

ORC DISTRICT HEATING APPLICATION

E-RATIONAL ORCLT 441 – 3000kWh – 315kWe

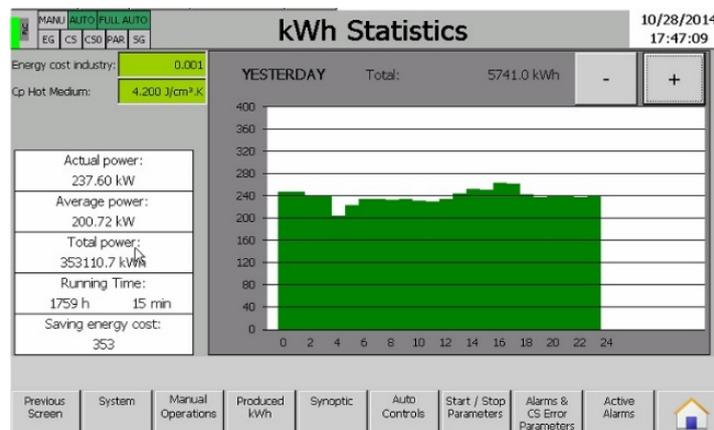


Holzheizkraftwerk Hövelhof GMBH, DE, transforms wood waste into useful heat and power. The wood waste comes from the production process in the furniture plant and is incinerated in a wood boiler to feed a hot thermal oil circuit. The thermal oil circuit at 300°C feeds a first high temperature ORC installed by Turboden. The production of the Turboden is about 1,000 kWe. The green electricity is used in the factory and the condenser heat at 90°C feeds a district heating net inside and outside (city network) of the factory.

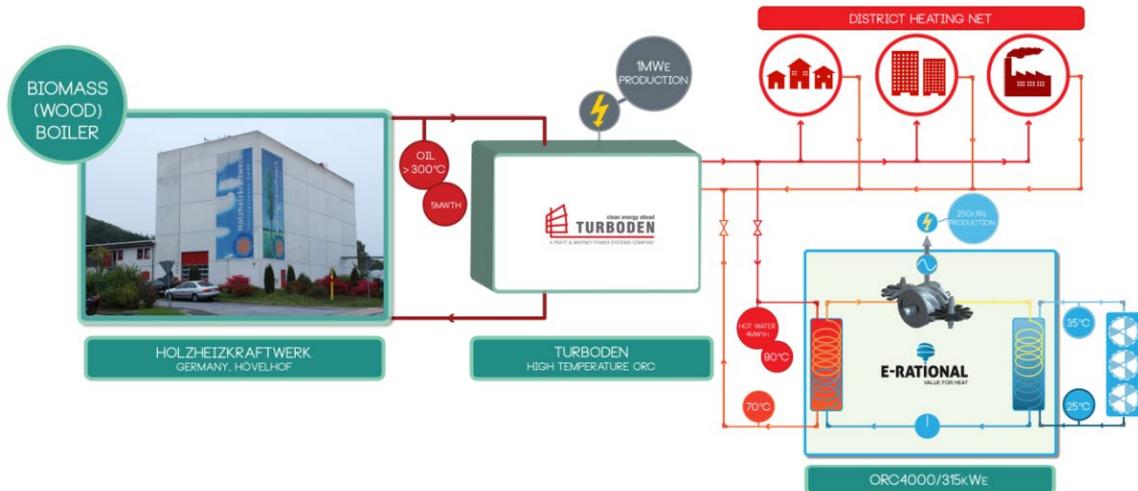
Since the demand of heat for the district heating net varies during the year (seasonal changes, day/night, weekdays vs weekends), there is always an excess of heat which had to be dumped. In order to increase the system's efficiency an E-RATIONAL ORCLT 441/ 315kWe was integrated in April 2014 to convert the remaining unused heat from the condenser of the Turboden into additional green power. With an average net power production of 220kWe on the E-RATIONAL ORC, the global output of the Holzheizkraftwerk energy plant could be increased by more than 20%, considering the same amount of biomass fuel was incinerated. Based on the heat demand in the district heating net, the central automation system balances the heat input between the district heating net and the E-RATIONAL ORC machine in order to maximize the electricity output, meanwhile the demand of on the district heating net is respected during the whole time of the year.



Left: Cabero adiabatic dry coolers for cooling of the E-RATIONAL ORC – Right: E-RATIONAL ORC machine in container



Daily statistics of the ORCLT 441/ 315kWe.



Introduction of the E-RATIONAL ORC to convert remaining heat, on the district heating net, into green electricity, made the global output of the plant increase with more than 20%.

Working temperature hot side	90°C → 72°C
Thermal load at hot side	± 3000kWth
Condenser	15°C → 25°C
Cooling capacity	± 2750kWth
Cooling	Adiabatic dry coolers
Installed generator capacity	3155kWe
Average net power production	220kWe
Run time since start-up	>35.000h
In operation since	2014
Running hours per year	± 8.000h

Machine definition ORCLT 441/ 315kWe Holzheizkraftwerk Hövelhof GMBH

E-RATIONAL is delivering a cost-effective solution to convert low temperature waste heat into clean energy without emissions. Our state-of-the-art **Organic Rankine Cycle (ORC)** technology, with in-house development of the expansion part and the use of industrial grade components, makes E-RATIONAL's ORCs user-friendly, robust and economically viable. The E-RATIONAL ORC has been designed to maximize uptime and efficiency with a minimized operational and maintenance cost. This results in a containerized modular machine, CE-compliant, with plug-and-play connections for easy installation.

The ORC machines can convert heat from various sources, such as:

- Industrial processes, e.g. cooling cycles at chemical plants, glass, steel or food industry, power plants, etc.
- District heating networks (unused excess heat)
- Biomass burners or biogas installations with CHP units
- Low temperature geothermal wells

E-RATIONAL's technology is suitable for heat recovery of feeding temperatures at maximum 170°C (338°F) and minimum 85°C (185°F) at the hot side. Typical temperature difference between inlet and outlet is 20°C. Cooling temperature sent to the machine can be maximum 60°C (140°F), depending on the temperatures at the hot side.

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