



THE FRENCH CLEANTECH
WHO CONVERTS HEAT INTO
CO2-FREE POWER



ORC 2017 - Milan
September 2017

The Innovative Company In turbomachinery design

We accelerate the energy transition by building innovative turbomachines and thermodynamic machines to recycle exhaust energy and reduce global warming...



Organic Rankine Cycle (ORC)
Generates electricity from heat

In commercial phase



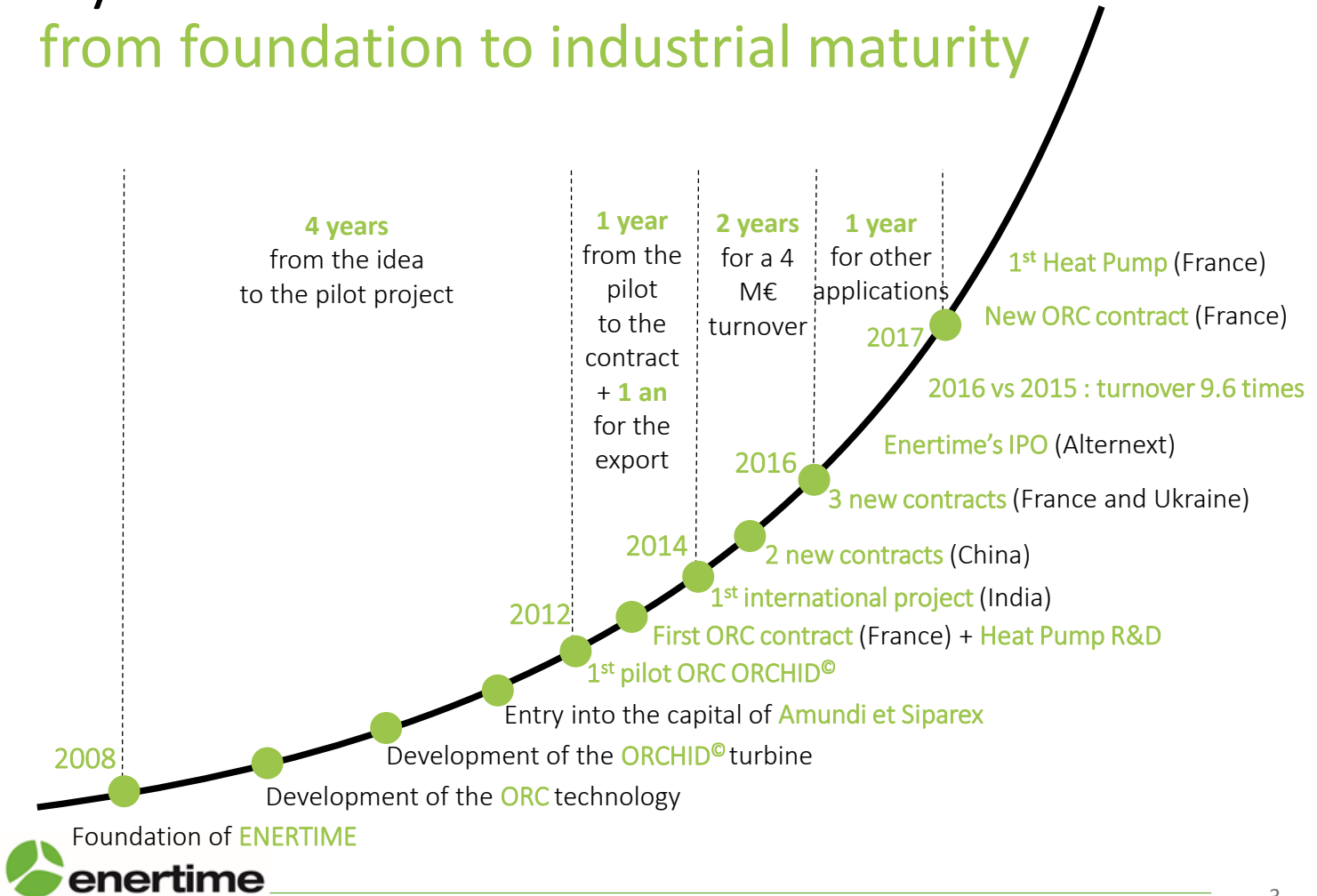
High Temperature Heat Pump
Produces high temperature heat
from low temperature heat

In industrial pilot phase



Natural gas Turbo-Expander
Generates electricity by recovering
energy from the gas expansion

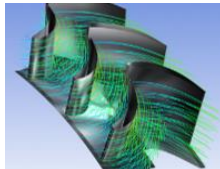
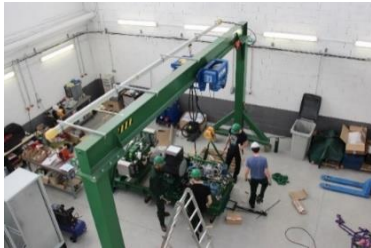
9 years from foundation to industrial maturity



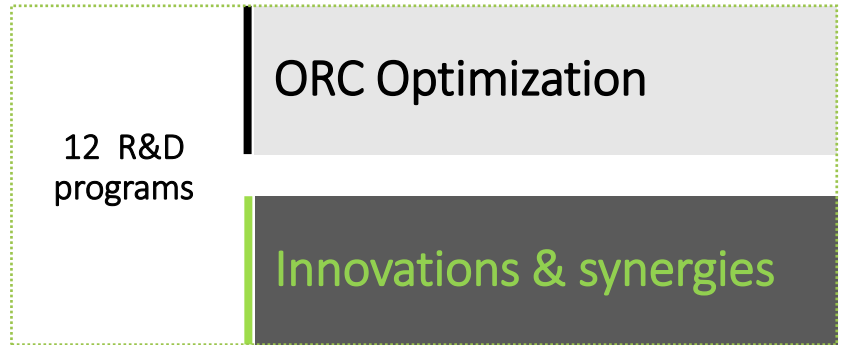
Solutions developed at our HQ
& turbine workshop near Paris



And assembled at
partner's locations

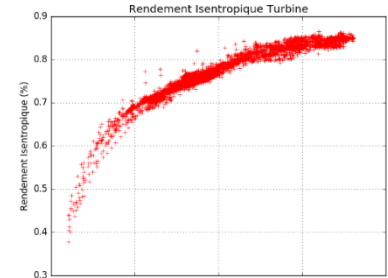
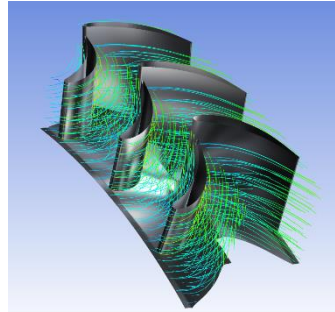
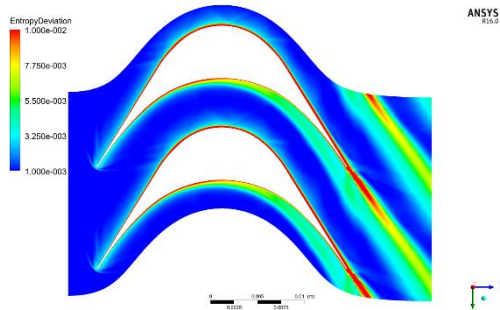


With a strong and focused R&D on 2 key directions

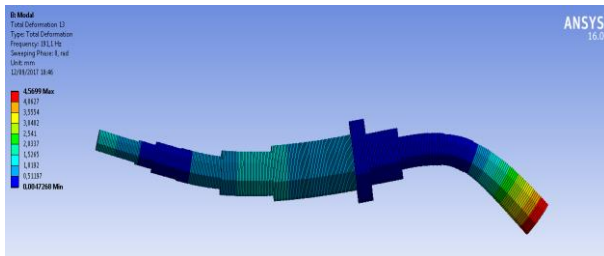


Turbomachine specialist

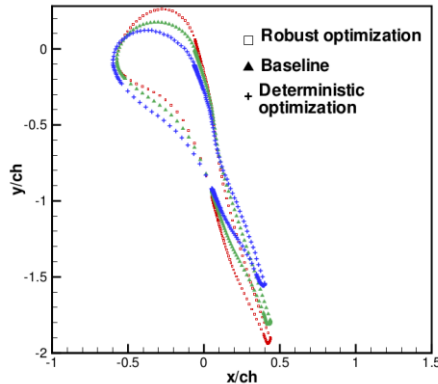
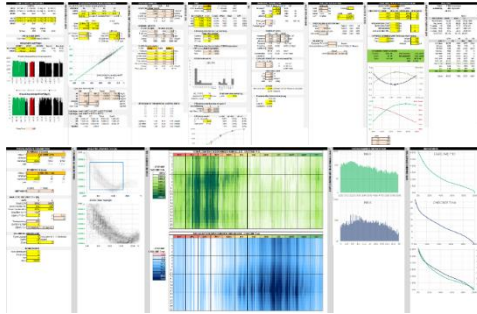
High performance aerodynamic design: **over 85% isentropic efficiency measured**



Robust mechanical design: **over 95% availability**



Looking for constant improvement with recognized academic partners



[E. Bufi, Robust optimization of ORC turbine expanders, PhD Thesis]

Variability of the inlet conditions
(Duty & T° of the heat source, ambient conditions, ...)

Uncertainties
(physical properties, T° , P ...)



Optimizing the **turbine** and **ORC cycle** design
only on the nominal point can lead to
suboptimal solutions

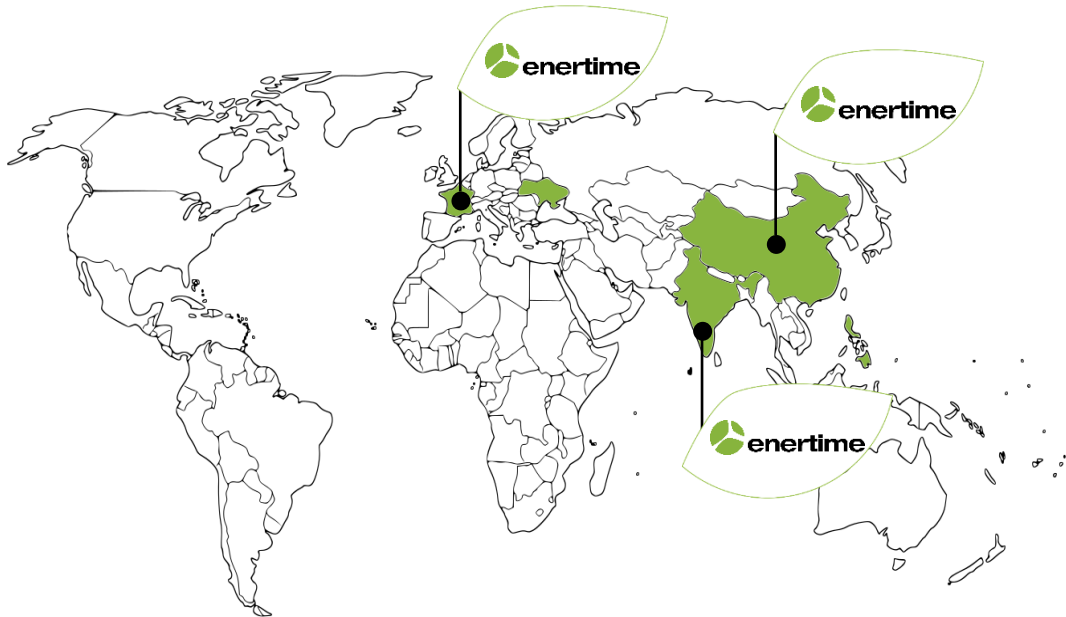


Which design is the most likely to be the most
suited for a real industrial application ?

=

Started a PhD thesis on Robust Optimization

62% of turnover in 2016 exports to overseas

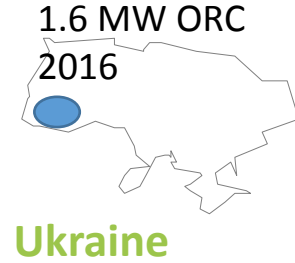
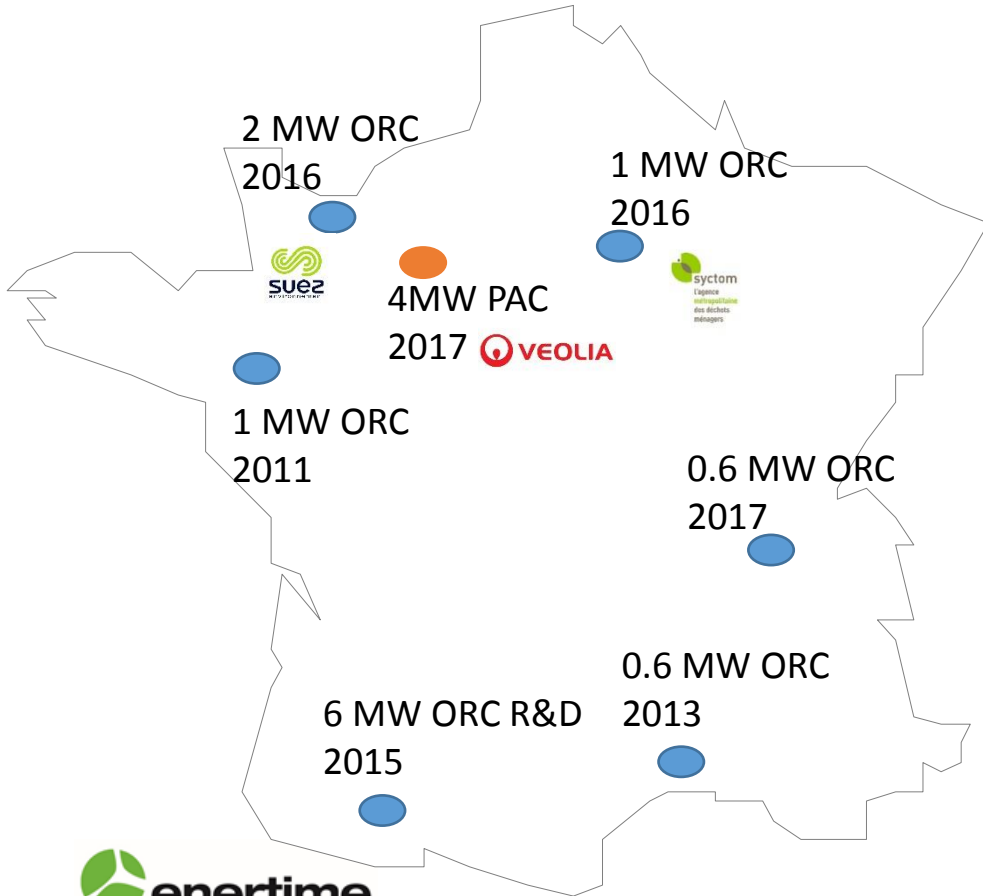


11 Languages
Commonly spoken by our
team

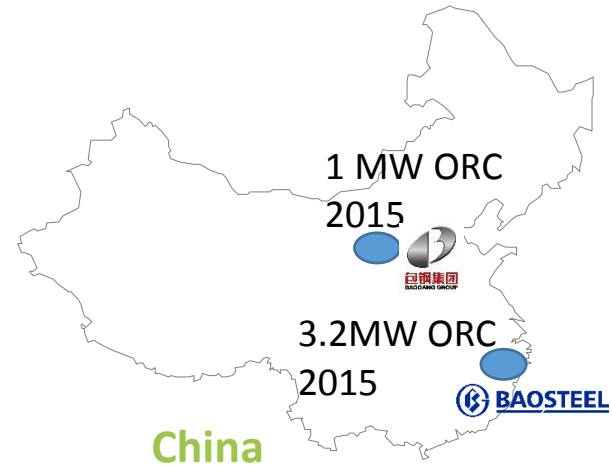
Offices
in India and China

10 COUNTRIES COVERED
By agents, partners or offices

62% of turnover in 2016 exports to overseas



Ukraine



China

Industrial References

10 plants commissioned or under construction

FMGC in Chateaubriant (France), 1000 kWe



Biomass Plant in Port Marianne (France), 550 kWe



Biomass Plant in Kamenetz-Podolskyi (Ukraine), 1600 kWe



WHR for integrated steel plant in Shanghai (China), 3500 kWe



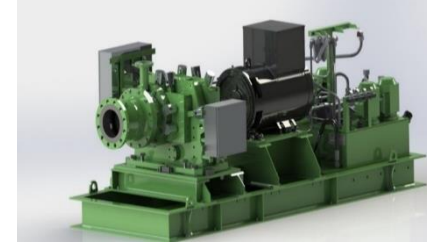
Industrial References

10 plants commissioned or under construction

Incineration WHR in Caen (France), 2000 kW_e



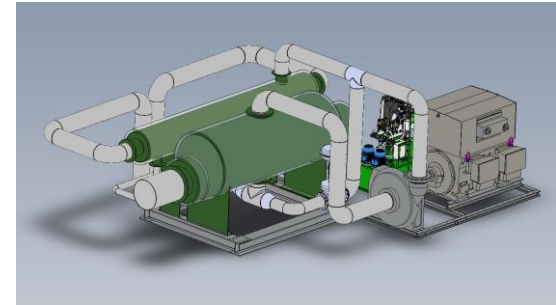
CSP & Biomass (India), 100 kW_e



WHR in steel plant in Baotou (China), 1000 kW_e



Incineration WHR in Le Mans (France), 3700 kW_{th}



Incineration plant low grade HR in St Ouen (France), 1200 kW_e



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