

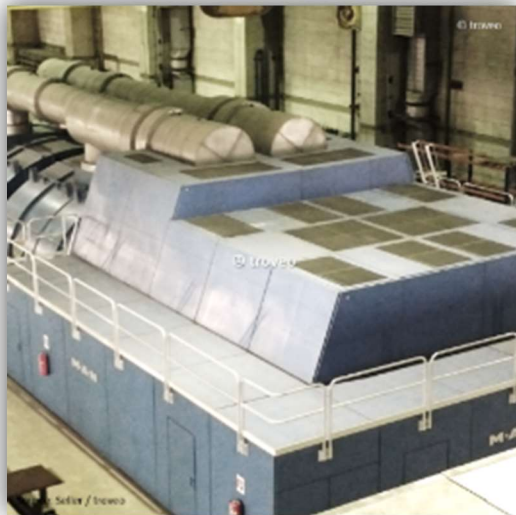
## GENERAL DESCRIPTION

### TOP MAINTAINED, COMPLETE 50 Hz 350 MWe COAL-FIRED POWER PLANT AVAILABLE FOR RE-LOCATION

**Type: Coal-fired or Gas-fired  
Steam Power Plant**

**Location: Western Europe**

steam turbine – top view of HP set



This thermal power plant unit has been commissioned in 1986 and is designed for base-load or medium-load operations with electricity feed-in into the 50 Hz public grid.

The unit is capable of highly flexible power generation with a wide spread in generation capacity and a short start-up time.

The power plant is designed for high efficiency operation with total efficiency in excess of 42%. The filter technology comprises dedusting, desulphurisation and denitrification and fulfils the latest environmental standards.

The operator has decided to decommission the unit due to overall overcapacity in the European electricity market. Due to its moderate use (150.000 operating hours only) and its continuous supervision and maintenance it is still in excellent condition.

This steam turbine power station is still fully operational, well preserved and is offered as a complete unit.

## Offering

|                             |   |
|-----------------------------|---|
| <b>item / type / layout</b> | hard coal and natural gas fired power plant unit of 350 MWe gross capacity, with part-load facilities and all necessary auxiliary systems   |
| <b>typical usage</b>        | typical use of this power plant is the generation of electricity and district heating at full and partial-load, with hard coal or natural gas<br>power plant can be operated 100% with either fuel type |

|  |   |
|--|---|
| <b>special features</b>                | <p>very high partial load capacity, high efficiency, very short start-up and shutdown times, complete documentation, very good preserved and fully operational, well maintained, in overall top condition, possibility for district heat extraction, very low emissions, generous technical design reserves</p> <p>so far extremely high availability, technically monitored top condition, state-of-the-art control and environment protection technology and operation monitoring systems, experts for operation and maintenance on site still available, all operating permits maintained and all legal requirements fully met</p> <p>operator is certified for environmental impact avoidance</p> |
| <b>status</b>                          | <p>suspended and ready to start at any time - not yet shut down; technically holistically preserved (completely mothballed); ongoing preservation is continuously monitored by experts since March 2020</p>   |
| <b>availability for dismantling</b>    | any time ready, subject to sales contract   |
| <b>sales prices</b>                    | 12.9 million EUR asking price for the entire plant (installed as it is)   |
| <b>new build cost</b> (for comparison) | around 510 million EUR (as it was in 1986)  |
| <b>new build time</b> (for comparison) | originally 5 years (from 1981 to 1986)  |

## Key Figures

|                          |   |
|--------------------------|---|
| <b>main fuel type</b>    | <p>hard coal <u>and / or</u> natural gas</p> <p>the unit is designed to use both fuels for full operation</p>                           |
| <b>electrical output</b> | 350 MW <sub>e</sub> gross   |
| <b>thermal output</b>    | <p>designed to optionally extract steam for district or industry site heating</p> <p>a maximum heat capacity of 200 MW<sub>th</sub></p> |
| <b>efficiency</b>        | 42% gross efficiency  |

|   |  |
|---|--|
| <b>flue gas filter technology<br/>(daily average)</b> | <ul style="list-style-type: none"> <li>- fly ash filter ( &lt; 10 mg / Nm<sup>3</sup> dust )</li> <li>- desulphurisation ( &lt; 200 mg / Nm<sup>3</sup> SO<sub>2</sub> )</li> <li>- denitrification ( &lt; 150 mg / Nm<sup>3</sup> NO<sub>x</sub> )</li> </ul> |
|---|--|

|                        |  |
|------------------------|--|
| <b>grid connection</b> | step-up transformers are <u>not</u> included |
|------------------------|--|

|                   |  |
|-------------------|--|
| <b>plant size</b> | ~50.000 m <sup>2</sup> building area without coal storage yard |
|-------------------|--|

|   |   |
|---|---|
| <b>year of commissioning /<br/>year of last retrofits</b> | 1986 - commissioned /<br>2010 – turbine and boiler retrofit<br>2010 - control system retrofit |
|---|---|

|                              |      |
|------------------------------|------|
| <b>last full maintenance</b> | 2018 |
|------------------------------|------|

|                                |   |
|--------------------------------|---|
| <b>major upgrades / events</b> | most recent major overhauls / upgrades: <ul style="list-style-type: none"> <li>- generator 2006</li> <li>- turbine 2010</li> <li>- control system 2010</li> <li>- boiler 2010</li> <li>- condenser 2010</li> <li>- coal mills 2014</li> <li>- full preservation until 2023</li> </ul> |
|--------------------------------|---|

## Operating Figures

|                                 |                              |
|---------------------------------|------------------------------|
| <b>max. generation capacity</b> | 350 MWe gross (at full load) |
|---------------------------------|------------------------------|

|                                 |   |
|---------------------------------|---|
| <b>min. generation capacity</b> | 120 MW gross when using turbine-driven feed water pump<br>90 MW gross when using electric feed water pumps only |
|---------------------------------|---|

|                                   |   |
|-----------------------------------|---|
| <b>cold start time hard coal:</b> | 460 min (to reach max. capacity)<br>180 min (to start grid synchronization) |
|-----------------------------------|---|

|                                     |   |
|-------------------------------------|---|
| <b>cold start time natural gas:</b> | 295 min (to reach max. capacity)<br>180 min (to start grid synchronization) |
|-------------------------------------|---|

|   |                               |          |              |
|---|-------------------------------|----------|--------------|
| <b>coal quality<br/>(as has been used so far)</b> | calorific value               | MJ/kg    | > 25,5 *     |
|   | ashes (raw)                   | % weight | 8,5 < x < 15 |
|   | volatile components (waf)     | % weight | 30 < x < 45  |
|   | Sulphur (raw)                 | % weight | 0,3 < x < 2  |
|   | Chlorine content (raw)        | % weight | < 0,15       |
|   | grindability according to HGI | °H       | 45 < x < 75  |
|   | Nitrogen                      | % weight | < 2,4        |

\*) in case the calorific value of used coal is less than 25.2, the achievable maximum unit output is reduced, i.e. even coals with lower calorific values can be used

**fuel consumption at full load** ~ 115 t/h hard coal (with best quality)  
or  
~ 80.000 m<sup>3</sup>/h natural gas

**fuel consumption at min. load** ~ 35 t/h hard coal (with best quality)

**fuel storage capacity** 2.000.000 million tons hard coal  
(note: oversized coal yard as strategic reserve; all equipment available for sale)

**type of cooling** river water

**amount of cooling water** two pumps with 8 m<sup>3</sup>/s are installed;  
type Voith with 6 kV electric motors

**ash disposal requirement** fly ash was collected with electric filters (7 stages in three lines with 50% redundancy); subsequently, the ash was sold to the building materials industry as a cement additive

**gypsum disposal requirement** the hole waste water of the power block can be used to operate the desulfurization facility made by NIRO ATOMIZER (Denmark)  
Gypsum as derived from desulphurisation was sold to a mine operator, as a filler to stabilize an old lime mine

## Technical Figures of Main Components

This power plant unit for sale comprises a hard-coal or gas-fired boiler, a 350 MW steam turbine, a 380 MVA generator, the entire components of the water / steam cycle, the entire flue gas cleaning system as well as all coal yard and coal feeding equipment.

|   |  |
|---|--|
| <b>coal handling</b>                    | <p>amongst others:</p> <ul style="list-style-type: none"> <li>• conveyor belt system designed to mix seven different coal types (total belt lengths &gt; 3 km)</li> <li>• railway delivery and transport systems, to deliver ~ 10.000t a day by rail</li> </ul>  |
| <b>boiler</b>                           | <ul style="list-style-type: none"> <li>• 1,018 t/h Benson boiler – type Sulzer with part load pumps</li> <li>• with two Lungström air preheaters</li> <li>• with a high performance DeNO<sub>x</sub> filter system operated with ammonium gas to reduce NO<sub>x</sub> to less than 150 mg/m<sup>3</sup> even if coal is used with more than 2,5% nitrogen content</li> <li>• 4 coal mills with 32 coal and additional 32 gas burners for 4 burning levels type EVT</li> <li>• full steam blower cleaning system type Clyde Bergemann</li> </ul> |
| <b>steam turbine</b>                    | <ul style="list-style-type: none"> <li>• 350 MW, 1x HP, 1x MP, 2x LP sections, type MAN</li> <li>• with an existing preparation for decoupling more than 200 MW thermal power</li> </ul>   |
| <b>generator</b>                        | <ul style="list-style-type: none"> <li>• 380 MVA hydrogen cooled (Siemens type licensed)</li> </ul>  |
| <b>water / steam cycle</b>              | <ul style="list-style-type: none"> <li>• one feed water turbine driven pump for 120% mass flow</li> <li>• two electrical feed water pumps each for 60% mass flow</li> <li>• seven low pressure preheaters</li> <li>• three high pressure preheaters</li> <li>• one condenser</li> </ul>  |
| <b>auxiliary transformers</b>           | <ul style="list-style-type: none"> <li>• 3 MVA exciter transformer</li> <li>• several DC, high voltage transformers for the e-filters</li> </ul>   |
| <b>control and communication system</b> | <ul style="list-style-type: none"> <li>• state-of-the-art and comprehensive Siemens T3000 control system for the power plant and all auxiliary systems integrated in it</li> </ul>   |

## Additional Information

### spare parts

- the most necessary wear parts and spare parts for components with long delivery times or special materials are catalogued in a spare parts warehouse
- boiler pipes and materials are also available
- whole replacement units such as pumps and vans as well as valves are also stored on site

### documentation

- the entire documentation is available in multiple versions on site; the operating documentation is largely digitised; as-built documentation of the control and process engineering is available; the records of all revisions, test runs and the operating manuals are available; also, the entire quality documentation is available
- in 2010, the entire control technology was renewed; all data from before is also available in the form of paper records; the error or malfunction messages from the maintenance department were signed using SAP PM so that there is also a complete documentation on malfunctions
- since the power plant got vibration monitoring in 2010 for both, the turbines and all vital large rotating systems, and since this control system has a long-term memory, the entire operation history of all parameters has been fully documented since 2010
- a complete record of all emissions is also available as a data set
- all test books of all systems subject to monitoring are complete and stored on site
- the system has been operated with a service life calculator since 2004. The data from these measurements, which have been recorded for all essential components of the boiler and turbine since then, were recalibrated in 2017 through accompanying structural examinations from the existing material structures, so that very precise information about the wear and the expected remaining service life of the power plant can be taken

### marketing service fee

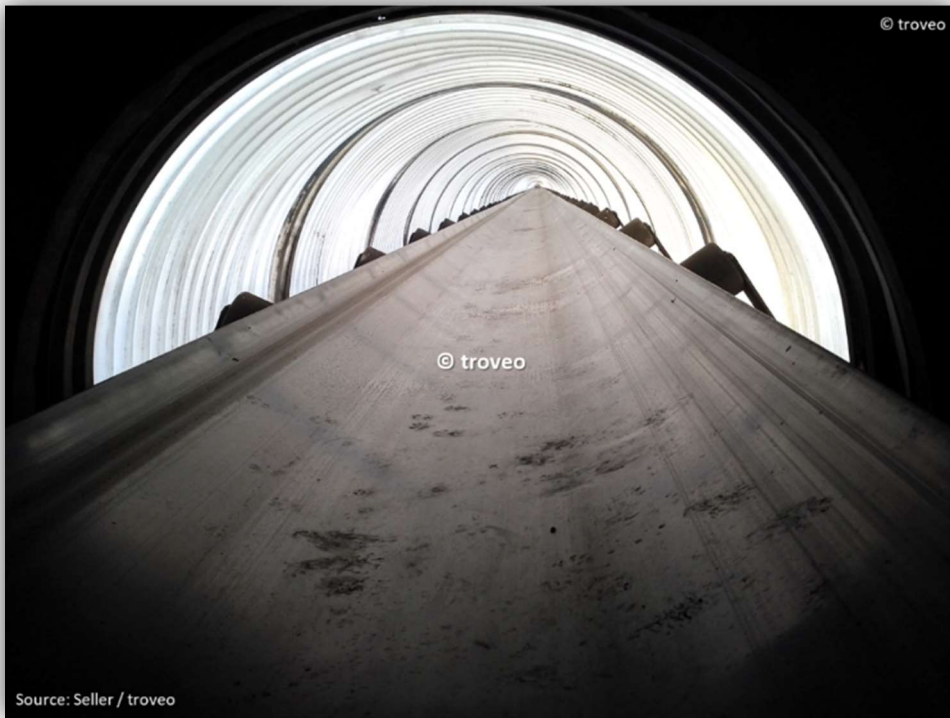
- will be paid by the seller

### dismantling of unit

- costs shall be borne by buyer
- technical assistance by seller negotiable



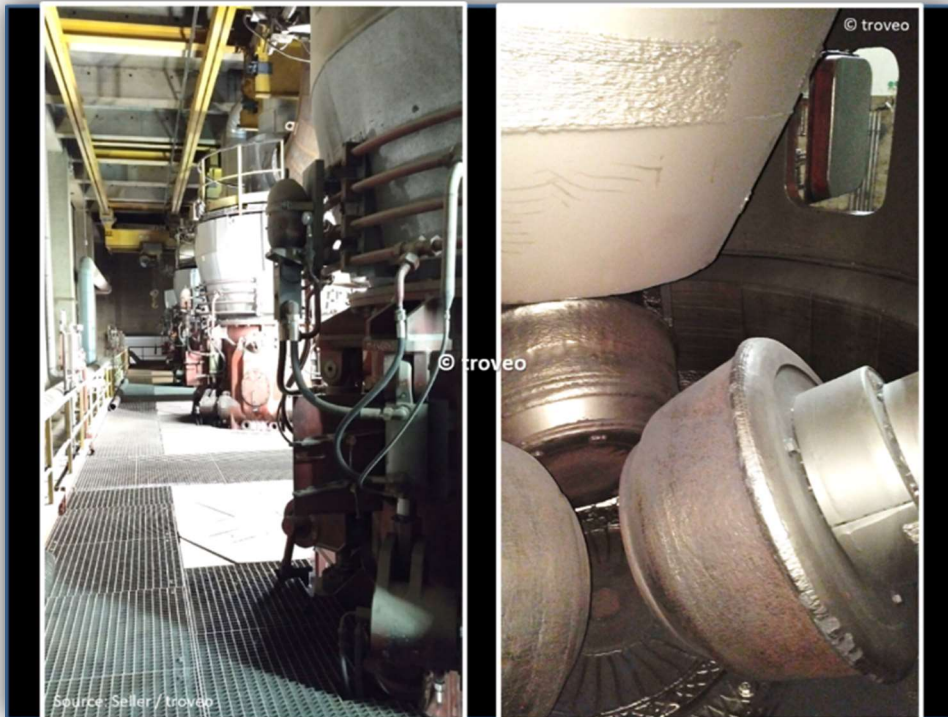
## Impressions



fuel supply – coal yard conveyor belt



fuel supply - gas pressure reducing station



fuel supply – coal mills (outside and inside view)

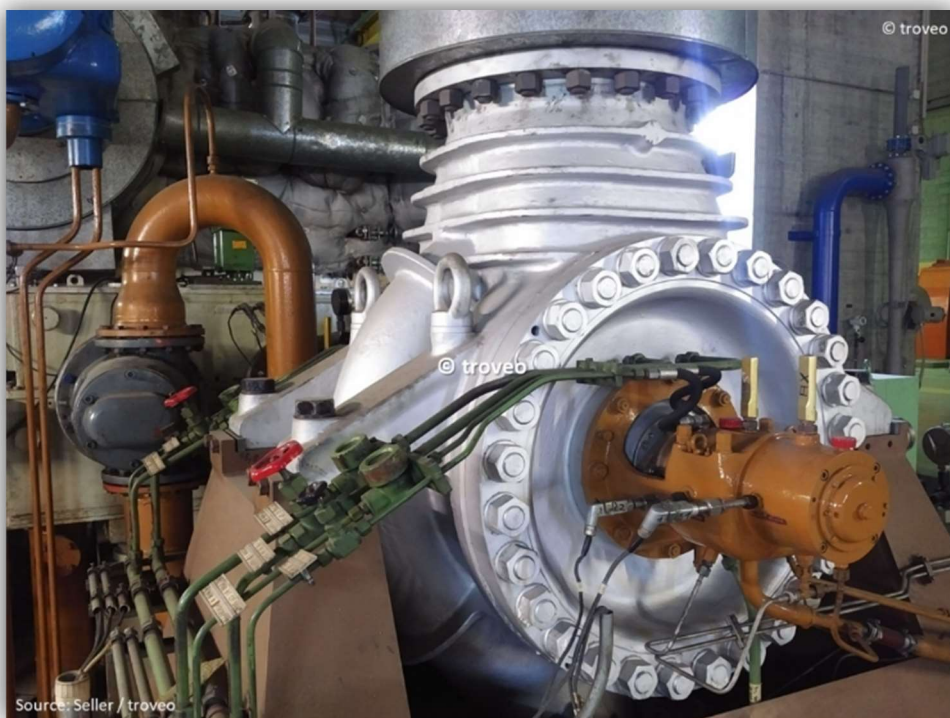


steam boiler – boiler top-side suspension





steam boiler – base piping system



steam boiler – main feed-water pump

*Business Opportunity – 350 MW<sub>e</sub> Steam Turbine Power Plant for Sale*



steam turbine – bearing oil lubrication system



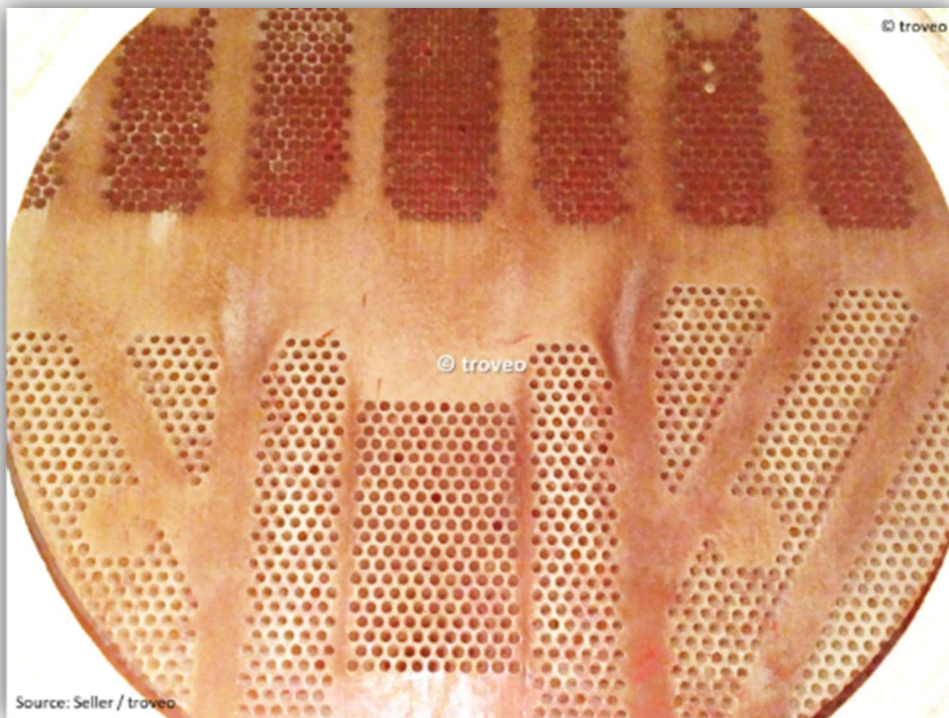
water/steam cycle – main high-pressure condensate pumps



Business Opportunity – 350 MW<sub>e</sub> Steam Turbine Power Plant for Sale



water/steam cycle – high-pressure condensate pipes



water/steam cycle – main condenser inside view (heat exchange pipes)

*Business Opportunity – 350 MW<sub>e</sub> Steam Turbine Power Plant for Sale*



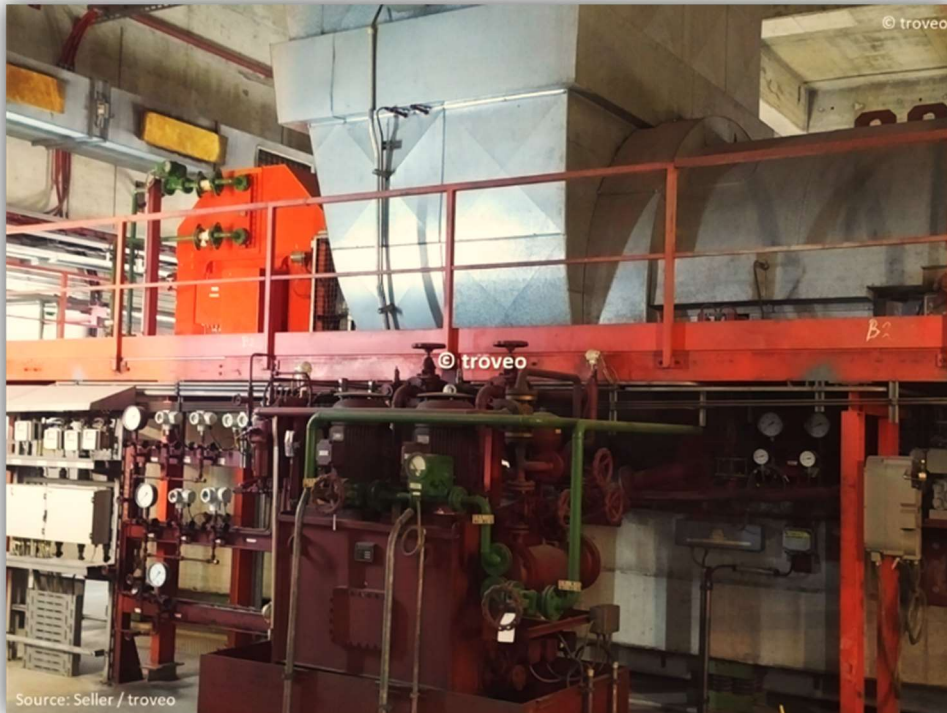
water/steam cycle – high pressure pre-heaters



cooling water system – loop pump



*Business Opportunity – 350 MW<sub>e</sub> Steam Turbine Power Plant for Sale*



flue gas system - draught fan



flue gas cleaning system - ammoniac evaporator station for the DeNO<sub>x</sub> filter





water/steam cycle – one of more than 40 fan air heaters/dryers,  
temporarily installed until 2023 for plant preservation

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### Disclaimer:

Although the statements and technical information contained herein are believed to be materially accurate, no representation or warranty is given as to the accuracy of any of the information provided.

### Contact:

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