



# COMPANY PRESENTATION

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Zuccato Energia Srl - Via della Consortia 2 - Verona - Italia  
info@zuccatoenergia.it - [www.zuccatoenergia.it](http://www.zuccatoenergia.it)



Italian firm with seat in Verona, Italy

Specialized in the manufacture of ORC modules to produce electricity from **low temperature ( $T \geq 86^\circ \text{C}$ ) heat sources**

Designs, develops and manufactures its own ORC modules having electric outputs from **30 to 550 kW<sub>E</sub>** and mounted on a self-supporting, self contained frame ("skid")

Can supply **flange-to flange systems, customized /full custom systems** or whole turn-key integrated systems

# SPECIALIZED IN SMALL- TO MEDIUM-SIZE ORC SYSTEMS ( 30-550 kW<sub>E</sub> )

- **Europe: 27 ORC systems in Italy and Germany**
- **Africa : 1 hybrid system in Tunis**
- **USA: 3 systems in Indiana, delivery Q4 2017**
- **South Korea: 1 ORC system, delivery Q4 2017**

**Among these, the first installed plants  
are operating non-stop since 2011**

# WHY CHOOSE ZUCCATO ENERGIA ?

- **Several technological advantages**
- **Full consultancy, not just supply**
- **Ability to create custom systems**
- **Operational testing before delivery**

## Several Technological Advantages, including:



- ✓ **High isentropic efficiency of the turbine**
- ✓ **Ability to operate even down to 50% partial load**
  - Output modulation according to available thermal power
- ✓ **Extensive use of ceramic bearings**
  - High reliability, longer service life
- ✓ **Direct-drive generator mounted on turbine shaft**
  - No gearboxes, no efficiency losses
- ✓ **Custom-designed inverters for each model**
  - Maximum efficiency in energy conversion
- ✓ **Flange-to-flange, containerizable skid-mounted system**
  - Maximum modularity and compactness
- ✓ **Use of hot or overheated water as thermal vector fluid**
  - Less risks, lower costs and easier management
- ✓ **Eco-compatible working fluid**
  - Non-toxic, non-flammable and ozone-friendly

# All-Round Consultancy, not just ORC Module Supply

Zuccato Energia is not just a supplier of ORC modules: it is also able to **analyze** how its systems may be applied to the client's reality and proceed from there to **designing and supplying entire turn-key plants**

- ✓ Carrying out **feasibility studies**;
- ✓ Correctly **sizing thermal production/recovery systems** (boiler / exchangers)
- ✓ Creating **preliminary designs of the entire plant** based on the most suitable of its ORC systems;
- ✓ **Integrating** the new system with existing ones and **sizing out** the project both from the technical and financial standpoints;
- ✓ Supporting **third-party system integrators** chosen by the client, if it so prefers;
- ✓ Drawing up financial amortization estimates (**business plans**) in various scenarios.

## Ability to Create Custom Systems

- Zuccato Energia does not just integrate systems: it also and above all designs and manufactures its own ORC modules, so it can offer standard, "off the shelf" systems as well as custom systems tailored to the user's needs.
- It is possible to perform different degrees of customizations, e.g :
  - ✓ **Modifying skid geometry** to better fit it into existing spaces;
  - ✓ **Containerizing the system**, creating a **weatherproof** enclosure for outdoor installation or a **soundproofed** enclosure for residential area operation.
  - ✓ **Tuning the working point** of an "off-the shelf" system to meet particular temperature or thermal power needs;
  - ✓ **Creating full-custom turbines and modules** perfectly tailored to the available thermal power, temperature and environment.

## Operational Testing Before Delivery



- ✓ Zuccato Energia is equipped with an internal test area designed as a testbench prova for its own systems
- ✓ Every single module undergoes extensive preliminary testing even before leaving the factory

- ✓ During preliminary testing - in the presence of the client and/or its technicians - the module is extensively tested in simulated operational conditions identical to those the ORC module will meet once installed on the client's premises
- ✓ The module is tested for **flawless operation and full compliance** to commissioned design parameters





# THE ZUCCATO ENERGIA RANGE OF PRODUCTS

- **5 product lines, more than 15 models**
- **Thermal power input from 350 to 3600 kW<sub>T</sub>**
- **Electric power output from 30 to 550 kW<sub>E</sub>**
- **Exploitable temperatures starting from 86 °C**
- **Hot or overheated water as vector fluid**
- **Safe, environment-friendly working fluid**



**Turbine +  
Generator**

**Control  
Panels**

**Heat  
Exchangers**

**Cooling Water  
Output**

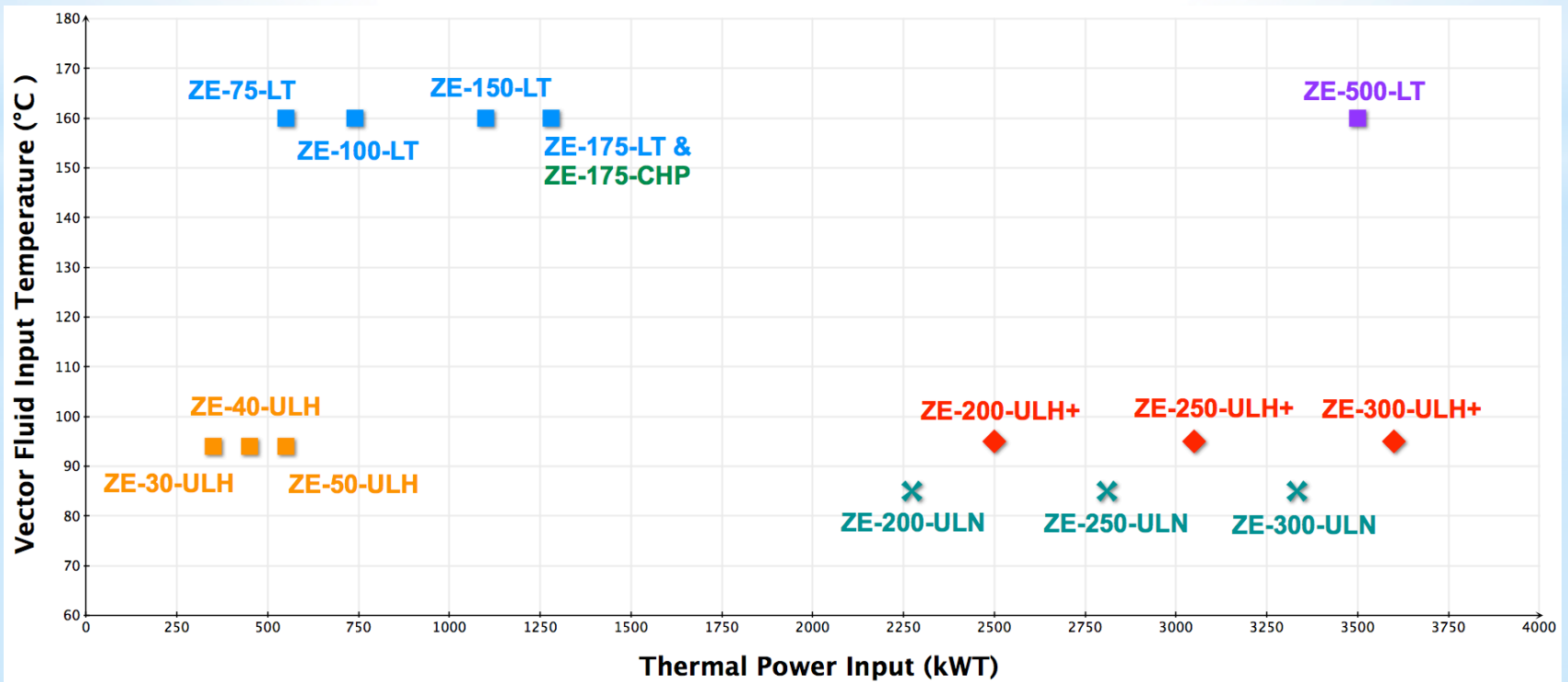
**Cooling Water  
Input**

**Hot/Overheated  
Water Input**

**Hot/Overheated  
Water Output**

# Thermal Power Requirements

Series	Thermal Power Input	Electric Power Output	Thermal Energy Vector
ULH	350 ... 550 kW <sub>T</sub>	30 ... 50 kW <sub>E</sub>	Hot Water @ T <sub>≥</sub> 95 °C
LT	550 ... 3500 kW <sub>T</sub>	75 ... 550kW <sub>E</sub>	Overheated Water @ T <sub>≥</sub> 160 °C
ULH+	2500 ... 1280 kW <sub>T</sub>	200 ... 300kW <sub>E</sub>	Hot Water @ T <sub>≥</sub> 95 °C
ULN	2273 ... 3333 kW <sub>T</sub>	200 ... 300kW <sub>E</sub>	Hot Water @ T <sub>≥</sub> 85 °C
CHP	1280 kW <sub>T</sub>	175 kW <sub>E</sub> + 1157 kW <sub>T</sub> @ 80 °C	Overheated Water @ T <sub>≥</sub> 160 °C





# LT Series

LOW-TEMPERATURE  
ORGANIC RANKINE CYCLE  
(LT-ORC)

POWER GENERATION MODULES

VECTOR FLUID: OVERHEATED  
WATER ( $T \geq 160^{\circ}\text{C}$ )

Specifications	ZE-75-LT	ZE-100-LT	ZE-150-LT	ZE-175-LT	ZE-500-LT
Electric Power Output	75 kW <sub>E</sub>	100 kW <sub>E</sub>	150 kW <sub>E</sub>	175 kW <sub>E</sub>	561 kW <sub>E</sub>
Thermal Power Input	550 kW <sub>T</sub>	740 kW <sub>T</sub>	1100 kW <sub>T</sub>	1280 kW <sub>T</sub>	3500 kW <sub>T</sub>
Vector Fluid Temperature			Input $\geq 160^{\circ}\text{C}$ Output $140^{\circ}\text{C}$		In $\geq 160^{\circ}\text{C}$ Out $145^{\circ}\text{C}$
Electric Efficiency	13,60%	13,50%	13,60%	13,60 %	16,00%
Condensation stage Thermal Dissipation	471 kW <sub>T</sub>	640 kW <sub>T</sub>	940 kW <sub>T</sub>	1075 kW <sub>T</sub>	2909 kW <sub>T</sub>
Condensation Stage Cooling Water Flowrate	8,49 kg/s	11,91 kg/s	13,14 kg/s	14,88 kg/s	86,88 kg/s
Condensation Temperature	In $32^{\circ}\text{C}$ Out $40^{\circ}\text{C}$		Input: $26^{\circ}\text{C}$ / Output: $36^{\circ}\text{C}$		In $32^{\circ}\text{C}$ Out $40^{\circ}\text{C}$

# ULH Series

**LOW-TEMPERATURE  
ORGANIC RANKINE CYCLE  
(LT-ORC)  
POWER GENERATION MODULES**

**VECTOR FLUID:**

**HOT WATER ( $T \geq 94^{\circ}\text{C}$ )**



Specifications	ZE-30-ULH	ZE-40-ULH	ZE-50-ULH
Electric Power Output	30 kW <sub>E</sub>	40 kW <sub>E</sub>	50 kW <sub>E</sub>
Thermal Power Input	350 kW <sub>T</sub>	450 kW <sub>T</sub>	550 kW <sub>T</sub>
Vector Fluid Temperature	Input $\geq 94^{\circ}\text{C}$ / Output $86^{\circ}\text{C}$		
Vector Fluid Flowrate	10.20 Kg/s	13.40 Kg/s	16.42Kg/s
Condensation Stage Thermal Dissipation	310 kW <sub>T</sub>	390 kW <sub>T</sub>	470 kW <sub>T</sub>
Condensation Stage Cooling Water Flowrate	14,81 Kg/s	18,65 Kg/s	22,46 Kg/s
Condensation Temperature	Input: $26^{\circ}\text{C}$ / Output: $31^{\circ}\text{C}$		



# ULH<sup>+</sup> Series

**HIGH-POWER, LOW-TEMPERATURE  
ORGANIC RANKINE CYCLE  
(LT-ORC)**

**POWER GENERATION MODULES**

**VECTOR FLUID: HOT WATER  
( $T \geq 95^{\circ}\text{C}$ )**

Specifications	ZE-200-ULH+	ZE-250-ULH+	ZE-300-ULH+
Electric Power Output	200 kW <sub>E</sub>	250 kW <sub>E</sub>	300 kW <sub>E</sub>
Thermal Power Input	2500 kW <sub>T</sub>	3050 kW <sub>T</sub>	3500 kW <sub>T</sub>
Vector Fluid Temperature	Input $\geq 95^{\circ}\text{C}$ / Output $80^{\circ}\text{C}$		
Vector Fluid Flowrate	39.68 Kg/s	48.41 Kg/s	57.14 Kg/s
Condensation Stage Thermal Dissipation	2266 kW <sub>T</sub>	2758 kW <sub>T</sub>	3249 kW <sub>T</sub>
Condensation Stage Cooling Water Flowrate	108,27 Kg/s	131.75 Kg/s	155.24 Kg/s
Condensation Temperature	Input: $26^{\circ}\text{C}$ / Output: $31^{\circ}\text{C}$		



# ULN Series

**HIGH-POWER, LOW-TEMPERATURE  
ORGANIC RANKINE CYCLE (LT-ORC)  
POWER GENERATION MODULES**

- IDEAL FOR THE NAVAL SECTOR -

**VECTOR FLUID: HOT WATER  
( $T \geq 95^{\circ}\text{C}$ )**

Specifications	ZE-200-ULN	ZE-250-ULN	ZE-300-ULN
Electric Power Output	200 kW <sub>E</sub>	250 kW <sub>E</sub>	300 kW <sub>E</sub>
Thermal Power Input	2273 kW <sub>T</sub>	2810 kW <sub>T</sub>	3333 kW <sub>T</sub>
Vector Fluid Temperature	Input $\geq 85^{\circ}\text{C}$ / Output $80^{\circ}\text{C}$		
Vector Fluid Flowrate	108,24 Kg/s	133,81 Kg/s	158,71Kg/s
Condensation Stage Thermal Dissipation	2039 kW <sub>T</sub>	2518 kW <sub>T</sub>	2982 kW <sub>T</sub>
Condensation Stage Cooling Water Flowrate	97,42 Kg/s	120,29 Kg/s	142,48 Kg/s
Condensation Temperature	Input: $20^{\circ}\text{C}$ / Output: $25^{\circ}\text{C}$		

# For More Information:



**Zuccato Energia Srl**

Via della Consortia 2 - Verona

**Tel +39 045 83 78 570**

**Fax +39 045 83 78 574**

[info@zuccatoenergia.it](mailto:info@zuccatoenergia.it) - [www.zuccatoenergia.it](http://www.zuccatoenergia.it)

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# Thank you for your attention!