

# COGEN® COAL GAS SYSTEMS®



**TURN COAL  
TO GAS  
CLEAN &  
GREEN FUEL  
POLLUTION FREE**



Engr. KHALID SAEED – COGEN SYSTEMS – POWER GEN-COAL GAS GEN-ENERGY MANAGEMENT

## COAL IS GOLD

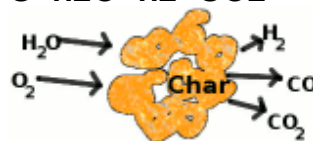
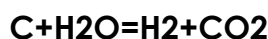
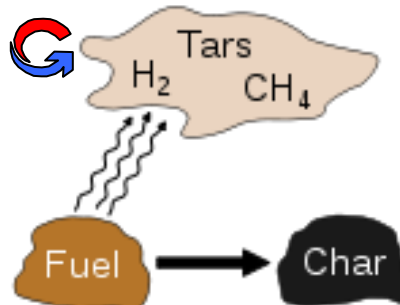
**Produce In House Natural Gas (SNG)  
Produce Clean & Green Gas , Turn  
Coal to gas and Burn into Gas  
Electric**

**Generators, Boilers, Furnace, Foundries,  
Chillers, Driers, Heaters, Stenters.**

- NO COMBUSTION - NO POLLUTION.
- GET CARBON CREDIT & EARN 15 EURO/T
- NO MORE GAS LOAD SHEDDING.
- NO QUE FOR SSGC/SNGPL.
- MOST ECONOMICAL, STORE-ABLE.
- GAS GEN UNIT RATE Rs. 6.5 /EKWH.
- MINIMUM MAINTENANCE.
- AUTOMATIC COAL FEED AND CLIKER DISPOSAL. – SOLID COAL
- LHV 21000 65000 KJ/M3.
- 650 Kg COAL GENERATE 1000 KWE .
- 30% CLINKER/SLAG.
- COAL MAY BE LOCAL BALUCHISTAN/IMPORTED.



COAL GAS ELECTRIC GENERATOR SET



COAL = 35% Gas + 65% CO<sub>2</sub>

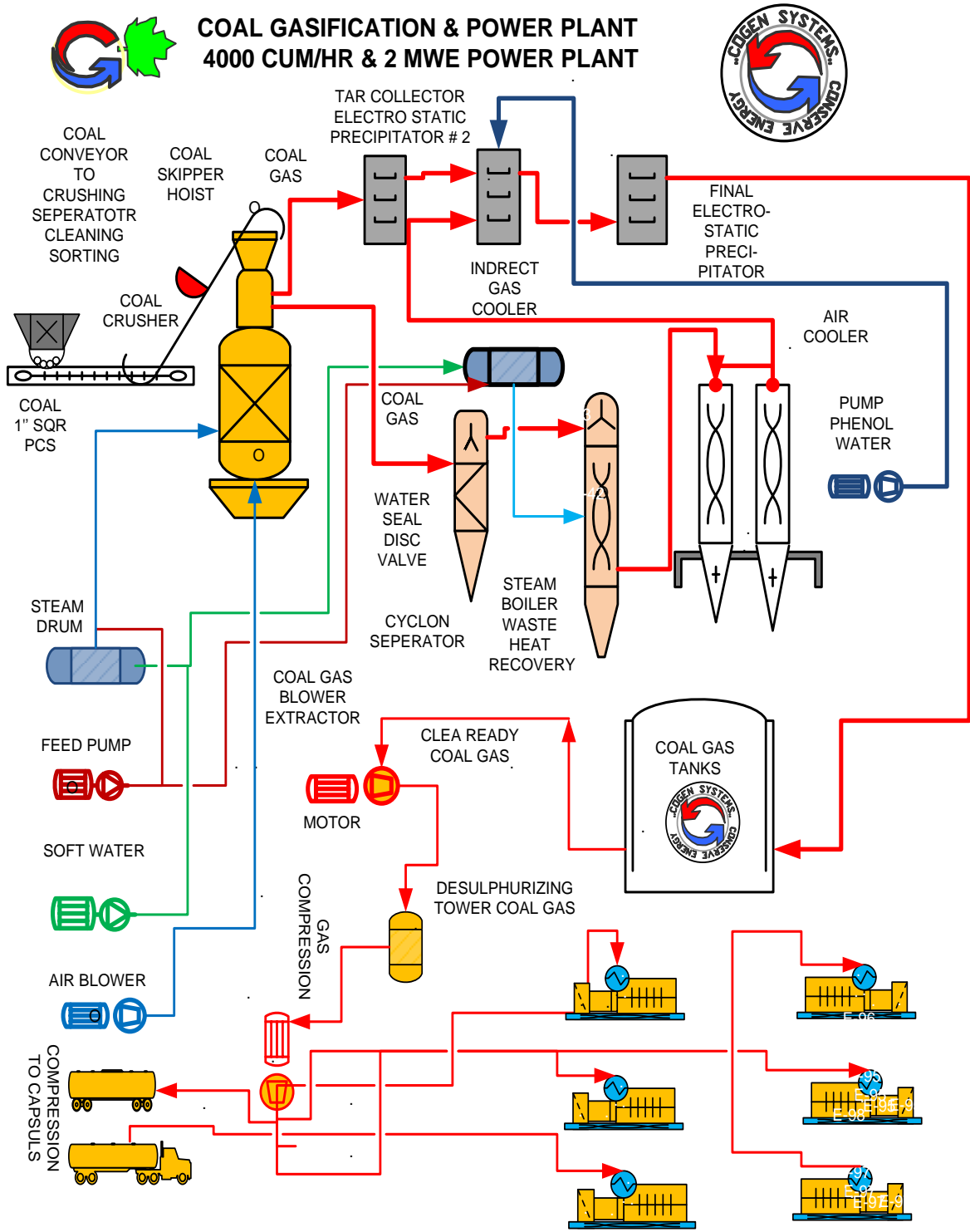


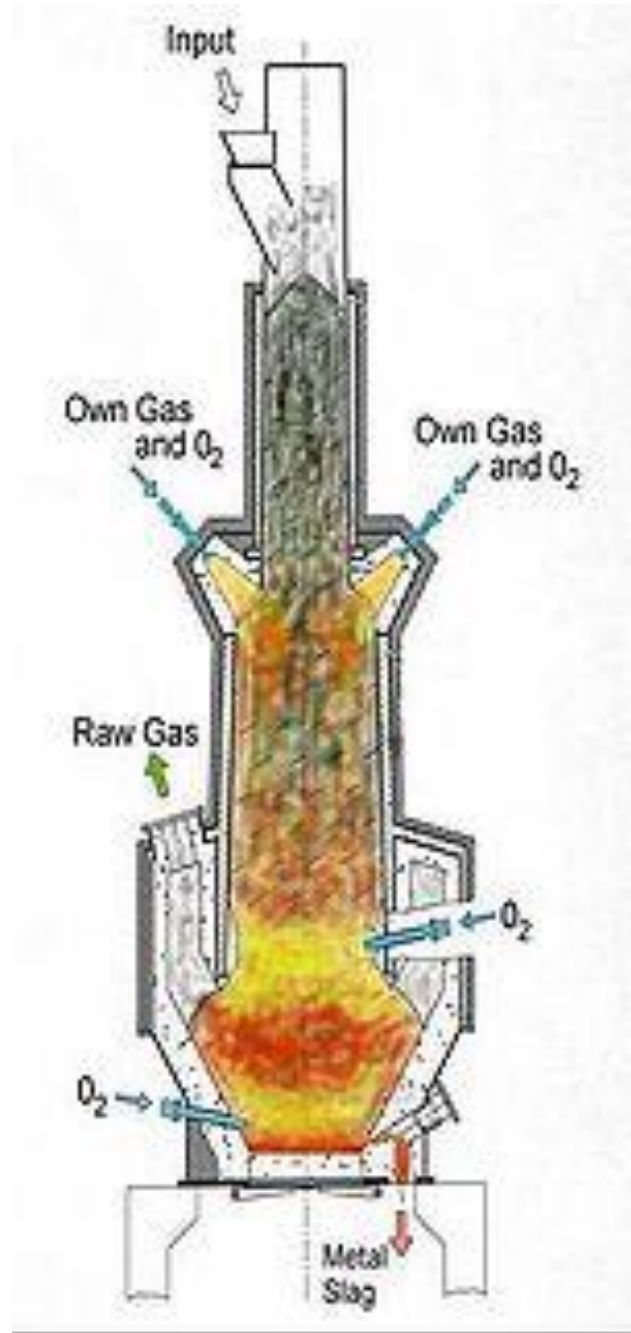
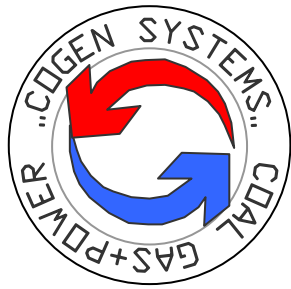
- 1 M<sup>3</sup> Coal Gas = 3.0 Rs/M<sup>3</sup>
- 1 KWe = 2 M<sup>3</sup> @ 180 Btu/Ft<sup>3</sup>.
- 1 Kg Coal Produce = 3 M<sup>3</sup> Gas.
- 500 KWe Gen Cost = 1,65,000 US \$
- 6000 M<sup>3</sup> Gasifier = 4,50,000 US\$
- Coal Gas Elect Unit @ = 6.5 Rs.
- 1 Kg Coal = 10 Rs. Local & Import

Engr. KHALID SAEED - Cogen House # 111-A/2, 3rd, Street, Phase-6, Kh-e-Muhafiz, DHA, Karachi-75500, Pakistan, Ph- 021- 35340068 -35340071 Mob- 0300. 8287009, E-mail: cogenpak@gmail.com, web: www.cogensys.pk



**COGEN  
SYSTEMS**



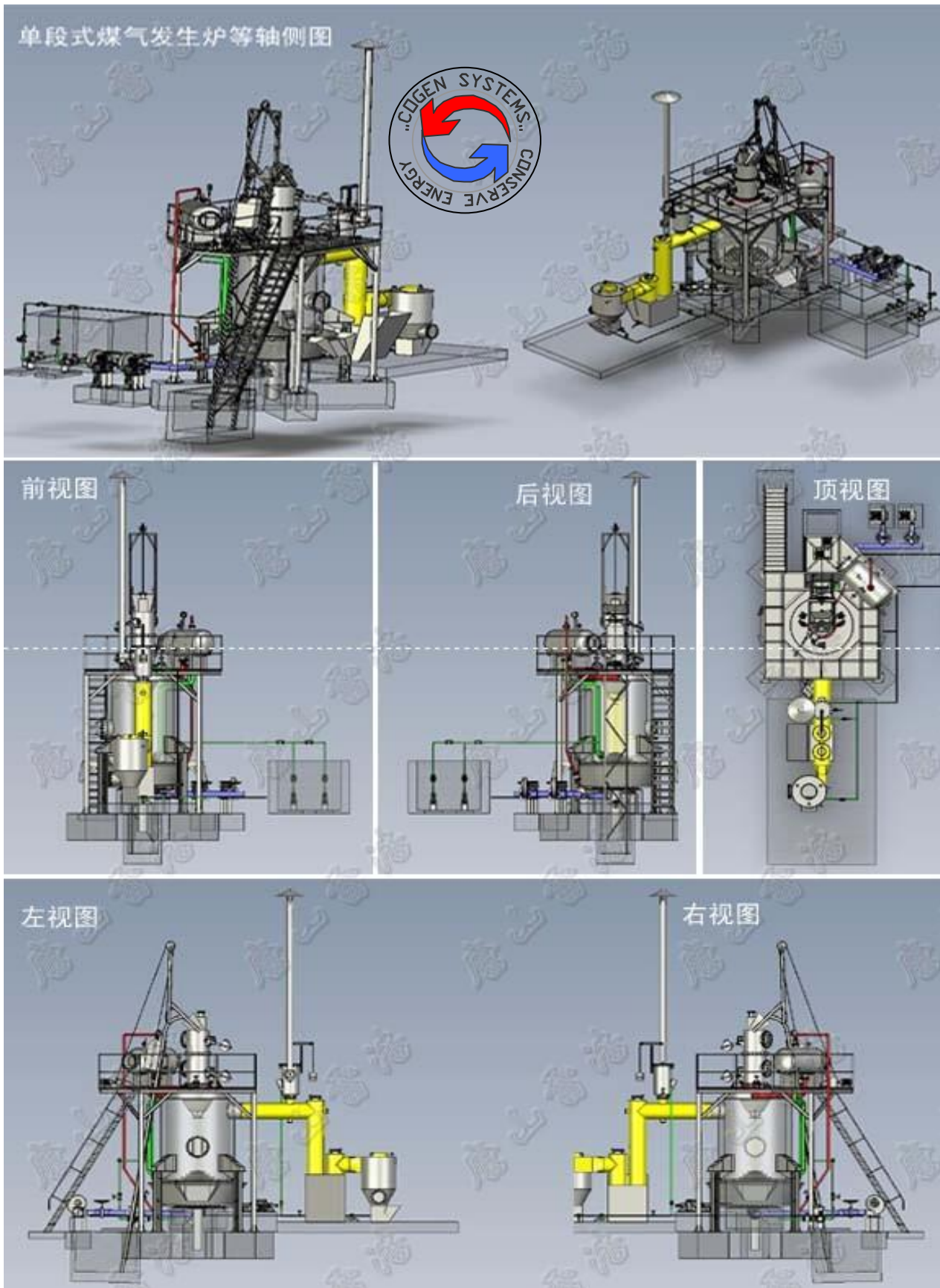


**INPUT TO GASIFIER**

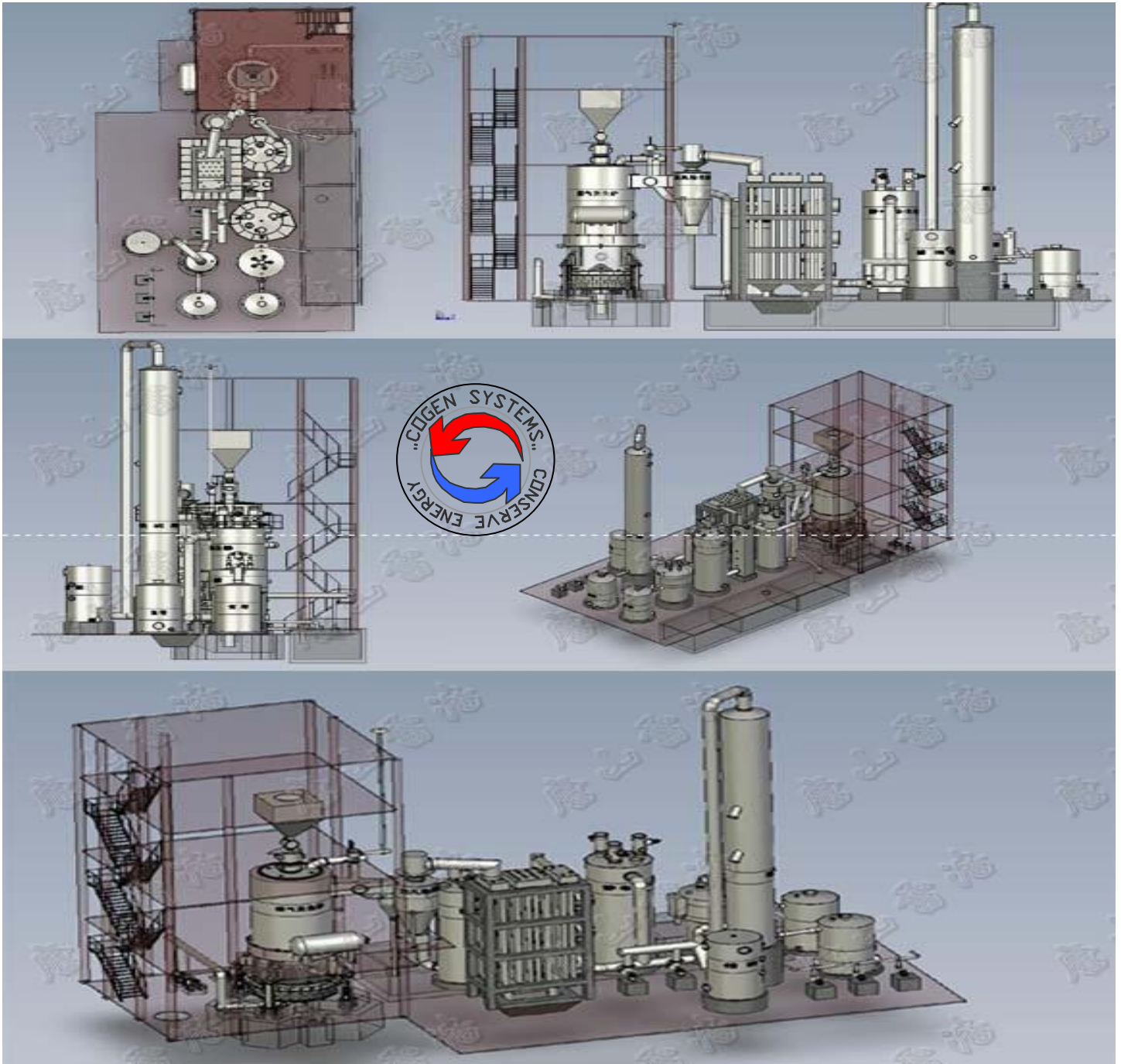
- 1- COAL FEE D 2,500 Kg/Hr.
- 2- AIR FEED 7000 M3/Hr. ( 4,118 CFM)
- 3- SOFT WATER 450 Kg/Hr.
- 4- BY PRODUCT STEAM FROM 450 Kg/Hr.
- 5- STEAM FEED 300 Kg/HR
- 6- PHONEL WATER FEEDED 200 Kg/Hr

**OUTPUT FROM GAFIERS**

- 1- CLEAN GAS PRODUCE 7500 M3/Hr.
- 2- DIRTY GAS PRODUCE 7500 Kg/Hr,
- 3- **CLINKER PRODUCED 380 Kg/H**
- 4- **TAR PRODUCE 150 Kg/H**
- 5- **SULPHURE PRODUCED 35 Kg/HR**





2MWE COAL GASIFICATION PALNT DIMENSIONA 100' L x 50'W x 30' H



## COAL GAS ELECTRIC GENSET 500 KWE EACH

|  |   |
|--|---|
| <p><b>• PROPERTIES OF IMPOETRED COAL:</b></p> <ul style="list-style-type: none"> <li>• (Imported :INTERTEK Indonesia)</li> <li>• Coal Density: 1500 Kg/CuM</li> <li>• Moisture in Coal: 12-13.5%</li> <li>• Inherent Moisture: 9%</li> <li>• Ash (A.D) 5-8%</li> <li>• Volatile material (A.D) 38-40%</li> <li>• Fixed Carbon (AD) 44-46%</li> <li>• GCV (AD) 6500</li> <li>• Gross GCV (AR)6179 Kcal/Kg</li> <li>• Sulfur (AD) Less then 1%</li> <li>• HGI 46</li> <li>• Cost FOB Indonesia : 80 US \$/Ton</li> <li>• Mech. Intesity: 60%</li> <li>• Heat Stability: 60%</li> <li>• Fixed carbon content:55%</li> <li>• Ash ratio: 15%</li> <li>• Softening temp of Ash:1250C</li> <li>• Colloidal Thickness: 12 mm</li> <li>• Heating Power: 21 MJ/kg</li> <li>•</li> </ul>  | <p><b>• PROPERTIES OF LOCAL COAL (BALUCHISTAN)</b></p>  <ul style="list-style-type: none"> <li>• (Local : Baluchistan)</li> <li>• Coal Density: 1400 Kg/CuM</li> <li>• Moisture in Coal: 15-17 %</li> <li>• Inherent Moisture: 9-12 %</li> <li>• Ash (A.D) : 5-8%</li> <li>• Volat. Matr. (A.D) : 25-30 %</li> <li>• Fixed Carbon (AD) : 45-48 %</li> <li>• GCV (AD) : 5500</li> <li>• Gross GCV(AR): 3800 Kcal/kg</li> <li>• Sulfur.(AD)Less then 8-9 %</li> <li>• HGI 46</li> <li>• Cost. FOB.Indonsia: 80 \$/Ton</li> <li>• Mech. Intesity: 60%</li> <li>• Heat Stability: 60%</li> <li>• Fixed carbon content: 55%</li> <li>• Ash ratio: 15%</li> <li>• Softening temp of Ash:1250C</li> <li>• Colloidal Thickness: 12 mm</li> <li>• Heating Power: 21 MJ/kg</li> <li>• Cost Rs.: 6.5 Rs/Kg Quetta</li> </ul>  |
| <p><b>• COAL GAS INTO GENERATOR SET</b></p> <ul style="list-style-type: none"> <li>• LHV : 180 Btu/CuFt</li> <li>• Gas CONSUMPTION: 2 M3/KWEH</li> <li>• Gas Pressure in Tank: 03. Psi</li> </ul>  | <p><b>• COAL GAS QUALITY BEF GEN</b></p> <ul style="list-style-type: none"> <li>• LHV : 180 Btu/CuFt</li> <li>• Gas Production: 3 M Cube / Kg Coal</li> <li>• Gas Pressure in Tank : 0.3 psi</li> </ul>   |
| <p><b>• GAS GENSET TECH SPECS</b></p>  <p style="text-align: right;">MA</p> <ul style="list-style-type: none"> <li>• DE IN CHINA(500KWE EACH)</li> <li>• MODEL: 500GFM-1 SHENDONG</li> <li>• GEN Cap: 500 KWe/625 KVA</li> <li>• Gas Consump: 894 M3/H</li> <li>• Gas Consum:1.8 M3/ekwh,</li> <li>• Gas Input: 11 MJ/kwth.</li> <li>• Coal Consump: 268 Kg/Hr</li> <li>• Lube Oil Consump:1.0 gr/ekwh</li> <li>• Gen Volt/Hz: 400V , 50Hz.0.8PF</li> <li>• Gen rpm: 1000 rpm,Lean Burn gas.</li> <li>• Gen size: LxWxH = 20'x8'x9'</li> <li>• Genset Weight: 12.5 Tons</li> <li>• Gen No of Cylinder: 12 Cylinder</li> <li>• Gen Governor : Wood Words</li> <li>• Governor Control :Magneto.2301-A</li> <li>• Alternator Protect:IP23-Class-F</li> </ul> | <p><b>• COAL GAS PLANT TECH SPECS(2 STAGE GASIFIER)</b></p> <ul style="list-style-type: none"> <li>• MODEL: LCG3Q-2.6M-China</li> <li>• Gas Prod.Capacity: 4000 CuM/Hr (4200-5400 range)</li> <li>• Gas LHV : 165 Btu/CuFt</li> <li>• Gas LHV : 6150 KJ/NM3</li> <li>• Coal Consump: 1 Kg/3.3 CuM gas</li> <li>• Total Coal: 1300 -1700 Kg/h</li> <li>• Cost of GasProd: 3.0 Rs/M3</li> <li>• Coal Plant aux Load: 120 KWE</li> <li>• Coal Plant area: 100'x150'x30'.</li> <li>• Coal Plant Gross Wt: 95 Tons</li> <li>• Gasification Unit:18x338x50'</li> <li>• Coal feed size: 1'' Sqr pcs.</li> <li>• Process Temp Heating: 65C</li> <li>• Steam Pressure: 30 &amp; 20 psi</li> <li>• Coal Gas Temp =120C Stag-I</li> <li>• ColGas temp.=550 C stag-II</li> <li>• Gas GCV: 5800-6500 KJ/NM3</li> <li>• Gas Prod Press : 1 psi</li> <li>• Gasifier JW Pres :7 psi</li> <li>• <b>GAS QUALITY INTO THE TANK</b></li> <li>• Dust Content: 20 mg/NM3</li> </ul>  |

|   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Excitation Systems: Brushless, Revolv.</li> <li>• Altern: Siemens Durignit-2000.Insutn</li> <li>• Altern: Thyrestor AVR"Thyropart"</li> <li>• Altern: Class-F Insulat,DIN50019</li> <li>• Altern: Short Cirt-Sqrl. cage 3-5 sec.</li> <li>• Altrn. Ovr/Ld: VDE0530,1.5 Times/2min</li> <li>• Engine Aspirt: Turbo charged AC</li> <li>• Engine:90mmx210mmx7m/s/71.4L</li> <li>• Gen Start Sys:24 V DC Batteries +self</li> <li>• Control Panel: ShenDong-China</li> <li>• Jacket water :75/65C, 50 M3/h</li> <li>• Exhaust Temp: 540 C</li> </ul> <p>=====</p>  | <ul style="list-style-type: none"> <li>• Diameter of particulate: less then 5 micron</li> <li>• Tar &amp; Light oil Content after Desulfurizing: 20 mg/NM3</li> <li>• <b>COAL GAS PLANT SUPPLY</b></li> <li>• Delivery : 12 weeks aft L/C</li> <li>• Install Time:6 Weeks</li> <li>• On the Job Training to Engrs. &amp; Staff.</li> <li>• Plant Commissioning Chargeable.</li> <li>• 1 Year Standard Warranty of all Equipment under Sellers Scope.</li> <li>• Post Commissioning O&amp;M. Contract (Chargeable)</li> <li>• Monthly Visits Chargeable.</li> <li>•</li> </ul>  |
|---|--|

**COMMERCIAL TERMS & CONDITIONS**

- **COAL GAS PLANT SUPPLY**
- CNK Karachi Port
- 100% Clear L/C thru International Banks.
- Delivery : 12 weeks aft L/C(3 Months)
- Install Time: 6 Weeks (1 ½ Month).
- Top Supervision by COGEN CONSULT.
- Commissioning Startup by Chinies Experts.
- On the Job Training to Engrs. & Staff. By COGEN CONSULT.
- Plant Commissioning Chargeable.
- 1 Year Standard Warranty of all Equipment under Sellers Scope.
- Post Commissioning O&M. Contract (Chargeable)
- Monthly Visits Chargeable BY COGEN CONSULT
- Energy efficiency Log SheetLog data Profit Evaluation by COGEN CONSULT..

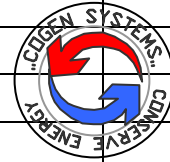
**• COAL GAS PROJECT POPULATION**

- 2500 KWE INDONISIA 5X500 KWE GAS GEN (5X500 kwE UNITS)
- 4000 KWE INDONISIA , 8X500 KWE GAS GEN
- 11,000 KWE INDONEISA ,22X500 KWE GAS GEN
- 15,000 KWE , INDONESIA 30 X 500 KWE GAS GEN
- 1000 KWE, AFRICA 2 X 500 KWE GAS GEN
- 5000 KWE, AFRICA 10 X500 KWE GAS GEN
- 1260 KWE CHINA, 1X500 +1X260 KWE GAS GENSET

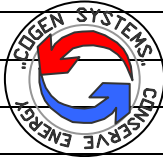
**ASSENTIAL PARTS OF COAL GASIFIER**

| #  | Parts descriptions                          |  | Units/<br>Qty | size |
|----|---|---|---------------|------|
| 1  | Gasifier Assembly                           |   |               |      |
| 2  | Coal Bunker                                 |   |               |      |
| 3  | Coal Feeder                                 |   |               |      |
| 4  | Gasifier Roof                               |   |               |      |
| 5  | Up Stage Output Gas Pipe                    |   |               |      |
| 6  | Up Stage Body                               |   |               |      |
| 7  | Center Pipe                                 |   |               |      |
| 8  | Support Assembly of Gasifier                |   |               |      |
| 9  | Gasifier Body                               |   |               |      |
| 10 | Steam Drum-1000L                            |   |               |      |
| 11 | Bracket Support of Gasifier                 |   |               |      |
| 12 | Fire Grate                                  |   |               |      |
| 13 | Chipping Circle(Small Ash Removal Knofe)    |   |               |      |
| 14 | Big Ash (Removal) Plugh                     |   |               |      |
| 15 | Ash Tray Ash Tray Transmission System       |   |               |      |
| 16 | Ratchet wheel transmission (slag removal)   |   |               |      |
| 17 | Three Terminal Blast Line                   |   |               |      |
| 18 | Poking Holes                                |   |               |      |
| 19 | Hydraulic System for Ratchet wheel rotation |   |               |      |
| 20 | Emergency water Box                         |   |               |      |
| 21 | Fire resistance material                    |   |               |      |



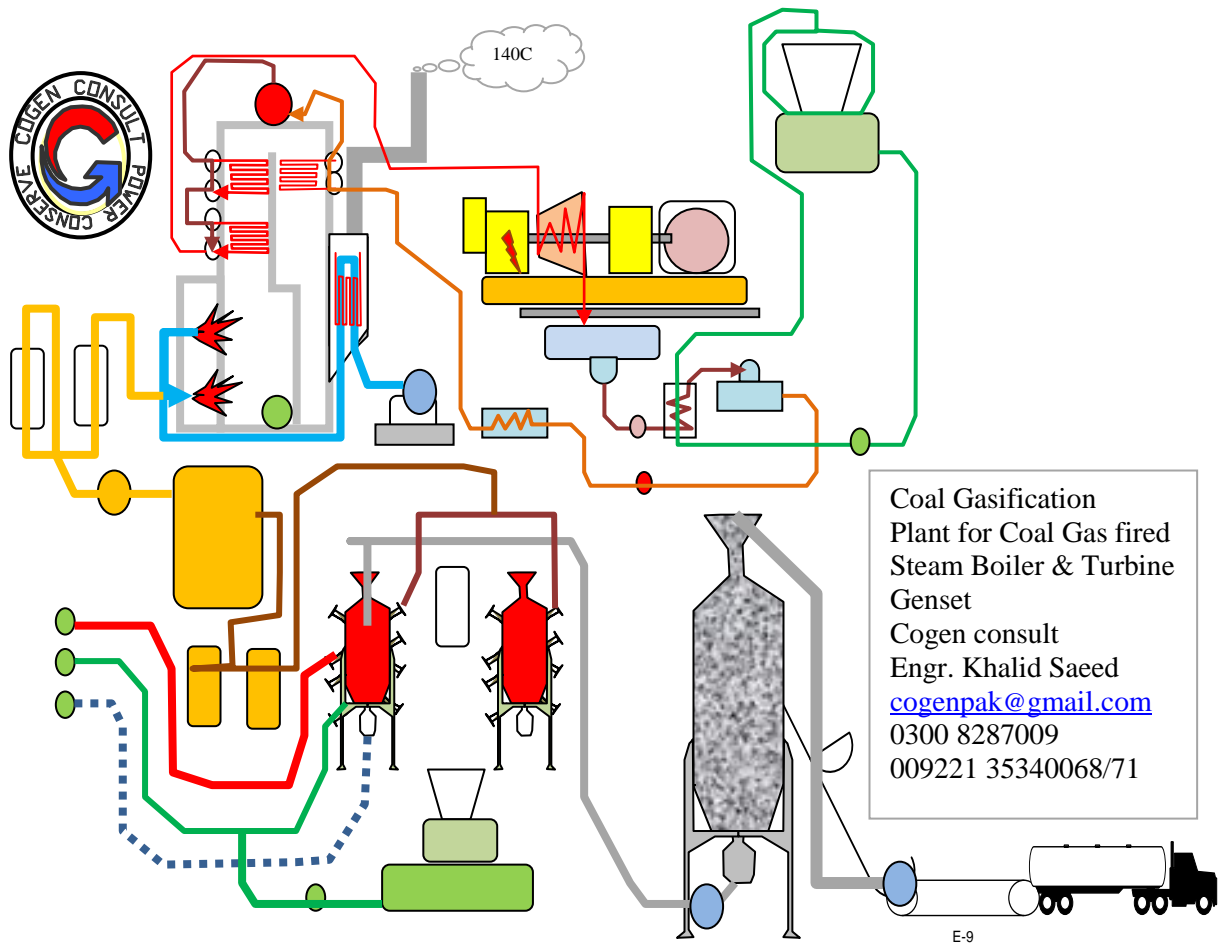


|    |  |  |  |
|----|--|--|--|
| 22 | Detarer (Electric) C-48  |  |  |
| 23 | High Pressure Power 15 mA  |  |  |
| 24 | Detarer C-24   |  |  |
| 25 | High Voltage(Pressure) Power 100mA   |  |  |
| 26 | Cyclon Cleaner   |  |  |
| 27 | Wet Disc Valve   |  |  |
| 28 | Air Cooler C-32  |  |  |
| 29 | Indirect Cooler  |  |  |
| 30 | Steam Drum –for Phenol water (800L)  |  |  |
| 31 | Bell jar Valve 12''D   |  |  |
| 32 | Check valve (Dry valve)  |  |  |
| 33 | Electric Hoist (2Ton)+Coal Bucket  |  |  |
| 34 | Running Facility   |  |  |
| 35 | Air Blower(18.5 KWe)   |  |  |
| 36 | Gas Pressure Adder (55 KWe) BoosterOne Standby   |  |  |
| 37 | Soft water Pump(3KWe-32Mx12.5M3/h)One Standby  |  |  |
| 38 | Circulating water Pump(11KWe,94 m3/h,7M H2O)One Stanby                                 |  |  |
| 39 | TAR Pump(2.2KWe,40M3/h,7M H2O) One Standby   |  |  |
| 40 | Phenol Water Pump (7.5 KWe) One standby  |  |  |
| 41 | Cooling & drying machine   |  |  |
| 42 | Water & Steam Pipe line System within Plant room 50'x50' Battery Limits                |  |  |
| 43 | Water & Steam Piping valve & Fittings within Plant room limits                         |  |  |
| 44 | Coal Gas Piping within Plant room 50'x50'  |  |  |
| 45 | Piping valve Fittings for Demin water within Plant room (Treated water owner supplied) |  |  |
| 46 | Piping valve & Fittings for Raw water Circulating water (Raw water owner supplied)     |  |  |
| 47 | Diesel Fuel Oil piping with in Plant room(Diesel tank & Pumps owner supplied)          |  |  |
| 48 | Phenol Piping valve fittings ( Phenol tank owner supplied)                             |  |  |

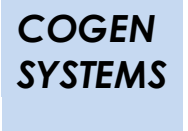
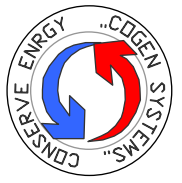
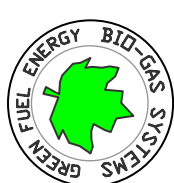
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| 49 | Sewage Disposal Piping valve& Fittings<br>(extension to main sewage owner supplied) |  |  |
| 50 | Valves Strainer NRD vent drain valves within<br>plant room.                         |  |  |
| 51 | Blast gas system Valves set   |  |  |
| 52 | Main Gas Piping Valves set  |  |  |
| 53 | Valves for Cold water circuit   |  |  |
| 54 | Washing water Systems   |  |  |
| 55 | Emergency water Box & water Seal valve  |  |  |
| 56 | Plate form for Operators inspection with<br>Ladder & safety railing.                |  |  |
| 57 | Flanges & Blind Flanges within plant room   |  |  |
| 58 | Piping accessories and Nut Bolts washers<br>with in Plant room.                     |  |  |
| 59 | Fixing Material   |  |  |
| 60 | Others Automatic Instrument Control Systems   |  |  |
| 61 | Control panel for gasifier Operation  |  |  |
| 62 | Control panel for the Pumps   |  |  |
| 63 | Transducer for Air Blowers  |  |  |
| 64 | Transducer for Coal gas pressure  |  |  |
| 65 | Instrument Air Reciever tank  |  |  |
| 66 | Water Softening Plant   |  |  |
| 67 | Coal gas Analyser   |  |  |
| 68 | Desulphurization System   |  |  |
| 69 | De-Sulphurizing Tower(72''D=6Ft D)  |  |  |
| 70 | Regeneration tank   |  |  |
| 71 | Rich Liquid tank  |  |  |
| 72 | Thin Liquid tank  |  |  |
| 73 | Re-Agent Tank   |  |  |
| 74 | Drop Catcher  |  |  |
| 75 | De-Sulphurizing Pumps(37 KWe)   |  |  |
| 76 | Re-Generation Pump (37 KWe)   |  |  |
| 77 | Liquid Conveying Pumps(1.5 KWe)   |  |  |
| 78 | Sprayer - 4 No -24''D   |  |  |
| 79 | Coal gas outlet Valves (12''D)  |  |  |
| 80 | Plate form ,Piping  |  |  |
| 81 | Electric Apparatus & meters & gauges.   |  |  |
|    | =====xx=====  |  |  |

TURNKEY PROJECT MANAGERS – COGEN CONSULT  
 GASIFIER DEALER SUPPLIER COGEN SYSTEMS KARACHI

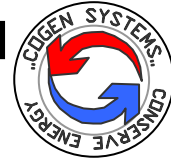
Contact for Further Under standing/Demo.  
 Energy Efficiecnyn-Project Management-Planning  
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Coal Gasification  
 Plant for Coal Gas fired  
 Steam Boiler & Turbine  
 Genset  
 Cogen consult  
 Engr. Khalid Saeed  
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 0300 8287009  
 009221 35340068/71



# COGEN™ SYSTEMS- INTRODUCTION



OUR REF # COGEN0510X

THE MANAGING DIRECTOR / CEO & UTILITY ENGINEERS / MANAGERS

- FUEL COST CUTTING BY 45% USE COGEN SYSTEMS
- GAS-DIESEL-HFO- FUEL HI-BILL SUFFERES.
- CONSERVE ENERGY – REDUCE GAS / FUEL BILLS 45%.
- RECYCLE WASTE ENERGY-ELECTRICAL-MECHANICAL-THERMAL-
- REDUCE LOSSES- IMPROVE EFFICIENCIED & PROFIT.45%
- GENERATE STEAM FROM ENGINE EXHAUST SMOKE 25%
- GENERATE HOT WATER FROM ENGINE EXHAUST GASES25%
- GENERATE HOT WATER FROM ENGINE JACKET RADIATOR
- GENERATE STEAM FROM FURNACE EXHAUST SMOKE
- GENERATE ELECTRICITY FROM FOUNDRY EXHAUST SMOKE
- AIR CONDITIONING FROM HOT WATER FROM ENGINE
- AIR CONDITIONING FROM EXHAUST GASES FROM ENGINE
- IR CONDITIONING FROM FURNACE CHIMNEY SMOKE
- AIR CONDITIONING FROM FOUNDRY EXHAUST SMOKE
- ELECTRICTY FROM WIND POWER
- ELECTRICITY FROM SOLAR ENERGY(SHAMSI TAWANYEE)
- ELECTRCITY FROM HYDROGEN AS FUEL CELLS
- ELECTRICTY FROM EXHAUST STEAM FROM ENGINES
- ELECTRICITY FROM EXHAUST STEAM FRON FURNACE
- ELECTRICTY FROM COW DUNG BIO GAS
- ELECTRICTY FROM SEWAGE (GUTTER) GASES
- ELECTRICTY FROM GARBAGE WASTE ( FOOD & SABZI)
- ELETRCITY SAVING USING VARIABLE FREQUENCY DRUVES
- ELECTRIC- SAVING USING POWER FACTOR IMPROV- PALNT

-----XX-----

CALL FOR FREE ENERGY AUDIT +FACTORY SURVEY  
 PRINCIPAL ENR. KHALID SAEED - POWER PLANT & COGEN .  
 Address: 111 –A/2, 3RD. STREET, PHASE- VI, Kh-e-Muhafiz- DHA,  
 Karachi-75500 Pakistan . Ph: 5340068 Fx; 5340071



,Mob: 03008287009 & 03002107702, [Email:cogenpak@gmail.com](mailto:cogenpak@gmail.com),

[Website: www.cogen.pk](http://www.cogen.pk) ,

## COGEN PROJECTS POPULATION 1980-2011(30 Yrs)

|                       |     |             |         |                |      |
|-----------------------|-----|-------------|---------|----------------|------|
| COGEN ROJECTS         | NO  | 375         | Cogen   | 2010 UP        |      |
| PROECTS IN HAND       | Qty | Model/Make  | Exhaust | Ceramics Tiles | Year |
| Project on Completion | #   | ZERE TAMEER |         | 2010           |      |

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**COGEN  
SYSTEMS**

|  |   |                     |              |                |      |
|--|---|---------------------|--------------|----------------|------|
| MARFANI DENIM MILLS                          | 1 | CAT G 3516B         | STM          | DENIM          | 2010 |
| NACISEY FOOD INDUSTRIES                      | 2 | CAT G3306           | HW           | PROCESS        | 2010 |
| INDIGO DENIM -2 BIN QASIM                    | 1 | JENB- 1000 KWE      | STEAM        | CHILLER        | 2010 |
| INDUS DYEING KORANHI                         | 8 | JENB+CAT<br>G3516B  | STEAM        | CHILLER        | 2010 |
| DENIM INTERNATIONAL KHI                      | 6 | CAT G 3520 –C       | STEAM        | AC CHILLER     | 2010 |
| PARSONS INDUSTRIES KHI                       | 2 | CAT G 3512 X 2      | STEAM        | AC CHILLER     | 2010 |
| SAYA WEAVING KHI                             | 1 | JENB 1000 KWE       | STEAM        | AC CHILLER     | 2010 |
| DOW UNIVERSITY KHI                           | 3 | CAT G3516B          | STEAM        | AC CHILLER     | 2010 |
| MUSTAQUIM DYEING SITE<br>KHI                 | 1 | JENB 1000 KWE       | STEAM        | AC CHILLER     | 2010 |
| KRYSTOPAK LANDHI                             | 6 | JENB 1000 KWE       | STEAM        | AC CHILLER     | 2010 |
| NOVATEX LANDHI                               | 6 | JENB 1000 KWE       | STEAM        | AC CHILLER     | 2010 |
| INDUS DYEING HYDERABAD                       | 1 | STEAM<br>TURBINE    | STEAM        | AC CHILLER     | 2010 |
| ENGRO FOOD SUKKUR                            | 3 | CAT G<br>3516A+JENB | STEAM        | AC CHILLER     | 2009 |
| ENGRO FOOD SUKKUR                            | 3 | Cat G 3516 C        | STEAM        | Chiller 300 RT | 2009 |
| PARSONS INDUSTRIES                           | 3 | Cat G 3516 C        | Power<br>gen | Chiller 150 RT | 2009 |
| Nirrave food bin Qasim                       | 3 | JENB 500 KWE        | HW           | RICE MILL      | 2009 |
| SAYA WEAVING MILLS KHI                       | 3 | Cat G 3516 C        | Power<br>gen | Chiller 200 RT | 2009 |
| UNITED TOWELS EXPORTS                        | 3 | Cat G 3516 C        | Power<br>gen | Process HW     | 2009 |
| ADNAN TEXTILE SITE KHI                       | 3 | Cat G 3516 C        | Power<br>gen | Chiller 450 RT | 2009 |
| UNITED MANUFACTURER<br>KHI                   | 3 | Cat G 3516 C        | Power<br>gen | AC CHILLER     | 2008 |
| KARAM CERAMICS KHI                           | 3 | Cat G 3516 C        | Power<br>gen | AC CHILLER     | 2008 |
| <u>Shabbir Tiles 2bin Qasim<br/>khi</u>      | 5 | Cat G 3516 C        | Power<br>gen | AC CHILLER     | 2008 |
| <u>Shabbir Tiles 1 Landhi</u>                | 3 | Cat G 3516 C        | Power<br>gen | AC CHILLER     | 2008 |
| <u>Clariant Pakistan<br/>Ltd.Jamshoro</u>    | 2 | Jenbacher           | STEAM        | AC CHILLER     | 2008 |
| <u>HEJ Research Institute<br/>University</u> | 4 | Cat G 3412          | Power<br>gen | AC CHILLER     | 2007 |
| <u>The Forum Bldg.</u>                       | 4 | Cat 3512            | Power<br>gen | AC CHILLER     | 2007 |
| <u>Siddqsons Denim City</u>                  | 2 | Cat G3516B          | Hot water    | AC CHILLER     | 2007 |
| <u>Bake Parloure Bin Qasim</u>               | 2 | Cat G3508           | Hot water    | Flour material | 2007 |
| <u>Rasul Flour Mills Kornagi</u>             | 2 | Cat G3508A          | Hot Water    | Flour material | 2007 |
| <u>Siddique osns Denim Hub</u>               | 5 | Cat G3516C          | Steam        | Chiller 400RT  | 2007 |

|  |   |              |             |               |      |
|--|---|--------------|-------------|---------------|------|
| <u>Baluchstn</u>                           |   |              |             |               |      |
| <u>Engro Food Sahiwal Punjab</u>           | 3 | Cat G3516C   | Steam       | Fabric Drying | 2007 |
| <u>Indus Dyeing Korangi</u>                | 5 | Jenbacher    | Steam       | Fabric Drying | 2007 |
| <u>Egro Food Sukkur</u>                    | 3 | Cat G3516c   | Steam       | Process       | 2007 |
| <u>Ali Asghar Tex Korangi</u>              | 2 | Cat G3520B   | Steam       | Process       | 2007 |
| <u>Macter mango Pharam Khi</u>             | 1 | Cat G 3512   | HW          | Chiller 300T  | 2007 |
| <u>MEW NDC Islamabad</u>                   | 4 | Cat G3508    | Hirise Bldg | Chiller 500   | 2007 |
| <u>Artistic fabrics Landhi Khi</u>         | 3 | G3516C+B     | Steam       | Jacket Use    | 2007 |
| <u>Artistic Garments Korangi</u>           | 3 | G3516B+12A   | Hot water   | jacket        | 2007 |
| <u>Yarn Merchant Tex Cogen - Karachi</u>   | 2 | Cat G3516C   | Steam       | Chiller 200T  | 2007 |
| <u>Morgan Chemicals Khi</u>                | 3 | DEUTZ 900    | HW          | Chiller 300T  | 2007 |
| <u>RASOOL FLOOR MILLS</u>                  | 2 | G 3508       | HW          | Process       | 2007 |
| <u>KBI Textile Mills SITE Khi</u>          | 1 | Guascore     | Hot Air     | Fabric Drying | 2006 |
| <u>Renfro Crescent Karachi</u>             | 1 | Jenbacher    | Steam       | Process       | 2006 |
| <u>Lucky Textile Karachi</u>               | 1 | Cat G3520C   | Steam       | Process       | 2006 |
| <u>ParkLane Towers Lhr.</u>                | 3 | Cat Diesel   | Hirise Bldg | Chiller 250   | 2005 |
| <u>Amin Textile Power - Kotri</u>          | 3 | Waukesha 900 | HW          | Chiller 300T  | 2005 |
| <u>PAK DENIM SITE KHI</u>                  | 2 | Jenbacher    | Steam       | Chiller 400T  | 2005 |
| <u>INDIGO DENIM BIN QASIM</u>              | 3 | Jenbacher    | Steam       | Chiller 500T  | 2005 |
| <u>Soorty Denim Cogen -Khi</u>             | 2 | Cat-G3516B   | Steam       | Chiller 450T  | 2005 |
| <u>Fatani Denim Cogen- Khi</u>             | 2 | M.A.N.Gas    | Steam       | Chiller 200T  | 2005 |
| <u>Gulshan Weav. Cogen Shaikhopura</u>     | 4 | Wauk 900     | Steam       | Chiller 450T  | 2005 |
| <u>Gulistan Textile Cogen Shaikhopura</u>  | 4 | Wauk 900     | Steam       | Chiller 450T  | 2005 |
| <u>Ismail Indust. Cogen Hub Baluchistn</u> | 1 | ABD D/F      | Steam       | Chiller 200T  | 2005 |
| <u>Candy Land Cogen Hub Balochistan</u>    | 3 | Guascore     | Steam       | Chiller 200T  | 2005 |
| <u>BAKE PARLOUR BIN QASIM</u>              | 2 | CAT G3508    | HW          | FOOD PROCE    | 2005 |
| <u>Artistic Denim Mills-II -Khi.</u>       | 8 | Cat-G3516    | Steam       | Chiller 200T  | 2005 |
| <u>Amins Industr.Sona -CD Khi</u>          | 2 | Cat-G3516    | HW          | Chiller 240T  | 2004 |
| <u>Saya Weaving -SITE Khi</u>              | 2 | Jenbacher    | Steam       | Chiller 200T  | 2005 |
| <u>Classic Denim -Khi</u>                  | 3 | Cat-G3516C   | HW          | Chiller 200T  | 2005 |
| <u>Parsons Industries-Khi</u>              | 2 | Cat-G3512A   | Steam       | Chiller 165T  | 2005 |
| <u>Lakson Tobacco - -Khi</u>               | 1 | LG chiller   | Steam       | Chiller 450T  | 2005 |

|                                      |          |                            |                |                     |             |
|--------------------------------------|----------|----------------------------|----------------|---------------------|-------------|
| <b>KBI Textile Mills SITE Khi</b>    | 1        | <b>Guascroe 900</b>        | <b>HW</b>      | <b>Chiller 240T</b> | <b>2004</b> |
| <b>Silver Textile Mills -Khi</b>     | 1        | <b>Cat-G3516</b>           | <b>Steam</b>   | <b>Chiller 200T</b> | <b>2004</b> |
| <b>Naveena Denim - Khi</b>           | 1        | <b>Cat-G3520B</b>          | <b>Steam</b>   | <b>Chiller 150T</b> | <b>2004</b> |
| <b>Duetech Printing -Khi</b>         | 1        | <b>Cat-D3412</b>           | <b>HW</b>      | <b>Chiller 150T</b> | <b>2004</b> |
| <b>Modern Fibres -Khi</b>            | 3        | <b>Cat-G3516</b>           | <b>HW</b>      | <b>Chiller 350T</b> | <b>2004</b> |
| <b>Engro Chemical -Khi</b>           | 3        | <b>Cummins</b>             | <b>Steam</b>   | <b>Urea Process</b> | <b>2004</b> |
| <b>Color Ital Dyeing -Khi</b>        | 2        | <b>Wauk900</b>             | <b>Steam</b>   | <b>Chiller 100T</b> | <b>2004</b> |
| <b>Indus Dyeing - HYDRabd</b>        | 2        | <b>Cat-G3516</b>           | <b>Steam</b>   | <b>Process</b>      | <b>2004</b> |
| <b>Falcon Abbrasives -Khi</b>        | 2        | <b>Cat-G3508</b>           | <b>HW</b>      | <b>Chiller 150T</b> | <b>2004</b> |
| <b>Marfani Denim Khi</b>             | 1        | <b>Cat-G3512</b>           | <b>HW</b>      | <b>Chiller 150T</b> | <b>2004</b> |
| <b>Dost Sons - Nooriabad</b>         | 4        | <b>Wauksh900</b>           | <b>HW</b>      | <b>Chiller 350T</b> | <b>2003</b> |
| <b>Silver Towels -North Khi</b>      | 1        | <b>Cat-G3412</b>           | <b>HW</b>      | <b>Process</b>      | <b>2003</b> |
| <b>Liberty Energy -II SITE - Khi</b> | 2        | <b>Cat-G3516</b>           | <b>Steam</b>   | <b>Process</b>      | <b>2003</b> |
| <b>Pharm Evo Pharma-Khi</b>          | 1        | <b>Cat-D3512</b>           | <b>Steam</b>   | <b>Chiller 150T</b> | <b>2003</b> |
| <b>Adnan Power cogen SITE - Khi</b>  | 2        | <b>Cat-G3516</b>           | <b>HW</b>      | <b>Chiller 450T</b> | <b>2003</b> |
| <b>Atistic Milliner Denim - Khi</b>  | 2        | <b>Cat-G3516</b>           | <b>HW</b>      | <b>Boiler</b>       | <b>2003</b> |
| <b>Ammar Textile Cogen- Lahore</b>   | 2        | <b>Cat-G3516</b>           | <b>Steam</b>   | <b>Process</b>      | <b>2003</b> |
| <b>ARTISTIC DENIM KORANGI</b>        | 3        | <b>Cat-G3516</b>           | <b>---</b>     | <b>Chiller 200T</b> | <b>2003</b> |
| <b>NAKSHBANDI TEXTILE KHI</b>        | 1        | <b>Wauk635</b>             | <b>HW</b>      | <b>Process</b>      | <b>2003</b> |
| <b>HUSSAIN TEX LHANDI</b>            | 3        | <b>Cat-G3516</b>           | <b>HW</b>      | <b>Chiller 200T</b> | <b>2003</b> |
| <b>NAKSHBANDI INDUSTIRES KHI</b>     | 2        | <b>Cat-G3516</b>           | <b>HW</b>      | <b>Process</b>      | <b>2002</b> |
| <b>LIBERTY TEXTILE KHI</b>           | 4        | <b>Cat-G3516</b>           | <b>Steam</b>   | <b>Chiller 150T</b> | <b>2003</b> |
| <b>ADNAN POWER SITE KHI</b>          | 2        | <b>CAT G3516A</b>          | <b>HW</b>      | <b>CHILER 450RT</b> | <b>2003</b> |
| <b>ABBAS SPINNING COGEN KHI</b>      | 6        | <b>Cat-G3516</b>           | <b>HW</b>      | <b>Chiller 150T</b> | <b>2002</b> |
| <b>MASTER TEXTILE RAWIND</b>         | 1        | <b>Cat-D3512</b>           | <b>HW</b>      | <b>Boiler</b>       | <b>2002</b> |
| <b>ALLIED COGEN LAHORE</b>           | 1        | <b>Cat-D3306</b>           | <b>HW</b>      | <b>Chiller 065T</b> | <b>2002</b> |
| <b>ALLIED CAT COGEN KHI</b>          | 1        | <b>CAT G Cat-G3408</b>     | <b>HW</b>      | <b>Chiller 075T</b> | <b>2001</b> |
| <b>FTC COGEN POWER</b>               | 4        | <b>FTC COGEN KHI</b>       | <b>Steam</b>   | <b>Electricity</b>  | <b>1990</b> |
| <b>AEG KANIS GAS TURBINES</b>        | 7        | <b>AQUATOR FFC RY KHAN</b> | <b>Heating</b> | <b>Electricity</b>  | <b>1988</b> |
| <b>KESC –BIN QASIM THERMAL</b>       | 2        | <b>KESC BIN QASIM</b>      | <b>HFO+LPG</b> | <b>Electriciity</b> | <b>1987</b> |
| <b>GHAZI POWER HFO PLANT</b>         | <b>#</b> |                            |                | <b>1982</b>         |             |
|                                      |          |                            |                |                     |             |

|                         |   |                   |             |             |      |
|-------------------------|---|-------------------|-------------|-------------|------|
| AQUATOR SPA-ITALY- FFC  | 2 | Fuaji fertilizers | Gas Turbine | process     | 1982 |
| NED SOALR THERMAL POWER | 1 | Solar Heat        | HW-freon    | Electricity | 1980 |
| AMMONIA UREA COMPLEX    | 2 | Fuaji fertilizers | Gas Turbine | process     | 1982 |
| NED Solar Power Plant   | 1 | Solar Heat        | HW-freon    | Electricity | 1980 |

## COGEN™ POPULATION