



## *ORC APPLICATION*

# **COGENERATION PLANT FOR SECONDARY SOLID FUEL WASTE INCINERATOR**

- Recover heat from incinerator oven that would otherwise be lost and convert it into electricity.
- Options for low operating temperatures.
- Produce clean electricity with zero emission.

# ENTIRE PLANT

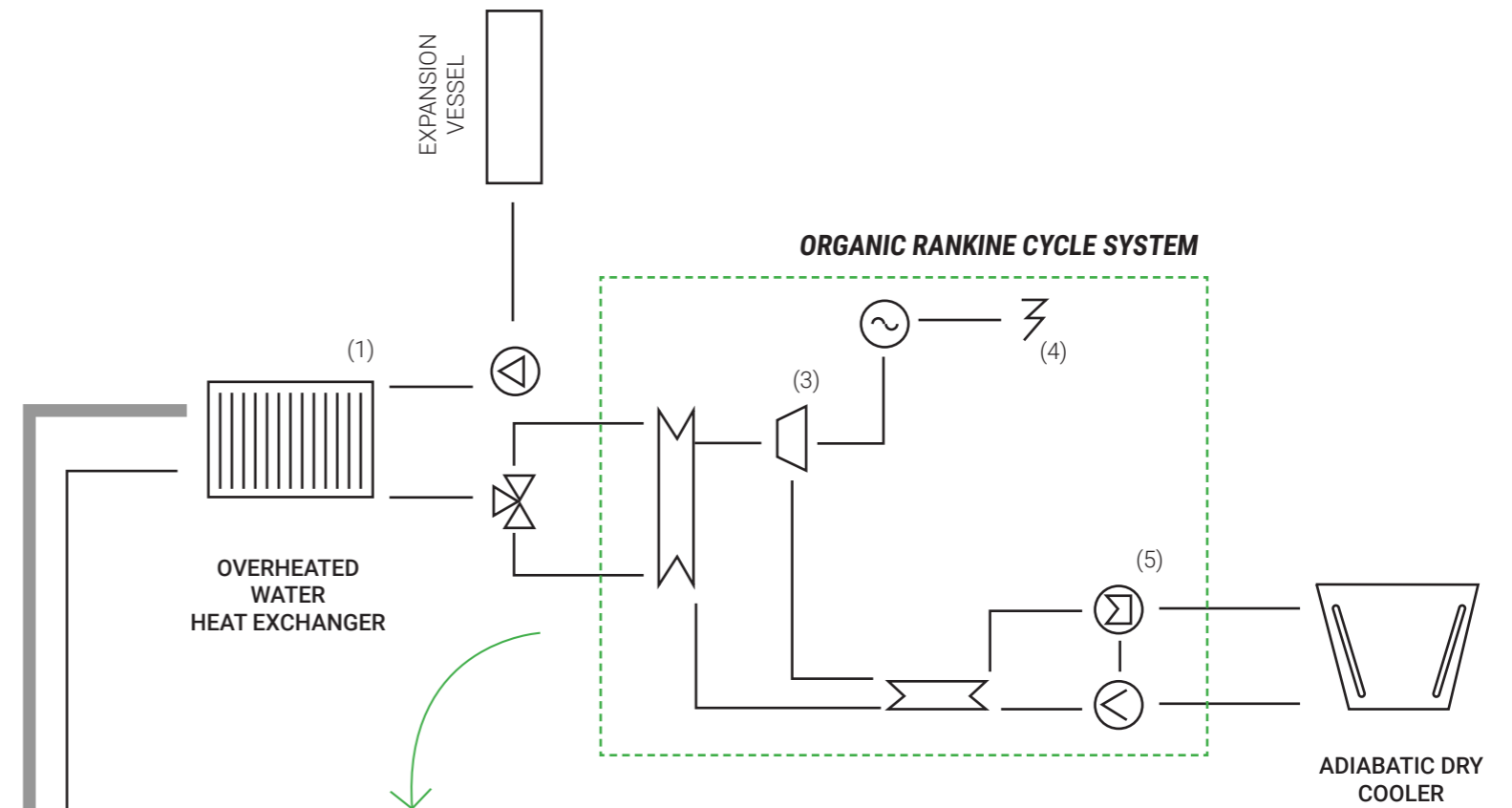
S.E. TRAND SRL - ITALY

The cogeneration plant was configured to meet the energy needs of the waste disposal company.

The Heat Recovery System operates by taking the high-temperature fumes from the incinerator oven, thanks to an overheated water heat exchanger, and distributing them to the ORC system to produce electricity. Excess heat is dissipated using an adiabatic Dry Cooler.



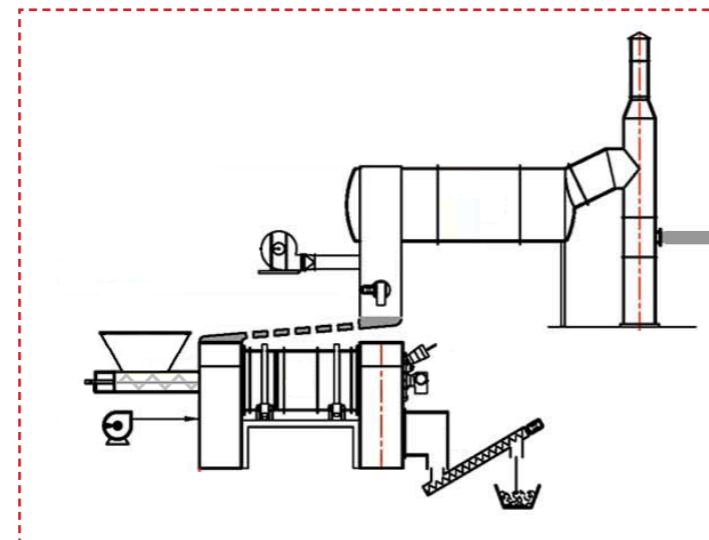
The plant is designed for heat recovery - 10 bar saturated steam - and complete with a fume purification system with continuous monitoring of the emissions to the chimney.



Heat from a heat source (1) evaporates, through an evaporator heat exchanger (2), a low-boiling-point working fluid which expands spinning a turbine (3) attached to an alternator generating electric power (4). The working fluid is then condensed in a condenser heat exchanger (5) and residual heat is dissipated by using an external cooling system such as an evaporative cooling tower or a dry cooler.

Thermal power input	1,400 kWt
Electric power output	200 kW
System Efficiency	14.30 %
Flue gas inlet/outlet temperature	1050 °C

## PYROGASIFICATION PLANT



SYSTEM SMOKE TREATMENT

### CHARACTERISTICS OF THE MATERIAL

TYPE	HOSPITAL WASTE	
AVERAGE NOMINAL CALORIFIC VALUE	MJ/Kg	25/30
APPROXIMATE HUMIDITY	%	20
SPECIFIC WEIGHT	Kg./ m3	350>400
MAXIMUM ASH CONTENT	%	3

### FUELS FOR STARTING PLANTS

PYROGASIFICATION CHAMBER	Methane gas
REACTOR CHAMBER	Methane gas

### SIZING AND OPERATION

NOMINAL CAPACITY	Kg./h.	700
POWER TIME	h/day	24
ANNUAL OPERATION	hours	8.000

### VALUES OF THE REACTOR CHAMBER

TEMPERATURE	°C	950>1.100
MINIMUM OXYGEN CONTENT	%	6
MINIMUM FUME RESIDENCE TIME	sec.	2

PERFORMANCE OF THE PLANT: 80%





# ORC SYSTEM - TECHNICAL NOTES



## ZE-200-LT

Vector fluid	Pressurized water
Vector fluid input temperature	160°C
Vector fluid output temperature	145°C
Vector fluid nominal flowrate	21.65 kg/s
Working fluid type	HFC mixture, non flammable, environmental friendly
Operating temperature range (Working fluid)	60°C < T < 165°C
Operating pressure	≤ 20 bar

The system is mounted on a self-supporting frame (skid) which includes heat exchangers, turbogenerator and control panel.

The module is fully automatic and don't need a technical operator as it is managed entirely remotely.

## TURBINE

Type	Single stage, radial flow turbine with fixed nozzles; directly coupled to generator
Working fluid temperature	145°C input / ~ 100°C output
Stage pressure	PS16 (tested up to 24 bar)
Materials	CNC Machined steel body / Aluminium alloy impeller

