FOR SALE

170 MW Combined Cycle Co-generation Power Plant
Burning Blast Furnace Gas / Coke
Oven Gas / Natural Gas

For sale – in continued operation, or for relocation - as a whole, or in parts
Commissioned: January 2001

Shutdown: 31st December 2013

~ 110,000 service hours

Life-time Maintenance by OEM

Recent Plant Overhaul (August 2013)

Fully operable condition, under long term preservation
Year of Manufacture: 2001
Year Retired: 2013
Condition: Excellent
Operating Hours: ~110,000
Status: Installed on foundation
PLANT CONFIGURATION

MAJOR EQUIPMENT

Gas Turbine-Generator Set, process gas fuelled, producing:
120 MWe @ 15 kV

Fuel Gas Compressor (Blast Furnace Gas / Coke Oven Gas), comprising of;
LP Axial Compressor / HP Centrifugal Compressor, 21 MW

Heat Recovery Steam Generator (without supplementary firing), producing:
196.56 t/h (Nominal) of steam @ 78.5 bar absolute / 520 C

Condensing Steam Turbine-Generator Set, producing:
70.2 MWe @ 11.5 kV

Transformer, 100/150 MVA / 132/15 kV
Transformer, 62/95 MVA / 132/11.5 kV
Transformer, 20/25 MVA / 15/10.6 kV
Transformer, 20/25 MVA / 11.5/10.6 kV

145 kV Gas Insulated Switchgear
120 MWe GAS TURBINE-GENERATOR SET

HISTORY

- Commissioned: 1999
- Decommissioned: 31st December 2013
- Lifetime Service Hours: 108,242
- Lifetime Hot Starts: 716 (incl. failed starts)
- Lifetime Cold Starts: 510 (121 @ high rate ramp)
- Last Major Overhaul: October 2012
- Overhauled By: Ansaldo Energia
- Type of Overhaul: Hot Gas Path Inspection
- Service Hours - After Overhaul: 8,684
- Hot Starts – After Overhaul: 63 (incl. failed starts)
- Cold Starts – After Overhaul: 60 (26 @ high rate ramp)
- Preservation Procedure: Machine preserved at shutdown, Preservation maintained
GAS TURBINE

Manufacturer: Ansaldo Energia S.p.A. (Genoa, Italy)
Model: V94.2 "K"
Licensor: Siemens AG, Germany
Type: Heavy duty gas turbine
Fuel: Blast Furnace Gas, Coke Oven Gas & Natural Gas mixture

Base Load Rating:
Dry Operation:
Power: 112,000 kWe
Heat Input: 380 MWt
Fuel:
APF: 112,000 Nm³/h
COKE Oven Gas: 19,000 Nm³/h
Natural Gas: 18,740 Nm³/h
Fuel LHV: 2,180 kcal/Nm³

With steam inj.:
Power: 120,000 kWe
Heat Input: 480 MWt
Fuel:
APF: 56,000 – 120,000 Nm³/h
COKE Oven Gas: 15,000 – 22,000 Nm³/h
Natural Gas: As necessary to achieve required Heat Input.
Fuel LHV: 2,200 – 3,300 kcal/Nm³

Fuel Gas Comp.: ~ 23 MW (driven off turbine shaft)
Speed: 3,000 rpm
**FUEL GAS COMPRESSOR**

**HISTORY**
- Commissioned: 1999
- Decommissioned: 31st December 2013
- Lifetime Service Hours: 108,242
- Last Major Overhaul: To be advised
- Overhauled By: To be advised
- Service Hours - After Overhaul: 8,684
### Process Gas Compressor

**Gas:**
- Blast Furnace Gas (AFO)
- Coke Oven Gas (COG)

**Normal Flow Rate:**
- AFO: 112,000 Nm³/h
- COG: 19,000 Nm³/h

**Mass Flow:** 190,400 kg/h

**Rated Speed:** 6,900 rpm

### LP Compressor

**Manufacturer:** Sulzer Turbo

**Type:** Axial Compressor

**Model #:** AV 50-15

**Inlet Pressure:** ~ 1 bara

**Discharge Pressure:** 7 bar abs

**Absorbed Power:** 13,770 kW

### HP Compressor

**Manufacturer:** Sulzer Turbo

**Type:** Centrifugal Compressor

**Model #:** R 71-6

**Inlet Pressure:** 6 bar abs.

**Discharge Pressure:** 26 bar abs.

**Absorbed Power:** 12,070 kW
HRSG
Manufacturer: Ansaldo Energia S.p.A.
Type: HRSG, natural circulation

HP Steam Production:
Steam Flow: 54.6 kg/s (196,560 kg/h)
Steam Pressure: 78.5 bar abs.
Steam Temp.: 520°C

MP Steam Production:
Steam Flow: 12.8 kg/s (46,080 kg/h)
Steam Pressure: 11.6 bar abs.
Steam Temp.: 285°C

LP Steam Production:
Steam Flow: To be advised
Steam Pressure: 1.7 bar abs
Steam Temp.: Saturated
180 t/h STEAM GENERATOR
Blast Furnace Gas / Coke Oven Gas / Natural Gas Fuelled
**AUXILIARY BOILER**

Manufacturer: Ansaldo Energia S.p.A.

**Type:** Radiant furnace, natural circulation, bi-drum boiler

**Fuel:** Blast Furnace Gas / Coke, Oven Gas / Natural Gas

**Nominal Steam Prod.:**
- **Steam Flow:** 50 kg/s (180,000 kg/h)
- **Steam Pressure:** 73 bar abs.
- **Steam Temp.:** 520°C

**Number of Burners:**
- Blast Furnace (AFO) Gas: 2
- Coke Oven Gas (COG): 2
- Natural Gas (NG): 2

**Operating Cases:**

**Case 1;**
- AFO Gas Flow: 72,500 Nm³/h
- AFO Gas Thermal Input: 63.1 MWT
- COG Gas Flow: 15,235 Nm³/h
- COG Thermal Input: 72.2 MWT
- NG Flow: 1,960 Nm³/h
- NG Thermal Input: 18.8 MWT
- Total Thermal Input: 154.1 MWT
- Steam Flow: 156,000 kg/h

**Case 2;**
- AFO Gas Flow: 59,180 Nm³/h
- AFO Gas Thermal Input: 54.8 MWT
- COG Gas Flow: 12,480 Nm³/h
- COG Thermal Input: 59.9 MWT
- NG Flow: 2,151 Nm³/h
- NG Thermal Input: 20.7 MWT
- Total Thermal Input: 135.4 MWT
- Steam Flow: 134,000 kg/h
70 MWe CONDENSING STEAM TURBINE-GENERATOR SET

HISTORY
- Commissioned: November 2002
- Decommissioned: 31st December 2015
- Lifetime Service Hours: To be advised
- Last Major Overhaul: To be advised
- Overhauled By: To be advised
- Service Hours - After Overhaul: To be advised
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>Ansaldo Energia S.p.A.</td>
</tr>
<tr>
<td>Serial Number</td>
<td>2183</td>
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<tr>
<td>Model</td>
<td>SCGF</td>
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<tr>
<td>Type</td>
<td>Single cylinder reaction steam turbine</td>
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<tr>
<td>Nominal Rating</td>
<td>70,204 kWe</td>
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<tr>
<td>Normal Inlet Flow</td>
<td>180,000 kg/h</td>
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<tr>
<td>Normal Inlet Pressure</td>
<td>76 bar abs.</td>
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<tr>
<td>Normal Inlet Temperature</td>
<td>517 °C</td>
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<tr>
<td>Normal Exhaust Pressure</td>
<td>0.043 bar abs.</td>
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<tr>
<td>Speed</td>
<td>3,000 rpm</td>
</tr>
</tbody>
</table>
GENERATOR

Manufacturer: Ansaldo Energia S.p.A., Genoa, Italy

Apparent Power: 94,000 kVA
Active Power: 75,780 kW
Power Factor: 0.8
Rated Speed: 3,000 rpm
Voltage: 11,500 V
Current: 4,719 A
Phases: 3
Connection: Y
Frequency: 50 Hz
Service: S1
Protection: IP 54
Insulation Class: F / F
152 MVA STEP-UP TRANSFORMER

HISTORY
- Commissioned: 1999
- Decommissioned: 31st December 2013
- Lifetime Service Hours: To be advised
- Last Major Overhaul: To be advised
- Overhauled By: To be advised
- Service Hours - After Overhaul: To be advised
Manufacturer: ABB Trasformatori S.p.A., Italy
Type: Step up Transformer
Standard: CEI 14-4
Cooling Method: ONAN / ONAF
Vector Group: YN011
Rating: 100,000 / 15,000 kVA
Primary Voltage: 132,000 V
Primary Current: 665 A
Secondary Voltage: 15,000 V
Secondary Current: 5,850 A
Phases: 3
Frequency: 50 Hz
Regulation: On-line Tap Changer
Number of Positions +/-: 10 / 10
Increment: 1.5%
Temperature Rise: Windings: 65°C, Oil: 80°C
25 MVA STEP-DOWN TRANSFORMER

HISTORY

- Commissioned: 1999
- Decommissioned: 31st December 2015
- Lifetime Service Hours: To be advised
- Last Major Overhaul: To be advised
- Overhauled By: To be advised
- Service Hours - After Overhaul: To be advised
25 MVA STEP-DOWN TRANSFORMER

HISTORY
- Commissioned: 1999
- Decommissioned: 31st December 2015
- Lifetime Service Hours: To be advised
- Last Major Overhaul: To be advised
- Overhauled By: To be advised
- Service Hours - After Overhaul: To be advised
GAS INSULATED SWITCHGEAR

Manufacturer: ABB ADDA, Italy
Serial Number: 85800
Type: AGB 145-170S
Normal Voltage: 145,000 V
Breaking Capacity: 31.5 kA (Ω 145 kV)
 Interruption Factor: 1.5
 Normal Current: 1,250 A
 Frequency: 50 Hz
 Gas: SF6
 Gas Pressure: 6 bar
 Weight of Gas: 12 kg / pole
 Weight of Pole: 250 kg