

**Technical specification and offer no. Q1225  
2 x 3.535 MWe DEUTZ TBG 632V 16**

**Gas Power CHP station**



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**8<sup>th</sup> May 2007**

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## **1. PROJECT SCOPE**

The supply, construction and commissioning of a 7 MWe power station first commissioned in September 2000 but mothballed in November 2001. Now available for immediate relocation – 50hz utility.

Basic scope of work is to dismantle in Europe, pack, ship, re-erect and commission a 7MWe gas fuelled power station. A Turnkey price can be provided subject to site survey, civil and electrical infrastructure requirements.

The available equipment consists of two DEUTZ TBG632V16 gensets powered by natural gas and all the necessary ancillary equipment including heat recovery and transfer plant, controls, switchgear, power cables to the 6.6kV board and small wiring within the station.

## **2. ENGINES**

A natural gas measurement and Regulation System (MRS) filters and reduces the gas pressure from the network pressure.

Type	DEUTZ TBG 632V 16
Rated output	3,535 kWe
Gas consumption	8,898 kW at 100% load +/- 5%
Cylinders and configuration	16 in V
Turning speed	1,000 rpm
Equivalent electrical output	72.8%
Input air flow	18,627 kg/h
Exhaust gas flow	19,134 kg/h
Gas temperature	528°C
Maximum noise level at 1 m	110dB

### 3. ELECTRICAL

Each engine drives a 6 pole 4,600 kVA 6.6kV 50Hz alternator.

The alternators are direct coupled to a 5 PANEL 6.6 kV SCHNEIDER switchboard.

Medium voltage and 400 volt Power and control cabling within the station is to european regulations.

An Auxiliary Services transformer 6.6/0.4 kV, 400kVA, 50 Hz feeds an auxiliary Services Panel for

- Compressors
- Cooling radiators
- Pumps and fans
- Process Control Panel
- Motor Control Panel
- Bridge Crane
- Air coolers
- Lighting

### 4. THERMAL

#### Steam generation

The motor exhaust gases are directed to a mixed multitubular boiler that produces 7 t/h of saturated steam at 6.5 bar with the heat of the exhaust gases, and this boiler also has a conventional natural gas burner that produces 3.1 t/h. The conventional burner would go into operation in the following cases:

- To supplement the steam demand due to demand higher than 7,179 kg/h.
- To handle the full steam demand (up to the maximum of 3,600 kg/h) in the case of a malfunction or prolonged motor stoppage, which would require steam production independent from cogeneration.

The following table provides the information on the multitubular generator:

Maximum steam flow with only motor gases	7.1 t/h
Steam flow with only conventional burner	3.6 t/h
Maximum steam flow with motor gases and burner	10.7 t/h
Registered pressure	11 bar
Normal operating pressure	6.5 bar
Steam quality	Saturated dry
Motor gas recovery flow	38,268 kg/h
Motor gas temperature	535°C
Maximum burner power	3,950 kW
Feed water temperature	80°C
Eco output temperature with motor exhaust gases	117°C
Output temperature with just the burner	225°C
Output of just gases	78.5%
Output with just burner	88%

## Hot water

The heat energy of the high and low temperature cooling circuits of the motors was also used to produce 40m<sup>3</sup>/h of water at 60°C, required in the cellulose casing manufacturing process.

The total thermal balance of the cogeneration plant was as follows:

- Steam production with exhaust gases at 6.5 bar:	7 t/h
- Steam production with exhaust gases with burner:	3.6 t/h
- Hot water production (15°C-60°C):	40m <sup>3</sup> .
- Hot water production for boiler (40°C/80°C):	7.5 t/h

The heat recovered in the cogeneration is:

- Heat recovered exhaust gases:	4,936 kW
- Heat recovered cooling water:	
- To produce hot water:	2,093 kW
- To heat boiler intake water:	349 kW
- Total heat recovered:	7,278 kW

### Total annual Energy Balance:

- Hours of operation per motor:	8,059 h/year
- Electrical power:	2 x 3,535=7,070 kW
- Electricity produced:	56,977,130 kWh/year
- Fuel consumption:	2 x 8,898 =17,796 kW 143,417,969 kWh/year
- Steam produced:	56,413 t/year
- Hot water at 60°C:	322,360 m <sup>3</sup> /year
- Heat recovered:	58,653,402 kWh/year
- Equivalent electrical output:	73%

## **5. SCOPE OF SUPPLY**

ENGINE GENSETS - 5300hrs and 1600hrs then mothballed.  
FANS/SILENCERS - Cooling air intake silencers, Air outlet silencers  
BRIDGE CRANE – 2 tonne  
DUCTS/PIPING/VARIOUS  
FIRE PROTECTION SYSTEM – smoke and flame detectors  
RADIATORS and COOLING TOWER  
TANKS FOR WATER and OIL MAKE-UP  
AIR COMPRESSOR - Atlas Copco  
PUMPS  
INSTRUMENTATION – Thermometers/ Manometers/ Pressurestats/ Flow meters/  
Magnetic level indicator/ Temperature transmitters  
TRANSFORMER - Auxiliary transformer. Rated power: 0.4 MVA 6.6/0.4kV  
MEDIUM VOLTAGE SWITCHBOARD – 5 panel 6.6kV Schneider swbd  
GROUND RESISTANCE  
CONTROL SYSTEM - Control cabinets/ control system/ data collection  
MEASUREMENT AND REGULATION STATION  
AIR COOLERS  
DUAL FIRED BOILER

New equipment

EXHAUST GAS SILENCER

## **6. Basic Scope of Service (Dismantling and packing)**

Quoted sales price to include the complete dismantling of the plant. Packing and loading the smaller components into containers. The generators would be transported 'open' but fully protected from the environment with custom made heavy duty tarpaulins.

**Price is £1,250,000 (GBP) (excl all local and excise taxes and insurances)**

## **7. Extended Scope of Service (Re-installaton)**

In addition to the above a full Turnkey price can be provided extending to transportation of all plant to the nearest internation sea-port, export shipping, destination logistics (excluding excise taxes and customs duties), and full re-installation engineering to include:-

- rebuild the power plant, including labour, supervision, flights to principle city, new cabling and pipework, steelwork, fixings and fastenings, exhaust system insulation etc. Commissioning and load testing of the plant against site load or load banks.

## **8. HEALTH AND SAFETY AND QUALITY CONTROL**

The company selected to dismantle and prepare the plant for shipment has full ISO9001 quality accreditation and is an expert in power generation and CHP engineering as such will ensure the following (Reference can be provided). The same company is also available to undertake a full EPC re-installation of the above plant at its final destination. :-

- A duty of care to its employees, site users, owners / occupiers, visitors and the general public.
- A Health & Safety system, which is intended to ensure that all employees, customers and members of the general public are made aware of their collective responsibilities under the mandatory, legislative and company laws, rules, regulations and common sense approach which is embodied within a Company Health & Safety Manual.
- Embrace all its obligations and exercise controls in the areas in which it operates producing and maintaining full Site Health & Safety Plans incorporating all 'local' requirements.
- Conduct its affairs within the requirements of the Health & Safety environment, the Company will provide the necessary training to personnel to enable them to understand hazards and risks, to be able to maintain a safe system of work and to be aware and responsible for their own actions.

## 9. SCHEDULE OF WORK

This estimated schedule of works for re-installation assumes the following:

- That necessary civil work is completed on time
- That consumables (power, water etc) is available on time
- That the terms mentioned in any associated contract are followed

From date of agreement of terms of sale and deconstruction contract approximate milestones are:

Delivery to new site of main components (location dependent):	3 months
Erection	2½ months
Commissioning	1½ month
<u>Total</u>	<u>7 months</u>

## 10. PRICE AND CONDITIONS

To supply DEUTZ TBG632V16 gensets powered by natural gas and all the above necessary ancillary equipment, controls, switchgear, power cables to the 6.6kV board and small wiring within the station.

**FIRM PRICE** packed for shipment

**£1,250,000 STERLING**

**Budget shipping re building and putting to work [excluding civils but including design and project management]**

**Allow £375,000 (based on continental 'First' World location)**

### TERMS OF PAYMENT AND CONDITIONS

A. Delivered to site costs

**To be agreed**

B. Re build and commissioning

**To be agreed but generally against client engineer approved certificates within an MF1 form of contract.**