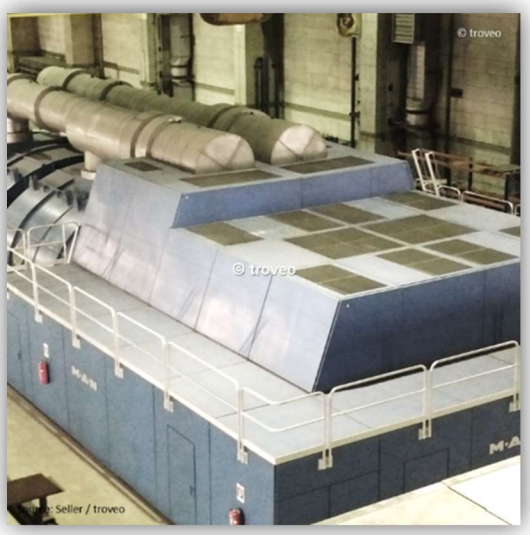
GENERAL DESCRIPTION

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

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

steam turbine – top view of HP set



Location: Western Europe

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 offered as a complete unit.

Offering

item / type / layout	hard coal and natural gas fired power plant unit of 350 MWe gross capacity, with part-load facilities and all necessary auxiliary systems
typical usage	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 power plant can be operated 100% with either fuel type

special features	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 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 operator is certified for environmental impact avoidance
status	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
availability for dismantling	any time ready, subject to sales contract
sales prices	quotes welcomed
new build cost (for comparison)	around 510 million EUR (as was in 1986)
new build time (for comparison)	originally 5 years (from 1981 to 1986)

Key Figures

main fuel type	hard coal and / or natural gas the unit is designed to use both fuels for full operation
electrical output	350MW_e gross
thermal output	designed to optionally extract steam for district or industry site heating a maximum heat capacity of 200 MW_{th}
efficiency	42% gross efficiency

flue gas filter technology (daily average)	- fly ash filter (< 10 mg / Nm^3 dust) - desulphurisation (< 200 mg / Nm^3 SO_2) - denitrification (< 150 mg / Nm^3 NO_x)
grid connection	step-up transformers are not included
plant size	~50.000 m² building area without coal storage yard
year of commissioning / year of last retrofits	1986 - commissioned / 2010 – turbine and boiler retrofit 2010 - control system retrofit
last full maintenance	2018
major upgrades / events	most recent major overhauls / upgrades: - generator 2006 - turbine 2010 - control system 2010 - boiler 2010 - condenser 2010 - coal mills 2014

Operating Figures

max. generation capacity	350 MWe gross (at full load)
min. generation capacity	120 MW gross when using turbine-driven feed water pump 90 MW gross when using electric feed water pumps only
cold start time hard coal:	460 min (to reach max. capacity) 180 min (to start grid synchronization)
cold start time natural gas:	295 min (to reach max. capacity) 180 min (to start grid synchronization)

coal quality (as has been used so far)	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 m³/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 m³/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

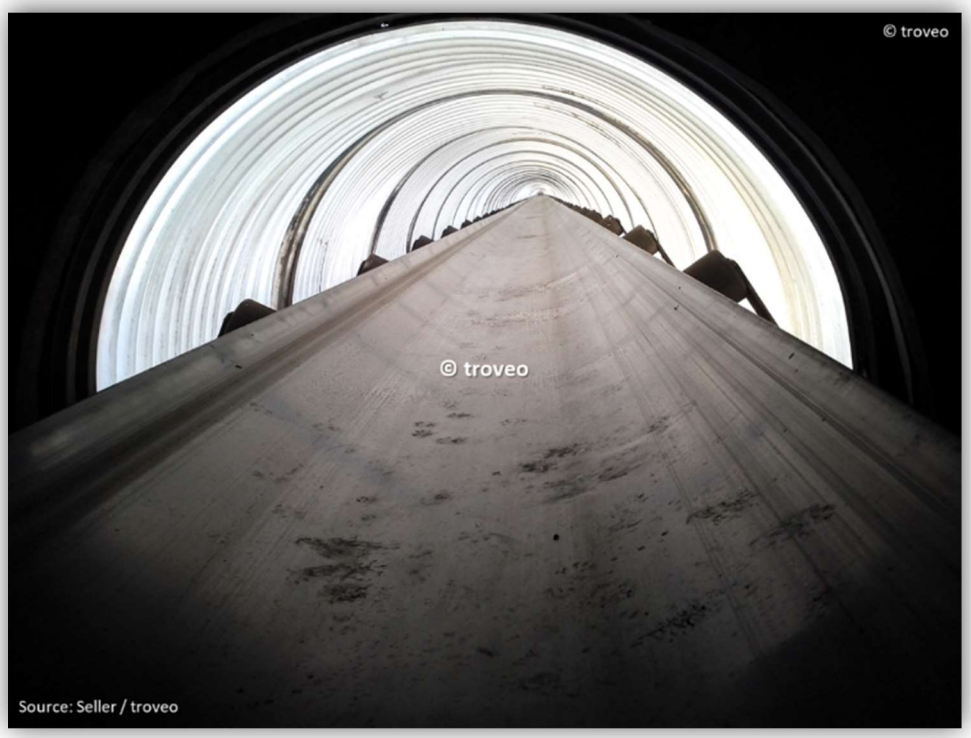
This power plant unit for sale comprises a hard-coal or gas-fired boiler, a 350 MW steam turbine, a 380 MVA generator, the entire components of the water / steam cycle, the entire flue gas cleaning system as well as all coal yard and coal feeding equipment.

coal handling	amongst others: • conveyor belt system designed to mix seven different coal types (total belt lengths > 3 km) • railway delivery and transport systems, to deliver ~ 10.000t a day by rail
boiler	• 1,018 t/h benson boiler – type Sulzer with part load pumps • with two Lungström air preheaters • with a high performance DeNOx filter system operated with ammonium gas to reduce NOx to less than 150 mg/m³ even if coal is used with more than 2,5% nitrogen content • 4 coal mills with 32 coal and additional 32 gas burners for 4 burning levels type EVT • full steam blower cleaning system type Clyde Bergemann
steam turbine	• 350 MW, 1x HP, 1x MP, 2x LP sections, type MAN • with an existing preparation for decoupling more than 200 MW thermal power
generator	• 380 MVA hydrogen cooled (Siemens type licensed)
water / steam cycle	• one feed water turbine driven pump for 120% mass flow • two electrical feed water pumps each for 60% mass flow • seven low pressure preheaters • three high pressure preheaters • one condenser
auxiliary transformers	• 3 MVA exciter transformer • several high voltage, DC transformers for the e-filters
control and communication system	• state-of-the-art and comprehensive Siemens T3000 control system for the power plant and all auxiliary systems integrated in it

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



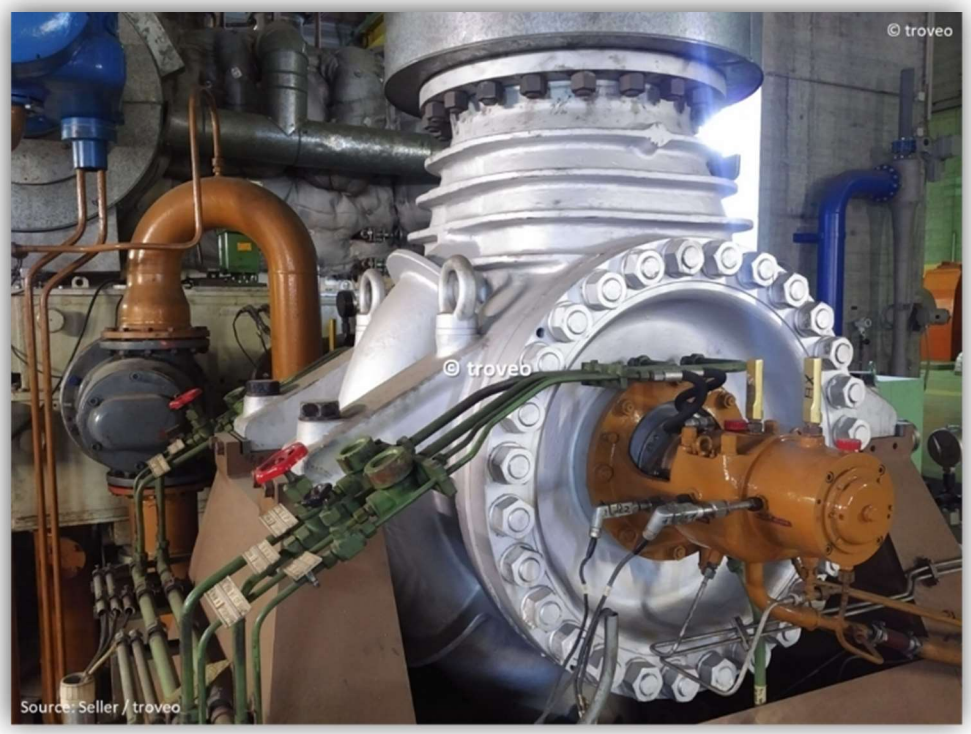
fuel supply – coal yard conveyor belt

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

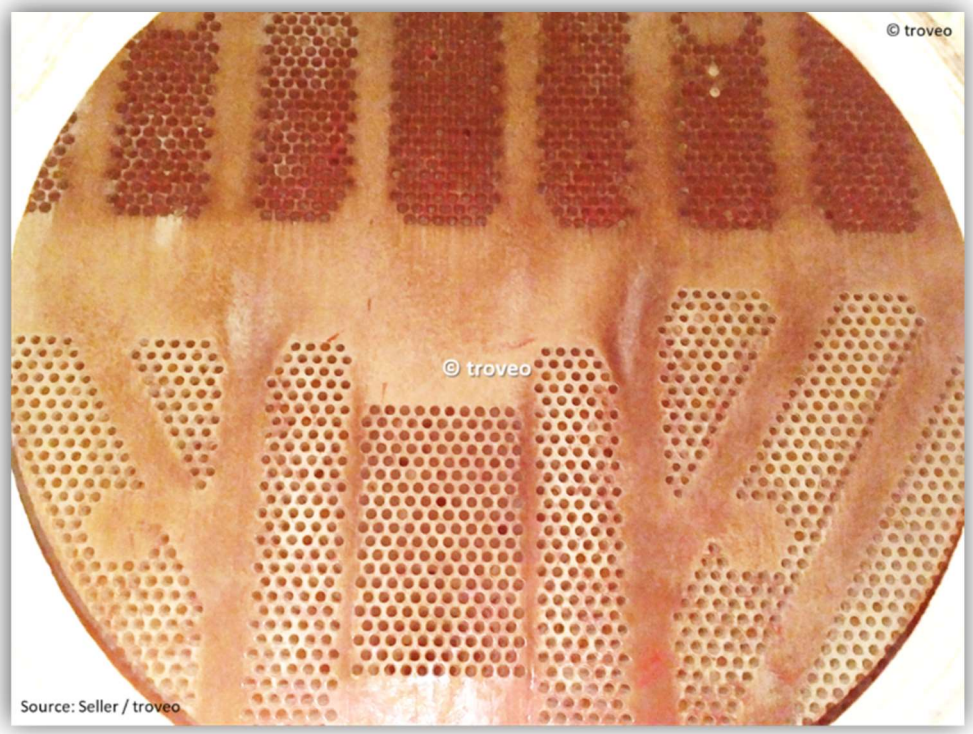


steam boiler – main feed-water pump

steam turbine – bearing oil lubrification system

water/steam cycle – main high-pressure condensate pumps

water/steam cycle – high-pressure condensate pipes



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

water/steam cycle – high pressure pre-heaters

cooling water system – loop pump

flue gas system - draught fan

flue gas cleaning system - ammoniac evaporator station for the DeNOx filter

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

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.

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