
ZUCCATO
ENERGIA

ZUCCATO ENERGIA

INDEX

ABOUT US

Zuccato Energia Srl is an Italian company, founded in 2006 and based in Verona, Italy, operating in the renewable energy sector and having its core business in the design and production of Organic Rankine Cycle (ORC) electric power generation systems. These systems enable efficient conversion of low-temperature heat into electricity and have several applications.

Zuccato Energia is not just a systems integrator, as it designs and manufactures its ORC modules, testing their performance in their facility.

Always devoted to R&D, it is open to new challenges, creating both standard and custom ORC systems and prototypes, to efficiently meet the requirements of even the most complex projects.

The firm is proud to have dozens of installations in Italy, Africa, USA, Asia and Latin America, some of which have been operating non-stop since 2011, as a testimonial of their reliability.

SERVICES

MANUFACTURERS, NOT JUST INTEGRATORS

- Designs and manufactures its own ORC modules, so it can offer the model range, "off the shelf" systems as well as custom systems tailored to the user's needs;
- Containerization of the system for outdoor use, or creation of soundproofed enclosures for applications in residential areas;
- Modifications to the geometry of the module frame ("skid") to better fit into available spaces;
- Adaptation of the working point of a module to meet particular temperature or thermal power needs;
- Manufacture of full-custom turbines and modules perfectly tailored to the available thermal power and temperature specifications;
- Zuccato Energia tests each one of its ORC modules in a purpose-built test area on its premises.

COMPREHENSIVE CONSULTANCY SERVICES

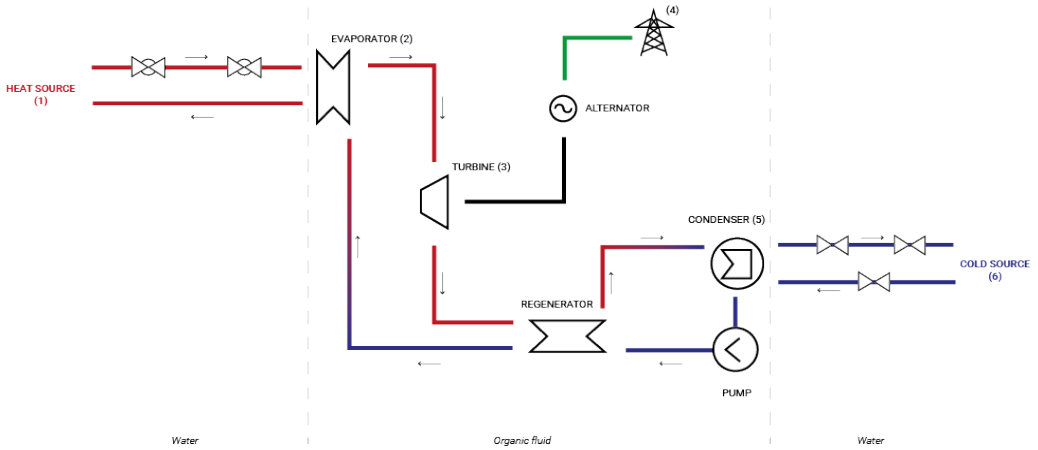
- Carry out feasibility studies;
- Correctly size thermal production / heat recovery systems (boiler, heat exchangers, heat dissipation systems such as dry coolers and evaporative towers);
- Create preliminary designs of the entire plant, based on the most suitable ORC system;
- Integrate the new system with existing ones, and size out the project both from a technical and financial standpoint, or – if the client so prefers – assist the client's preferred system integrators in doing the same;
- Draw up financial amortization estimates (business plans).

In short, Zuccato Energia can be seen as an all-round partner, able to work side-by-side with the client to make sure that the latter receives an optimal answer to its needs.

OUR TECHNOLOGY
Organic Rankine Cycle

All of Zuccato Energia's systems are based on the Organic Rankine Cycle (ORC), a simple, high efficiency thermodynamic cycle that is ideally suited for the conversion of low and medium temperature heat sources (86°C and up) into electrical energy.

Invented by Scottish physicist William Rankine (1820 -1872), one of the fathers of thermodynamics, it operates in an emission-free, closed loop, illustrated in the diagram below.



A heat source [1] generates heat that is transferred through a vector fluid circulating in a closed loop to one or more primary heat exchangers, usually a preheater and an evaporator [2], where heat is transferred from the vector fluid to the working fluid.

The working fluid -a biodegradable, low boiling point liquid that is nontoxic at room temperature- boils in the evaporator at a temperature far below that of water and becomes a dry, high-pressure gas whose expansion causes the impeller of a specially designed and sized Turbine to rotate [3].

The high-speed rotation (12,000÷18,000 rpm) of the turbine shaft drives the rotor of a generator directly connected to it, generating electrical energy [4] that, after synchronization of frequency, phase, and voltage by a converter, can be fed into the national power grid or consumed by itself, depending on local needs and policies.

Downstream of the turbine, the working fluid - still in the gaseous phase - is sent to another heat exchanger, the condenser [5], where it is cooled, releases its excess heat, and condenses back to a liquid that is collected in a condensation tank, ready to be returned to the primary heat exchanger via a circulating pump, closing the cycle.

The excess heat released in the condenser is itself a low-temperature heat source that can be used for other purposes, such as preheating or drying biomass fuel (thus increasing its heating value), building heating, water heating, and so on.

If this is not possible, the residual heat can be removed by an external cooling system [6] such as an evaporative cooling tower or a dry cooler.

TECHNICAL ADVANTAGES

• Implementation of single-stage turbines specifically designed in-house for each model of ORC module to guarantee top efficiency (up to 90%);

• Excellent operational performances even under partial load allow modulation of electrical production according to the available thermal power;

• Each module is mounted on a self-supporting, self-contained, flange-to-flange frame (skid), which can be containerized for maximum modularity and compactness;

• Extensive use of ceramic bearings grants a longer service life and maximum reliability;

• The non-toxic, non-flammable working fluid is fully eco-compatibile as well as being ozone-friendly;

• Direct coupling of the generator to the turbine shaft eliminates the need for a gearbox and eliminates the inherent efficiency losses;

• Custom-designed power converters (inverters) for each model guarantee maximum efficiency in energy conversion;

• The completely dry working fluid avoids turbine blade erosion;

• An accurate choice of top-quality components grants a long service life;

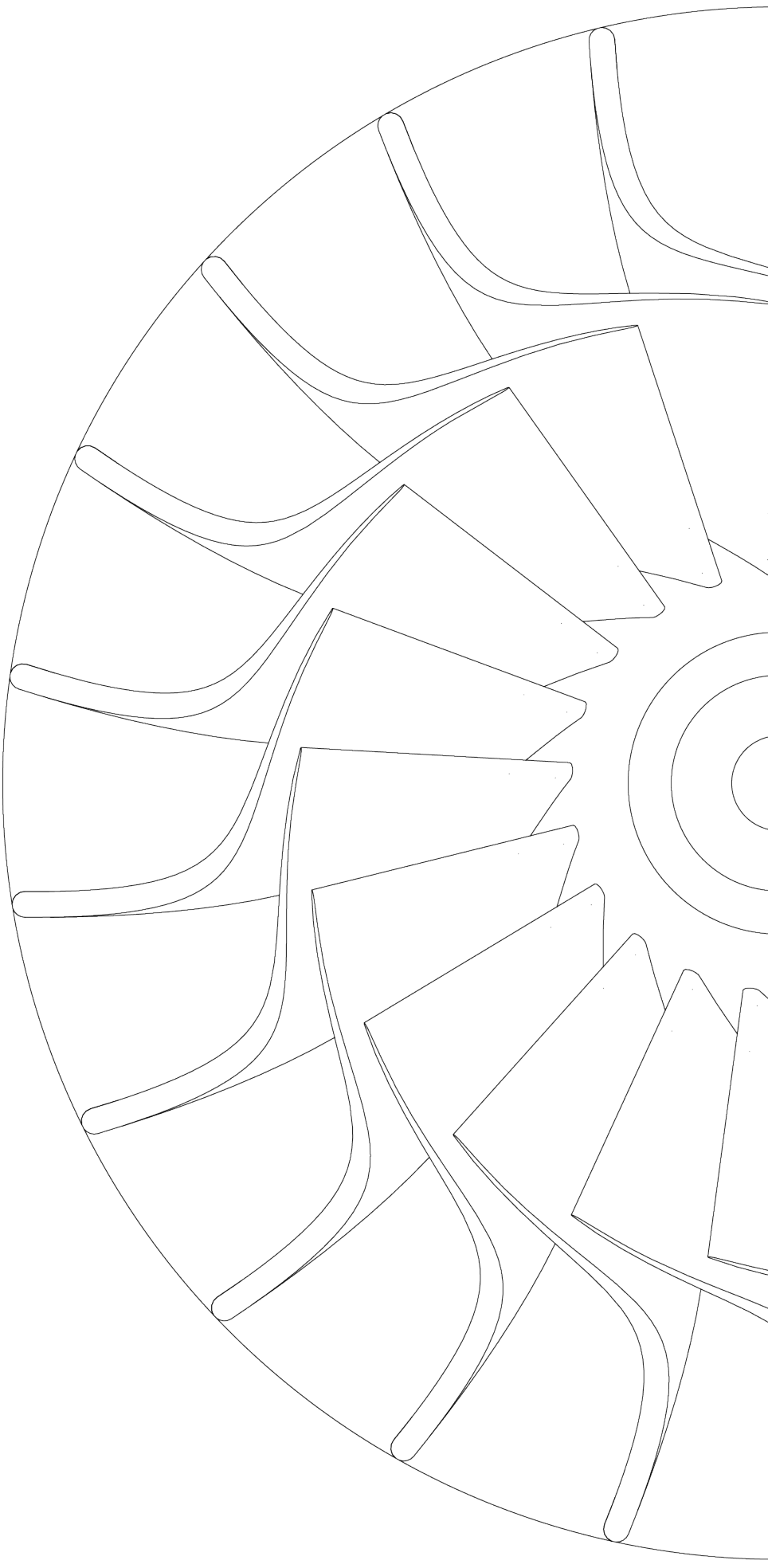
• Low operational pressures give better operational safety and require far less bureaucratic red tape for operation;

• Full-scale automatization avoids the need to employ specialized personnel for operation;

• An integrated remote control system grants the client and technical assistance personnel full remote monitoring and management capabilities through LAN, WAN and the Web;

• No need for special authorizations for installation and operation.

ORC APPLICATION



GEOTHERMAL HEAT

Why not take advantage of a free and inexhaustible energy source?

Geothermal energy is a form of renewable, inexhaustible energy that comes from the Earth's own internal heat, which rises proportionally to the depth one penetrates into the Earth's crust.

By placing a thermal collection system into an existing hot spring or into an ad-hoc geothermal pit drilled in an appropriate point of the Earth surface, it is possible to obtain hot water with enough flowrate and temperature to operate one or more Zuccato Energia's ORC modules.

Said modules have exclusive technical advantages which make them particularly suitable to harness energy from "weak", relatively low-temperature sources, without having to resort to complex and difficult-to-manage systems.

It is thus possible to use Zuccato Energia's ORC modules to exploit geothermal heat sources or geothermal pits having a reduced depth with regard to those required by conventional, steam-based systems.

Among the exploitable sources the following can be counted:

- Hot springs having a temperature of 95°C or above;
- Volcanic heat sources having temperatures equal or greater than 150°C;
- Purpose-made geothermal pits.

SOLAR THERMODINAMIC

Why not use the largest, inexhaustible power source?

Thanks to their excellent performance under partial load - i.e. when thermal power input is below nominal values - Zuccato Energia's ORC modules can easily be used to implement thermodynamic or hybrid solar plants.

These ORC-based thermodynamic system can use the relatively low-temperature heat obtained by simple concentration-type solar panels to produce electric power as long as enough solar power is available.

Hybrid systems can then automatically switch over the ORC module to using alternative heat sources (such as biomass/biogas boilers, geothermal heat systems...) when solar heat is insufficient, such as during night time or in case of inclement weather conditions.

Zuccato Energia has already built and installed pilot systems of this kind as part of research and in partnership with prestigious Universities both in Italy and abroad.

BIOMASS

Waste?
No: resources!

ORC modules by Zuccato Energia have found several applications in combination with a wide range of overheated water generation systems based on biomass combustion.

A typical system connects one or more ORC modules to a fixed -or movable- grate boiler fueled via an automated feeding system by wooden chips derived from woodworking waste or from pruning residues derived from the management of municipal, regional or state parks.

The biomass conversion plants built by Zuccato Energia – several of which have been operating for years – are highly reliable and compact enough to be employed even in a small firm, monetizing its waste, simplifying waste disposal, and paying themselves back in a few years.

HEAT RECOVERY FROM BIOGAS ENGINES

Why not obtain maximum efficiency?

Many cattle breeders choose to use the manure of their livestock to generate biogas through the use of fermenter digesters; this biogas is then used as fuel for engines connected to electrical generators (commonly called gensets).

Few of them know, however, that thanks to Zuccato Energia's ORC systems it is also possible to recover the waste heat contained in the exhaust fumes or carried away by the cooling jackets of said gensets - a valuable thermal resource that would otherwise be wasted.

The same heat recovery system can of course be applied to any genset of sufficient power, regardless of the fuel it uses - biogas, syngas, vegetable oil, methane or biofuel, thus pushing the overall system efficiency to the maximum.

Zuccato Energia has an extensive experience in this field, having installed several systems of this type both in Italy and Germany.

HEAT RECOVERY FROM ENGINES

Why burning more fuel ?

Thanks to their compactness and modularity, ORC-based heat recovery systems by Zuccato Energia are ideal to be factory-mounted or applied as a retrofit to engines.

In this capacity, ORC modules can excellently replace one or more gensets in the task of producing electric power by using waste thermal energy recovered from the engines instead of fuel.

Essentially, two types of energy recovery are possible:

- Medium-temperature (160°C) heat recovery from exhaust gases and cooling jackets of auxiliary engines or primary engines too small to justify a steam-based recovery system;
- Low-temperature (≥ 85°C) heat recovery from the cooling jackets of large engines or multi-engine units already equipped with a steam-based energy recovery system;

ORC modules manufactured by Zuccato Energia are comparable in size with gensets of equal electrical output, but differently from the latter, they do not pollute nor use a single drop of fuel more.

HEAT RECOVERY FROM INDUSTRIAL PROCESSES

Petrochimical Industry
Glassworking
Food Industry
Metalworking Industry
Ceramics
Paper Industry

The ORC systems by Zuccato Energia can recover energy from most industrial processes involving heat, such as:

- Ovens, furnaces and kilns in steel, glass and ceramic industries and cement mills;
- Boilers and steam generators in paper mills and naval industry;
- Ovens, dryers and smokehouses in the food industries as well as incinerators in animal fat rendering.

For example, by installing heat exchangers in the flue gas circuit of a glass bottle manufacturing plant equipped with three ovens, enough thermal energy can be recovered to drive the same number of ZE-150-LT ORC modules , which can output up to 3 GW/year of electricity to the power grid.

Even an end-of life waste disposal site can become a power generation plant, by using an ORC module to recover the heat from the combustion of flared-off waste gas too weak to operate a normal genset.

ORC SERIES

ULH SERIES

Designed using the most advanced technologies, the ULH-series ORC modules from Zuccato Energia are a compact and efficient solution for the use of low-temperature thermal sources.

Available in a power range from 30 to 100 kWe output, and able to operate efficiently even under partial load conditions (i.e. lower than nominal thermal power input) their ideal fields of application are waste heat recovery from engines and industrial processes, harnessing geothermal power and converting solar heat from concentrator-type solar panels into electricity.

General Specifications	ZE-30-ULH	ZE-40-ULH	ZE-50-ULH	ZE-100-ULH
Thermal power input	350 kWt	450 kWt	550 kWt	1200 kWt
Electric power output	30 kWe	40 kWe	50 kWe	100 kWe
System efficiency	8.50 %	8.90 %	9.10 %	8.30 %
Skid dimensions (L x W x H)	3.3 x 1.4 x 2.1 m		3.5 x 1.4 x 2.1 m	5.6 x 2.3 x 2.7 m
Weight (incl. working fluid)	3100 Kg		4500 Kg	6500 Kg
Vector fluid				
Vector fluid	Hot Water			
Vector fluid input temperature	≥94°C			
Vector fluid output temperature	86°C			
Vector fluid nominal flowrate	10.20 kg/s	13.40 kg/s	16.42 kg/s	28.50 kg/s
Condensation Stage				
Thermal power dissipation	310 kWt	390 kWt	470 kWt	1100 kWt
Cooling water input temperature	26°C			27°C
Cooling water output temperature	31°C			35°C
Cooling water nominal flowrate	14.81 kg/s	18.65 kg/s	22.46 kg/s	32.50 kg/s
Turbine				
Type	Single stage, radial inflow turbine with fixed nozzles, directly coupled to generator			
Working fluid temperature	85°C input / ~60°C output			
Stage pressure	PS4,42 (tested up to 10 bar)			
Materials	CNC Machined steel body / Aluminium alloy impeller			
Working Fluid				
Type	Environmentally friendly, non-flammable HFC mixture			
Operating temperature range	60°C ≤ T ≤ 165°C			
Operating pressure	≤ 20 bar			
Toxicity / Biodegradability / Ozone layer impact	Non-toxic / Full eco-compatibility / Ozone-friendly			

LT SERIES

Designed using the most advanced technologies, the LT-Series ORC modules from Zuccato Energia are a compact and efficient solution for small-scale primary power generation.

Available in a wide range of models ranging from 75 to 495 kWe, and able to operate efficiently even under partial load conditions (i.e. lower than nominal thermal power input), these systems' ideal fields of application are in association with biomass-fueled boilers, as well as in waste heat recovery applications from ovens and industrial processes.

General specifications	ZE-75-LT	ZE-100-LT	ZE-150-LT	ZE-175-LT	ZE-200-LT	ZE-250-LT	ZE-500-LT
Thermal power input	550 kWt	740 kWt	1100 kWt	1280 kWt	1400 kWt	1560 kWt	2909 kWt
Electric power output	75 kWe	100 kWe	150 kWe	175 kWe	200 kWe	250 kWe	495 kWe
System efficiency	13.60 %	13.50 %	13.60 %	13.60 %	14.30 %	16.00 %	17.00 %
Skid dimensions (L x W x H)	4.1 x 2.0 x 2.7 m	5.6 x 2.3 x 2.7 m					10.3 x 4.5 x2.9 m
Weight (incl. working fluid)	4000 Kg	6500 Kg	6200 Kg				21500 Kg
Vector fluid							
Vector fluid	Presurrized water						Diathermic Oil
Vector fluid input temperature	≥160°C					175°C	225°C
Vector fluid output temperature	145°C		140°C		145°C		103°C
Vector fluid nominal flowrate	8.49 kg/s	11.91 kg/s	13.14 kg/s	14.88 kg/s	21.65 kg/s	12.00 kg/s	11.28 kg/s
Condensation Stage							
Thermal power dissipation	471 kWt	640 kWt	940 kWt	1075 kWt	1180 kWt	1300 kWt	2391kWt
Cooling water input temperature	32°C	26°C				28°C*	32°C
Cooling water output temperature	40°C	36°C				40°C*	48°C
Cooling water nominal flowrate	14.07 kg/s	15.60 kg/s	22.46 kg/s	25.69 kg/s	28.25 kg/s	25.91 kg/s*	35.38 kg/s
Turbine							
Type	Single stage, radial inflow turbine with fixed nozzles, directly coupled to generator						
Working fluid temperature	145°C input / ~ 100°C output						180°C input / ~ 100°C output
Stage pressure	PS16 (tested up to 24 bar)						PS40
Materials	CNC Machined steel body / Aluminium alloy impeller						
Working Fluid							
Type	Environmentally friendly, non-flammable HFC mixture						
Operating temperature range	60°C ≤ T ≤ 165°C						60°C ≤ T ≤ 185°C
Operating pressure	≤ 20 bar						≤ 30 bar
Toxicity / Biodegradability / Ozone layer impact	Non-toxic / Full eco-compatibility / Ozone-friendly						

*Available also with a direct condenser - no cooling circuit is required

CHP SERIES

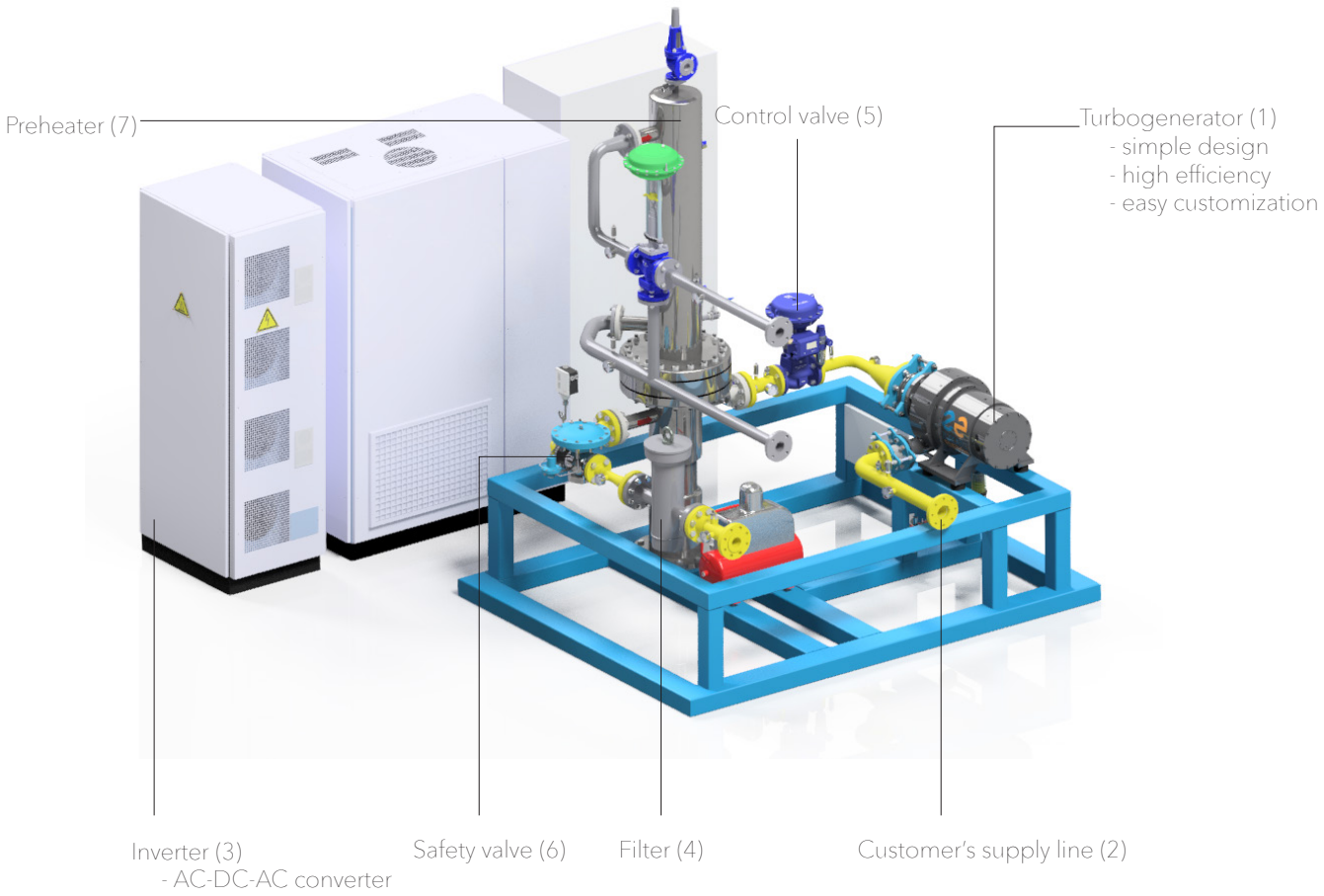
The CHP-series ORC modules are a compact and efficient solution for small-scale primary power generation when combined heat and power generation is required.

General Specifications	ZE-105-CHP
Thermal power input	1280 kWt
Electric power output	105 kWe
System efficiency	8.20 %
Skid dimensions (L x W x H)	5.6 x 2.3 x 3.2 m
Weight (incl. working fluid)	6500 Kg
Vector fluid	
Vector fluid	Overheated Water
Vector fluid input temperature	≥160°C
Vector fluid output temperature	140°C
Vector fluid nominal flowrate	14.88 kg/s
Condensation Stage	
Thermal power dissipation	1157 kWt
Cooling water input temperature	60°C
Cooling water output temperature	80°C
Cooling water nominal flowrate	13.82 kg/s
Turbine	
Type	Environmentally friendly, non-flammable HFC mixture
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
Working Fluid	
Type	Environmentally friendly, non-flammable HFC mixture
Operating temperature range	60°C ≤ T ≤ 165°C
Operating pressure	≤ 20 bar
Toxicity / Biodegradability / Ozone layer impact	Non-toxic / Full eco-compatibility / Ozone-friendly

TURBOEXPANDER

TURBOEXPANDER TECHNOLOGY

The high-pressure gas line arrives at the user site. Normally, this pressure is reduced by the reducing valves from which no useful work is produced. By installing a turboexpander in parallel to the existing pressure reduction valves, it is possible to exploit this energy potential to produce zero-emission electricity.



The core of the plant is a high-speed Turbogenerator (1), which comprises a turbine and a generator placed on the same shaft into a hermetic enclosure. Natural gas exiting from the turbogenerator is heading to the user's supply line (2).
Turbogenerator produces high-frequency alternating current, which then is transformed by means of AC-DC-AC power converter (3) into an alternating current with the frequency and voltage requested by the national grid.
The natural gas, before entering the plant, is cleaned via a filter (4) to ensure long-lasting and safe operation of all the plant components. The control valve (5) and the safety valve (6) are aimed at keeping a certain value of the turbine outlet pressure and protect the plant components and customer's supply line from overpressure.
The gas expansion in the turbogenerator is linked to a significant reduction of its temperature. In order to avoid the formation of condensattion and the freezing of the pipelines, the gas is preheated prior the expansion at the gas preheater (7) – a water to gas heat exchanger.

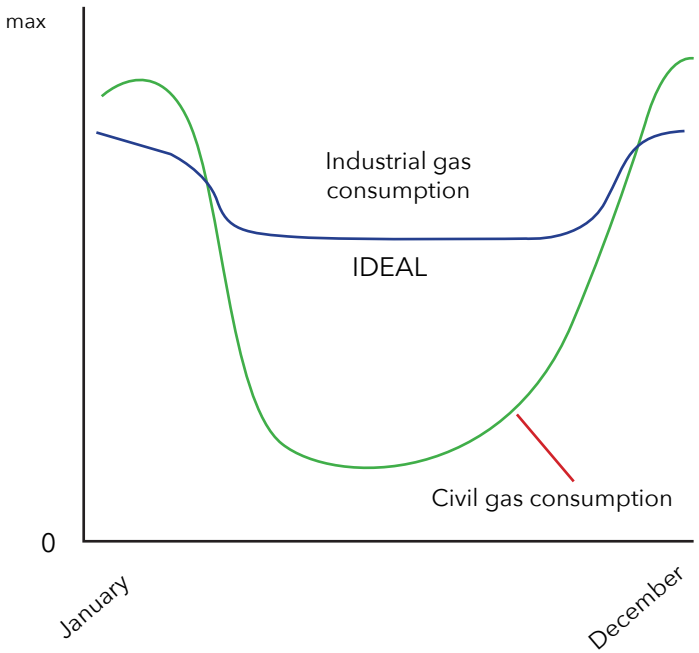
TURBOEXPANDER APPLICATION

PRESSURE REDUCTION CABIN

The gas expansion system lends itself to the creation of energy recovery systems by optimizing the reduction of gas pressure from the supply level to that required by users.

The turboexpander can recover energy from most companies that use gas in their production processes such as industrial companies with uninterrupted technical process or medium thermal energy and cogeneration plants.

This system is suitable for industries with mass flow of natural gas from 1800 to 21000 Sm3/h and inlet pressure up to 50 bar.

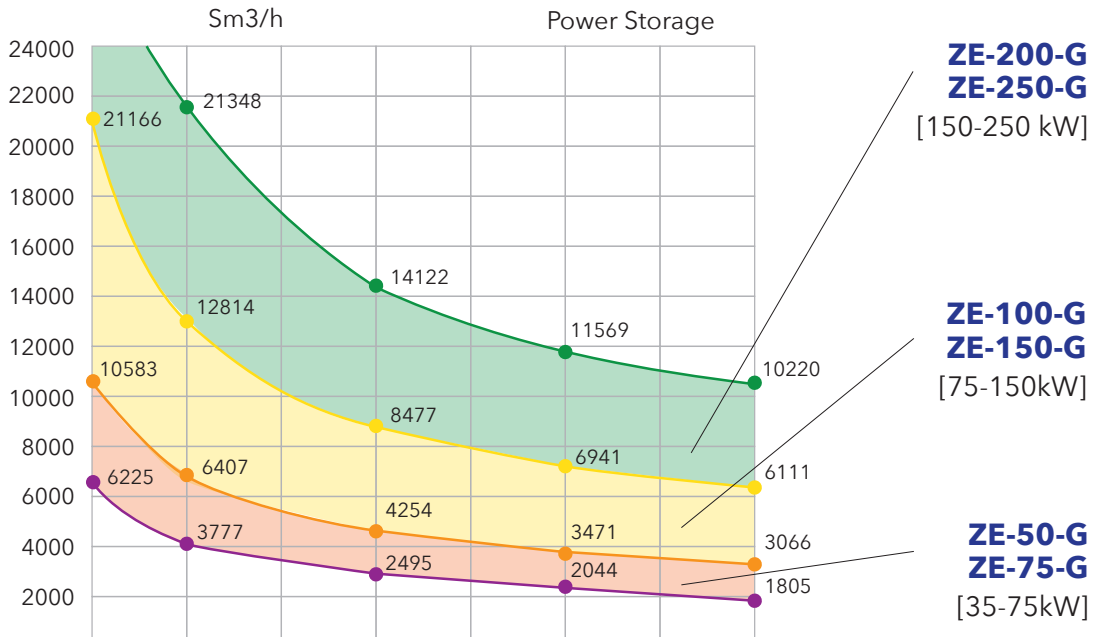


INDUSTRIAL FACTORY or POWER PLANT

- Iron&Steel
- Non-metallic materials
- Food
- Paper
- Chemical
- MW-scale off-grid electric plants
- Thermal power plants
- Glass and ceramic

TURBOEXPANDER PRODUCT RANGE

The target power range is from 35 to 250 kW. The power range of Turboexpander depends on the mass flow of natural gas and pressure ratio between inlet and outlet.

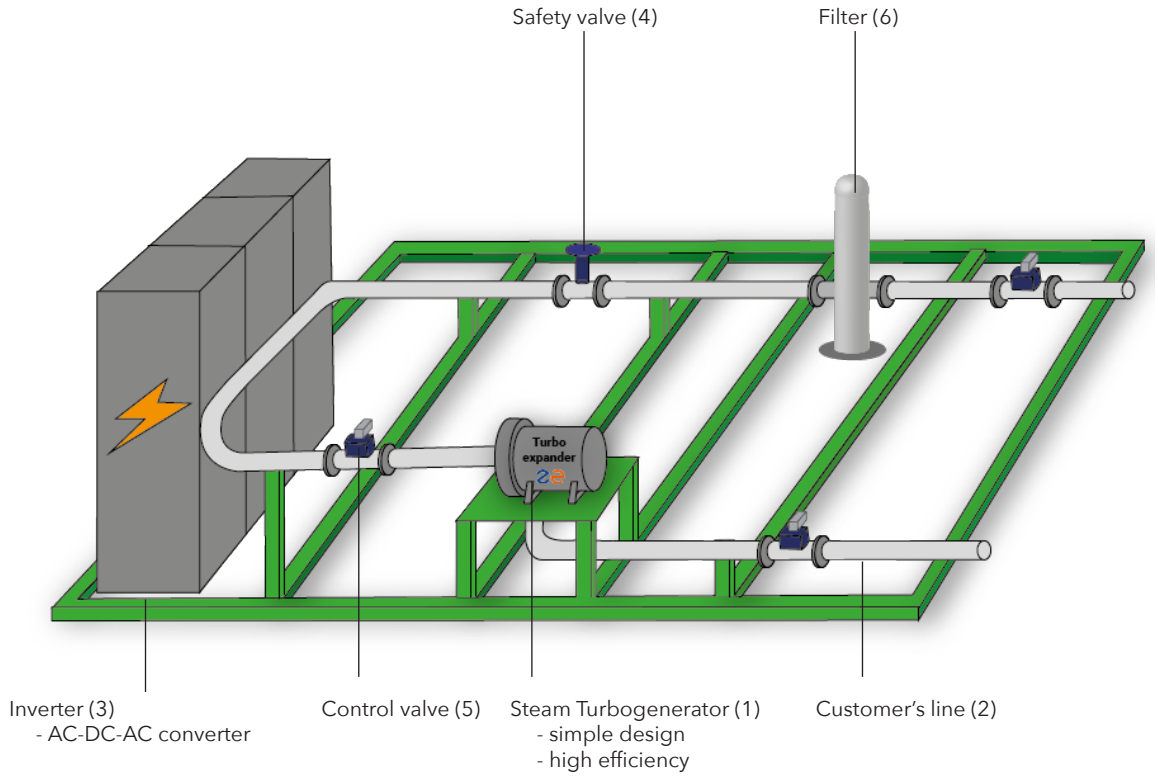


ZE-50-G [35-50 kW]	ZE-75-G [35-75 kW]	ZE-100-G [75-100 kW]	ZE-150-G [75-150 kW]	ZE-200-G [150-200 kW]	ZE-250-G [200-250kW]
Q ≥ 2044 Sm3/h Pressure Ratio ≥ 5	Q ≥ 3066 Sm3/h Pressure Ratio ≥ 5	Q ≥ 4100 Sm3/h Pressure Ratio ≥ 5	Q ≥ 6100 Sm3/h Pressure Ratio ≥ 5	Q ≥ 8200 Sm3/h Pressure Ratio ≥ 5	Q ≥ 10200 Sm3/h Pressure Ratio ≥ 5
Q ≥ 2314 Sm3/h Pressure Ratio ≥ 4	Q ≥ 3470 Sm3/h Pressure Ratio ≥ 4	Q ≥ 4670 Sm3/h Pressure Ratio ≥ 4	Q ≥ 6950 Sm3/h Pressure Ratio ≥ 4	Q ≥ 9300 Sm3/h Pressure Ratio ≥ 4	Q ≥ 11570 Sm3/h Pressure Ratio ≥ 4
Q ≥ 2800 Sm3/h Pressure Ratio ≥ 3	Q ≥ 4250 Sm3/h Pressure Ratio ≥ 3	Q ≥ 5650 Sm3/h Pressure Ratio ≥ 3	Q ≥ 8470 Sm3/h Pressure Ratio ≥ 3	Q ≥ 11300 Sm3/h Pressure Ratio ≥ 3	Q ≥ 14100 Sm3/h Pressure Ratio ≥ 3
Q ≥ 4300 Sm3/h Pressure Ratio ≥ 2	Q ≥ 6400 Sm3/h Pressure Ratio ≥ 2	Q ≥ 8560 Sm3/h Pressure Ratio ≥ 2	Q ≥ 12800 Sm3/h Pressure Ratio ≥ 2	Q ≥ 17100 Sm3/h Pressure Ratio ≥ 2	Q ≥ 21350 Sm3/h Pressure Ratio ≥ 2

STEAM TURBINE

STEAM TURBINE TECHNOLOGY

The steam turbine is installed in parallel to the existing reduction valve in order to convert the energy of the high-pressure steam into the electrical power. Because of the customers' necessity to have a medium/low pressure steam for their industrial process, only the steam back pressure (non-condensing) turbines are suitable for pressure reduction application. After the expansion process in the turbine there is medium/low pressure steam which is directed to the customer's process.



The main part of the steam turbine system is a high-speed Steam Turbogenerator (1), which comprises a back-pressure turbine and a generator placed on the same shaft. The high-pressure steam from the boiler (steam generation device) is directed to the Steam Turbogenerator.
After the expansion process in the turbine the medium/low pressure steam exiting from the Steam Turbogenerator is heading to the customer's industrial process line (2). The steam energy is converted into mechanical power that drives an electrical generator.
Steam Turbogenerator produces high-frequency alternating current, which then is transformed by means of AC-DC-AC power converter (3) into alternating current with the grid frequency and requested voltage. The control valve (5) and the safety valve (4) are aimed at keeping a certain value of the turbine outlet pressure and protect the plant components and customer's supply line from overpressure.

STEAM TURBINE APPLICATION

Zuccato Energia's Steam turbine is suitable for industries with steam mass flow from 1,85 to 15,65 ton/hour and inlet pressure up to < 30 bar. The target power range is from 75 to 250 kW.

Industries with potential for using the technology include healthcare, food and drink, chemicals processing, pharmaceuticals and any facility with a steam baseload and pressure reduction. The electricity produced can be used locally, for example to run pumps or other equipment, or exported to the power grid.

INDUSTRIAL FACTORY or POWER PLANT

- Iron&Steel
- Non-metallic materials
- Food
- Paper
- Chemical
- MW-scale off-grid electric plants
- Thermal power plants
- Glass and ceramic

STEAM TURBINE PRODUCT RANGE

The power range of Steam turbines depend on the mass flow of the steam, turbine inlet pressure and the pressure ratio between turbine inlet and outlet.

ZE-75-S [75 kW]	ZE-100-S [100 kW]	ZE-150-S [150 kW]	ZE-200-S [200 kW]	ZE-250-G [250 kW]
1,85 t/h ≤ Q ≤ 2,29 t/h 30 bar < pin < 5 bar Pressure ratio = 5	2,48 t/h ≤ Q ≤ 3,05 t/h 30 bar < pin < 5 bar Pressure ratio = 5	3,7 t/h ≤ Q ≤ 4,58 t/h 30 bar < pin < 5 bar Pressure ratio = 5	4,93 t/h ≤ Q ≤ 6,1 t/h 30 bar < pin < 5 bar Pressure ratio = 5	6,17 t/h ≤ Q ≤ 7,62 t/h 30 bar < pin < 5 bar Pressure ratio = 5
2,09 t/h ≤ Q ≤ 2,58 t/h 30 bar < pin < 5 bar Pressure ratio = 4	2,78 t/h ≤ Q ≤ 3,44 t/h 30 bar < pin < 5 bar Pressure ratio = 4	4,18 t/h ≤ Q ≤ 5,16 t/h 30 bar < pin < 5 bar Pressure ratio = 4	5,56 t/h ≤ Q ≤ 6,88 t/h 30 bar < pin < 5 bar Pressure ratio = 4	6,95 t/h ≤ Q ≤ 8,6 t/h 30 bar < pin < 5 bar Pressure ratio = 4
2,53 t/h ≤ Q ≤ 3,13 t/h 30 bar < pin < 5 bar Pressure ratio = 3	3,8 t/h ≤ Q ≤ 4,18 t/h 30 bar < pin < 5 bar Pressure ratio = 3	5,07 t/h ≤ Q ≤ 6,26 t/h 30 bar < pin < 5 bar Pressure ratio = 3	6,75 t/h ≤ Q ≤ 8,35 t/h 30 bar < pin < 5 bar Pressure ratio = 3	8,44 t/h ≤ Q ≤ 10,4 t/h 30 bar < pin < 5 bar Pressure ratio = 3
3,8 t/h ≤ Q ≤ 4,7 t/h 30 bar < pin < 5 bar Pressure ratio = 2	5,06 t/h ≤ Q ≤ 6,26 t/h 30 bar < pin < 5 bar Pressure ratio = 2	7,59 t/h ≤ Q ≤ 9,39 t/h 30 bar < pin < 5 bar Pressure ratio = 2	10,2 t/h ≤ Q ≤ 12,52 t/h 30 bar < pin < 5 bar Pressure ratio = 2	12,7 t/h ≤ Q ≤ 15,65 t/h 30 bar < pin < 5 bar Pressure ratio = 2

*Pressure ratio = $\frac{\text{Pressure inlet}}{\text{Pressure outlet}}$

*Q - Mass Flow rate, ton/h

*pin - turbine pressure inlet, bar

CONTACT US

ADDRESS
Via della Consortia, 2 37127
Verona - Italia

TEL.
+39 045 8378 570

E MAIL
info@zuccatoenergia.it