

ORC INDUSTRIAL WASTE HEAT RECOVERY APPLICATION

2 X E-RATIONAL ORC 20FT – 3MW_{TH} – 370kWe

TREDI Strasbourg, France is part of the S  ch   group (<http://www.groupe-seche.com>), a major French waste management business.

The plant in Strasbourg, France treats hazardous and medical waste in two high temperature incinerators (HTIs). The flue gas from the incineration process is cooled with pressurized water. For each HTI part of the recovered heat is used for "evapo-incineration", a thermal technique for treating slightly contaminated liquid waste by evaporation of the aqueous liquid waste and incineration of the concentrated residue. However, this process only uses a small proportion of the available heat, so TREDI decided to install E-RATIONAL ORC units to convert the balance of unused waste heat into electricity.



Because the HTIs must be capable of independent operation, TREDI Strasbourg installed two separate E-RATIONAL ORC units. The temperature of the pressurized hot water can vary between 140  C and 160  C. The evapo-incineration must always have the right temperature and therefore it modulates the heat input into the ORC. The heat load per HTI is around 2800kW, with maximum over 3000kW. These variable conditions are easily accommodated thanks to the E-RATIONAL ORC unit's high turn-down ratio.

Hot water at 150  C (up to 160  C) coming from the HTI cooling powers the ORC unit. The return temperature varies according to the operational status of the evapo-incineration process and is set remotely in the control room. The average net production of each ORC unit is 280kWe, with peaks up to 350kWe. The ORC machines are connected to direct air cooled condensers which provide the necessary cooling for ORC operation. Every three weeks, one HTI is stopped for cleaning, while the other continues in operation.



Unit 1 – E-RATIONAL ORC 20FT – 3MW_{TH} – 370kWe with direct air cooled condensers

The ORCs are equipped with a capacitor bank to improve the power factor according to requirements from the local power utility company.

The output from the two E-RATIONAL ORC machines covers more than 80% of the site's power requirement creating major cost savings on the customer's power purchases.

Heat carrier	Hot Pressurized water 13 bar
Design Working temperature hot side	160°C
Thermal load at hot side	± 2800kWth with peak to 3000kWth
Cooling capacity	± 2500kWth
Cooling	Air cooled condensers
Total installed generator capacity	370kWe
Average net power production	280kWe
In operation since	September 2016
Running hours per year	± 8200 hours
Support scheme	None, savings on Power Purchase

Machine definition TREDI Strasbourg



Unit 2 – E-RATIONAL ORC 20FT – 3MWTH – 370KWE with direct air cooled condensers

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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