bites





The field clinic should have capability to treat scorpion and snakebite cases. However, all such cases will be referred to the hospital for treatment on the decision of the onsite doctor. Site doctor will accompany the victim to the hospital and will return after ensuring that the right person has started the proper treatment.

Medical Emergencies related to Road Traffic Accidents All such cases will be referred initially to nearest facility.

#### FIRE CONTINGENCY PLAN

Fire is a major hazard in any situation where large number of people work and sleep in a relatively confined area. Four essential steps in the control of the fire hazards are:

### Reduction of the Basic Risk by:

- Restricting eigarette smoking
- Upgrading and maintenance of electrical fittings
- Posting warning notices
- Training -both in the use of fire-fighting equipment and in general awareness of the hazards and what to do in the event of fire.

### Early Detection by:

- Means of smoke alarms•
- Personal vigilance

#### Prompt Reaction by:

- Shouting "Fire, Fire, Fire!"
- Sounding the fire alarm •
- Evacuating the tents and trailer
- Fighting the fire, if appropriate



#### Immediate Response by:

- Using the nearest suitable fire extinguishers
- Isolating the electrical supply, if appropriate
- Accounting for all personnel (Head count)
- Organizing available personnel to assist with fire-fighting, if appropriate

There shall be one Fire Chief! Fire Fighting Team Leader. He will form a Fire Team from available personnel if the fire team member not present. When the Fire Alarm is sounded, the facility must be evacuated immediately and the occupants must proceed directly to the Muster Point. A head count and search must be carried out as soon as all occupants are out of their working locations.

On discovering fire Fire extinguishers, Dry Powder fire extinguishers are located near the door of every portion of the building, and on each vehicle. Foam fire extinguishers shall be located near fuel locations. On discovering a fire, you should immediately attempt to fight it with the nearest extinguisher UNLESS:

There is no extinguisher on hand

OR

The fire is near the exit to your room

OR

There is a noticeable quantity of smoke

OR

You are not confident of using the extinguisher

OR

The fire is visibly increasing in size.

OR

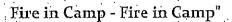
A fuel tank has caught fire (EVACUATE THE AREA) In which case,

#### GET OUT AT ONCE AND SOUND THE ALARM

All personnel, upon hearing the alarm, proceed to the Muster Point immediately.

Anyone near a radio upon hearing the alarm will make a general call announcing:





If a fire is extinguished, remember that it can re-ignite spontaneously. Do not leave the scene until it is assured that the fire is out and will not re-ignite. Then immediately report the incident to the Party Chief, HSE Adviser or the most senior person in camp.

On hearing the fire alarm everyone is to proceed directly to the Muster Point. A head count will be conducted at the Muster point. Following procedures are designed to insure the safety of Personnel.

- All the fire wardens will check the areas allotted to them. The fire team will approach to the fire scene under the direction of the fire chief.
- The Fire Chief I Fire Team is to proceed directly to the fire and carry out the crew procedure for dealing with the situation.

#### Fire fighting procedures

These are guidelines only to give a general outline towards getting a fire extinguished should the situation arise. Below assumes that we have a major fire in the camp area. Hopefully before it gets to this situation somebody has been able to put the fire out while it is minor.

A fire fighting team will be set up from available personnel. This team will be trained in correct fire fighting procedure. Other crew members will also be trained so they maybe co-opted onto the team as required. Eventually all crew members should be trained in the use of fire extinguishers and basic fire control.

### Protection of personnel -equipment

The prime concern in case of fire is the protection of personnel -equipment is secondary; the person discovering the fire should raise the alarm, immediately evacuate everyone from the area and notify the fire chief.







The "FIRE CHIEF" will be the most experienced in camp and will take complete charge of fire fighting and directing the "FIRE TEAM", the senior member of the kitchen staff will account to the coordinator for their personnel, including the camp boss.

The head of each department will account for his men. The coordinator gets a head count at the muster point. At the same time the electrician will cut off the power to the fire location. Power should only be cut to the fire site as power is required for lighting if at night and also to run water pumps, if available. The least people involved the better. All other people are to stay at the muster point. Should they be required they will be directed where to go and what to do:

# REMEMBER THAT THIS IS ONLY A GUIDE. NOTHING EVER HAPPENS AS PLANNED

#### **WEATHER CONTINGENCY PLAN**

In case of severe weather conditions the following precautions will be taken:

#### Fog

No one shall leave the camp until the PC has assessed the situation and is satisfied that the visibility is such that driving will not be hazardous. All vehicles will travel with headlights on until the fog has completely cleared. Vehicles will travel in convoy if necessary.

Heavy rain driving in the rain calls for extra care and driving skills. The roads will be slippery, and acceleration and braking must be made gently. Reduce your speed and be aware of olfier road users. Should the rain be heavy enough to impair your vision, you should pull off the road in a safe location and wait for the weather to pass. Call base camp to inform them of your late arrival and present location.

#### Sandstorm

The sandstorm will be treated as FOG. Visibility will be seriously impaired, and disorientation is a possibility. Take care exiting the vehicle as the strong wind could blow the door out of your grasp.





In all severe weather conditions the senior most staff member will decide upon the best course of action for the crew and trouble shooters. Should the situation dictate, production will be stopped and personnel ordered to take shelter? Department heads will co-ordinate with their unit's incharge to decide upon the safest course of action. All vehicles standing by on weather should call back and inform them of their status and position.

#### EMERGENCY SPILL PROCEDURE

Stop the flow as soon as possible Use any safe, practical means at your disposal. Remember to locate and check the operation of all valves daily. Remember that every gallon you keep from leaking is one less to clean up later. Contain the spill in the smallest possible area Sound judgment is the key to good containment. Keep in mind that other regulatory agencies have very definite ideas about what you can or cannot do with the natural resources around the fuel site. If you use the material around the spill to create a dike, be sure that it can be restored to its original condition after clean up is complete. Report the spill through the proper channels and initiate cleanup procedures:

- · Prompt, accurate reporting is imperative and should be done as soon as possible after discovery of the spill.
- If the spill is minor and the cleanup is obvious you should go ahead but if a major spill occurs you should stand by for detailed instructions.
- Remember that disposal of waste created by clean up has to be taken care of properly and not left to create another problem
- In some cases, this may require evacuation of the waste to a suitable site designated by the authorities.

In conclusion, you must do everything possible to prevent a spill but if one does happen you should STOP THE FLOW, CONTAIN THE MATERIAL and REPORT THE INCIDENT through proper channels, AND CLEAN IT





### Environmental Management Plan



### ANNEXURE-VIII

#### TEST REPORTS

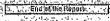




CHEMICAL ANALYSIS TRYPREPORT

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GEELLABIFFISTORA

TISOU DATE TEOLOGO

#### GEL/LAB/14385 F

### NOISE LEVEL ESTIMATION RESULTS

(i) Name of Company (Matyari Sugar Mills)

2) Address District Matyari

3) Date of Analysis 22:01:2016

4) Test Metrod 1:Noise Level Meter

5) No. of Samples

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Signature of incharge of the Environmental Laboratory.

Name: Minhammed Qadisuddii Designalions in GM Karachi Lab Daton 29/01/2015

End of the Report



### Grobal Environmental Labaryns Eta

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Burgaren C







Reference No: EPA/2016/10/05/EE/86
ENVIRONMENTAL PROTECTION AGENCY
GOVERNMENT OF SINDE
Plot # ST - 2/1, Sector 23, Koranga Industrial area
Karachi - 74900

Ph. 021 - 35065950, 35065621, 35065946 epasindh@gmail.com Fax No. 021 - 35065940

Dated: 24th May: 2017

#### SUBJECT: DECISION ON INITIAL ENVIRONMENTAL EXAMINATION (IEE):

1. Name and Address of Proponent:

Description of Project:

Chief Executive Officer.

M/s Matiari Sugar Mills Limited,

Plot No. Matiari House, C-48. KDA

Scheme No.01, Karachi.

6.2MW Cogeneration Bio-gas power plant:

3: Location of Project:

Matjari Sugar Mills Limited, Nasrpur Road.

District Matiari, Sindh.

4: / . Date of Filing of IEE:

03-10-2016

- 5. After careful review of the Initial Environmental Examination (IEE) report, the Sindh Environmental Protection Agency (SEPA) has accord its approval subject to the following conditions:-
  - (i) Matiari Sugar Mills Limited hereinafter referred as proponent shall comply Sindh Environmental Quality Standards (SEQS) air emission from the power plant.
  - (ii) Mitigation measures recommended in the IEE report must be strictly adhered to in minimizing any negative environmental effect on the natural ecology
  - (iii) Sindh Environmental Quality Standards for noise levels shall be implemented in order minimize noise impact of the proposed project. For distremission/Particulate matter air pollution control equipment invist be install before commissioning of the project, also an appropriate buffer shall be kept across the boundary of the project for the purpose of extensive plantation.
  - (iv) Monitoring of ambient air quality at the plant boundary and 500 meter radius shalf be conducted on monthly basis for CO. Particulate matters and NOx parameters during operation of the plant. In order to observe incremental impact of the plant. The result shall be annexed with the quarterly monitoring reports.
  - (v) All emission control equipment must be install before operation of the plant, only after the verification of this office plant will operate.
  - (vi) A comprehensive waste management plan shall be developed for effective disposal of waste. Unusable waste shall be recycled; all remaining waste shall be disposed off at designated landfill. Proper solid waste containers of suitable size shall be provided for daily collection and disposal. Sewage waste will be treated in sewage treatment plant before disposal.
  - (vii) Damage to natural vegetation will be minimized. Firewood, woody plants and shrubs will not be used as fuel during construction.



Reference No: EPA/2016/10/05/IEE/86 ENVIRONMENTAL PROTECTION AGENCY GOVERNMENT OF SINDH

Plot # ST - 2/1, Sector 23, Korangi Industrial area Karachi - 74900 Ph; 021 - 35065950, 35065621, 35065940 epasindh@gmail.com Fax No. 021 - 35065940

ii) A complete code of Health, Safety and Environment (HSE) shall be developed, which should include efficient parameters at specific work place. For this purpose HSE setup should be established and supervised by a designated HSE officer at the senior level with sufficient administrative and technical authority to perform the designated functions. Proponent will make sure that the operating instructions and emergency actions are made available to every worker/labor/commuter at the site.

(ix) The proponent will ensure that an independent environmental monitoring consultant, is engaged to monitor hazards, dust emissions, road obstructions, traffic jams, sound and noise level(s) and other environmental damages due to construction of plant.

(x) Proponent will carry out self-monitoring and reporting and will submit report to Sindh EPA for the recommended parameters with their appropriate frequencies as listed in Self-Monitoring & Reporting Rules.

6. This approval and any considerations thereof shall be treated as hull and void if the conditions, mentioned in para-5 above, are not complied with.

7. The proponent shall be liable for compliance of EIA/IEE Regulations, 2014, which direct for condition for approval, confirmation of compliance, entry, inspection and mont toring.

This approval does not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law in force.

The approval is accorded only for the project activity described in the IEE. Report.

Proponent thail submit separate BIA or IEE as required under regulation for any enhancement or change in the design of project.

10. Implementation Report of all the mitigation measures and EMP laid down in the IEE Report shall be submitted to this office on quarterly basis. No violation of any regulations, rules, instruction and provision of SEP Act, 2014, shall be made and illucate of any such violation of the rules/laws in the approval shall stand cancelled without any

All the environmental conditions of this approval shall be incorporated in the lerm's and conditions of tender document of the project for commitment and compliance.

Deputy Director (Technical-LI)
For Director General

#### **L17**/

AUDITED FINANCIAL STATEMENTS

OF

MATOL (PRIVATE) LIMITED

FOR THE YEAR ENDED

JUNE 30, 2017

Rahman Sarfaraz Rahim Iqbal Rafiq Chartered Accountants KARACHI, LAHORE & ISLAMABAD

# MATOL PRIVATE LIMITED OVER VIEW

STANDARD CAPACITY OF THE PLANT - YEARLY   SUPER FINE   LTR   96,000   96,000				
### STANDARD CAPACITY OF THE PLANT - YEARLY  \$COPER FINE		UNIT		
### B-GRADE   LTR   1,000   4,000   1,00,000   #### TOTAL PER DAY   LTR   100,000   100,000   #### TOTAL PER DAY   MT   86   80   #### SUPER FINE   22,850   22,850   22,850   #### SUPER FINE   MT   23,850   22,850   ### SUPER FINE   MT   25,043,83   21,074,01   ### B-GRADE   MT   1,449,69   1,232,16   ### EXPORT OUANTITY SALES	STANDARD CAPACITY OF THE PLANT - YEARLY			
### TOTAL PER DAY ### 100,000 100,000  #### PRODUCTION PER DAY ### 80 80  #### 23,800 28,800  #################################	SUPER FINE	LTR .	96,000	96,000
### PRODUCTION PER DAY ### 28,506   28,800   ### 28,506   28,800   ### 28,506   28,800   ### 28,506   28,800   ### 28,506   28,800   ### 28,506   28,800   ### 28,506   28,800   ### 28,506   28,800   ### 28,507   23,503,83   24,074,01   ### 25,074,05   1,449,60   1,282,16   ### 25,074,05   1,449,60   1,282,16   ### 25,074,05   1,445,700   792,310   ### 27,504,096   17,347,700   ### 27,504,096	B-GRADE	LTR	4,000	4,000
### PER YEAR ON THE BASIS OF 360 DAYS  #### PRODUCTION SUPER FINE - B-GRADE  #### PASS 383 12,074 01  ### PASS 383 12,074 01	TOTAL PER DAY	LTR	100,000	100,000
### PACKAGE SELLING PRICE OF LOCAL SALES ####################################	PRODUCTION PER DAY	MT	80	80
SUPER FINE	PER YEAR ON THE BASIS OF 360 DAYS	МÏ	28,800	28,800
SUPER FINE				
### PACKADE #### 1,449.69, 1,282.16    EXPORT QUANTITY SALES	**************************************	MT	23:593.83	21.074.01
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SUPER FINE   SUP	-B-GRADE	MT.	1,449.69	1,282.16
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AVERAGE SELLING-PRICE OF EXPORT  -SUPER FINE - PER MT  -B-GRADE - PER MT  -B-GRADE - PER MT  -AVERAGE SELLING PRICE OF LOCAL SALES  -B-GRADE - PER MT  -AVERAGE Conversion Rate	<del> </del>		••	
SUPER FINE   PER MT   US Dollar   663.33   652.60	B GRADE	MT	· <del>-</del> -	518.186
### B-GRADE -PER MT  ###################################	AVERAGE SELLING PRICE OF EXPORT		· · · · · · · · · · · · · · · · · · ·	***
### AVERAGE SELLING PRICE OF LOCAL SALES  B-GRADE - PER MT.	-SUPER FINE - PER MT	US Dollar	663.33	652,60
B-GRADE - PER MT	-B-GRADE - PER MT	US Dollar	466.30	454.23
Average Conversion Rate	AVERAGE SELLING PRICE OF LOCAL SALES	· .		
-SUPER FINE - PER MT -B-GRADE - PER MT -B-GRADE - PER MT -B-GRADE - PER MT -AVERAGE YELLD, PER MT OF MOLASSES	-B-GRADE - PER MT.	US Dollar	<u></u>	471,31
B-GRADE - PER MT	Average Conversion Rate -	PKR ·	104.38	104,45
-B-GRADE - PER MT.	-SUPER FINE - PER MT		69,239	79,548
MOLASSES CONSUMED         MT         133,277         122,214           AVERAGE RATE OF MOLASSES CONSUMED PER MT         PKR         9,435         9,038           % To Sales         %         100         100         100           Cost of sales         %         86.67         87.52           Gross profit         %         13,33         12,48           Distribution cost         %         3.48         3.69           Administrative expenses         %         1.41         1.54           Finance cost         %         2.12         2.86           Other opreating expenses         %         0.44         0.31           Other income         %         (0.05)         (0.18)           Profit before taxation         %         5.93         4.26           Taxation Current         %         1.03         1.02           Net profit after taxation         %         4.90         3.24           Earnings Per Shares         PKR         4.20         1.75	-B-GRADE - PER MT.	] ' [	48,659	. 57,892
AVERAGE RATE OF MOLASSES CONSUMED PER MT         PKR         9,435         9,038           % To Sales         %         100         100           Cost of sales         %         86.67         87.52           Gross profit         %         13,33         12,48           Distribution cost         %         3.48         3.69           Administrative expenses         %         1.41         1.54           Finance cost         %         2.12         2.86           Other opreating expenses         %         0.44         0.31           Other income         %         (0.05)         (0.18)           Profit before taxation         %         1.03         1.02           Net profit after taxation         %         4.90         3:24           Earnings Per Shares         PKR         4.20         1.75	AVERAGE YEILD, PER MT OF MOLASSES	LTR	235.82	229.52
% To Sales       %       100       100         Cost of sales       %       86.67       87.52         Gross profit       %       13.33       12.48         Distribution cost       %       3.48       3.69         Administrative expenses       %       1.41       1.54         Finance cost       %       2.12       2.86         Other opreating expenses       %       0.44       0.31         Other income       %       (0.05)       (0.18)         Profit before taxation       %       5.93       4.26         Taxation Current       %       1.03       1.02         Net profit after taxation       %       4.90       3:24         Earnings Per Shares       PKR       4.20       1.75	MOLASSES CONSUMED	. MT	133,277	122,214
% To Sales       %       100       100         Cost of sales       %       86.67       87.52         Gross profit       %       13.33       12.48         Distribution cost       %       3.48       3.69         Administrative expenses       %       1.41       1.54         Finance cost       %       2.12       2.86         Other opreating expenses       %       0.44       0.31         Other income       %       (0.05)       (0.18)         Profit before taxation       %       5.93       4.26         Net profit after taxation       %       4.90       3:24         Earnings Per Shares       PKR       4.20       1.75	AVERAGE RATE OF MOLASSES CONSUMED PER MT	PKR	9,435	9,038
Cost of sales       %       86.67       87.52         Gross profit       %       13.33       12.48         Distribution cost       %       3.48       3.69         Administrative expenses       %       1.41       1.54         Finance cost       %       2.12       2.86         Other opreating expenses       %       0.44       0.31         Other income       %       (0.05)       (0.18)         Profit before taxation       %       1.03       1.02         Net profit after taxation       %       4.90       3.24         Earnings Per Shares       PKR       4.20       1.75		%	100	100
Gross profit       %       13.33       12.48         Distribution cost       %       3.48       3.69         Administrative expenses       %       1.41       1.54         Finance cost       %       2.12       2.86         Other opreating expenses       %       0.44       0.31         Other income       %       (0.05)       (0.18)         Profit before taxation       %       5.93       4.26         Taxation Current       %       1.03       1.02         Net profit after taxation       %       4.90       3:24         Earnings Per Shares       PKR       4.20       1.75		%	86.67	87.52
Distribution cost       %       3.48       3.69         Administrative expenses       %       1.41       1.54         Finance cost       %       2.12       2.86         Other opreating expenses       %       0.44       0.31         Other income       %       (0.05)       (0.18)         Profit before taxation       %       5.93       4.26         Taxation Current       %       1.03       1.02         Net profit after taxation       %       4.90       3:24         Earnings Per Shares       PKR       4.20       1.75				
Administrative expenses       %       1.41       1.54         Finance cost       %       2.12       2.86         Other opreating expenses       %       0.44       0.31         Other income       %       (0.05)       (0.18)         Profit before taxation       %       5.93       4.26         Taxation Current       %       1.03       1.02         Net profit after taxation       %       4.90       3:24         Earnings Per Shares       PKR       4.20       1.75			1	
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Profit before taxation         %         5.93         4.26           Taxation Current         %         1.03         1.02           Net profit after taxation         %         4.90         3.24           Earnings Per Shares         PKR         4.20         1.75				1
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# Rahman Sarfaraz Rahim Iqbal Rafiq

CHARTERED ACCOUNTANTS

Piot No. 180, Block-A, S.M.C.H.S. Karachi-74400, PAKISTAN. Tel. No.: (021) 34549345-9 Fax No.:(021) 34548210 E-Mail :Info@rsrir.com Website: www.rsrir.com Other Offices at Lahore - Islamabad / Rawalpindi

### AUDITORS' REPORT TO THE MEMBERS

We have audited the annexed Balance Sheet of MATOL (PRIVATE) LIMITED ("the Company") as at June 30, 2017, the related profit & loss account, statement of comprehensive income, statement of changes in equity and cash flow statement together with the notes forming part thereof, for the year then ended and we state that we have obtained all the information and explanations which, to the best of our knowledge and belief, were necessary for the purpose of our audit.

It is the responsibility of the Company's management to establish and maintain a system of internal control, and prepare and present the above said statements in conformity with the approved accounting standards and the requirements of the Companies Ordinance, 1984. Our responsibility is to express an opinion on these statements based on our audit.

We conducted our audit in accordance with the auditing standards as applicable in Pakistan. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the above said statements are free of any material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the above said statements. An audit also includes assessing the accounting policies and significant estimates made by management, as well as, evaluating the overall presentation of the above said statements. We believe that our audit provides a reasonable basis for our opinion and, after due verification, we report that:

- (a) in our opinion, proper books of accounts have been kept by the Company as required by the Companies Ordinance, 1984;
- (b) in our opinion:
  - the balance sheet and profit and loss account together with the notes thereon have been drawn up in conformity with the Companies Ordinance, 1984, and are in agreement with the books of accounts and are further in accordance with accounting policies consistently applied;
  - (ii) the expenditure incurred during the year was for the purpose of the company's business; and
  - (iii) the business conducted, investments made and the expenditure incurred during the year were in accordance with the objects of the Company;
- (c) in our opinion, and to the best of our information and according to the explanations given to us, the balance sheet, profit and loss account, statement of comprehensive income, cash flow statement and statement of changes in equity together with the notes forming part thereof conform with approved accounting standards as applicable in Pakistan, and give the information required by the Companies Ordinance, 1984, in the manner so required and respectively give a true and fair view of the state of the Company's affairs as at June 30, 2017, of the profit, its comprehensive income, its changes in equity and cash flows for the year then ended; and
- d) in our opinion, zakat deductible at source under the Zakat and Ushr Ordinance, 1980 (XVIII of 1980) was deducted by the Company and deposited in the central zakat fund established under section 7 of that Ordinance.

Rahman Sarfaraz Rahim Iqbal Rafiq

Chartered Accountants

Engagement partner: Muhammad Waseem

Karachi.

2 1 SEP 2017

### MATOL (PRIVATE) LIMITED BALANCE SHEET AS AT JUNE 30, 2017

**** *** * * * * * * * * * * * * * * *		15.	2017	2016
ASSETS		Note	Rupe	ees ———
NON- CURRENT ASSETS				•
Property, plant and equipmen	t.	4	1,221,187,042	708,134,284
Intangible assets	•	5	977	1,459
			1,221,188,019	708,135,743
CURRENT ASSETS				
Stores, spares and loose tools		6	25,490,122	22,621,291
Stock-in-trade		7	542,581,275	632,171,844
Trade debtors		8	14,018,275	170,792,151
Advances deposits, prepayme	ents and other receivables	9 .	150,765,656	21,693,104
Tax refunds due from Govern			31,563,642	19,768,584
Due from holding company			205,426,968	126,839,448
Cash and bank balances		10	6,856,411	9,166,262
			976,702,349	1,003,052,684
	·		2,197,890,368	1,711,188,427
EQUITY AND LIABILITH	<b>∑S</b>	,		
SHARE CAPITAL AND RI	ESERVES			
Authorized Capital			• .	
25,000,000 ordinary shares or	f Rs 10/= each		250,000,000	250,000,000
Issued, subscribed and paid u	n capital	11	218,585,600	218,585,600
Accumulated profit	F Carrier		192,955,241	120,818,661
1100tilliateted passion		٠.	411,540,841	339,404,261
Surplus on revaluation of pro	perty, plant & equipment	12	834,568,455	322,848,022
				; ·
NON-CURRENT LIABILIT	• •	4.0	0.1.101.881	
Liabilities against asset subje-	ct to finance lease	13	34,421,771	50,407,701
		• •		
CURRENT LIABILITIES				
Trade and other payables		14	154,947,293	71,088,585
Accrued mark-up		15	9,972,112	8,819,701
Short-term borrowing		16	734,292,393	900,000,000
Current portion of asset subje	ct to finance lease	13	18,147,503	18,620,157
Current barmen or many amala			917,359,301	998,528,443
Contingencies and commitme	ents	17		
Couring on on commune	******	~ '	2,197,890,368	1,711,188,427

'The annexed notes from 1 to 37 form an integral part of these financial statements

Chief Executive

Pirector

### MATOL (PRIVATE) LIMITED PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED JUNE 30, 2017

		2017	2016
	Note	Rupee	
Sales-net	18	1,876,635,197	1,187,394,330
James 1974	19	(1,626,554,648)	(1,039,245,888)
Cost of sales	1,7 :	250,080,549	148,148,442
Gross profit	i		
Administrative expenses	20	(26,374,223)	(18,235,507)
Distribution cost	21	(65,351,145)	(43,838,180)
Finance cost	22	(39,847,196)	(33,985,493)
Other operating expenses	23	(8,237,628)	(3,738,116)
	24	877,929.	2,086,334
Other income	<b>4</b> 7	(138,932,263)	(97,710,962)
Profit before taxation		111,148,286	50,437,480
Taxation	25	(19,262,371)	(12,082,576)
Net profit after taxation		91,885,915	38,354,904
	29	4.20_	1.75
Earnings per share- basic & diluted			

The annexed notes from 1 to 37 form an integral part of these financial statements

MUNN Chief Executive

Director.

### MATOL (PRIVATE) LIMITED STATEMENT OF COMPREHENSIVE INCOME FOR THE YEAR ENDED JUNE 30, 2017.

	•	2017	2016
		Ruj	pees ———
Profit after taxation		91,885,915	38,354,904
Other comprehensive income for the year			<b>-</b>
Total comprehensive income for the year		91,885,915	38,354,904

"The annexed notes from 1 to 37 form an integral part of these financial statements

Saman Chief Executive

### MATOL (PRIVATE) LIMITED STATEMENT OF CHANGES IN EQUITY FOR THE YEAR ENDED JUNE 30, 2017

	Share Capital	Accumulated Profit	Total
		Rupees	· · · · · · · · · · · · · · · · · · ·
			·
Balance as at July 01, 2015	218,585,600	104,332,931	322,918,531
		-	
Total comprehensive income for the year ended June 30, 2016		38,354,904	38,354,904
25% Cash Dividend paid for the year ended June 30, 2015	<del>-</del>	(54,646,400)	(54,646,400)
endeat.June 50, 2015		· ·	
Transferred from surplus on revaluation			
of property, plant and equipment		32,777,226	32,777,226
Balance as at June 30, 2016	218,585,600	120,818,661	339,404,261
			• .
Total comprehensive income for the year ended June 30, 2017	• •	91,885,915	91,885,915
25% Cash Dividend paid for the year ended June 30, 2016		(54,646,400)	(54,646,400)
Sidod 94Ho 50, 2010			
Transferred from surplus on revaluation			
of property, plant and equipment		34,897,065	34,897,065
Balance as at June 30, 2017	218,585,600	192,955,241	411,540,841

The annexed notes from 1 to 37 form an integral part of these financial statements

Chief Executive

Director

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MATOL (PRIVATE) LIMITED STATEMENT OF CASH FLOWS FOR THE YEAR ENDED JUNE 30, 2017

	Note	———Rupe	28
CASH FLOWS FROM OPERATING ACTIVITIES			
Cash flow from operations	26	323,884,432	(241,068,164)
Finance cost paid	ļ	(38,694,785)	(30,455,654)
Taxes paid		(19,262,371)	(12,082,576)
Net cash generated from / (used in) operating activities	L.	265,927,276	(283,606,394)
CASH FLOWS FROM INVESTING ACTIVITIES			·
Fixed capital expenditure		(31,424,536)	(120,821,404) (120,821,404)
Net cash used in investing activities	: 1	(31,424,536)	(120,021,404)
CASH FLOWS FROM FINANCING ACTIVITIES		(54,646,400)	(54,646,400)
Dividend paid (Lease rentals paid) / Finance lease obtained		(16,458,584)	69,027,858
Net cash (used in) / generated from financing activities		(71,104,984)	14,381,458
Net increase / (decrease) in cash and cash equivalents		163,397,756	(390,046,340)
Cash and cash equivalents at the beginning of the year		(890,833,738)	(500,787,398)
Cash and cash equivalents at the end of the year	27	(727,435,982)	(890,833,738)

The annexed notes from 1 to 37 form an integral part of these financial statements

Chief Executive

2016

2017

MATOL (PRIVATE) LIMITED NOTES TO THE FINANCIAL STATEMENTS FOR THE YEAR ENDED JUNE 30, 2017

### STATUS AND NATURE OF BUSINESS

1.1 The Company was incorporated in Pakistan on November 24, 2003 as a private limited company under the Companies Ordinance, 1984. The principal business of the Company is to manufacture and sell industrial alcohol. The Company is a subsidiary of Matiari Sugar Mills Limited which holds 66% shares of the company.

The registered office of the Company is situated at Matiari house, Plot No.C-48, K.D.A Scheme No 1, Karachi, Pakistan.

#### BASIS OF PREPARATION

#### 2.1 Statement of compliance

During the year, the Companies Act 2017 (the Act) has been promulgated, however, Securities and Exchange Commission of Pakistan (SECP) vide its circular no. 17 of 2017 dated July 20, 2017 communicated Commission's decision that the Companies whose financial year closes on or before Jun 30, 2017 shall prepare their financial statements in accordance with the provision of the repealed Companies Ordinance, 1984. Accordingly, these financial statements have been prepared in accordance with approved accounting standards as applicable in Pakistan. Approved accounting standards comprise of Accounting and Financial Reporting Standards for Large Sized Company (LSC) issued by Institute of Chartered Accountants of Pakistan and provisions of and directors issued under of the Companies Ordinance, 1984. In case requirements differ, the provisions or directives of the Companies Ordinance, 1984 shall prevail.

### 2.1.1 Critical accounting estimates and judgments

The preparation of the financial statements is in conformity with the approved accounting standards that require management to make judgments, estimates and assumptions that affect the application of policies and reported amounts of assets and liabilities, income and expenses. It also requires management to exercise judgments in application of the company's accounting policies. The estimates and associated assumption are based on historical experience and various other factors that are believed to be reasonable under the circumstances, the results of which form the basis of making the judgments about carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates,

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimates are revised.

Significant areas requiring the use of management estimates in these financial statements relate to the useful life of depreciable assets, provisions for doubtful receivables and slow moving inventory. However, assumptions and judgments made by management in the application of accounting policies that have significant effects on the financial statements are not expected to result in material adjustment to the carrying amounts of assets and liabilities in the next year.

#### 2.2 Basis of measurement

These financial statements have been prepared on the historical cost basis, except Land, buildings and Plant and machinery which are stated at revalued amounts.

### 2.3 Functional and presentation currency

The financial statements are presented in Pakistan Rupees, which is the Company's functional and presentation currency:

#### 2.4 Use of estimates and judgments

The preparation of financial statements is in conformity with approved accounting standards, as applicable in Pakistan, requires management to make judgments, estimates and assumptions that affect the application of accounting policies and the reported amounts of assets, liabilities, income and expenses.

The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances, the result of which form the basis of making judgments about carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revision to an accounting estimate are recognized in the period in which the estimate is revised if the revision affects only that period, or in the period of the revision and future periods if the revision affects both current and future periods.

Areas where various assumptions and estimates are significant to the company's financial statements or where judgments was exercised in application of accounting policy are as follows:

a) Residual values and useful lives of it	tems of Property, plan	t and equipment		3.1
b) Provision for obsolete inventory		•		3.3
c) Provision for taxation	•	•	•	3.7
d) Provision for doubtful debts	•			3.11

#### 2.5 Changes in accounting standards, interpretations and pronouncements

a) Amendments to approved accounting standards effective during the year ended June 30, 2017:

There were certain new amendments to the approved accounting standards which became effective during the year ended June 30, 2017 but are considered not to be relevant or have any significant effect on the Company's financial reporting and are, therefore, not disclosed in these financial statements.

b) Standards and amendments to approved accounting standards that are effective for the Company's accounting periods beginning on or after July 1, 2017:

There are certain new standards and amendments to the approved accounting standards that will become effective for the Company's annual accounting periods beginning on or after July 1, 2017. However, these amendments will not have a significant impact on the financial reporting of the Company and, therefore, have not been disclosed in these financial statements. Further, the new standards are yet to be adopted by the SECP. In addition to the foregoing, the Companies Act 2017 which is not effective on these financial statements, has added certain disclosure requirements which will be applicable in future.

#### SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

#### 3.1 Property, plant and equipment

Items of property, plant and equipment are stated at revalued amount less accumulated depreciation and impairment losses except for Office equipment, Furniture and Fixtures and Vehicles. Historical cost includes expenditure that is directly attributable to the acquisition of the asset including borrowing costs.

Where major components of an item of property, plant and equipment have different useful lives, they are accounted for as separate items of property, plant and equipment.

Subsequent costs are included in the asset's carrying amount or recognised as a separate asset, as appropriate, only when it is probable that future economic benefits associated with the item will flow to the entity and its cost can be reliably measured. Cost incurred to replace a component of an item of property, plant and equipment is capitalised and the asset so replaced is retired from use. Normal repairs and maintenance are charged to the profit and loss account during the period in which they are incurred.

Depreciation is charged to profit and loss account using reducing balance method whereby the cost of the asset less its estimated residual value is written off over the estimated useful life at rates given in note 4. Depreciation is charged from the month of additions, while no depreciation is charged in the month of disposal.

Surplus on revaluation of property, plant and equipment is credited to the surplus on revaluation account. Revaluation is carried out with sufficient regularity to ensure that the carrying amount of assets does not differ materially from the fair value. To the extent of the incremental depreciation charged on the revalued assets the related surplus on revaluation of property, plant and equipment is transferred directly to unappropriated profit.

Assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of these assets may not be recoverable. Whenever the carrying amount of these assets exceed their recoverable amount, an impairment loss is recognized in the profit and loss account.

#### 3.2 Intangible Assets

An intangible asset is recognised if it is probable that future economic benefits attributable to the asset will flow to the enterprise and the cost of such asset can be measured reliably. Costs directly associated with identifiable software that will have probable economic benefits exceeding costs beyond one year, are recognised as an intangible asset. Direct costs include the purchase cost of software and other directly attributable costs of preparing the software for its intended use.

Computer software acquisition or development cost is stated at cost less accumulated amortisation and impairment losses, if any, and is amortised on a straight-line basis over its estimated useful life.

#### 3.3 Stores, spares and loose tools

Stores and spares are stated at cost determined using moving average method. Provision is made for slow moving and obsolete items, if any. Items in transit are valued at cost comprising invoice value plus other charges incurred thereon.

#### 3.4 Stock-in-trade

These are valued at lower of cost and net realizable value. The cost of inventories comprises all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition. Cost is determined as follows.

a) Raw materials

first in first out basis.

b) Work-in-process and finished goods

at weighted average cost comprising direct cost of raw material, labour and other manufacturing overheads.

Net realizable value signifies the estimated selling prices in the ordinary course of business less cost necessarily to be incurred in order to make the sale.

#### 3.5 Cash and cash equivalents

Cash and cash equivalents are carried in the balance sheet at cost. For the purposes of the cash flow statement, cash and cash equivalents comprise cash and cheques in hand, balances with banks on current and savings accounts, and running finance under mark-up arrangements.

### 3.6 Foreign currency transactions

Transactions in foreign currencies are translated into Pak Rupees at exchange rates prevailing on the date of transaction. Monetary assets and liabilities denominated in foreign currencies at the balance sheet date are retranslated into Pak Rupee at the exchange rate prevailing at that date. Foreign currency differences, if any, arising on retranslation are recognised in profit and loss account.



#### 3.7 Taxation

Income tax expense represents current tax expense. Provision for current taxation is based on taxable income at the current rates of taxation after taking into account tax credits and tax rebates, if any.

Company is in presumptive tax regime (PTR) in accordance with section 154 of Income Tax Ordinance, 2001 due to which no deferred tax arised on company's assets or liabilities.

#### 3.8 Borrowing and their costs

Borrowings are recognised initially at fair value, net of transaction costs incurred. Borrowing costs are recognised as an expense in the period in which these are incurred except to the extent of borrowing cost that are directly attributable to the acquisition, construction or production of a qualifying asset. Such borrowing costs, if any, are capitalized as part of the cost of that asset.

#### 3.9 Trade and other payables

Trade and other payables are stated at cost which is the fair value of the consideration to be paid in the future for goods and services received, whether or not billed to the Company.

#### 3.10 Provisions

A provision is recognised in the balance sheet when the Company has a legal or constructive obligation as a result of a past event and it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of obligation. However, provisions are reviewed at each balance sheet date and adjusted to reflect current best estimate.

#### 3.11 Trade debts and other receivables

Trade debts and other receivables are initially measured at fair value and subsequently at amortised cost using the effective interest method, less provision for impairment, if any. A provision is established when there is an objective evidence that the Company will not be able to collect all the amounts due according to the original terms of receivables. Trade debts and other receivables considered irrecoverable are written off.

#### 3.12 Revenue recognition

Revenue comprises the fair value of the consideration received or receivable for the sale of goods and services in the ordinary course of the Company's activities.

The Company recognises revenue when the amount of revenue can be reliably measured, it is probable that future economic benefits will flow to the Company and specific criteria has been met for each of the Company's activities as described below:

#### - Sale of goods & services

Sale of goods is recognised when the goods are delivered and the risks and rewards of ownership have passed to the customer;

#### - Interest / mark up income

Return on PLS savings account is accounted for on accrual basis.

#### 3.13 Financial assets and liabilities

The Company recognises financial asset or a financial liability when it becomes a party to the contractual provision of the instrument. Financial assets and liabilities are recognised initially at cost, which is the fair value of the consideration given or received as appropriate, plus any directly attributable transaction costs. These financial assets and liabilities are subsequently measured at fair value or amortised cost using the effective interest rate method, as the case may be.

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Financial assets are derecognised when the contractual right to cash flows from the asset expire, or when substantially all the risks and rewards of ownership of the financial asset are transferred. Financial liability is derecognised when its contractual obligations are discharged, cancelled or expired. Financial assets and financial liabilities are offset and the net amount is reported in the financial statements only when the Company has a legally enforceable right to offset the recognised amounts and the Company intends either to settle on a net basis or to realise the asset and settle the liability simultaneously.

A financial asset is assessed at each reporting date to determine whether there is objective evidence that it is impaired. A financial asset is impaired if objective evidence indicates that a loss event has occurred after the initial recognition of the asset, and that the loss event had a negative effect on the estimated future cash flows of that asset.

# PROPERTY, PLANT AND EQUIPMENT

PROPERTY, PLANT AN	D ECOTEL	ATEM T						
r			Owned	.,,,			Leased	ļ
: : :	Freehold Land	Bulldings	Plant and Machinery	Office and other equipments	Forniture and fixtures	Vehicles	Plant and Machinery	Total
As at June 30, 2015 Cost / Revalued amount Accumulated depreciation Net book value	15,000,000	142,894,921 (44,055,024) 98,839,897	939,695,064 (455,191,289) 484,503,775	7,382,885 (2,963,754) 4,419,131	1,616,587 (500,635) 1,115,952	1,717,315 (551,237) 1,166,078	-	1,108,306,772 (503,261,939) 605,044,833
Year ended June 30, 2016 Opening net book value Additions / tranfers during the year	15,000,000	98,839,897 15,348,300	484,503,775 79,975,370	4,419,131 106,860	1,115,952 283,614	1,166,078	71,500,000	605,044,833 167,214,144
Disposals Cost	-	-	-					
Accumulated depreciation Net book value		(5,337,132)	(53,176,248	(455,068	3) (123,717	(233,214		(64,124,693) 708,134,284
Depreciation for the year Closing net book value	15,000,000	108,851,065	511,302,897	4,070,923	1,275,849	932,864	10,700,000	K.P.
As at June 30, 2016 Cost / Rovalued amount Accumulated depreciation	15,000,000	158,243,221 (49,392,156)	1,019,670,434 (508,367,537	) (3,418,82	2) (624,352	(784,45)	i) (4,799,314)	1,275,520,916 (567,386,632) 708,134,284
Net book value	15,000,000	108,851,065	511,302,89	4,070,72	J 1,270,017			
Year ended June 30, 2017 Opening net book value Additions I tranfers during the year Reyaluation surplus	15,000,000	. 1,841,727	511,302,89 20,138,85 471,676,30	9	23 1,275,84	932,86 9,443,95 -		708,134,284 31,424,536 546,617,498
Disposais Cost	:	Ţ <del>.</del>	T .	T. :	: :		-	
Accumulated depreciation Net book value		(5,450,227	(51,542,8	(410,6	49) (127,5			(64,989,276) 1,221,187,042
Depreciation for the year	35,000,00				74 1,148,20	9,588,8	78 69,600,000	11221112
Closing net book value	Diogogo	,						
As at June 30, 2016  Cost / Revalued amount  Accumulated depreciation	35,000,00	(54,842,38	3) (559,910,3	47) (3,829,	471) (751 <u>,</u> 9	37) (1,572,3	87) (11,469,383	) (632,375,908)
Net book value	35,000,00	5%	10%	10% - 3	3% 10%	20%	10%	_
. Annual rates of depreciation	U70	<del></del>						5

4.1 Had there been no revaluation, the related figures of freehold land, buildings and plant and machinery as at June
 30, 2017 would have been as follows:

	2017	2016
Note	Rupe	es ———
	2,609,370	2,609,370
	75,864,087	79,472,587
	198,820,030	230,223,981
	277,293,487	312,305,938

Freehold land Buildings Plant and machinery

		2017	2016
INTANGIBLE ASSETS	Note	Rupee	· S
		· · ·	
Net carrying amount		1,459	2,178
Opening net book value		(482)	(719)
Amortisation charge	<del></del>	977.	1,459_
Closing net book value	-		
Gross carrying amount	•	110,000	110,000
Cost	•	(109,023)	(108,541)
Accumulated amortisation		977	1,459
Net book value	===		
	·	33%	33% ·
Amortisation rate	=	3370	
THE AND LOOSE TOOLS			
STORES, SPARES AND LOOSE TOOLS		16,114,311	15,916,084
Stores		9,148,566	6,486,774
Spares		227,245	218,433
Loose tools		25,490,122	22,621,291
	=		
STOCK-IN-TRADE			339,197,166
- v d-1		416,299,783	
Raw material		8,462,920	8,035,746
Work-in-process		117,818,572	284,938,932
Finished goods	· =	542,581,275	632,171,844
	•	•	
TRADE DEBTORS		4 ( 040 077	170,792,151
Considered good	=	14,018,275	170,772,131
	OMDED.		
ADVANCES, DEPOSITS, PREPAYMENTS AND	OIDEK		
RECEIVABLES - unsecured			
			1,739,560
Advances to - Employees- considered good	9.1	2,247,975	11,632,782
- Suppliers- considered good		95,981,850	13,372,342
- Suppliers- considered good		98,229,825	13,312,342
			2,195,000
- Deposits		2,195,000	2,193,000 3,771,545
- LICTOSIIS	4.77	3,195,670	
			0 054 <b>01</b> 7
- Prepayments - Others	9.2	47,145,161 150,765,656	2,354,217 21,693,104

9.1 This represents interest free advances provided to employees in accordance with the Company's policy. The advances are unsecured and are recoverable in equal monthly installments.

Included in the above is an amount of Rs 37.79 million paid during the year as penalty to SBP for delay in meeting the export performance benchmark for 2015-16. Based on Company's reason and explanations, SBP condoned the delay to complete the performance till december 2016, however the Company was able to do that by April 2017. The Company's application based on expeort performance achieved as per benchmark is under consideration of SBP for condoning the delay till April 2017. The Company has therefore not expensed the amount in expectation that the SBP would condone the delay till April 2017 as it has fully fulfilled and met the main condition of completing export performance as per the Export Refinance facility allowed by SBP.

	Note	2017 2016 Rupees
CASH AND BANK BALANCES	More	719
Cash in hand		3,334,660 3,529,389 3,531,751 5,636,154
Cash at bank - current accounts  Cash at bank - PLS saving accounts	10.1	3,521,751 5,636,134 9,165,543 9,165,543
•.		6,856,411 9,166,262
DY G accounts ranges f	from 4% to 6% per annum (2016	6; 5% to 6% per annum)

Mark-up rate on PLS accounts ranges from 4% to 6% per annum (2016; 5% to 6% per annum) 10.1

# ISSUED, SUBSCRIBED AND PAID UP CAPITAL

IBBUED, See			2017	2016
2017	2016		Rup	ees
Number	of shares	•	<u> </u>	707.600
		and on ordinary shares of Rs 10 each	218,585,600	218,585,600
21,858,560	21,858,560 Fully	Paid up ordinary shares of Rs 10 each	(0 shares (66.2)	17%) of Rs. 10/-
A+ Tune 30 201	7 Matiari Sugar Mills Lin	nited (Holding Company) held 14,474,10	OO BITATOS (00.2	

At June 30, 2017 Matiari Sugar Mills Limited (Holding Company) held 14,47 each (2016:14,474,160 shares (66.217%) of Rs 10/- each). 11.1

#### SURPLUS ON REVALUATION OF PROPERTY, 12 PLANT AND EQUIPMENT

This represents surplus over book values resulting from the revaluation of property, plant and equipment carried out in the years 2009, 2012 and 2017 as reduced by the surplus realized on disposal, if any, of the revalued assets and incremental depreciation arising out of revaluation. The latest revaluation of land, building, plant and machinery of the Company was carried out by an independent valuer M/s. Oceanic Surveyors (Private) Limited as on June 30, 2017. 2017

as on June 30, 2017.			2017	20.20
-		•	Rupee	
Land Balance as at 1 July Surplus on revaluation during the	year		12,390,630 20,000,000 32,390,630	12,390,630
Building and Plant and machin Revaluation surplus on written de Surplus on revaluation during the Transferred to accumulated prof incremental depreciation char	e year it in respect of		310,457,392 526,617,498 (34,897,065) 802,177,825 834,568,455	343,234,618 (32,777,226) 310,457,392 322,848,022
LIABILITIES AGAINST	ASSET SUBJECT	TO		
FINANCE LEASE  Present value of minimum leas  Less: Current portion shown to	e payments inder current liabilities		52,569,274 (18,147,503) 34,421,771	69,027,858 (18,620,157) 50,407,701

13

The above represents finance leases entered into with a financial institution for Plant and machinery having a term of 4 years. Lease rentals are payable quarterly bearing pre-determined mark-up rates which include finance cost chargeable at 3MK + 1.75% per annum.

•					2016	
· · · · · · · · · · · · · · · · · · ·	Minimum lease payments	Financial charges for future periods	Principal outstanding	Minimum lease payments	Financial charges for future periods	Principal outstanding
Not later than one year	26,782,997	4,311,465	22,471,532	23,559,147	4,938,990	18,620,157
Later than one year but not		2,043,509	30,097,742	56,751,474	6,343,773	50,407,701
later than five years	58,924,248	6,354,974	52,569,274	80,310,621	11,282,763	69,027,858
				20	17	2016
			Note		—— Rupe	es ————
TRADE AND OTHER F	AYABLES	•				
Creditors			-	110	,747,794	38,008,140
Accrued liabilities				3	,051,500	991,04
Salaries					,138,498	4,085,48
Utility bills  Audit fee and professiona	Labornes				820,800	400,00
Audit fee and professiona	i charges			8	,010,798	5,476,52
Other payables				<del> </del>	294,879	230,49
Income tax			14.1	22	2,862,999	. 16,893,70
Workers' Profits Participa	ition Fund		14.1	l l	2,540,266	10,271,93
Workers' Welfare Fund			•		490,557	207,78
Others				30	5,188,701	27,603,91
			•		1,947,293	71,088,58
				<del></del>		٠
Workers' Profits Partic	ipation Fund					
				4	c 002 702 '	17,841,85
Balance at the beginning	of the year	·			5,893,703 5,969,296	2,708,78
Allocation for the year			*	•	-	(3,656,9
Paid during the year			•		2,862,999	16,893,70
Balance at the end of the	year		• • •	<del></del>		
A CONTINUE TO LEGIS TO			• •			
ACCRUED MARK UP		٠				
a restaurance and a mental harmen the	orrowings	>	• • • •		8,935,979	7,401,62
-Markup on short term b -Markup on Leased Asse	outowings .				1,036,133	1,418,0
-Markab on Teased Wese	,	·	• •		9,972,112	8,819,70
SHORT-TERM BORR	OWING - sect	ured			٠.	
MCB Bank Limited	•				4 000 000	900,000,0
Export refinance facility			<u>:</u>		4,298,000	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Running finance	: •	<u>.</u>	. مدرد		9,994,393	900,000,0
			16.	15	4,292,393	200,000,0

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The Company has a total finance facility of Rs. 900 million (2016: Rs. 900 million). These arrangements are secured by way of 1st registered exclusive charge over current assets of the company amounting Rs.1,200 million and corporate guarantee of Rs. 300 million of Matiari Sugar Mills Limited and personal guarantee of all sponsor directors of the company. The rate of mark-up is 3 months KIBOR plus 1.25% (2016: 3 months KIBOR plus 1.25%) per annum except Export Re-Finance on which mark-up rate is 3% (2016: 4.5%) per annum. The facilities are available for various periods expiring upto 31 October 2017.

### CONTINGENCIES AND COMMITMENTS

#### 17.1 Contingencies

19

As per the Gas Infrastructure and Development Cess Act 2011 (the Act), certain companies as specified in the Act (including 'Sui Southern Gas Company' (SSGC)) shall collect and pay Gas Infrastructure and Development Cess (GID Cess) in such manner as the Federal Government may prescribe. Through an amendment, the rate of GID Cess applicable on the Company was increased to Rs. 100 per MMBTU.

During the previous year, the Company has obtained a stay order on the retrospective application of the Act from the Honourable High Court of Sindh. The Company is confident of favourable outcome and therefore deferred the recognition of expense against such billing amounting to Rs.26.67 million in these financial statements as per the advice of its legal counsel. The case is pending for further adjudication in the High Court of Sindh, Karachi.

•			2017 Rupe	2016
17.2	Commitments	ote · ·		* H
	- Bank guarantee to SSGC - Export orders - Post dated cheques in favour of collector of custom in lieu of ind	lemnity	13,500,000 575,499,130 127,500,000	13,500,000 578,616,500 188,191,497
	bond against DTRE			
18	SALES - NET			
	Export sales	18.1	1,876,635,197	1,161,884,905
	Local sales Less: Sales tax			30,093,937 (4,584,512) 25,509,425
	LCSS, Dates tax	·.	1,876,635,197	1,187,394,330

18.1 Exchange gain amounting to Rs. 0.19 million (2016: Gain of Rs. 3.44 million) absorbed in export sales.

			2017	7010·
)	COST OF SALES	Note	Rupe	ees ————
			284,938,932	18,033,848
	Opening finished goods	19.1	1,459,434,288	1,645,348,138
	Cost of goods manufactured	•	1,744,373,220	1,663,381,986
			(117,818,572)	(284,938,932)
٠	Closing stock of finished goods		1,626,554,648	1,378,443,054
			, :	

				, 1
	•		•	
		٠,		
		2017	2016	
	Note	Rupees		
0.1 Cost of goods manufactured	14010	•		
	19.1.1	1,257,416,313	1,104,474,390	
Raw material consumed	17,1,1	31,016,909	28,177,712	
Stores and spare consumed		40,936,276	38,899,771	
Salaries, wages and other benefits		53,012,963	57,393,427	
Fuel and power	***	124,348	118,333	•
Communication		4,526,363	5,116,992	
Insurance		1,212,826	1,048,161	
Repairs and maintenance		995,428	954,065	
Travelling and entertainment	p. 15	238,931	241,065	
Printing and stationary		4,471,864	2,934,610	
Security expenses		919,965	1,735,942	
Cartage and transportation		64,989,276	64,124,693	
	4	1,459,861,462	1,305,219,161	
Depreciation	Г	8,035,746	8,967,557	
Add: Opening work in process	<i>:</i> -	(8,462,920)	(8,035,746)	
Less: Closing work in process	\	(427,174)	931,811	•
Less: Closing work 22 p-	,	1,459,434,288	1,306,150,972	•
		1,439,437,200		•
19.1.1 Raw material consumed	•			•
19.1.1 Raw material company		339,197,166	178,559,804	
Opening stock		1,334,518,930	1,265,111,752	
Add: Purchases		1,673,716,096	1,443,671,556	
Add: ruionasou		(416,299,783)	(339,197,166)	
Less: Closing stock	•	1,257,416,313	1,104,474,390	
Less: Closing Brook	•	1,231,410,010		
			• .	
20 ADMINISTRATIVE EXPENSES	•			
20 ADMINISTRATIVE EXTENSES		17,575,250	10,695,000	
Director's remuneration	31	6,239,252	5,189,325	
Salaries and other benefits		63,150	68,090	
Communication		252,443	209,296	
Insurance	·	342,720	376,814	
Repairs and maintenance		148,555	213,813	
Travelling and entertainment		48,771	23,540	
Printing and stationery		1,239,600	1,058,910	•
Legal and professional		464,000	400,000	*
Auditor's remuneration	·	482	719	
Amortization	5	26,374,223	18,235,507	
Alliotization		24,5		. , .
	•			
21 DISTRIBUTION EXPENSES				
21 DISTRIBUTION EXPLINATION	.*	18,993,100	13,661,102	
Outward freight		10,107,051	8,939,851	
Rent for storage tank		25,620,378	12,580,580	
Sample testing and export expenses		3,225,698	1,974,594	
Wharfage		2,309,867		
Wharrage License and establishment charges	•	2,634,876		-
License and establishmen		2,460,175		
		/		
Insurance Surveyor charges		65,351,145	, , , , , , , , , , , , , , , , , ,	

			· •		
•		•			
				•	•
,			65,351,145	43,838,180	
			2017	2016	
	IANCE COST	Note			
22 FIN	ANCE COST		· _		•
3.6	rkup on Export refinance		34,691,512	29,839,521	
	rkup on Leased assets		4,635,402	3,945,231	
MIA	Kup on Leased assets		39,326,914	33,784,752	
	· · · · · · · · · · · · · · · · · · ·		520,282	200,741	
Bar	nk charges		39,847,196	33,985,493	
		•			
OT	HER OPERATING EXPENSES				
23 OT	HER OPERATING EXITINGED				
***	1 LYYATCAN Found		2,268,332	1,029,336	
	orkers' Welfare Fund		5,969,296	2,708,780	
Wo	orkers Profit Participation Fund		8,237,628	3,738,116	
a	OTTED INCOME				
24 07	THER INCOME	•			
D.	turn on Pls saving account		877,929	2,086,334	
K.C	min on r is saving account		Trace of the last		
 'க்சி நூ	AXATION	•			
25 TA	XATION			·	
C.		25.	.1 18,766,352	12,082,576	
	irrent		496,019		
PT	ior		19,262,371	12,082,576	
25.1 Pr	rovision for taxation has been made	on the Presumptive Tax 1	basis under section 154 of	the Income Tax	
. 201 1	rdinance, 2001.	•			•
J		•	2017	2016	
26 C	ASH FLOWS FROM OPERATING	ACTIVITIES	Rup	ees ———	
, <b>, , , , , , , , , , , , , , , , , , </b>					
***	rofit before taxation		111,148,286	50,437,480	•
ν.		. •			
	dinstments for non-cash items				4.4
	djustments for non-cash items  Depreciation expense		64,989,276	64,124,693	•
	Depreciation expense		482	719	
	Depreciation expense Amortization expense		482 39,847,196	719 33,985,493	
	Depreciation expense Amortization expense Finance cost		482	719 33,985,493 1,029,336	
	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund	oation Fund	482 39,847,196	719 33,985,493 1,029,336 2,708,780	
	Depreciation expense Amortization expense Finance cost	oation Fund	482 39,847,196 2,268,332	719 33,985,493 1,029,336	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip	pation Fund	482 39,847,196 2,268,332 5,969,296	719 33,985,493 1,029,336 2,708,780	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip	pation Fund  pital changes	482 39,847,196 2,268,332 5,969,296 224,222,868	719 33,985,493 1,029,336 2,708,780 152,286,501	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets	pation Fund  pital changes	482 39,847,196 2,268,332 5,969,296	719 33,985,493 1,029,336 2,708,780 152,286,501	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools	pation Fund  pital changes	482 39,847,196 2,268,332 5,969,296 224,222,868	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635)	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade	pation Fund  pital changes	482 39,847,196 2,268,332 5,969,296 224,222,868	719 33,985,493 1,029,336 2,708,780 152,286,501	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt	pation Fund	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569 156,773,876	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635)	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt Advances, deposits, prepayments and	pation Fund	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635) 51,664,791	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt Advances, deposits, prepayments and Short term Investment	pation Fund  pital changes  f other receivables	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569 156,773,876 (129,072,552)	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635) 51,664,791 24,263,303	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt Advances, deposits, prepayments and Short term Investment Tax refunds due from Government -	pation Fund  pital changes  f other receivables	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569 156,773,876 (129,072,552) (11,795,058)	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635) 51,664,791 24,263,303 7,000,000 2,634,128	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt Advances, deposits, prepayments and Short term Investment Tax refunds due from Government - Due from holding company	pation Fund  pital changes  f other receivables  net	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569 156,773,876 (129,072,552)	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635) 51,664,791 24,263,303 7,000,000	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt Advances, deposits, prepayments and Short term Investment Tax refunds due from Government - Due from holding company (Decrease)/Increase in current Liabilit	pation Fund  pital changes  f other receivables  net	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569 156,773,876 (129,072,552) (11,795,058) (78,587,520)	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635) 51,664,791 24,263,303 7,000,000 2,634,128 (44,470,340)	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt Advances, deposits, prepayments and Short term Investment Tax refunds due from Government - Due from holding company	pation Fund  pital changes  f other receivables  net	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569 156,773,876 (129,072,552) (11,795,058) (78,587,520) 75,621,080	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635) 51,664,791 24,263,303 7,000,000 2,634,128 (44,470,340) (5,058,066)	
A	Depreciation expense Amortization expense Finance cost Provision for Workers' Welfare Fund Provision for Workers' Profits Particip Effect on cash flow due to working ca Increase)/ decrease in current assets Stores, spares and loose tools Stock-in-trade Trade debt Advances, deposits, prepayments and Short term Investment Tax refunds due from Government - Due from holding company (Decrease)/Increase in current Liabilit	pation Fund  pital changes  f other receivables  net	482 39,847,196 2,268,332 5,969,296 224,222,868 (2,868,831) 89,590,569 156,773,876 (129,072,552) (11,795,058) (78,587,520)	719 33,985,493 1,029,336 2,708,780 152,286,501 (2,777,846) (426,610,635) 51,664,791 24,263,303 7,000,000 2,634,128 (44,470,340)	

,		•		2017	2010
27	CASH AND CASH EQUIVALENTS		Note	——— Rup	ees
	Short term borrowings Cash and bank balances		16 10	(734,292;393) 6,856,411 (727,435,982)	(900,000,000) 9,166,262 (890,833,738)

### RELATED PARTY TRANSACTIONS AND BALANCES

Related parties comprise of group companies, key management personnel, directors and their close family members and staff provident fund. Transaction with related parties are on arm's length. Remuneration and benefits to executives of the Company are in accordance with the terms of the employment while contribution to the provident fund is in accordance with staff service rules. Remuneration of the chief executive, directors and executives is disclosed in note 31 to the financial statements. Transactions with related parties during the year other than those disclosed elsewhere in the financial statements are as follows:

other than those disclosed discovered in the interest of the control of the contr	2017	2016
Parent Company Transactions during the year Purchases of Molasses Payments on behalf of Company	Rup- 147,275,285 27,190,416	172,627,260 32,403,107
Balance outstanding at year end	205,426,968	126,839,448
Group companies Transactions during the year Advance against expenses Payments against security charges  Balance outstanding at year end	24,000,000 4,471,864 24,032,313	2,934,610 19,485
Staff Provident fund Contribution made during the year	2,099,864	1,764,506
EARNINGS PER SHARE		
Profit after taxation - Rupees = Weighted average number of ordinary shares = Earnings per share - Rupee =	91,885,915 21,858,560 4,20	38,354,904 21,858,560 1.75

## FENANCIAL INSTRUMENTS AND RELATED DISCLOSURES

#### Financial risk management

The Board of Directors of the Company has overall responsibility for the establishment and oversight of the Company's risk management framework. The Company has exposure to the following risks from its use of financial instruments:

Credit risk

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- Liquidity risk
- Market risk

#### 30.1 Credit risk

Credit risk is the risk that one party to a financial instrument will fail to discharge an obligation and cause the other party to incur a financial loss, without taking into account the fair value of any collateral. Concentration of credit risk arises when a number of financial instruments or contracts are entered into with the same party, or when counter parties are engaged in similar business activities, or activities in the same geographic region, or have similar economic features that would cause their ability to meet contractual obligations to be similarly affected by changes in economic, political or other conditions. Concentrations of credit risk indicate the relative sensitivity of the Company's performance to developments affecting a particular industry.

The carrying amount of financial assets represents the maximum credit exposure. To reduce the exposure to credit risk the Company has developed a policy of obtaining advance payments from its customers. Except for customers relating to the Government and certain small and medium sized enterprises, the management strictly adheres to this policy. For any balances receivable from such small and medium sized enterprises, the management continuously monitors the credit exposure towards them and makes provisions against those balances considered doubtful of recovery. Cash is held only with banks with high quality credit worthiness.

The maximum exposure to credit risk at the reporting date is as follows:

·	2017	2016
	——— Кир	ees ———
Trade debtors Advances deposits and other receivables Tax refunds due from Government Due from holding company Bank balances	14,018,275 147,569,986 31,563,642 205,426,968 6,856,411 405,435,282	170,792,151 17,921,559 19,768,584 126,839,448 9,165,543 344,487,285

Based on past experience, consideration of financial position, past track records and recoveries, the Company believes that trade debtors considered good do not require any impairment. None of the other financial assets are either past due or impaired.

#### 30.2 Liquidity risk

Liquidity risk is the risk that the Company will encounter difficulty in meeting obligations associated with financial liabilities that are settled by delivering cash or another financial asset. Liquidity risk arises because of the possibility that the Company could be required to pay its liabilities earlier than expected or difficulty in raising funds to meet commitments associated with financial liabilities as they fall due. The Company's approach to managing liquidity is to ensure, as far as possible, that it will always have sufficient liquidity to meet its liabilities when due, under both normal and stressed conditions, without incurring unacceptable losses or risking damage to the Company's reputation. The following are the contractual maturities of financial liabilities, including interest payments:

	1	Contractual cash flows			
	Carrying value	Total	Up to one	More than one year	
	1	Rupe	665		
Finance lease obligation Trade and other payables Short term borrowings Accured Mark-up June 30, 2017	52,569,274 154,947,293 734,292,393 9,972,112 951,781,072	(56,716,990) (154,947,293) (734,292,393) (9,972,112) (955,928,788)	(19,579,341) 154,947,293 (734,292,393) (9,972,112) (608,896,553)	(37,137,649)	
Finance lease obligation Trade and other payables Short term borrowings Accured Mark-up June 30, 2016	69,027,858 71,088,585 900,000,000 8,819,701 1,048,936,144	(74,412,031) (71,088,585) (900,000,000) (8,819,701) (1,054,320,317)	(20,072,529) (71,088,585) (900,000,000) (8,819,701) (999,980,815)	(54,339,502) (54,339,502)	

Contractual cash flows include tentative interest payments to be made up to the maturity of relevant facilities. The future interest related cash flows depend on the interest rates applicable at that time and the extent of utilization of running finance facilities.

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### 30.3 Market risk

Market risk is the risk that the value of the financial instrument may fluctuate as a result of changes in market interest rates or the market price due to a change in credit rating of the issuer or the instrument, change in market sentiments, speculative activities, supply and demand of securities and liquidity in the market. Market risk comprises of currency risk, interest rate risk and other price risk.

#### Currency risk

Currency risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in foreign exchange rates. Foreign Currency risk arises mainly where receivables and payables exist due to transactions entered into foreign currencies. The Company is exposed to foreign currency risk on sales to the extent that, orders placed are denominated in a currency other than Pak Rupees that is Dollar(\$). As at June 30, 2017 net receivables / (payables) amounting to \$ 106,970 (2016: \$ 1,635,923) are exposed to foreign currency

As at June 30, 2017, if the Pakistan Rupee had weakened / strengthened by 5% against US Dollar with all other variables held constant, profit before tax for the year would have been lower / higher by Rs. 0.56 million (2016: Rs. 8.44 million) mainly as a result of foreign exchange gains / losses on translation

#### Interest rate risk

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. Majority of the interest rate exposure arises from short and long term borrowings from banks and term deposits with banks. The Company is exposed to cash flow interest rate risk on its running finance arrangements and deposits with banks.

A change of 100 basis points in interest rates at the reporting date would have increased / (decreased) profit or loss by 7.31 million (2016: 8.94 million) This analysis assumes that all other variables, in particular foreign currency rates, remain constant. The analysis is performed on the same basis for current and last year.

### Other Price Risk

Other Price Risk is the risk that the fair value of future cash flows of the financial instruments will fluctuate because of changes in market prices such as equity price risk. Equity price risk is the risk arising from uncertainties about future value of investments securities. As at balance sheet date, the Company is not exposed to equity price risk.

#### Collateral

The Company has created charge over its fixed assets and current assets in order to fulfill the collateral requirements for financing facilities.

### 30.4 Capital risk management

The management's policy is to maintain a strong capital base so as to maintain investor, creditor and market confidence and to sustain future development of the business. The management closely monitors the return on capital along with the level of distributions to ordinary share holders.

The management seeks to maintain a balance between higher returns that might be possible with higher levels of borrowings and the advantages and security afforded by a sound capital position.

The Company is not required to maintain any regulatory capital.

#### 30.5 Fair value of financial assets and liabilities

Particulars

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'Fair value' is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Consequently, differences can arise between carrying values and the fair value estimates.

The carrying amounts of all financial assets and liabilities reflected in the financial statements approximate their fair values. The Company measures fair values using the following fair value hierarchy that reflects the significance of the inputs used in making the measurements:

Level 1: Fair value measurements using quoted prices (unadjusted) in active markets for identical assets or liabilities.

Level 2: Fair value measurements using inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.

Level 3: Fair value measurements using inputs for the asset or liability that are not based on observable market data (i.e. unobservable inputs).

#### REMUNERATION OF CHIEF EXECUTIVE AND DIRECTORS

The aggregate amounts charged in the financial statements for remuneration, including certain benefits to Directors, Chief Executive and Executives of the Company, are as follows:

	Particulars	Chief Executive	Director	Total	Chief Executive	Director	Total ·
Managerial R	emuneration(Rupees)	15,046,250	2,529,000	17;575,250	8,400,000	2,295,000	10,695,000
Number of pe		1	1	2			1 2
PLANT CA	PACITY AND AC	TUAL PRODU	CTION		2017		2016
Installed cap	pacity (Metric tons) uction (Metric tons) uction (Metric tons)				28,800 25,043 86.95%		28,800 22,356 77.63%
	OF EMPLOYEES				2017	—Number	2016
Total Num	ber of Employees umber of Employee				87		87

### NON-ADJUSTING EVENT AFTER THE BALANCE SHEET DATE

The Board of Directors in its meeting held on has proposed a dividend at the rate of Rs. 5.00 for the year ended June 30, 2017 (2016: Rs. 2.5 per share). These appropriations will be placed before shareholders for approval in the forthcoming Annual General Meeting and the effect thereof will be accounted for in the financial statements for the year ending June 30, 2018.

· ·			
-n		2017	2016
	TO BE OWNER TO BE OWNER TO THE	Rupee	
35	DISCLOSURE RELATING TO PROVIDENT FUND	•	3,799,630
	ed could	5,958,479	1,694,705
	<ul><li>(i) Size of the fund</li><li>(ii) Cost of investment made</li></ul>	2,804,715	45%
	Cimmothmente made	47%	1,694,705
*7	Character and	2,804,715	-,,-
]		acedance with the prov	isions of Section
	The contributions and investments out of the fund have been made in accept of the Companies Ordinance, 1984 and the rules formulated for the provident fund.	urnose. The figures are	based on the un-
7	and City Companied Ut/11001005, 120's tille and a	mpower 224 / D	
ل	andited financial statements of the provident fund.	•	• • • •
	•		<i>∴</i> .
36	DATE OF AUTHORIZATION FOR ISSUE	2017	2.1
ل	with orized for issue on	by the Board of	Directors of the
- <sub>"1</sub>	These Financial Statements were authorized for issue on		
	Company.		
.J	GENERAL		
37	(48) linkari	nagery for the purpo	se of comparison.
37.1	Corresponding figures have been rearranged and reclassified, wherever	hese financial statemen	ts.
2112	Corresponding figures have been rearranged and reclassifications in t There have been no significant rearrangements and reclassifications in t	€	
]	to have been rounded off to the neare	st rupee.	
37.2	Figures in these financial statements have been rounded off to the neare		
	·		
}	•		
)			•
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			\ <b>\</b>
j	<b>X.</b>		Ν\ .
<b>,</b>	Nation	MA	<u> </u>
	THE WAY	Dif	ector
	Chief Executive	•	
	NV.NV		

· 

AALINFORMATION	
Mame of Applicant	MATOL (PVT) LTD  G-48, Matiari House, KDA Scheme-1, Karachi
Registered business o	Nasarpur Road, Matiari
i) Plant Location:  // Type of Generation Facility:	Chation

	NT CONFIGURATION				
PLA	Plant size installed capacity:	6.2 MW	The Gas hased	power station	
· (i)·	Plant size Ilistance	6.2 MW Conventioal Steam Tu	Unit # 2	Unit#3	
(ii) :	Type of Technology,	Unit#1	Officer Zara	3 MW	
(iii)	Number of Units/size:	1.2 MW	2·MW	Unit#3	
. /m/:		Unit #1	Unit # 2	Toyo Denki- Japan	
् <u>र रिक्</u> रा इ.स.च्या		Jument Schneider	Lery somer-france	SGD2-AG21-5752	
(iv)	Unit Make & Model	N/A	B2613	SGUZ-AGEZ	
		IV/A			
	De-rated Capacity at mean	5.6.MW			
(V)	site condition	- 111			
. \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	an aumontion.	0.15 MW	Unit # 2	Unit #3	
(vi)	Commissioning/	Unit # 1	2013	2015	
(vii	Commertial Operatio Date	2006	Unit#2	Unit#3	
	Expected life of Facility from	Unit # 1	15	50	
· \ (vi)	commertial operation:		Unit#2	Unit#3	
	commercial operation useful	Unit # 1	12	49	
· (i)	Expected Remaining useful	5		Unit #3	
	life of the facility:	Unit#1	Unit #2	5500 V	
	Supply Voltage:	400 V	400 V		
	<b>7</b>	As per WAPDA Standard			
- 1	Xi) Provision of Metering	1/13/20			
<u>` ا</u>					

 		erroictics	
Dog P	PLANT	CHARACTERISTICS	3.1 KW per second
	·	Ramping Rate	Natural Gas
	2	Alternative fuel	
· . ·	PLAN	CONFIGURATION Installed capacity gross:	6.2 MW
eger Bere	(1)	De-rated Capacity at mean	5.6
	(1)	site condition	
.(*	1 100	A williary consumption:	0,15 MW
	(111)	Net capacity of the plant at	5.45 MW
•••	(iv)	mean site condition	
11	`~{`	THE STATE OF THE S	



### 1. General information (i) Name of the applicant. (ii) Registered/Business office (iii)Plant Location. (iv) Type of Generation Facility

Matol Pvt. Limited, Matiari

C-48; Matiari House; KDA Scheme-1, Karachi

Nasarpur Road, Matiari

Thermal Power Plant

### 2. Plant configuration.

(i) Plant Size Installed Capacity (Gross ISO) 6200 KWH or 6.2 MWH

(ii) Type of Technology

Conventional Steam Turbine Power Station

(iii)Number of units/Size (MW

a. Unit# l

1.2 MW Jument Schneider N/A

b: Unit#2

2 MW Lery soomer-france B2613

o. Unit#3:

3 MW Toyo Denki- Japan SGD2-AG21-5752

## (iv) Unit Make & Model

a. Unit# [

Jument Schneider N/A

b. Unit#2

Lery soomer-france B2613

c. Unit#3

Toyo Denki- Japan SGD2-AG21-5752

(v) De-rated Capacity at Mean Site Conditions 5.6 MW (Based on boiler capacity)

(vi) Auxiliary Consumption

:Commissioning/Commercial Operation date

-Unit# 1

2006

b. Unit#2

2013

Unit#3

2015

Expected Life of the Facility from Commercial Operation/Commissioning (viii): 💥

a. Uni#1

b. Unit#2

15

Unit#3

50

# (ix) Expected Remaining useful Life of the Facility

a. Unit# l

b. Unit#2

c. Unit#3

49

### (x) Supply Voltage

á. Unit∯ l

400 V

Unit#2

400 V

e. Unit#3

5500 V

(XI) Provision of Metering, As per Wapda Standard.

3. Fuel/Raw Material Details		
(i) Primary Fuel	Biogas	
(li) Alternate Fuel	Natural gas	
(iii) Fuel Source (Imported/Indigenous)		
(iv) Fuel Supplier	SSGC	
(v) Supply Arrangement	Pipe line	
(vi) Sugarcane Crushing Capacity		
(vii) Bagasse Generation Capacity		
(viii) Bagasse Storage Capacity (if		
(ix) No of storage Tanks		
(x) Storage Capacity of each tank		
(xi) Gröss Storage		garage (n. 1841) Geografia
(XII) Logistics		
4. Emission Values		
	Primary Fuel	Alternative Fu
(i) Sulfür di oxide (SOx), (mg/Nm3)	Santally 2 det	Alternative Fl
(ii) Oxide of Nitrogen (NOx), (mg/Nm <sub>3</sub> )		
(iii) Carbon di oxide (CO <sub>2</sub> ), %		
(iv) Carbon mono oxide (CO), (mg/Nm <sub>3</sub> )		
(v) Particulate Matter (PM), (mg/Nm <sub>3</sub> )		
5. Plant Characteristics		
(i) Generation Voltage 400 y		
(ii) Frequency		
(iii)Power Factor 0.80		
(iv) Automatic Generation Control (AGC)		
(v) Ramping Rate	3.1 KW/Sec	
(vi) Alternative Fuel	Natural gas	
(vii) Time required to Synchronize		
from cold start	so one and loading the comple	ex to thii load
. Plant Configuration		
Generation Facilities		
(i) Installed Capacity Gross ISO		
	.6.2 MW	
(ii) De-rated Capacity at Mean Site Condit (iii) Auxiliary Consumption		
Amprioximally Consumption	0.15 MW	

	3.	Fuel/Raw	Material 1	Details
--	----	----------	------------	---------

(i) Primary Fue

Biogas

(li) Alternate Fuel

Natural gas

- (iii) Fuel Source (Imported/Indigenous)
- (iv) Fuel Supplier

SSGC

(v) Supply Arrangement

Pipe line

- (vi) Sugarcane Crushing Capacity

(vii) Bagasse Generation Capacity

Bagasse Storage Capacity (if any)

- (ix) No of storage Tanks
- (x) Storage Capacity of each tank
- (xi) Gross Storage
- (xii) Logistics

#### 4. Emission Values

Primary Fuel

Alternative Fuel

- (i) Sulfur di oxide (SOx), (mg/Nm3)
- (ii) Oxide of Nitrogen (NOx), (mg/Nm<sub>3</sub>)
- (iii) Carbon di oxide (CO2), %
- (iv) Carbon mono oxide (CO), (mg/Nm<sub>3</sub>)
- (v) Particulate Matter (PM), (mg/Nm<sub>3</sub>)

#### 5. Plant Characteristics

(i) Generation Voltage

- (ii) Frequency
- (iii) Power, Factor.

- (iv) Automatic Generation Control (AGC)
- (v) Ramping Rate

3.1 KW/Sec

(vi) Alternative Fuel

Natural gas

Time required to Synchronize to Grid and loading the complex to full load from cold start

#### 6. Plant Configuration

#### 7. Generation Facilities

(i) Installed Capacity Gross ISO:

(ii) De-rated Capacity at Mean Site Conditions 5.6 MW

(iii) Auxiliary Consumption

0.15 MW

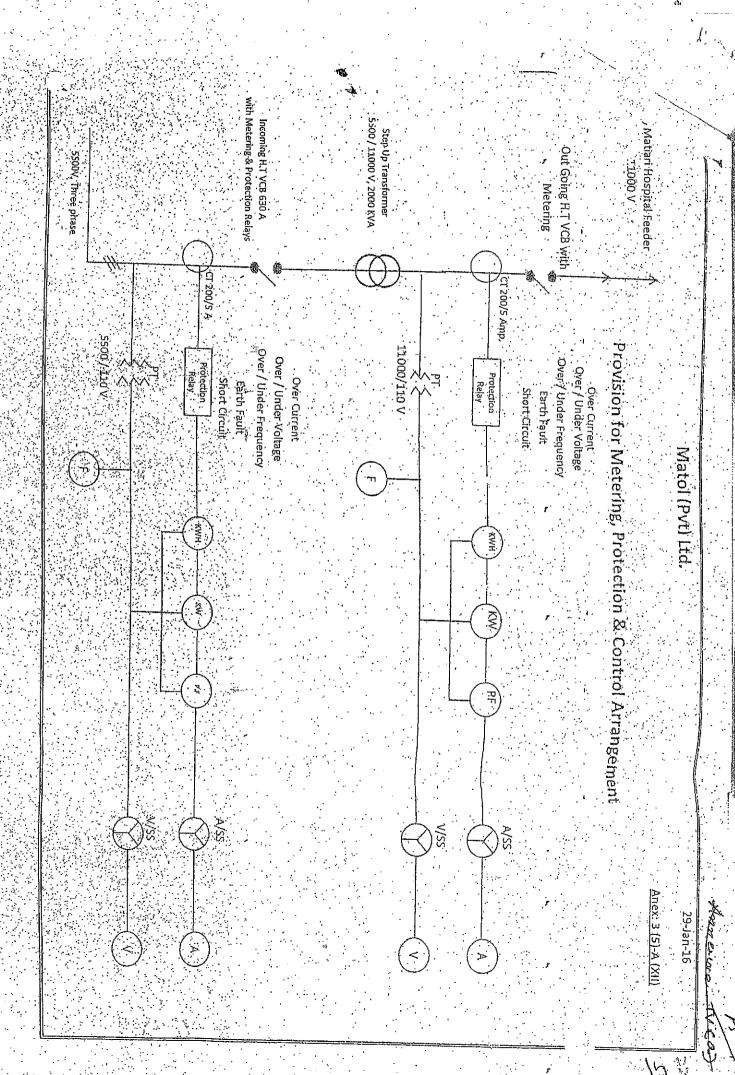
# 7. Lay out plan of the power plant

# 8. Proposed land use Area

			1
S.No /	Description	Unit	Values
2440	Cogeneration Plant	days	300
	operation		1.00
	Total biogas	$M^3$	43000
.2	generated	300	
	Total Biogas/N.gas	MT	43000
·3	Consumed		5000~8000
	Off-season steam	MT	Nil
4	" generation		
	Boiler Capacity	T/Hr	22 tons
5	Boiler Operating	Bar(g)	25 bars
6	parameters		
are received	Turbo-Alternator	MW :	03 MW
17年2月1日,19			
	Extraction cum Back		
	pressure turbine LP.		1.3
8/	, Gross Power	IVI VY	
	Generation		
	a) Factory and grid		N/A
	in parallel		
	∷ b) Factory Off ,Grid		
	ON		
	c) Factory ON, Grid		
	OFF		
	d)Off season		
9	Power Consumption		
	a) Factory and grid		
	in parallel		
	b) Factory Off, Gri	d	A A CONTRACTOR
	ON		
1	c) Factory ON, Gr	id   · · · · · · ·	
	OFF.		
	ujOff season		
10	Power Export a)	MW	
10	Factory and grid in	1	
	parallel b) Factory		
	Off, Grid ON c)		
	Factory ON, Grid		
	OFF d)Off season		
	Oll djor season		

(i) Building/Structures (with Roof Top)

- (ii) Green Belt
- (iii)Roads/Paved Areas
- (iv) Vacant
- (v) Total plant area 10 Acre
- 9. Description for Plant Operation



PROPOSED POWER PRUCHASEL

MATIARI HEALTH SERVICES (PVT) LTD

OF SUPPLIED BY

IMW.

DRAFT INTERCONNECTION STUDY

ANNEXURE-

DRAFT ENVIRONMENTAL STUDY

NEXURI

#### **MSM**

July 6, 2018

#### Resident Director

Subject:

Interconnection Study

Matiari Hospital is located 6 KM away from Matol Private Ltd on Nasarpur Road Matiari. The Electric need of Matiari Hospital is 1500 kW where as Matol Private Ltd has a surplus Electric power generating capacity of 1500 kW. The generation voltages are 5.5 kW.

This Hospital is a CSR project of Matiari Group of Industries. It is thus desired to provide the excess generation of Matol Private Ltd to comply with the needs of Matiari Hospital.

For power transmission between the two organization namely Matol to Matiari Hospital. The voltage would be step up to 11 KV and transported through stand alone over head conductor, along Nasarpur Road. There will be very little transmission loss because of 11 KV transmission voltages & a short distance of 6 KM. At the hospital this voltage will be stepped down to 400 V and fed to a panel through protective switch gear. There will be a parallel supply of HESCO and standby Diesel Generator. List of protection device and connection circuit is attached.

Muhemmed Yousuf Khan General Manager



# ENVIRONMENTAL MANAGEMENT

PLAN

Matol Distillery Pvt. Ltd.
District Matiani, Sindh



Environmental Total Solutions



## MATOL DISTILLERY PVT. LTD

Matiari, District Matiari, Sindh



Developed by:

## **ENVIRONMENTAL TOTAL SOLUTIONS**

Office No. 1, G. Floor, Aqsa Tower, Main Rashid Minhas Rd.

Contact: +92-333-2277350, Email: iqbalh41@yahoo.com



## MATOL DISTILLERY PVT. LTD

Matiari House, Plot No. C-48, K.D.A Scheme No. 1, Karachi

## **ENVIRONMENTAL TOTAL SOLUTIONS**

Office No. 1, G. Floor, Agsa Tower, Main Rashid Minhas Rd. Contact: +92-333-2277350, Email: iqbalh41@yahoo.com



## EXECUTIVE SUMMARY

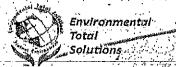
The Environmental Management Plan (EMP) for the Matol (Pvt) Limited (A ethanol production unit) identices the principles, approach, procedures and methods that will be used to control and minimize the environmental and social impacts of all operational activities associated with the project The Matol (Pvt) Limited is at 07 km east of Matiari on Nasarpur road. The distillery plant is capable of producing 100,000 liters of Fuel ethanol (80 Tons) per day. Bio-fuels have become particularly appealing to developing countries because of their potential to stimulate economic development in rural areas and alleviate poverty through the creation of employment opportunities and increased income in the agricultural sector.

The project's main environmental issues are related to the Distillery

- (i) Spent wash from distillation column;
- (ii) spent lees from analyzer column and
- (iii) Other wastewaters like fermenter washings, fermenter cooling, oor washings, spillage and cooling.

Among these, spent wash is of major environmental concern owing to its quantity and quality and is characterized by high percentage of dissolved organic (BOD; COD) and inorganic matter (in form of nitrogen, phosphorus, and potassium etc.), dark brown color, high temperature and low pH.

- A number of management plans will be implemented throughout the construction and operation phases of the TSHPP including the following plans:
- Biodiversity and Protected Areas Management Plan measures to ensure protection of local and regional biodiversity and minimize project impacts on three adjacent protected areas;
- Environmental Monitoring Plan measures to ensure project compliance, measure the success of proposed mitigation, continue baseline monitoring and review environmental and social performance;







- Community Relations and Safety Plan measures to inform local communities
   about the progress of the project and ensure community safety;
- Regional Health Management Plan Matol shall prepare a regional health plan to mitigate project impacts on the health of local populations if any;
- Additional Studies additional studies are planned to provide more baseline information for the project; and
- Training and Capacity Building training and capacity shall be provided in all aspects of the EMP.
- Monitoring shall also be done during operations to verify the success of
   mitigation measures and to conduct additional baseline sampling.
- The EMP outlines reporting and communication procedures to ensure that EMP provisions are communicated and reported at all levels of the project, including local communities.
- A key component of EMP success depends on e ective capacity building of the TSHPMB and the training of sta and all others involved in the EMP. These e orts will also be assisted by the implementation of technical assistance by outside consultants.
- The EMP shall be considered a controlled document and should be updated annually, following a reportable incident or plan update.
- A number of additional studies, complementary to the EMP, are proposed including further monitoring, sampling and investigations of water quality associated with the implementation of an intact surface management approach.





#### ACRONYMS

	A aris annual	Description
	Acronym	Description
	AP	Acidi cation Potential
	AQC	Analytical Quality Control
	BOD	Biological Oxygen Demand
	Ca (OH) <sub>2</sub>	Calcium hydroxide
	CETP	Common E uent Treatment Plant
		Methane
	CM <sub>4</sub>	
<del></del>	CMS	Control management system
_	CNG	Compressed natural gas
<u> </u>	COD	Chemical oxygen Demand
	CO	Carbon monoxide
*	DAP	Di-ammonium phosphate
	DDG	Dry distiller's grains
	DDGS	Dry distiller's grains soluble production
	CO <sub>3</sub>	Carbonate
	DO	Dissolve Oxygen
	ËA	Environmental Audit
	EBM	Environmental baseline monitoring
	EHS	Environmental health and safety
	EIA	Environmental initial assessment,
	EMP	Environmental management plan
	EP	Eutrophication impact
Tangar .	ETP	E uent treatment plant
	EU	European Union
	FBP	Fed batch process
	GDP	Gross domestic product
	GoP	Government of Pakistan
	GSP	Generalized system of performance
	en e	شہر میں کو کہ کہ کے جو انہ انہ کی کو میں کہ ہوت ہوئی ہو ہے۔ میں ان کے انہ ان کو میں انہیں کو کی کہ کہ ان کو ان کی ان کی کہ کا ان کی ان ان کی ان کی کہ کہ ان کی کہ کہ ان کی



GWP	
GHG	

HCl

HCO<sub>3</sub>

H<sub>3</sub>PO<sub>4</sub>

HSP

HTP

IEA

IEE

IMC

IPCC

MEG

MFN

TMM

Na₂CO₃

NaOH

NCS.

NEAP

**NEQS** 

N<sub>2</sub>O

NOX

OSHA

PCOP

**PCBS** 

PEPA

PEPA 1997

pН

PPE

PΜ

 $PM_{10}$ 

Global warming potential

Green house gases

Hydrochloric acid

Bi-Carbonate

Phosphoric acid

Health safety plan

Human toxicity potential

International energy agency

Initial environmental examination

Independent monitoring consultant

Inter Governmental panel on climate change

Ethylene glycol

Most favored nation

Methyl-cyclopentadienyl manganese

Sodium carbonate

Sodium hydroxide

National conservation strategy

National environmental action plan

National environmental quality standards

Nitrous oxide

Oxides of Nitrogen

Occupational safety & health administration

Photo chemical oxidation potential

Pollution control boards.

Pakistan environmental protection agency

Pakistan environmental protection act 1997

Power of Hydrogen ion concentration

Personal protective equipment

Particulate matter

Particulate matter smaller than 10 micron







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PSMA		Danes I		·	
I DIVITY .		Pennsylvania seepage	managama	nt admin	ictmotion
		* OTTIVO LI LOUTING BCC DELEC	manageme	шышын	ISLIALIOH
	•		Ο.		

PSO Pakistan state oil

SEPA Sindh environmental protection agency:

REN Recti ed ethanol neutral

SO<sub>2</sub> Sulfur di- oxide

SO<sub>4</sub> Sulfate

TCD Thermal conductivity detector

TSDF Treatment stabilization Disposal Facility

TDS Total dissolved solid

TSS Total dissolved solid

UNDP United Nations Development Fund

UNESCAP United Nations Economic & Social Commission for Asia the Paci c.

UNFCC United Nations frame work on climate change

VHG Very high gravity

VOCS Volatile organic compounds

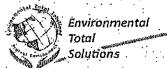
WAPDA Water & power development authority

WHO World health organization

## Management Plan

#### UNITS

Unit Symbol	Unit Description
oČ	degrees Celsius
%,	percent
10 <sup>6</sup> m³	million cubic meters
10 <sup>6</sup> m³/year	million cubic meters per year
dBA	decibel
g	grams
g/m <sub>3</sub>	grams per cubic meters
ha	hectares
km	kilometer
km/km²	density (for stream network)
$\mathrm{km}^{2}$ .	square kilometers
kg/s	kilograms per second
l/(s.km2)	liters per second per kilometer squared
m	meter
meq/100g	milli-equivalents per ioo grams
mm	millimeters
mg/mL	milligrams per milliliters
mg/m³milligrams	milligrams per cubic meters
m/s	meters per second
m <sub>3</sub>	cubic meters
m³/day	cubic meters per day
m³/ha	cubic meters per hectare
$m^3/s$	cubic meters per second
m³/year	cubic meters per year
MPN/mL	most probable number of coliform per 100 mL
MW	megawatt
pH	potential of hydrogen
ton/m³	tons per cubic meter
•	





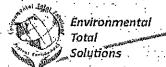
#### TINITS

。 	
Unit Symbol	Unit Description
oC .	degrees Celsius
%	percent
10 <sup>6</sup> m <sup>3</sup>	million cubic meters
10 <sup>6</sup> m³/year	million cubic meters per year
dBA	decibel
g	grams
g/m <sub>3</sub>	grams per cubic meters
ha	hectares
km	kilometer
km/km²	density (for stream network)
km²	square kilometers
kg/s	kilograms per second
l/(s.km2)	liters per second per kilometer squared
<b>m</b>	meter
meq/100g	milli-equivalents per 100 grams
mm	millimeters
mg/mL	milligrams per milliliters
mg/m³milligrams	milligrams per cubic meters
· m/s	meters per second
m3	cubic meters
m³/day	cubic meters per day
m³/ha	cubic meters per hectare
m <sup>3</sup> /s	cubic meters per second
m³/year	cubic meters per year
MPN/mL	most probable number of coliform per 100 mL
MW	megawatt
pH	potential of hydrogen
ton/m³	tons per cubic meter





Unit Symbol	Unit Description
oC	degrees Celsius
<b>%</b>	percent
10 <sup>6</sup> m <sup>3</sup>	million cubic meters
10 <sup>6</sup> m³/year	million cubic meters per year
dBA	decibel
g	grams
g/m <sub>3</sub>	grams per cubic meters
ha	hectares
km	kilometer
km/km²	density (for stream network)
km²	square kilometers
kg/s	kilograms per second
1/(s.km2)	liters per second per kilometer squared
m	meter
meq/100g	milli-equivalents per 100 grams
mm	millimeters
mg/mL	milligrams per milliliters
mg/m³milligrams	milligrams per cubic meters
· m/s	meters per second
m3	cubic meters
m³/day	cubic meters per day
m³/ha	cubic meters per hectare
$m^3/s$	cubic meters per second
m³/year	cubic meters per year
MPN/mL	most probable number of coliform per 100 mL
MW	megawatt
pH	potential of hydrogen
ton/m³	tons per cubic meter
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	LIOSSARYOFTERMS
Term	De nition
Adaptive management	The implementation of new or modi ed mitigation measures in response to an unanticipated environmental e ect.
Baseline	A description of the biophysical and socio- economic state of the environment at a given time, prior to development of a particular project
Alternatives	The evaluation of alternatives to project development in EIA (timing, location, technologies etc) including the no go, or no development option
Biota	All living plants and animals in a given area
Biodiversity	The variety of life on earth
Biophysical	Pertaining to the natural environment.
Contamination	Pollution
Conservation	The preservation of natural resources for use by future generations
Cost-bene t analysis	A method used to determine the monetary consequence of project impacts
Consultation	A process of communication with those potentially a ected by a project, policy, plan or program
Cumulative e ects	Changes to the environment that are caused by an action in combination with other past, present and future actions.
Endangered species	An animal or plant in danger of extinction.







Environment

The combination of elements whose complex interrelationships make up the settings, surroundings and conditions of life of the individual and society as they are or are felt

Ecology

A branch of science dealing with the interrelationships of organisms and their environment

Ecosystem

An interconnected and symbiotic grouping of microorganisms, fungi, plants and animals.

Environmental audit

An environmental management tool consisting of a periodic and objective evaluation of an organization and installations to assess compliance with regulatory and other requirements, as de ned by audit criteria.

Environmental impact

A critical evaluation of the likely e ects of a project on Assessment the environment, including the prescription of mitigation and management actions.

Environmental management plan

A comprehensive plan for the implementation of mitigation measures prescribed in the environmental impact assessment.

Fauna

The total animal population in a given area

Flora

The total vegetation assemblage in a given area,

Global warming

The increase in average temperature of the surface of the earth

Groundwater

Water found beneath the Earth's surface

Habitat

The home of a plant or animal





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In			5.1
1377	ıт	<b>``</b>	at.
111	ŁL.	/a	
	Ľ		

The consequence of a action or activity on the human or natural environment. Impacts may be positive, negative or neutral

Intact Rivers

A management approach to ensure that entire river sequences, from headwaters to sea, are kept free from barriers, allowing for the protection of a full sequence of habitats and migratory routes

Irreversible

A result whereby once occurred cannot be changed or reverted to its prior state

Issue

A question or concern regarding an environmental impact, consequence or e ect

Land II

A disposal area for waste that is eventually covered with soil

Life cycle assessment

An assessment of a project and its e ects from inception, through startup, operation and closure phases

Magnitude

The size or degree of a predicted impact

Mitigation

Prescribed actions taken to prevent, avoid, reduce or minimize the impacts, or potential adverse e ects, of a project

Monitoring

A combination of observation and measurement to assess the environmental and social performance of a project and its compliance with the EIA/EMP, or other approval and regulatory conditions

Natural habitats

Land and water areas where most of the native plant and animal species are still present, and either are legally protected, o cially proposed for protection, or unprotected but of known high conservation value





The state of the s	
Impact	The consequence of a action or activity on the
	human or natural environment. Impacts may be
	positive, negative or neutral
Intact Rivers	A management approach to ensure that entire river
	sequences, from headwaters to sea, are kept free
	from barriers, allowing for the protection of a full
	sequence of habitats and migratory routes
Irreversible	A result whereby once occurred cannot be changed
	or reverted to its prior state
Issue	A question or concern regarding an environmental
	impact, consequence or e ect
Land II	A disposal area for waste that is eventually covered
	with soil
Life cycle assessment	An assessment of a project and its e ects from
	inception, through startup, operation and closure
	phases
Magnitude	The size or degree of a predicted impact
Mitigation	Prescribed actions taken to prevent, avoid, reduce
	or minimize the impacts, or potential adverse

e ects, of a project

Monitoring

A combination of observation and measurement to assess the environmental and social performance of a project and its compliance with the EIA/EMP, or other approval and regulatory conditions

Natural habitats

Land and water areas where most of the native plant and animal species are still present, and either are legally protected, o cially proposed for protection, or unprotected but of known high conservation value







Physical cultural resources

Important sources of valuable historical and scienti c information, assets for economic and social development, and integral parts of a people's cultural identity and practices

РМ10

Particulate matter less than 10 microns in diameter

Proponent

The proposer, or applicant, of a project

Protected Area

A clearly de ned geographical space, recognized, dedicated and managed, through legal or other e ective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values

Reservoir

An arti cial water body created and used for water storage for irrigation, ood control, ow regulation or power generation purposes

Residual impact

Those impacts that remain after the application of mitigation measures

Risk

The likelihood of occurrence of an adverse project e ect

Runo

Precipitation falling on the ground that is not absorbed and eventually reaches rivers, lakes or other water bodies

Safeguard Policy

A set of ten policies of the World Bank with the objective to prevent and mitigate undue harm to people and their environment in the development process

Scoping

A tool to assess, evaluate and prioritize relevant issues or concerns arising from a project

Screening Process

To assess which projects require an environmental Impact assessment and to what extent





Signi cance

The relative importance of an issue or impact to society

Social impact assessment

A component of EIA that assesses the impacts of a project, policy, plan or program on people and society

Stakeholder

Someone who has an interest in the outcome of a project, or a decision a ecting them

Strategic Environmental Assessment A systematic process for evaluating the environmental consequences of proposed policy, plan or program initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision-making on par with economic and social considerations

Tiger Action Plan

A plan of World Wildlife Fund to improve the protection and management of key tiger populations and their habitats in top priority conservation landscapes, through measures than can be sustained and supported over the long term by governments, local communities and stakeholders

Water quality

A measurement of the purity of water, or drinking water

Watershed

The entire region or area where water ows into a lake, river, stream or other water body

Wetland

An area of land saturated with water that has high Biodiversity importance



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### - илуноптентаг Management Plan



## Introduction

#### 11 PREAMBLE

Matol Pvt. Limited Company has hired the services of M/s Environmental Total Solutions having its office at Office No. 1, Aqsa Tower, Main Rashid Minhas Rd. Karachi, to develop the Environmental Management Plan as well as monitoring of their activities to assess gaps with regard to compliance to the environmental laws of the company and to prepare and rehabilitate environmental management plan which should be implemented to cover those gaps.

#### Company Pro le

Matol Pvt. Limited is a Pakistan-based company having its registered at Matiari House, Plot No. C-48, K.D.A Scheme No. 1, Karachi. It was incorporated as a private limited company on November 24, 2003, the principal business of the Company is to manufacture and sell in industrial Ethanol (Ethyl Alcohol). The distillery plant is capable of producing 100,000 liters of Fuel ethanol (80 Tons) per day.

The idea behind the inception of Matol (Pvt.) Limited was to fulfill the international market needs and to synergize the Economies of Operational Efficiencies with Matiari Sugar Mills Limited Since 2001, Matol has been providing foreign exchange earnings, more employment and effective utilization of bye-product of sugar.

The Company has imported latest technology Bio-gas plant, digesters, and boilers from Europe and Germany for efficient production of Ethanol and optimum utilization of it's by products and to contribute towards the Green Environment of the Country.

#### Location and Boundaries

The project is located in Village Dato Bhatti, District Matiari, Sindh at a distance of 5 km. The industry is located in the vicinity of potential sugarcane-growing area, which reduces the transportation cost of Sugarcane/ Bagasse / Molasses thereby reducing the pollution load.

#### 1.2 ENVIRONMENTAL POLICY

The Environmental Policy of Matol Pvt. Limited is as follows:

Appointment of a responsible person of the company for environmental conformance.







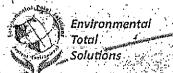
- Minimizing the consumption of natural resources and energy, whilst consuming material goods in moderation, waste and discharge properly.
- Reducing the creation of waste by the adoption of improved operating practices and by the recycling of material whenever practical.
- Ensuring all waste and effluent is disposed of in a safe and responsible manner through wastewater treatment where applicable.
- · Complying with environmental legislation.
- Maintaining full records of accountability for the use of Chemicals, Energy, Water consumption, wastewater treatment, disposal of sludge etc.
- Maintaining full records of Staff training in conservation on Water and Energy, Proper and minimal use of chemical and their correct disposal, Fire / Risk hazards etc.
- Strive for continual improvement in all above-mentioned areas.

This EMP shall be used as an umbrella plan in conjunction with the action plans such as the Industrial Liquid Waste Management Plan to be developed in order to specifically address identified risks and impacts, in compliance with the SEPA Performance Standard. The EMP is consist of some documented combination of operational procedures, practices, plans, and related supporting documents.

#### **Environmental impacts**

Environmental impact in the study area is any alteration of environmental conditions or creation of new set of environmental conditions, adverse or beneficial, caused or induced by the impact of project. The additional impacts of various activities of the proposed project on the environment such as air, water, soil, land use, ecology, socio-economic were identified. The study also includes the measures to be incorporated in the project to mitigate these impacts. The resultant impacts were assessed for their significance based on the background environmental quality in the area and the magnitude of the impact. All components of the environment were considered and wherever possible impacts were evaluated in quantitative/qualitative terms. Standard techniques and methodologies have been adopted to predict impacts on various environmental components.

Estimated impacts have been superimposed over the baseline (pre-project) status of environmental quality to derive post project scenario of the environmental conditions. The resultant (post-project) quality of environmental parameters is reviewed with respect to the





## Management Plan



permissible limits. The impacts thus predicted helps to minimize adverse impacts on environmental quality during and after project execution by suitably designed

#### 1.3 ENVIRONMENTAL MANAGEMENT PLAN

The environmental impacts can be categorized as primary and secondary. Primary are those which are directly attributed to the project and secondary impacts are those which are indirectly induced due to primary impacts and include those associated with investment & socio-economic status. The project impact may be broadly divided into two phases. During construction Phase: These may be regarded as temporary or short term and ceases with implementation of the project.

#### **During operation Phase**

These impacts are continuous warranting permanent measures for mitigation and monitoring. Construction and operation phase of the project comprises of various activities, each of which will have an impact on some or other environmental parameters.

Various impacts during construction and operational phase on various environmental parameters have been studied to estimate the impact on environment as discussed below.

#### Scope of EMP-

- Collection of data on the baseline environmental quality around the proposed industry including air, water, noise and land environments.
- Identification and assessment of potential adverse and beneficial environmental impacts due to the proposed project.
- Preparation of an EMP to minimize the adverse impacts.
- Preparation of post-project monitoring plan to ensure that the EMP achieves its desired objective

#### **Activities Covered**

In identification of environmental aspects, due consideration was given to cover all environmental related dimensions, resources use including all forms of emission and releases which are controlled and uncontrolled (e.g. fugitive emission), to all environmental media and waste of all types. The significant environmental aspects associates with the activities at operations unit within the organization, following aspects were considered, where relevant





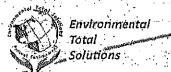


- Emission to Air;
- Release to water;
- Waste management;
- Contamination to land;
- Use of raw materials and natural resources;
- Rehabilitation activities monitoring

#### 1.4 METHODOLOGY

The environmental impact assessment was started with the scoping process. The purpose of scoping was to identify the important issues such as the appropriate time and space boundaries and the significant effects and factors. All the relevant necessary information for decision making was collected. A generic description of the proposed project of sugar mill as a power generation business and its related activities was collected from the proponent. A legislative review of the applicable laws, regulations, guidelines and standards from various organizations and literature was done. Baseline of the area's environmental and socioeconomic settings was collected through literature review and field surveys. Baseline of the area was measured through a change in the environment, resulting from a designated action or activity. To establish an environmentally sound preferred option for achieving the objectives of the proposed project, technology alternatives were studied in collaboration with the project proponent. The collected information was used to assess the potential environmental impacts of the proposed project activities. Detailed methodology and mitigation measures were evaluated to reduce the impacts of project activities on environment. The issues such as physical environment of the area, biological environment of the area and socio-economic environment of the area were studied during impact assessment and were detailed in Table 1.

The project area is rural; and cultivation is the main occupational activity. The potential existing sources of air pollution in the project area are road traffic, brick kilns, farm machines, and agricultural activities. There is no continuous major source of noise in the project area. Intermittent sources include farm tractors, farm equipment, and road and rail traffic. Considering the intermittent nature of these noise sources, it can be concluded that the noise pollution in the area is low. The potential impacts are classified according to the type of potential receptors.





The impacts have been assessed by following standard international guidelines and best available practices. The method defines three levels of consequence (or severity) and likelihood (or probability of occurrence) -high, medium or low -of an impact. A standard risk based approach has been used in which the significance of an impact is determined on the basis of the level of consequence and likelihood of the impact e.g. an impact of medium severity is assigned a low significance if the likelihood of occurrence of the impact is low and high significance if the likelihood of occurrence is high or almost certain Impacts associated with operation activities are air emission, water resources, GHG emissions, hazardous materials, ozone depletion, plant noise, waste water and solid waste management.

#### 1.5 COMPONENTS OF THE OEMP

Environmental issues identified in this OEMP are specific to the operational phase of the development. The OEMP has been prepared in an issues-based format that nominates for each environmental issue or impacting activity, the tasks that are required to be addressed during the operational phases of the development, covering:

Construction Impact Management Plan - measures to minimize negative impacts of operational activities on local communities and the natural environment

Biodiversity and Protected Areas Management Plan – measures to ensure protection of local and regional biodiversity and minimize project impacts on adjacent protected areas;

Environmental Monitoring Plan – measures to ensure project compliance, measure the success of proposed mitigation, continue baseline monitoring and review environmental and social performance;

Physical Cultural Resources Management Plan – measures to prevent any inadvertent loss of physical and cultural resources during project construction and operation;

Training and Capacity Building – training and capacity shall be provided in all aspects of the EMP.





#### - invironmentat Management Plan



The EMP shall be considered a controlled document and should be updated annually following a reportable incident or plan update

#### **EMP Study Report**

This is finally prepared and submitted as per guidelines given by SEPA as:

#### Chapter 1: Introduction

Chapter one provides purpose of the report, background information of the proposed project, brief description of nature, size and location of project, environmental setting of the project, estimated project cost; and scope of the study.

#### Chapter 2: Statutory Requirements & Standards

Chapter two describes the key environmental legislation and the standard relevant to the project and the methodology adopted in preparation of the report has also been described in this chapter.

#### Chapter 3: Description of Environment

Chapter three presents the methodology and findings of field studies undertaken to establish the environmental baseline conditions, which is also supplemented by secondary published literature

### Chapter 4: Process & Utilities

Chapter four describes the project and its associated activities and it also deals the process technology, in addition to technical and design information.

### Chapter 5: Ethanol Benchmarking & Best Practices

The Ethanol Benchmarking and Best Practices\* study provides an overview of ethanol production and potential environmental issues related to the ethanol production process. This study also introduces the potential for improvements in using resources including energy and water as well as reducing environmental impacts





#### Chapter 6: Environmental Management Plan

Chapter six describes the institutional arrangements for environments protection and Conservation during the operational stage of the Project and the management strategy for the project.

#### Chapter 7: Conclusion

The conclusion of the EMP report has been given in this chapter along with recommendations

#### Additional information is presented in the Annexes as follows:

- Annex I contains the Sindh Ambient Air Quality norms;
- Standards for motor vehicle and noise are presented in Annexure –II;
- Annex III reflects the SEQS for Municipal industrial effluent;
- Annex IV implies SEQS for Municipal industrial effluent discharged to inland water;
- Annex V replicates SEQS guidelines for industrial gaseous emission;
- Annex VI represents the Flora & Fauna of the project area;
- Annex VII reveals the Socio Economic and Culture Heritage of the area;
- Text Reports are pasted in Annex IX. suggest

#### PROPONENT DETAILS

Managing University Chief	Syed Shafqat Ali Shah
Executive	
Headio (vce)	Matol Pvt. Limited Company.
	Matirai House, C-48. K.D.A Scheme No.1, Karachi
	75350
Telephone:	+00-92-21-34521383 / 34536614 / 34529698 / 34526941
	00-92-21-34541734
Email	msm@matiarisugar.com
Factory	Matol Pvt. Limited
	Nasarpur Road





Elephone
Eax

Email

Coordinates

Raw Materials Required

Lype of Industry

Production Capacity

Environmental Constitution

Matiari, District Matiari

Phone #: 00-92-222-619925 / 760762 00-92-222-760507 factory@matiarisugar.com

25° 36′ 0″ North, 68° 27′ 0″ East Molasses

Manufacture and Sell of Ethanol

100 KLPD

Environmental Total Solutions (ETS)

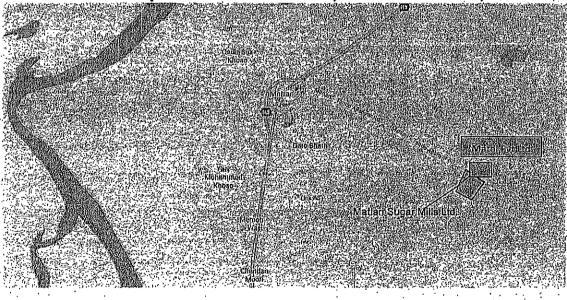
Office No. 1, Aqsa Tower, Main Rashid Minhas Rd.,

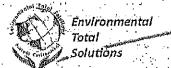
Karachi.

Contact: 0333-2277350

Email: Etspk41@yahoo.com, iqbalh41@yahoo.com

## Location map of Matol Pvt Ltd, Distt. Matiari, Sindh







## DESCRIPTION OF THE ENVIRONMENT

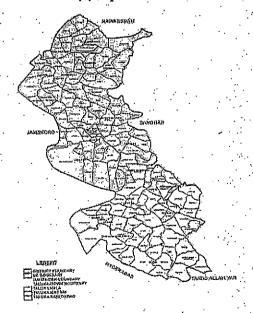
#### 3.1 INTRODUCTION

The existing physical, biological, and socioeconomic environmental conditions of the project area are described in this section. Information for this section was collected from a variety of sources, including published literature, reports of other studies conducted in the area, and surveys conducted specifically for this study.

The purpose of reviewing published literature was to gather information on the environmental setting and the work already carried out in the area. The relevant literature was of the previous studies conducted in the project area or in areas with a similar geographical and ecological setting. A complete list of references is provided at the end of this report.

#### 3.2 DISTRICT MATIARI

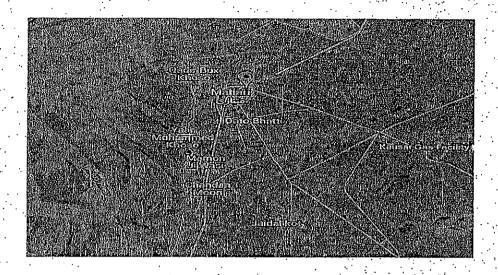
Matiari was previously a taluka of district Hyderabad. On the 4th of May 2005, this taluka was separated from Hyderabad and was awarded the status of a district. The district lies in 68° 14" 8' to 68° 14" 40' east longitudes to 25° 26" 20' to 26° 5" 43' north latitudes. The district is bounded by district Sanghar on the east, district Jamshoro on the west, district Shaheed Benazirabad on the north and district Hyderabad and Tando Allahyar on the south with River Indus in-between, spread over an area 1417 Sq. Kilometer.











#### 3.3 DEMOGRAPHY

#### **Population Characteristics**

Pakistan is among those four countries where life expectancy for female, at birth, is less than that of males, and as such the male population outnumbers the female population. Sex ratio in Matiari is 108 male per 100 females, which is more than the ratio at the National level, which is 106:100. Matiari has 52 percent male and 48 percent female population. Though 85 percent of the total population resides in rural areas and remaining 15 percent resides in urban areas. There could be some other socio economic reasons for such a di erence in male to female ratio, research has shown that there are three major contributing factors for this higher male/female ratio

#### Estimated Population of District Matiari for 2014

Age	ė gartys	TOTAL			' RURAL			URBAN	
group	вотн	MALE	FEMALE	BOTH	MALE	FEMALE	ВОТН	MALE	FEMALE
(in	SEXES			SEXES .	•. •		SEXES		
years		•			•				
All	834,660	433,507	401,153	708,021	367,783	340,238	.126,639	65,724	60,915
ages									
00-04	131,036	67,089.	63,947	113,226	58,083	55,142	17,810	9,004	8,805
04 09	134,589	70,887	63,700	115,682	61,016	54,666	18,905	9,871	9,034
10-14	95,994	53,531	43,464	81,196	45,137	36,059	15,797	8,394	7,405
15-19	85,467	42,475	42,993	71,376	35,357	36,019	14,093	7,118	6,973
19-24	82.401	39,379	43,023	69,544	32,840	36,705	12,858	6,539	6,318
25-29	66,841	34,769	32,072	56,523	29,276	27,247	10,319	5,495	4,825
30-34	50,846	27,975	22,871	42,735	23,562	19,173	8;1ii	4.413	3,697







								THE PARTY OF THE P	
35-39	35,925	18,770	17,155	30,066	15,679	14,388	5,860	3,092	2,767
40-44	38,280	18,905	19,374	32,230	15,951	16,281	6,049	. 2,956	3,094
	29;548.	15,899	13,649	24,850	13,419	11,431	4,698	2,479	2,218
	24,916	13,243	11,672	20,978	11,215	9,762	3,939	2,027	1,910
55-59	15,951	8,882	7,069	13,395	7,474	5,921	<b>2,</b> 555	1,408	1,146
60-64	15,309	8,071	7,238	13,000	6,866	6,134	2,309	1,205	1,104
65-69	8,569	· 4,749	3,820	7,192	3,969	3,223	1,377	780	597
70-74	7,931	3,848	4,083	6,893	3,354	3,540	1,037	496	543
75 &	10058	5,034	5,024	9,136	4,589	4,547	922	445	478
above					•				***

### 3.4 PHYSICAL RESOURCES

Topography, Geography, Geology, and Soils

#### Topography

Sindh can be divided into four distinct parts topographically i.e. Kirthar range on the west; a central alluvial plain bisected by the Indus river in the middle, a desert belt in the east and the Indus delta in the south.

Geomorphologically the 9.538 km² land area is part of Lower Indus Plain, more specifically ood plain of the Indus River system which is a vast alluvial plain that runs along the Indus River. As such the Project area consists of at land that slopes towards the river. Protective bunds or dykes had to be provided in view of the devastating oods of the past which used to submerge at least 20 to 40 km land on either side of the bank. The western boundary of the Project area and also of the Hala Reserved Forest area has accordingly been dyked. The average elevation of the area is 50 m above mean sea level.

#### Geography

The district lays in 68°14"8'to 68°14"40'east longitudes to 25°26"20'to 26°5"43'north latitudes. The district is bounded by district Saangharon the east, district Jamshoro on the west, district Shaheed Benazirabad on the north and district Hyderabad and Tando Allahyar on the south. The whole district is irrigated through canals and the river. The plane lands of Matiari are very fertile and productive. Indus River ows alongside the western border of the district. The lands along the river are formed of silt and sandy loam. Being in the Indus basin, this district has hardly any barren lands. Only a few lands (as seen in the irrigation map below) are barren while the rest are quite fertile croplands. The climate of the district is moderate as a whole. The months of May and June are very hot during the day with maximum and minimum





temperatures being 41°C and 26°C respectively. However, due to pleasant breeze, the temperature falls abruptly as the night falls. December and January are the coldest months with maximum and minimum temperature of 25°C and 11°C

#### Geology

The geology of Sindh is divisible in three main regions, the mountain ranges of Kirthar, Pab containing a chain of minor hills in the west and in east it is covered by the Thar Desert and part of Indian Platform where the main exposure is of Karonjhar Mountains, which is famous for Nagar Parkar Granite. In the north Sindh is enquired by rocks of Laki range extending to Suleiman range and its southern most part is encircled by the Arabian Sea. The rocks exposed in this area belong to upper Cretaceous which are recent in age. The sub-surface rocks are about 20,000 feet thick and belong to Cretaceous and Pre-Cretaceous periods. Mostly the rocks are of sedimentary origin of clastic and non-clastic nature and belong to marine, partly marine and uviatile depositional environments.

Basin wise Sindh lies in the lower Indus Basin and its main tectonic features are the platform and fore deep areas. Thick sequences of Pab sandstone of Upper Cretaceous, Ranikot Group (Khadro, Bara, Lakhra) of Paleocene, Laki, Tiyon, and Khirthar of Eocene age, Nari Formation of Oligocene, Gaj Formation of Lower to Middle Miocene, Manchar of Upper Miocene to Pliocene, Dada Conglomerate of Pleistocene are present in various areas of Sindh. Limestone and sandstones are the most dominant sedimentary rocks in the area. Structurally Sindh generally contains gently folded anticlinal features trending in north-south direction. The major active faults in province are as under:

Surjani Fault: N-S Trending. It is located west of Larkana. It cuts Quaternary deposits. The maximum magnitude of the earthquake associated with the fault is of the order M=6.1 on Ritcher Scale.

Jhimpir Fault: N-W Trending. A number of epicenters are located on the fault. The fault has produced an earthquake of M=5.6 on Ritcher Scale.

Pab Fault: NN-W Trending. It is Located in the eastern part of Pab range. The maximum magnitude of the earthquake associated with fault is of the order M=7.0 on Ritcher Scale.







Rann of Kutch: E-W Trending The fault has produced an earthquake of the order M=7.6 on Ritcher Scale. Recent studies have revealed that this fault traverses the Karachi Metropolitan Area.

Geologically, the section of the district Matiari, where the project operating, forms part of the Southern Indus Basin that is located south of the Sukkur Rift and west of the Indus and the meandering of the plain slows down.

#### Soil

The soil of the area is generally loamy and clayey and has been formed from Indus River alluvial deposits. Agricultural soils in the Project area are associated with irrigation and dry land agriculture and hence are ne in texture, rich in organic matter and nutrients as a result of their history of cropping, ploughing and fertilizer additions.

Soils of the surface layer to a depth of 2 m on the land of the Project area is composed of dry, soft and loosely packed clay, sand and silt, with a solid layer of clay and sandstone to a depth of approximately 20 m. A typical analysis of samples from the area shows that sulfate and chloride the parameters of concern for the integrity of concrete structures and plastic service pipes, are low.

#### Climate and Hydrology

Climate of the District Matiari can be described as hot and arid, characterized by low rainfall (less than 250 millimeters per annum) and absence of a well-de ned rainy season, and high temperatures.

The climate of Matiari District that forms the macro environment of Hala Block can be described as moderate. The months of May and June are very hot during the day with maximum and minimum temperatures of 42°C and 26°C respectively. This is followed by abrupt falls in temperature during the night with pleasant breeze which makes nights comfortable. December and January are the coldest months with maximum and minimum temperature of 25°C and 11°C. Sometimes cold winds from Baluchistan make the winter severe and the temperature falls below 8°C.

The area is exceedingly dry with mean annual rainfall averaged over a thirty four year period being less than 88mm. The available data indicate that there are two wet seasons: the rst





with low rainfall in February and March (with mean monthly rainfall of 6mm and 5mm respectively) and second with higher rainfall in the monsoon period of July, August, and September (with mean monthly rainfall of 45mm, 21.3mm and 10.5mm respectively). Approximately 78% of the mean annual rainfall occurs in the two wet seasons with 72% occurring in the monsoon season. The heaviest recorded rainfall in a given day is 184.5mm in the month of July.

The wind direction is generally NE (November to April) in winter and SW in summer (May to September). Dust storms are not frequent in the area. Hot winds blow during the months of June and July.

Humidity varies, highest about the end of August which is much less in May when the air is uncomfortable dry. Fogs are common in the cold season.

Climate will have little bearing on the minor environmental impacts from the installation of transformers in the extension and augmentation subprojects.

#### Groundwater and Water Supply

The water resources of the macro environment of Matiari District are limited to canal water supply and groundwater extraction with tube wells.

Groundwater is being used to supplement the shortfall in the supply of irrigation water. Every eld in the Project was found during the survey to have a tube well which was being operated due to short supply being experienced during recent years. However, operation of the tube wells irrigation channels owing through the area.

Groundwater in the project area is generally shallow, and is very signicantly a ected by the irrigation system, which consists of canals fed by the Indus. The groundwater depth has been found to vary during recent times when the Indus ow has reduced to its extensive use upstream.

There is an acute shortage of safe drinking water in all the villages. Ground water level is deep at about 30 ft. Water available from canal distributaries is of good quality but is not safe for drinking since it has not been upgraded to be considered safe for drinking and t for human consumption.







Groundwater sources exist in the area and potable water is available. The local population is generally reliant on supply from the hand pumps in rural areas while in urban areas population is using drinking water from piped water supply scheme.

#### Surface water

Hala being on the ood plain of the Indus receives its supply of freshwater indirectly from the canal distributaries. Indus River owing to the west of the project area are directly or indirectly providing the surface water resource of the project area. The Indus is in ood during July and August. In the past it used to over ow the banks and inundate the riverine areas. The damages done to crops and property year after year led to construction of embankments.

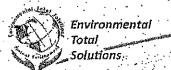
This action contained the oods but also to gradual clearance of land for organized agriculture in the ood plain area towards the embankment and also beyond the embankment on the west and beyond the Highway N<sub>5</sub> on the east.

Agricultural land in Matiari District area is irrigated with water from the network of branch canals and watercourses that lead from these canals irrigating the agricultural land in and around the project area. Most of the project area canals, branch canals and watercourses are unlined and require periodic maintenance.

#### Air Quality

Air quality in most of the project area appears good based on observation during the study period. Emissions should be controlled at source under the EMP. There will be a few items of powered mechanical equipment to be used in the construction of the GSS works that may give rise to complaints of dust and other emissions; however these should be minor and easily dissipated. Domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households, are minor.

Although there are some sugars mills/industries but there are no other industrial pollution sources in the vicinity of Hala Road. Air quality in the project area appeared very well during the study period. Air quality measurements in major urban centers revealed that CO, SO, and NO levels were in excess of the acceptable levels in some areas but the average levels were found below WHO standards.







The other major source of air pollution is dust arising from construction and other ground or soil disturbance, during dry weather, and from movement of vehicles on poorly surfaced or damaged access roads. It has been observed that dust levels from vehicles may even be high enough to obscure vision signicantly temporarily.

#### Noise

Noise from vehicles and other powered mechanical equipment is intermittent. Based on professional experience background daytime noise levels are probably well below 55dB (A).

#### 3.5 BIOLOGICAL RESOURCES

### Wildlife, Fisheries and Aquatic Biology

The resident fauna of the project area belong to the oriental region but has since vanished. A variety of mammals, birds, reptiles, and amphibians are reported to have had their habitat in the project area. The entire project area was surveyed to estimate the population of the wildlife species. None of the wildlife species were sighted during the survey as none of the main reported species including the hog deer, wild boar, Bengal fox, Indian crested porcupine and Asiatic jackal were sighted or reported in the project area.

The hog deer is vulnerable ungulate species that was the key species of the Matiari District and reserve forest present in the project area. Due to habitat degradation and human encroachment this key species are locally extinct from the reserve area. No direct sighting or dropping were observed in the project area during the present survey. According to wildlife department even the species of hog deer that was present in the reserve forest along the Indus River has vanished.

Wild boar (Sus scrofa) is another ungulate commonly found in forest along the Indus Rivers. The wildlife department and local people report that the population of this species in the area has recently grown. The Indian crested porcupine is reported from some parts of the area, but they have not been seen for some time. Bengal fox and desert cat were the common species of the area. The population of Bengal fox depends highly on the availability of rodents in large numbers, because it has to eat rodents weighing almost one kg each day. The desert cat is common in the scrub areas of the desert. It is threatened because of loss of habitat, and being hunted for its fur, as well as being killed when it attacks peoples' domestic fowl. Other common large mammals that are reported from the area include palm squirrels. The common







species of small mammals that are reported from the area are cairo spiny mouse, house rat, house mouse, pigmy gerbil, Indian gerbil, and desert jird.

The monitor lizard and spiny-tailed lizard is the large lizard that is found in the area. Other reptiles that are reported from the area are spotted Indian house gecko and ground agama. The reported reptiles of the project area include saw-scaled viper, Indian cobra, Indian sandy boa and sand swimmer.

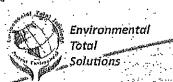
Saw-scaled viper is the most prominent snake in the area. This is a highly poisonous snake and is distributed throughout Pakistan. The cobra has also been reported in the project area. The population of the Indian sandy boa (Eryx johni) is very low. The population of sand-swimmers, or raitmahi (Ophimorrus tridactylus), is very high in the desert area. This lizard species prefers a sandy habitat with xerophytic plants. Marbled toad is the only amphibian species recorded from the area.

The most commonly observed bird is the white-cheeked bulbul, which is the most numerous species in the scrublands and, although found mainly in the plains, is also common on slopes. Other common birds are the little brown dove, black crowned nch lark, Persian short-toed lark, Indian short toed lark, lesser white throat, common white throat, house bunting, graynecked bunting, and crested lark.

Less common birds observed and recorded in the past include the Indian sparrow hawk; tawny eagle, common kestrel, gray partridge, Indian sand grouse, pintail sand grouse, Collard dove, great gray shrike, gray-backed shrike, hooded wheatear, tree pie, hoopoe, pied wagtail, black winged stilts, red-wattled lapwings, sandpiper, white backed vulture, gri on vulture, black vulture, golden eagle, rock partridge, and black-shouldered kite.

The gray partridge, sand grouse, little brown dove, spotted owlet, Sindh nightjar, Indian roller, black-crowned nch lark, ashy-headed nch lark, crested lark, white-cheeked bulbul, Indian robin, common babbler, jungle babbler, purple sunbird, Indian myna, and house sparrow are common area residents are still around but getting rare.

There are no areas of wildlife signicance near the subproject area. The wild animals are very few and are almost entirely connect to the wetland area.







### Terrestrial Habitats, Forests and Protected Species

The project area is irrigated agricultural land, where mostly the natural vegetation is replaced by agricultural eld and does not support rare or threatened plant species. Most of the plants species present in the site are cultivated. Shisham (Dalbergia sissoo) used to be abundant but was found reduced to a few. Kikar (Acacia prosopis) is not being used as fuel wood since the project area has been supplied naturalgas. Other trees which are planted are some varieties of mulberry, such as mulberry (Morus alba) and tut (Morus Idevigata); ber (Ziziphus jujuba); dhrek (Melia azadirachta); and sharin (Albizzia lebbek), a quick-growing tree; Sur da (Eucalyptus cameldanesis) is an exotic species that is present in the project area. This plant is also sold commercially in match factory.

The old arboreal vegetation of the waste places consists of jand (Prosopis spicigera), karil (Capparis aphylla), whose berries are collected for pickling. Along the canals and other moist places, there are found sar (Saccharum sara), kans (Saccharum spontaneum), pilchi (Tamarix dioca) and kundar (Typha angustata), which are used for making ropes, baskets, thatch and mats. The domestic livestock mostly grazed in this habitat of the project area. The fodder grasses found in the area are khabbal (Cynodon dactylon) and madhana (Eleusine degyptica).

There are some barren places which are mostly saline and consist of salt tolerant species. Shrubby Tamarix dioca is commonly observed in this area. The natural vegetation of Hala reserve is mostly replaced by agricultural eld, where cultivation practices are commonly observed.

The range forests outside the project area are composed of a number of scattered forest trees, which are protected by the Sindh forest department. The dominant species of these include Tamarix aphylla, Acacia nilotica, Prosopis juli ora, Calatropis procera, Alhagi marorum and Saccharum spontinium.

#### Protected Areas / National Sanctuaries

In Pakistan there are several areas of land devoted to the preservation of biodiversity through the dedication of national parks and wildlife sanctuaries. There is no wetland, protected area or national sanctuary near the area of works and subproject area.







#### 3.6 ECONOMIC DEVELOPMENT

Agriculture, Crops, Horticulture and Industries

Agriculture and Crops: The project is located in the agricultural land which receives adequate water supply as well as rains. Gone are the days when their land would be inundated and there would be loss of crop and property year after year. However, this change in profession has been brought about by raising the embankment, land clearance and availability of water at farm gate. The wildlife vanished with land clearance while the people had to switch over to agriculture, and raising livestock. With reduced availability of water in River Indus, the sher-folk also switched to farming and sh farming.

Crops and Horticulture: The main crops of this district are rice, maize and fodder, wheat, tomato, Cotton and Sugarcane, but beside these a lot of other crops are cultivated. The fruits and vegetables of this region are also considerable. "Nasarpur" is the biggest market of "Onion" in Asia.

They do not have to collect fuel wood for household consumption since they have been supplied natural gas. People own land varying in size from 2 to 5 acres.

Livestock: The village folks own livestock. Every village has 35 to 60 animals including goats and cows but not many sheep. Natural vegetation does not dry up and it is not costly to buy green or dry fodder for animals.

*Industry:* As Matiari is very near to Hyderabad, so the people of Matiari do accomplish their industrial needs from there. But the old industrial products of Matiari are very much popular all over Pakistan and abroad.

Residents of Matiari District hardly get job in industries that located in Hyderabad or Kotri, or Kotri site area which are only 60 to 75 kms away mostly because they are not skilled and opportunities for unskilled labor are very few.

These industrial products are "Khadee", "Kashee" and "Jundi" of Hala, "Loongee" & "Khes" of Nasarpur and "Ajrak" Of "Matiari" City.

There are a few numbers of industrial, commercial and agricultural businesses in the vicinity of the proposed sub-project.





### **Energy Sources**

Matiari is predominantly dependent on wood and natural gas as a source of fuel for cooking with electricity being a major source of lighting. There are no indications of planning and investment in alternative sources of fuel and energy.

### 3.7 SOCIAL AND CULTURAL RESOURCES

### Population Communities and Employment

The estimated population of Matiari District is 5, 25,082 (2005). Matiari District has socially aware population, which has taken up many social issues due to this fact many local NGO's are working here and nd it up less to work SPO, Aga Khan Foundation, HANDS & SGA are working here with local NGO's & CBO's. Edhi center is also located in Taluka Hala.

The people in the project area are engaged in low level occupation, with the members of the nuclear family engaged in farming, raising livestock, collecting sand and gravel at and from the river bed. Two or three persons from each village assume the management responsibility and assign di erent roles to di erent members of the family and to the families in other villages, if necessary. The persons in the management hierarchy are responsible to the Sardar or wadera or rais of the area.

The people both males and females are engaged in the following types of labor:

- Farming, including livestock farming
- Gravel-collection
- Water sale by donkey-cart

### **Education and Literacy**

The literacy rate of the District is 40 % including 25% in male and 15% in females. It means that out of 750,000 (Latest Assumed Population) near about 300,000 people are educated and others are uneducated. The Adult literacy rate is 40%. It means that some of 300,000 of the total population of Adults are educated in the District

There are eight primary schools for boys, one primary school for girls, one middle school, one high school, one technical institute and one large religious institution in the fourteen villages surveyed for this study. All the schools are functional.







As such the literacy rate among the youngsters is fairly high. Male literacy ratio is less than 30% and female literacy is about 15%. Quite a few persons can speak Urdu, the National language and many more can read the Holy Quran.

There is a mosque in almost every village. Things have started to change with the emergence of new leadership which has started setting up mosques and madrassas in the area of in uence.

#### Educational Institutions in District Matiari with Enrolment & Sta

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2	Technical Institutions	02	00	02	340	. 00	340	12	00	12
3	Vocational	. 00	02	02.	00	69	69	oo 🤚	04	04
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#### Health Facilities

The healthcare services are not available at each village in the Project area. However, Khondo has a Basic Health Unit (BHU). The people are compelled to go to Hala, Bhit Shah or Hyderabad depending on the severity of incidence of the disease. These places are at considerable distances and not within the reach of the farming community in the Project area. Cost of treatment is unbearable to the people particularly because of travel, fee that has to be paid to the doctor and medicine that has to be purchased. The cost of treatment takes away at least Rs. 3000 to 5000 each time a person falls seriously sick. Hiring a Datsun truck for transporting the patient, costs over Rs. 1000. This being equivalent to ten days earning of the family, adds to their debt burden. The situation is worse for the females who have to be taken to Mother and Child Health Centre for delivery and child care and that takes away a few thousand for each delivery, and subsequent child care. People pay the high cost by borrowing and that adds to their debt burden.





There are also other hospitals of voluntary and missionary organizations which provide health cover to the general public. Medical facilities are also located near sub-projects.

### Poverty

Impoverishment of resources leading to environmental degradation is both a cause and a consequence of rural poverty. Therefore, impoverishment of resources leads to desertication which in turn leads to poverty, and the vicious circle completes when poverty leads to further desertication.

The Project area with lush green elds did not show signs of poverty. People did seem concerned about short supply of inputs including water and power but by and large they seemed satis ed with whatever they were getting and whatever they had. Frequent droughts occurring during recent years were a cause of concern to them but they seemed to have accepted the reality that they have to be careful in excessive use of their resources. Perhaps this is the reason that the area seemed more developed than other parts of Sindh.

Family income of Rs 10 to 25 thousand, arrived at by this study, suggests that a majority of the families live at or above the poverty line. All members of the family contribute to sustain their living. Poverty, if induced, may be caused by the following factors:

- Scarcity of water
- Recurring drought
- Low return from crop and livestock farming
- Low literacy rate
- Lack of training
- High population growth
- Lack of access to employment in industrial area
- Increasing unemployment
- High cost of healthcare



# Process & utilities

### 4.1 TYPE OF PROJECT

M/s. Matol Pvt. Limited has operating distillery plant at Matiari, Nasarpur Road, Matiari, District Matiari in the province of Sindh, Pakistan. The distillery plant is molasses based and capable of producing 100,000 liters of Fuel ethanol (80 Tons) per day.

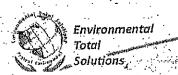
Molasses is a raw material for production of ethyl alcohol which gains importance for its use as fuel in admixture with petrol, as a main ingredient in beverages and as a starting raw material for various organic chemicals. Molasses is a renewable resource and dispense the use of petroleum for fuel and organic chemicals. Alcohol has assumed very important place in the country's economy. It is vital raw material for a number of chemicals. Ethanol has a potentiality as fuel in the form of "power alcohol" for blending with petrol in the ratio of 10:90.

#### 4.2 DISTILLERY

A distillery may employ batch or continuous fermentation, followed by distillation, to produce ethanol with a purity of 96% to 99%. This ethanol can be used in other industries or further processed and blended with gasoline. Waste from the distillation process is known as vinasse or spent wash. Anaerobic digestion of this waste is used to produce biogas, which can be utilized for the production of boiler fuel for the distillery or to fuel combined heat and power engines. Remaining waste can be returned to agricultural elds and / or used in the composting of organic solids emanating from processing.

### 4.3 MANUFACTURING PROCESS FOR DISTILLERY UNIT

Molasses is the chief raw material used in India for production of ethanol. Molasses contains about 45% total sugars, of which, 25 to 30% are cane sugar (sucrose) and the rest are reduced sugar. During fermentation, yeast strains of the species Saccharomyces, a living micro organism belonging to class fungi converts sugar (sucrose) present in the molasses into alcohol. Chemically, this transformation of sucrose to ethanol can be approximated by the equation.





Cane Sugar + Water Glucose/Fructose

II - 
$$C6 H_{12}O6 = 2C_2H_5OH + 2CO_2$$

+ 2CO2 265kcal /kg cal

180 · 02 88

During fermentation, traces of higher alcohols like amyl alcohol lower aldehydes like acetaldehydes are also formed as impurities in the fermenter. A low chart of manufacturing process of distillery with material balance is given in Figure 2.6. Operating parameters of distillery unit is given Table 2.4. The distillery unit involves three main operations

- Feed preparation
- Yeast propagation and continuous fermentation.
- Multi-pressure distillation

#### **Feed preparations and weighing**

Molasses stored in a storage tank is rst weighed in a tank with load cells so that accurate quantity can be fed to the fermentation section. The weighed molasses then transferred from tank to the diluter in fermentation section where it is diluted with water and fed to the fermenter.

#### Yeast propagation and continuous fermentation

Highly e cient yeast strain is propagated in the culture vessel under aseptic conditions. The ready yeast seed is then transferred from culture vessel to fermenter. The glucose in media gets converted to ethanol, in each of the 3 fermenters operating in continuous cascade mode. CO<sub>2</sub> liberated during reaction is sent to CO<sub>2</sub> scrubber for recovery of ethanol. The yeast sludge is separated from wash after fermentation in a wash settling tank and clari er. Part of the yeast sludge is reactivated and recycled back to the fermenter.



### Multi-pressure distillation

The fermented wash containing alcohol, non-fermentable solids and water is supplied to distillation columns to separate the alcohol from other impurities as a continuous ow. The distillation system is designed for premium quality extra neutral alcohol as briefed below.

The system consists of 7 columns, namely CO<sub>2</sub> stripper, stripper column, pre-reactor column, extraction column, recti cation column, re ning column, fusel oil column. Wash is fed to CO<sub>2</sub> stripper column to remove CO<sub>2</sub> gas present in it. Alcohol is stripped o water in stripper column. The distillate from stripper column is fed to pre-recti er column to remove most of fusel oil and the distillate from pre-recti er column is fed to extraction column after dilution with soft water. In extraction column most of the high boiling impurities separated from ethanol in presence of water. The bottom ethanol water mixture is pre-heated by system condensate and spent lees before being fed to recti er column. In recti er column, recti er spirit (RS) is taken out from top tray and fed to re ning column where mainly the methanol impurities are separated. Pure ENA is obtained at bottom, which is cooled and stored. The impure spirit from top of pre-recti er column, extraction column, recti er column and re ning column and balance alcohol is recycled to pre-recti er column. The alcohol containing fusel oil from pre-recti er and recti er column is also fed to fusel oil column.

Recti cation column and pre-recti er column works under positive pressure. The top Vapors from recti er column are condensed in stripper column for giving heat to stripper reboiler. Other columns work under vacuum.

#### **Process Selection**

The process selection is done based on the following considerations:

- i. Least stress on resources including raw materials and utilities.
- ii. Reduce, Recycle and Reuse of wastes.
- iii. Least or no pollution from the industry.
- iv. Least or no risk to human and property.
- v. Least or no adverse impacts on environment

The technology options for the facility Ethanol plant were considered based on raw material, process and waste water generation





#### 4.4 RAW MATERIAL, USES & PRODUCTS

Conventional feed stocks for the production of ethanol include both sugar-based and starch-based feedstock. The sugar-based feedstock includes crops such as sugar beets and sugar cane. In Pakistan the relatively high market value of sugar has limited implementation of direct conversion of sugar-based feedstock to ethanol; instead, ethanol is produced through the fermentation of blackstrap molasses a by-product of sugar crystallization.

#### Source of Blackstrap molasses in sugar industry

In a cane or beet sugar factory, sugar production process comprises of juice extraction, clari cation, evaporation, crystallization and centrifugal separation. Clari ed sugar juice is concentrated by evaporation to produce sugar syrup. The sugar syrup then goes through multiple rounds of crystallization to extract the sucrose. It is boiled and the sucrose crystallizes from the remaining molasses fraction. The product of this step is known as massecuite. The massecuite is then centrifuged to separate the sucrose from the molasses. This process is repeated three times in Pakistan's sugar mills. Thus clarified sugar juice is boiled and centrifuged the first time to produce 'A' sugar and 'A' molasses. 'A' molasses is then boiled again to produce 'B' sugar and 'B' molasses.

The 'B' molasses is boiled a third time to produce 'C' sugar which is mixed with water and is used to seed the next round of crystallization. The 'C' molasses is referred to as 'final' or 'blackstrap' molasses. Blackstrap molasses is a syrup containing mixture of un-crystallizable sugar, non-sugar solids originating from cane or beet, chemicals from the sugar manufacturing process and some water. It contain approximately 5 opercent sucrose and 50 percent other components that include water, various organic components (other than sucrose) and inorganic salts.

The color, taste, odor and composition of molasses vary with the type of raw material and also with stage of exhaustion (sugar extraction) of the molasses. Blackstrap molasses diers from other feed stocks for alcohol production such as corn, sorghum and potatoes etc. which have their carbohydrate contents stored as starch which is usually precooked and hydrolyzed into fermentable sugars. Molasses doesn't require pretreatment as the carbohydrates are already in the form of sugars. It is a non-sterile process and presence of undesirable microorganisms in the process cannot be completely avoided. The raw material used for fermentation itself shows the presence of contaminating microorganisms. The major cause of concern in molasses based







fermentation for ethanol production is the presence of wild yeast along with bacterial contamination

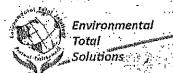
#### Quality of molasses

Normally 60-70% of the production cost is contributed by the feedstock in alcohol production. Owing to the increasing demand and cost of molasses, improving and maintaining the quality of the fermentation process has become a crucial factor. The key parameters that determine the quality and fermentation potential of sugar cane molasses are sugar content, minerals, suspended solids and acidity. High concentrations of calcium and chlorides negatively a ect the alcoholic fermentations of cane sugar molasses, while minerals like magnesium and zinc exert a positive e ect on yeast health and productivity.

During sugar production operations, juice-holding time, exposure temperature and addition of chemical a ect the composition of molasses. High temperature along with high or low pH increases sugar caramelization. Use of lime, sulfur and CO<sub>2</sub>, increase the content of calcium and carbonates in molasses. Use of antibiotics or a very high count of yeast cells are needed to overcome the bacteria that hide behind suspended solids.

These biocides are extracted in molasses as residuals, and a ect the yeast in distillery fermentation. The acidity of sugar cane molasses varies depending on the harvesting techniques. Very high acidity content on cane sugar molasses is detrimental to yeast fermentation. Finally, the quality of sugar cane molasses varies depending on its geographical origin and on the time of harvest. Molasses as it is produced from the centrifugal stage is in a hot condition (52 to 55°C). Due to the chemical treatments, it contains large amount of sulfurous gases. Sulfurous gases can inhibit yeast. Similarly fresh molasses has high foaming tendency as well as high bu ering capacity.

It also contains high level of suspended sludge. Processing of fresh molasses usually results high microbial count in distillery fermentation. This is why fresh molasses is stored for at least a month before use in a distillery. During storage the rst evidence of thermal degradation is production of frothing due to evolution of CO<sub>2</sub> by reaction of invert sugar with amino acid. Frothing is accelerated by high temperature. Even at normal temperature molasses undergoes very slow degradation in storage, usually with evolution of CO<sub>2</sub>.





Cooling and frequent mixing by recirculation during storage, helps to avoid internal combustion and caramelization. Molasses, if not cooled properly, also promotes the growth of heat stable microbes that a ects fermentation. At higher temperatures, generally in summer, wild yeast is produced in high quantities. Increasing storage time (more than six month) on the other hand can reduce the fermentable sugar content slowly. Molasses is stored in steel tank to prevent contamination. Prolonged holding of liquor at low temperature and inadequate mill sanitation, increases the microbial contamination and acids in molasses. Proper sanitation during storage of molasses is also necessary to avoid the microbial contamination. Contact with water and pockets of dilution in bulk stock, can give rise to high microbial ora. Contact of soil with molasses also should be avoided. It is necessary to handle and store in protective environment, taking above-mentioned factors into consideration.

Table: Chemical composition of blackstrap molasses

Parameter.	'.  Mean (W/V)
Brix	84 + 2.5%
Reducing Sugar	17+ 2.0%
Sucrose	32 + 3.5%
Total Sugar	49 + 5.5 %
Ash	12.69 + 0.26 %.
pH	5.8 + o.35

Table: Characteristics of Molasses Water

Molasses Water		Characteristics
pН		5.5-6.0%
Color.		Dark Brown
Total dissolved solids		82%
Sucrose	2 44	35%
Reduced sugar		20%
Un fermentable sugar		6%
Protein		2%
Sulfated ash		12%







Speci c gravity	
	1.4%
Calori c value (in kcal)	3050 k.cal/kg
Cl	0.4 %
SO <sub>4</sub>	1.5%
K₂O	22 %
P <sub>2</sub> O <sub>5</sub>	0.24 %
N	1.1 %
SiO <sub>2</sub>	0.4%
MgO	0.8%
CaO	1.5 %
Fe <sub>2</sub> O <sub>3</sub>	0.3%

# Molasses Speci cation

The exact composition of the molasses is discult to predict. It is in uenced by soil and climatic conditions, variety and maturity of cane and the processing conditions in the factory. For this reason, only ranges with indicative averages of the composition can be given ranges between 74-79%: the analysis below is based on 75%.

# Table No: Molasses Speci cations

		•		
COMPONENTS	20/15 (\$100 400) 20 08-10 (\$100 1850)			PERCENTAGE
Total sugars	en en seguine par estado.			46-52%
Sucrose		<del></del>		30-40%
Reducing sugar				15-20%
Unfermentable sugar			,	2-4%
Ra nose				and the second s
Non-sugar organic matter				9-12%
Nitrogen component as protein (6.2	5 *N)			2-3%
Betain '				an eagur
Glumatic acids			. · .	
Non-nitrogen bodies				
Soluble gums/ other carbohydrates				
Organic acid				<del></del>
· · · · · · · · · · · · · · · · · · ·	······································		<del></del>	







Crude ash					8-11%	- 77. (**)	
Sodium (as Na)		·			 0.1-0.4%		N. Carlo
Potassium (as K)		• .			 1.5-4.0%		
Calcium (as Ca)			:	• •	0.4-0.8%		
Phosphorus (as P)		•		٠,٠	0.6-2.0%	7.2	
Chlorine (as Cl)	1	·			0.7-3.0%		

Cane molasses contain small amount of citric acid, succinic acid, waxes, sterols, and vitamins, The viscosity of molasses varies widely. It depends upon several factors: dry matter, the area of production and temperature.

### ETHANOL PRODUCTION

Distilleries in Pakistan are using cane blackstrap molasses as a feedstock for alcohol production. The nal cane molasses contain about 50 weight (wt) percent total sugar. This is diluted to about 15-wt percent sugar to make Fermentable solution. pH is adjusted around 4.0 -5.0 by addition of su cient sulfuric acid. This mixture constitutes the mash, and appropriate strain of yeast is added to it, which has been growing in a yeast tub. The yeast makes up about 5 percent of total volume added to fermentor.

The fermentation is allowed to take place at75°F. The chemical reaction liberates a signi cant amount of CO2 and heat. The fermentation process can be conducted in batch or continuously, using open or closed fermentation tanks. According to industry sources, average ethanol recovery from one ton of molasses is estimated at 240 to 270 liters depending on the quality of molasses. After fermentation raw alcohol solution containing about 7 to 15 percent by volume is distilled from other by-products, resulting in a level of purity of approximately 95%. This is often referred to as hydrous ethanol. However for its application as gasoline blend it has to be dried to less than 1% moisture

### Process Description

A typical ow diagram of manufacturing process for ethanol is shown in Figure. The manufacturing process for molasses based ethanol consists of following stages,

Feed preparations;







- Yeast Propagation and batch fermentation;
- Multi-pressure Distillation;
- Molecular sieve dehydration for Fuel Grade Alcohol.

#### 4.6 DETAILS OF PROCESSES

### Feed preparations and weighing

Molasses stored in a storage tank is—rst weighed in a tank with load cells so that accurate quantity can be fed to the fermentation section. The weighed molasses then transferred from tank to the fermentation section where it is diluted with water and fed to the pre-fermenters and fermenters.

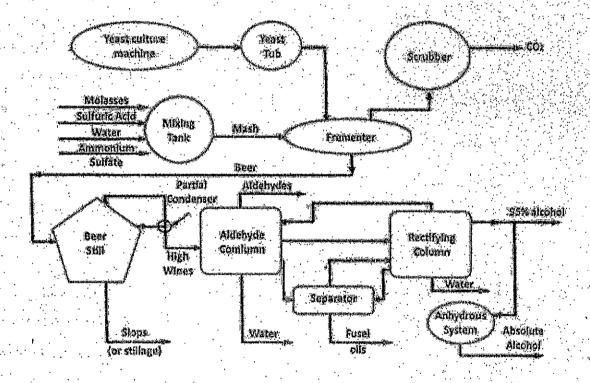


Figure No. Flow sheet for the production of alcohol by molasses fermentation

#### Yeast propagation and batch fermentation

In this process generally, marked, highly e cient yeast strain under aseptic conditions is propagated, in a pre-fermenter vessel.

The ready yeast seed is then transferred from the pre-fermenter to the fermenter. The glucose in media gets converted to ethanol, each batch of fermenting batch takes about 40 hours to be





ready for transfer to the distillation section. CO2 liberated during reaction is sent to CO2 scrubber for recovery of ethanol otherwise being lost in vent. The equipment is well de-signed to achieve enhanced e ciencies through better sugar/ yeast contact by shearing and mixing, e cient oxygen etc.,

The sludge is separated from wash after fermentation in a wash settling tank with lamellar assembly and then concentrated in centrifugal decanter.

#### Multi-pressure Distillation

As the alcohol produced has a low percentage of alcohol, there is a need to remove water portion using distillation, the major process is represented by the following owchart:

The following raw materials will be used for distillery:

Wash is fed to the analyzer column to remove. Alcohol is stripped o water and excess organic material called spent wash in analyzer column. The distillate from analyzer column is fed to the hydro-selection column after dilution with water. In extraction column most of the high boiling impurities separate from ethanol in presence of water. The bottom ethanol water mixture is pre-heated by system condensate and spent lees before being fed to the rectification column. In rectifier column product rectifier spirit is taken out from top tray and fed to the methanol removal column where mainly methanol impurities are separated. Pure ENA is obtained at bottom, which is cooled and stored. The impure spirit from top of extraction column, rectifying column and methanol removal column are top and balance alcohol is recycled to the impurities column. The rectification column, and impurities column get directly heated from steam at 1.5 bar (g).

Recti cation column and impurities column work under positive pressure. The vapors from recti cation column and impurities column are used for heating the other columns. The other columns work under vacuum.

### Molecular sieve dehydration for fuel grade anhydrous alcohol

Recti ed spirit at a concentration of around 96.5% pumped by a feed pump to the dehydration plant. The recti ed spirit containing alcohol and water will rest pass through feed economizer, then through a vaporizer cum super heater which will convert the recti ed spirit feed to superheated vapors. The superheated vapor will pass through a packed column, which







is already regenerated and pressurized to working pressure. All the water vapors present in vapor mixture are adsorbed in the column. Along with alcohol traces of alcohol are also adsorbed in the column. The Anhydrous alcohol vapors free from water vapors exhausted from the column are duly condensed in the re-boiler at the recovery column and is further passed through feed economizer to preheat the incoming feed and then to a nall product cooler. After saturation of sieve column with water, the low will be shifted to the next packed column, which is already regenerated and pressurized. After completion of dehydration cycle, the packed column saturated with water is regenerated by evacuation of adsorbed water and alcohol. The evacuated vapors are condensed. The condensed mixture of alcohol and water is then fed to the sieve column, which enriches the stream back to its previous composition. This sequence of adsorption and regeneration of packed columns continues.

#### Multi-pressure Distillation

The fermentation wash containing Alcohol, non-fermentable solids and water is supplied to Distillation to separate the alcohol and other impurities, as a continuous ow.

The distillation system is designed for premium quality extra neutral alcohol. The system details are as below.

The system consists of 7 columns, namely:

- CO stripper,
- Stripper column;
- Pre-reactor column;
- Extraction column;
- Recti cation Column;
- Re ning Column,;
- Fuel Oil column.

Wash is fed to CO stripper column to remove CO gas present in wash. Alcohol is stripped o water in stripper column. The distillate from stripper column is fed to pre-recti er column to remove most of fusel oil and the distillate from pre-recti er column is fed to extraction column after dilution with DM water. In extraction column most of the high boiling impurities separate from ethanol in presence of water. The bottom ethanol water mixture is pre-heated by system condensate and spent lees before being fed to recti er column. In





recti er column product recti er spirit is taken out from top tray and fed to re ning column where mainly methanol impurities are separated. Pure ENA is obtained at bottom, which is cooled and stored. The impure spirit from top of prerecti er column, extraction column, recti er column and re ning column are top and balance alcohol is recycled to pre-recti er column. The alcohol containing fusel oil from pre-recti er and recti er column id also fed to fusel oil column.

The top vapors from stripper column, Extraction column and fusel oil column are condensed in evaporator for spent wash concentration. The recti er column, fusel oil column and pre-recti er column get heat from stream at 3.5 bar (g).

Recti cation column and pre-recti er column works under positive pressure. The top vapors from recti er column are condensed in stripper column for giving heat to stripper re-boiler. Most of the other columns work under vacuum.

### Stillage processing

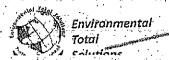
The spent wash at approximate 12.6 % w/w concentration from distillation is concentrated in a multi e ect evaporator to approximate 55% w/w. This concentrated spent wash will then be burnt in the boiler to produce high pressure steam. The steam is then sent to turbine to generate electric power for its captive use in the industry. The exhaust steam from turbine will be utilized in evaporation and distillery plants.

The alcohol production process using molasses is based on the properties, which some specied microorganisms have in metabolizing sugar, generating a product of ethyl alcohol; As the alcohol produced has a low percentage of alcohol, there is a need to remove water portion using distillation, The major process can be classied in to three major categories:

- Continuous Fermentation
- Multi pressure distillation
- Dehydration by molecular sieve

### Recti ed Spirit Production

Fermented wash from the clari ed wash tank is pumped to the fermented wash pre-heater and preheated to about 68-70°C by circulating hot spent wash on other side. Incoming spent







wash temperature is 80-82°C and after exchanging heat with fermented wash out let lamp of spent washes remains at 35-40°C this hot fermented wash is then feed at the top of Degasifying column.

### Analyzer column cum Degasifying Column

Analyzer column strips the fermented wash before discharging the rest of the material as spent wash. Metered ow of fermented wash is feed to the top of the analyzer column. Vapors of Recti er column provide energy to Analyzer column through a evaporator. Recti er top vapors are condensed on the shell side of the evaporator and spent wash is getting recirculated on tube side. Vapors generated from the re-boiler are used in the analyzer column now consist approximately 50% alcohol and 50% water with impurities such as higher alcohols, aldehydes, acids, sulfur dioxide, etc. Spent wash from the analyzer column bottom is sent for treatment to the E-uent Treatment Plant.

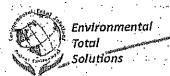
The level in the column bottom is controlled to ensure proper distillation and correct concentration of the spent wash. The vapor draw from top of the Analyzer is condensed in forth stage of evaporator system and pumped to Recti er column for concentration. Analyzer column is operating under vacuum. Using water ring vacuum pump creates vacuum and the vacuum in the column is maintained by manual valve, which bleeds extra air in the system.

### Aldehyde Column

Aldehyde column is principally used for removal of low boiling impurities. Vapors from degasifying column are fed to Aldehyde column. The vapors coming out of the top of the Aldehyde column are fed to the condenser-I where they are partially condensed bypassing cooling water on the tube side. Balance alcohol vapors are condensed in the condenser-II. Water is used for the Condensation. From aldehyde column top Technical Alcohol cut of 2% of total plant capacity is taken out. Aldehyde column works under vacuum.

# Molecular sieve dehydration for fuel grade anhydrous alcohol

Recti ed spirit at Azeotropic concentration is pumped by a feed pump to the de-hydration plant. The recti ed spirit containing 95 % alcohol and 5 % water will rst pass through feed economizer, then through a vaporizer cum super heater which will convert the recti ed spirit feed to superheated vapors. The superheated vapor will pass through a sieve column, which is already regenerated and pressurized to working pressure: All the water vapors present in





vapor mixture are adsorbed in the column. Along with alcohol traces of alcohol are also adsorbed in the column.

The Anhydrous alcohol vapors free from water vapors exhausted from the column are duly condensed in the re-boiler at the recovery column and is further passed through feed economizer to preheat the incoming feed and then to a nal product cooler. After saturation of sieve column with water, the ow will be shifted to the next sieve column, which is already regenerated and pressurized. After completion of dehydration cycle, the sieve column saturated with water is regenerated by evacuation of adsorbed water and alcohol. The evacuated vapors are condensed. The condensed mixture of alcohol and water is then fed to a recovery column, which enriches the stream back to azeotropic composition. This sequence of adsorption and regeneration of sieve column continues.

#### Recti er cum Exhaust Column

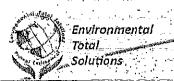
Analyzer column top vapors condensed in forth stage of evaporator and fed to Recti ed column for further concentration. Recti er column designed in sieve trays construction and operates under pressure for obtaining desired strength of alcohol. Condensing steam provides heat to Recti er column. Fusel Oil draws are taken from Recti er column and are sending to fusel oil decanter. The fusel oil stream is diluted with water for separation of fusel oils. The aqueous layer sends backs to Recti er column and fusel oil are sent to storage Technical Alcohol cut of 3% of total plant capacity is taken out from top of Recti er Column. Recti ed Spirit of 95% v/v concentration is drawn from one of the upper trays of Recti er Column and sends to storage after cooling.

### 4.7 PROPERTIES OF ETHYL ALCOHOL

Ethanol with a chemical formula CH CH OH is commonly known as Ethyl alcohol. It is also simply referred as alcohol or spirit in practice. The Facility is manufacturing ethanol of a fuel ethanol of di erent grades. The physical properties of ethanol are given in Table.

Table: Physical Properties of Ethanol

	Description	Valu	ıe	
ſ	Appearance	Clea		
	Colour	Colo	orless	





Physical Form	Volatile Liquid
Odor	Alcohol odour
Taste	Burning taste
Molecular Weight	46.07
Molecular Formula	CH,-CH,-OH
Boiling Point	<sup>3</sup> <sup>2</sup> 172 F (78 °C)
Freezing point	-179 F (-117 C)
Critical temperature, C	243.1
Critical pressure, Kp	6383.48
Critical compressibility factor, Z in Pv/Nrt	0.248
Density, d at 4-20 C	o.7893
Refractive index, n at 20 °C	1.36143
Surface tension at 25 C in dyn/cm	231
Viscosity at 20 C in cp	1.i7l
Heat of vaporization at normal b.p. J/g	.839.31
Heat of fusion, J/g	104.6
Flammability limits in air	Vol. % 4.3
Lower,	Vol. % 19.0
Upper,	
Auto ignition temperature, C	793.0
Flash point, closed cup, C	14.0
Specia c heat, at 20 C , J/g.C	2,42
Vapor Pressure	40 mm Hg @ 19 C
Vapor Density	1.59 kg/Nm
Water Solubility	Soluble
Volatility '	100 %
Odor Threshold	5-10 ppm
Viscosity	1.22 − 1.41 cp @20 °C
Solvent Solubility	Benzene, ether, acetone, chloro-form, methanol, organic solvents.

### **Ethanol Types**

In recent years, the demand for alcohol is continuously increasing due to its utilization as fuel and as raw material for various chemical products as mentioned in the table given below.

The production from a mill depends on the quality of the sugar cane, the e ciency of the milling equipment, how well it is operated and decisions on the quality of the mal products.

A well run factory with highly e cient plant can produce up to 90 liters of ethanol from high quality cane (16% sugar) but 74 liters is the more common benchmark used in the United





States. Utilizing the C grade molasses for ethanol with good quality cane can produce 83.5 Kgs of sugar and 38.5 liters of ethanol from a ton of cane.

### TABLE: ETHANOL Types & USES

	••		
1	Fuel Grade	Used in the pharmaceutical industry to produce	
	Anhydrous Alcohol –	pharmaceutical intermediaries and products (e.g. in cough	
	99.9%	mixtures, alcohol is used to dissolve ingredients not able to	
		be dissolved by water). Also used in surgical spirits, medical	
		disinfectants, and in the production of solvents for use in the	
		printing ink and lexible packaging industries.	
2	Recti ed Extra	Also has pharmaceutical applications but used mainly in the	
	Neutral Alcohol	personal care industry to produce cosmetics, hair care	
	(ENA)	products, toiletries, fragrances and perfumes. In the food	
	- 96.4%	industry, it is used to produce avors and spirit vinegar	
		which is used in various pickling processes and in the	
1. 1.24		production of condiments (e.g. tomato sauce, chutney,	
		mayonnaise and salad dressings)	
3	B-Grade Alcohol –	Used in the production of methylated spirits, solvents and	
	94%	thinners.	

### Ethanol yield

### Ethanol yield (liters/ton) based on actual production

	Ethanol (litres per ton)
Sucrose theoretical	677.
Sucrose	586
Sugar Cane	81
C- Grade Molasses	289
Raw sugar	563
Re (ned Sugar	586

### Auxiliaries

Auxiliary system comprises of dosing system for nutrient, antifoam, acid, Caustic as well as sterile air supply system for yeast activation and yeast propagation.







# ETHANOL BENCHMARKING & BEST PRACTICES

#### 5.1 PREFACE

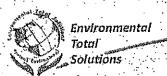
The Ethanol Benchmarking and Best Practices study provides an overview of the ethanol production process and some information on potential environmental issues related to the process. This study also introduces concepts for improvements in the use of resources including energy, water, and reducing environmental impacts. Additionally, it is intended to educate others outside the ethanol industry of the challenges faced by facilities to conserve resources.

#### Bio-ethanol production

Bio-ethanol contributes more than 90% of the total liquid bio-fuel consumption in the world Figure 4 shows different routes for the bio-ethanol production process. As can be seen in the gure, sugar/starch obtained from sugarcane/corn or cellulose feed stocks follows the process of fermentation, distillation, and dehydration in order to produce instand second generation ethanol respectively. It should be noted that molasses (also a sugar-based product) is treated separately in the gure in order to make it distinct from other conversion routes.

This report covers molasses-based bio-ethanol. First generation bio-ethanol, obtained from sugarcane and corn feed-stocks has so far dominated the bio-ethanol market globally and other technologies are at an early stage of development. In 2009, global ethanol production was about 74 billion liters, a four-fold increase since 2000 and it has contributed to a reduction in GHG emissions by 87.6 million tons in a year. The United States (US) was the world largest producer of bio-ethanol, accounting for about 52% (i.e. 38.5 billion liters) of the total bio-ethanol production in 2009. Brazil was the largest bio-ethanol exporter and second largest producer with a share of 34% (25 billion liters). The EU produced 3.9 billion liters (5.3%) whereas two emerging developing countries, China and India, contributed 2.8% and 0.5% of the total bio-ethanol production respectively.

Bio-ethanol production could surpass 125 million liters by 2020 with the development of new agricultural policies/programs along with the exploration of new feed stocks in America, Asia and Europe. The primary feed stocks for bio-ethanol production are corn (US), sugarcane



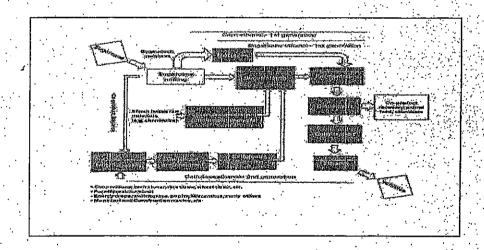


(Brazil, Thailand, India, Australia), and beet/grain (EU). Di erent bio-ethanol production processes are discussed by various authors in the literature.

Ethanol from sugarcane from to be the most cost competitive over the last few decade, following a steep leaning curve the production of ethanol, and there is a strong global ethanol market for international development.

Besides producing bio-ethanol from sugar cane juice, as in Brazil, other developing countries such as Thailand and India are also producing bio-ethanol using the byproduct of sugar industry molasses.

Molasses (with a fermentable sugar content 40 -50 percent by weight (w/w) is the byproduct obtained during the crystallization and centrifugation process in the production of sugar is no longer possible. Pakistan could produce 500 million liters of bio-ethanol from molasses which could be used in the transport sector in a blending ratio of 5 -10 % saving US \$ 200 - 400 million per year, brining various environmental and health bene ts.



### **Pollution Control Strategies**

Pollution control strategies can be broadly categorized in to preventive and reactive. The reactive strategy refers to the steps that may be applied once the wastes are generated or contamination of the receiving environment takes place. The control technology or a combination of technologies to minimize the impact due to the process rejects/wastes varies with quantity and characteristics, desired control e ciency and economics. Many combinations of techniques could be adopted for treatment of a specific waste or the contaminated receiving environment, but are often judged based on techno-economic





feasibility. Therefore, the best alternative is to take all possible steps to avoid pollution itself. This preventive approach refers to a hierarchy that involves i) prevention & reduction; ii) recycling and re-use; iii) treatment; and iv disposal, respectively.

Therefore, there is a need to shift the emphasis from the reactive to preventive strategy i.e., to promote preventive environmental management. Preventive environmental management tools may be grouped into management based tools, process based tools and product based tools, which are given below:

### 5.2 ENVIRONMENTAL INDICATORS

Indicators can be classi ed in to environmental performance indicators (EPI) and environmental condition indicators (ECI). The EPIs can be further divided into two categories i.e., operational performance indicators and management performance indicators. The operational performance indicators are related to the process and other operational activities of the organization. These would typically address the issue of raw material consumption, energy consumption, water consumption in the organization, the quantities of wastewater generated, other solid wastes & emissions generated from the organization etc

Management performance indicators are related to the management e orts to in uence the environmental performance of the organizational operations

The environmental condition indicators provide information about the environment. These indicators provide information about the local, regional, national or global condition of the environment. This information helps an organization to understand the environmental impacts of its activities and thus helps in taking decisions to improve the environmental performance.

Indicators basically used to evaluate environmental performance against the set standards and thus indicate the direction in which to proceed. Selection of type of indicators for a rm or project depends upon its relevance, clarity and realistic cost of collection and its development.

#### State of environment

Internationally accepted DPSIR framework for the presentation of the information DPSIR refers to:

D – Driving forces – causes of concern i.e. industries, transportation, etc



