Valorising waste heat for enhanced energy efficiency

6th July 2023

Flavio De Mestrangelo – Turboden SpA, Institutional Affairs Specialist

EU HEATLEAP PROJECT (2020-2023)

- Reference: LIFE19 CCM/IT/001334
- Acronym: LIFE HEATLEAP
- Start Date: 01/06/2020
- End Date: 31/08/2023
- € Total Eligible Budget: 4,487,668 €
- EU Contribution: 2,468,216 €
- Project Location:

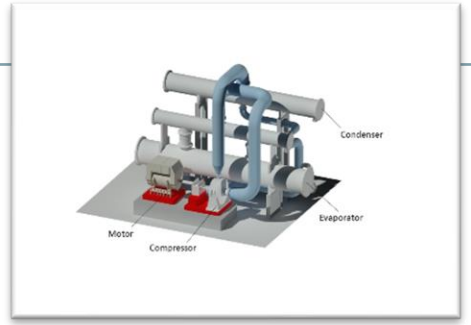
The HEATLEAP project aims to demonstrate the environmental and economic benefits of **waste heat recovery** systems such as **large heat pumps** in energy intensive industries and **gas expanders** in gas distribution networks by testing these technologies at real scale.

The project is funded under the **LIFE programme**, the EU's funding instrument for the environment and climate action.

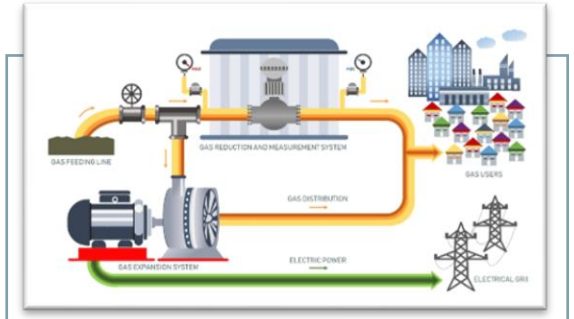
A CHALLENGING ENVIRONMENT

HEATLEAP: CHALLENGE ACCEPTED

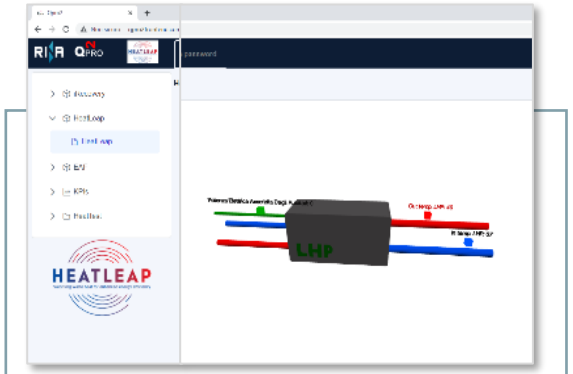
PROJECT'S HIGHLIGHTS



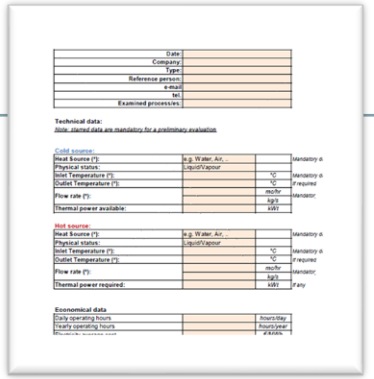
Innovative Large Heat Pump (LHP) with a size of up to 6MWth, able to supply District Heating with temperatures up to 120° C and characterized by a COP between 5 and 8, thanks also to an innovative working fluid



Innovative Gas Expander (GEX), able to recover pressure drop from the de-compression of Gas from the grid generating electricity in the range <1 MWe



Implementation of a **monitoring system** collecting and processing data in order to evaluate the real environmental benefits (e.g. air pollutant and greenhouse gas reduction, etc…)



Adoption of **new business model replication tool** in order to overcome the major barriers for waste heat recovery solutions in energy intensive industries

Continuative communication and dissemination activities to advocate for policies implementation at EU level

PROJECT'S TEAM

TURBODEN

Solutions provider.
Project coordinator and developer of large heat pump and gas expander.

ORI MARTIN

Leading European supplier of high quality steel.
Utilizer of WHR solutions (ORC + LHP).

COGEN EUROPE

The European Association for the Promotion of cogeneration and waste heat .
Coordinate and execute communication and dissemination activities.

RINA

Engineering e consultancy company. Monitoring system design for technical and environmental performance and project replicability.

CSMT

Technological and research hub based in Brescia.
Dissemination, communication and networking activities.

https://www.heatleap-project.eu/

a2a

Italian multi-utility, operating in the environment, energy, heat, grids and technologies for smart cities sectors.
District heating owner.
Utilizer of Gas Espander

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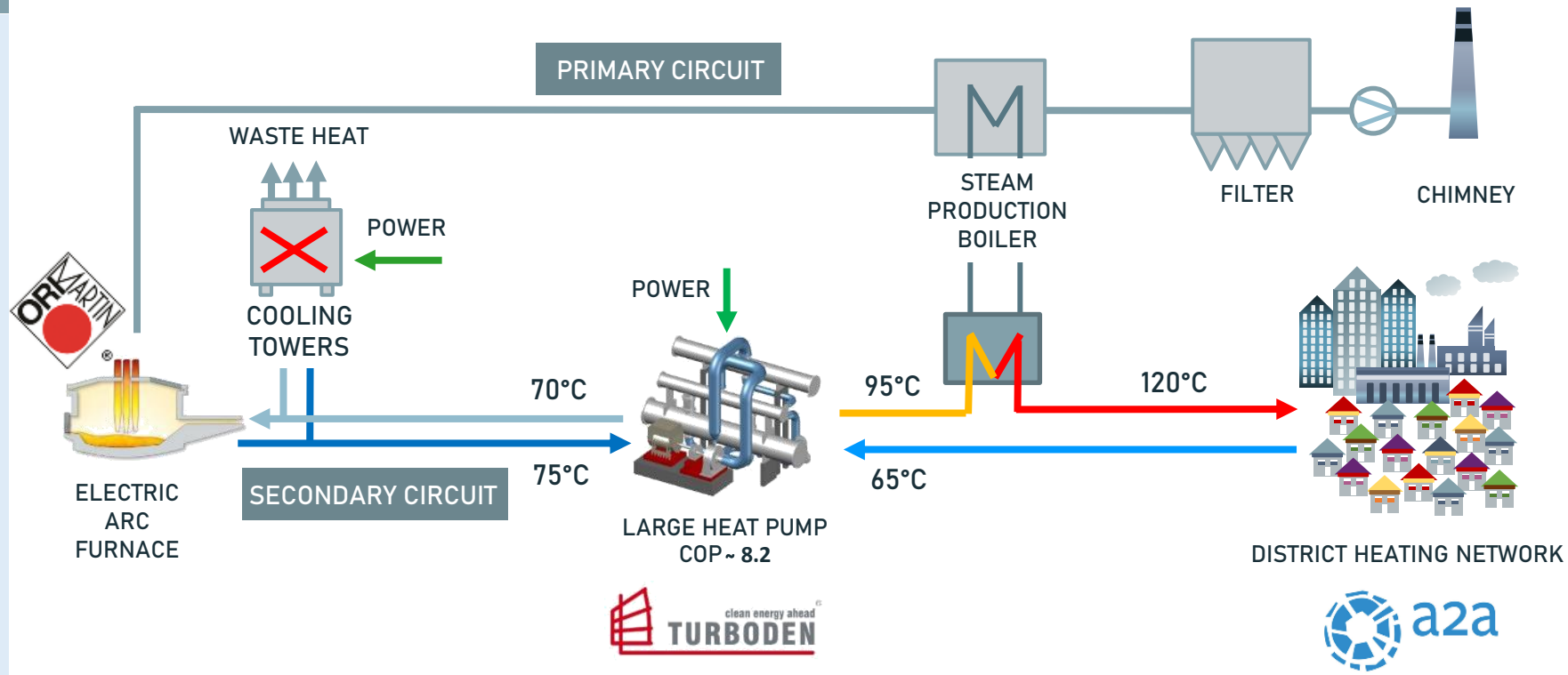
Davide Rizzi – Turboden SpA, Sales Engineer - Large Heat Pump

LARGE HEAT PUMP IN ORI MARTIN STEELWORKS

Low-grade waste heat (< 70° C) is often widely present in several Energy Intensive Industries, however it can be hardly valorised by using conventional technologies (e.g. organic Ranking cycles).
Conversely, some innovative technologies are emerging and can provide further energy improvement and CO_2 saving.

LHP TECHNICAL FEATURES

- **6 MWth** design, heat delivered with output temperature up to **120°C**
- Full **integration** with DH network. Control system designed to be highly flexible depending on:
  - DH network operating temperature
  - Steam production boiler heat production
- **High flexibility** with 2 compression stages and variable frequency driver
- **Working fluid**: Low GWP HFO, R1233ZD



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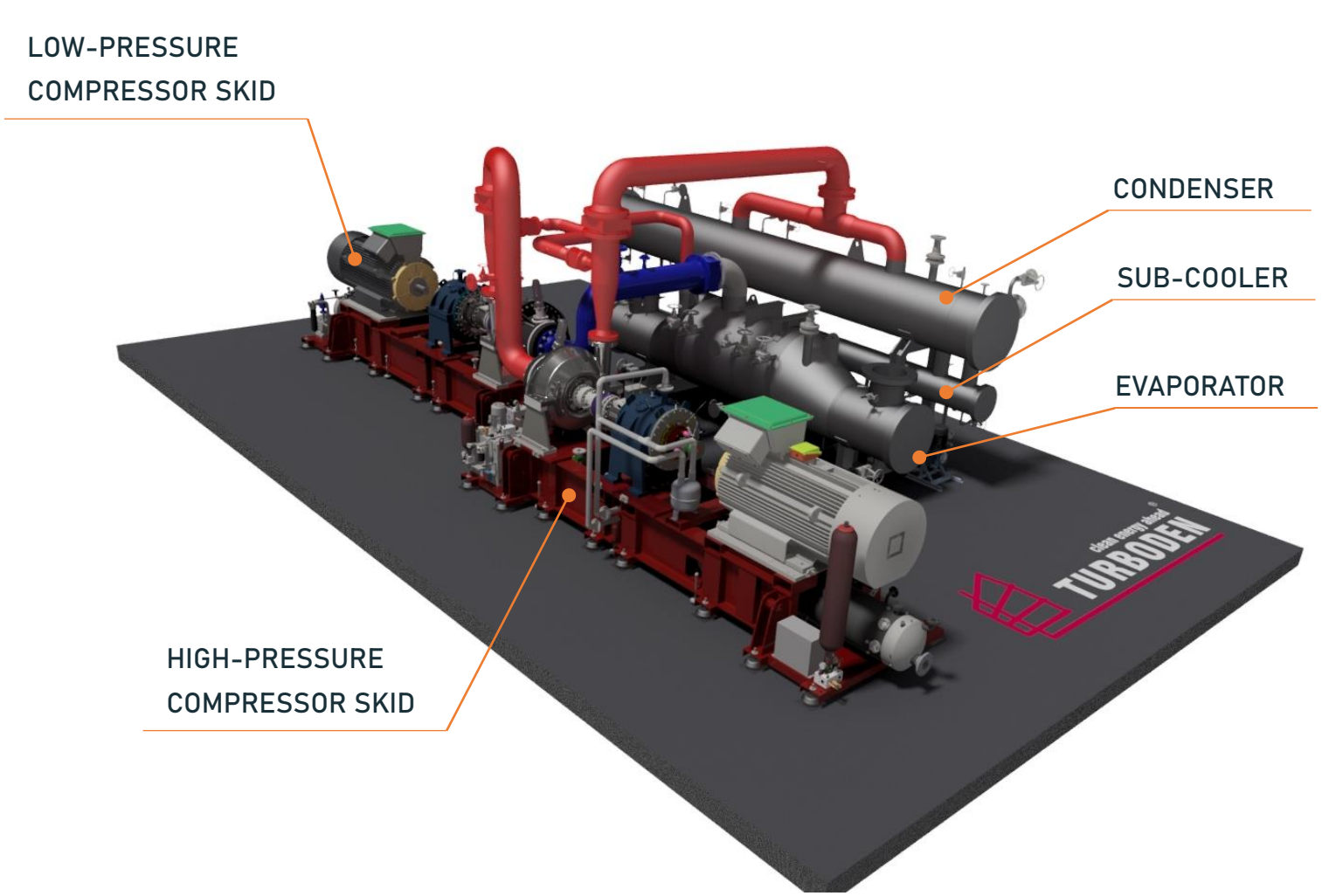

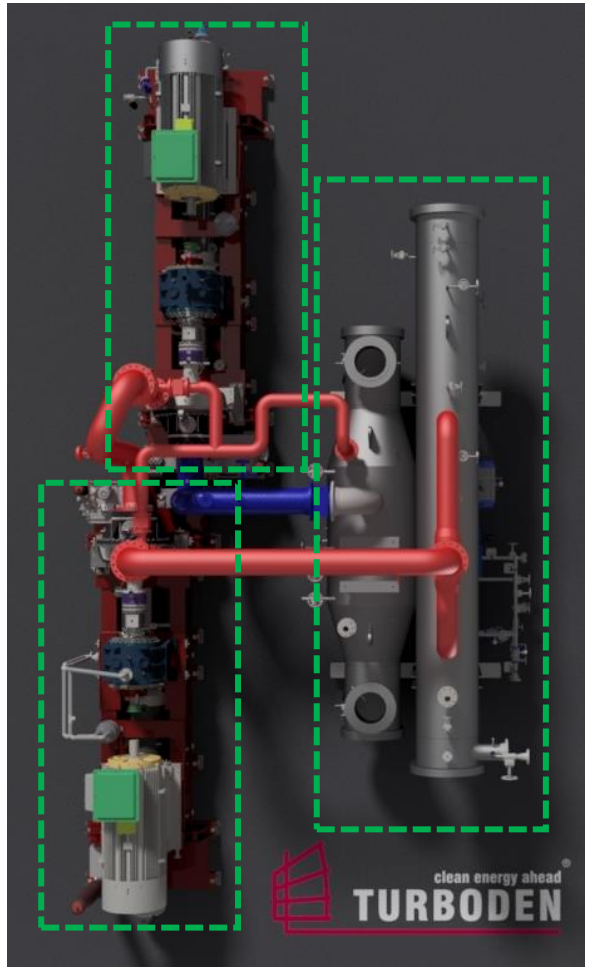

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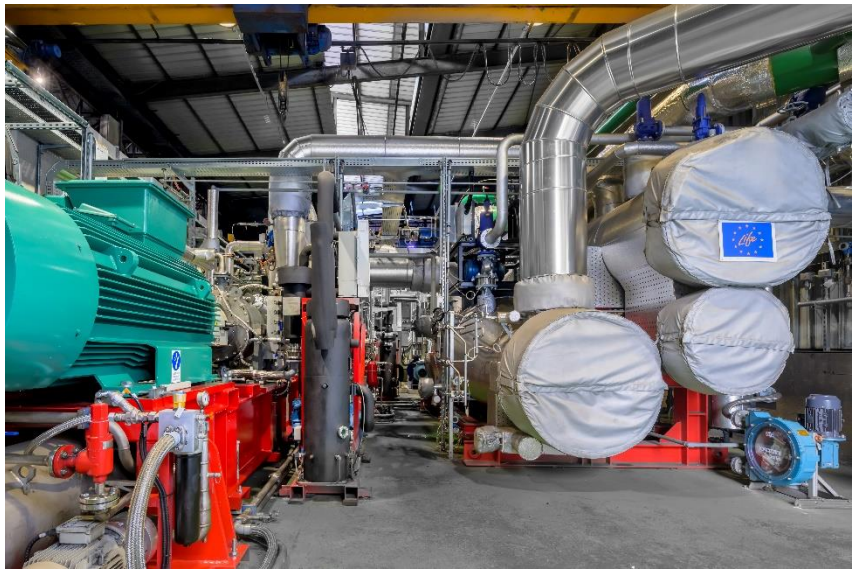
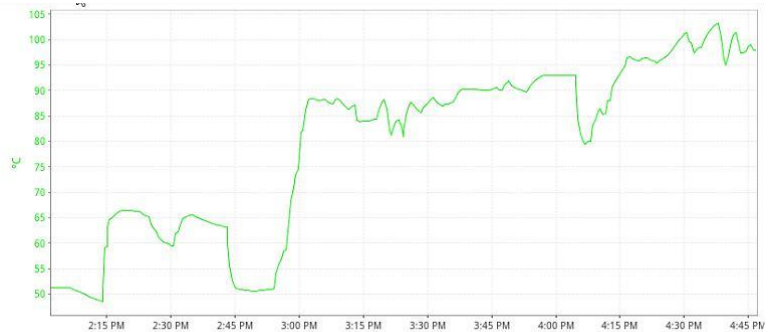
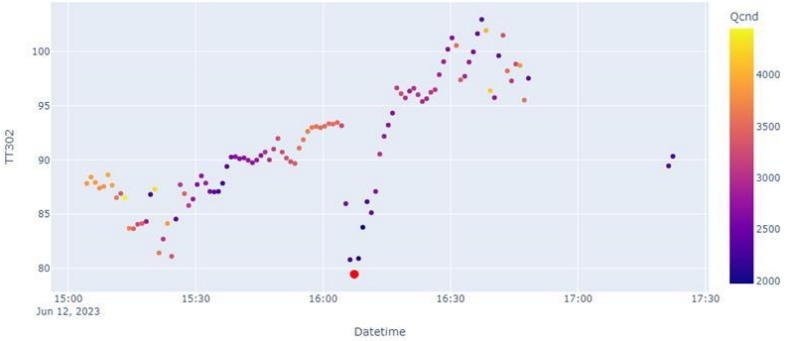
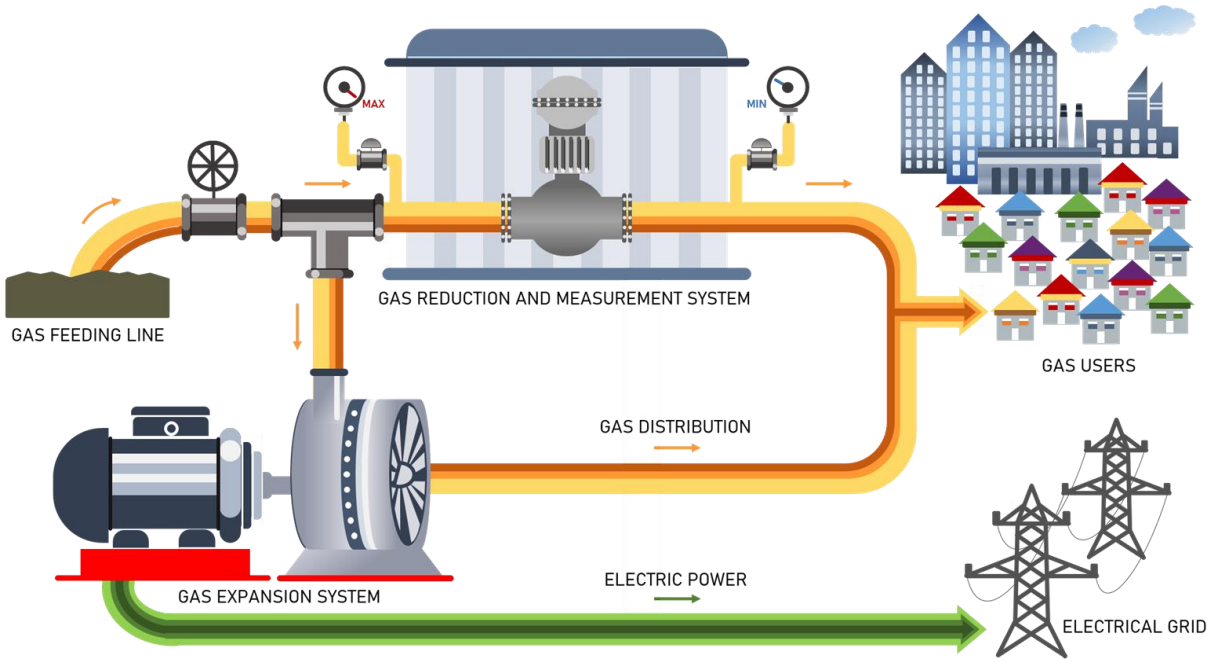


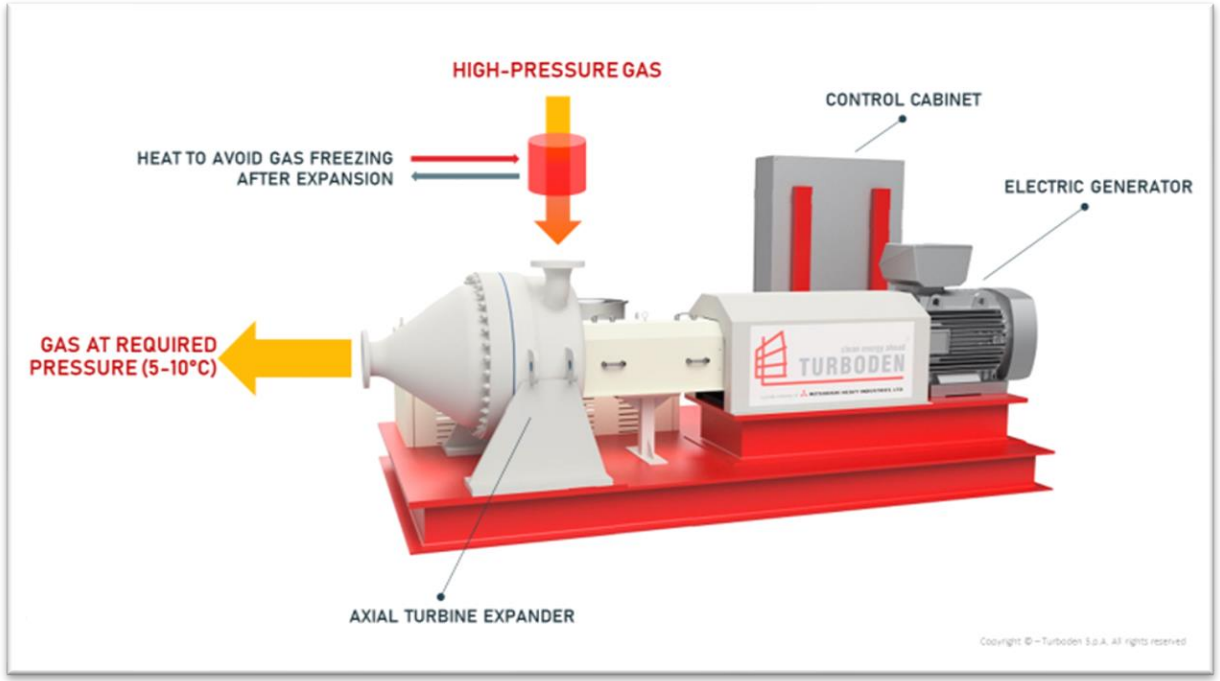




LHP tests
DH summer season
(4,5 MW @105°C)

INNOVATIVE GAS EXPANDER: GAS DISTRIBUTION NETWORK





CONFIGURATION: Power generation from gas letdown station within Brescia's gas network infrastructure

KEY FEATURES: flow rate 25,000 Sm3/h ; pressure reduction 12 → 6 barg

ELECTRIC POWER PRODUCED: 300 KWel

HIGHLIGHTS : Smart City Project – pressure reduction through expansion of the natural gas entering the Brescia's gas distribution network, exploiting the district heating return for the gas pre-heating process.

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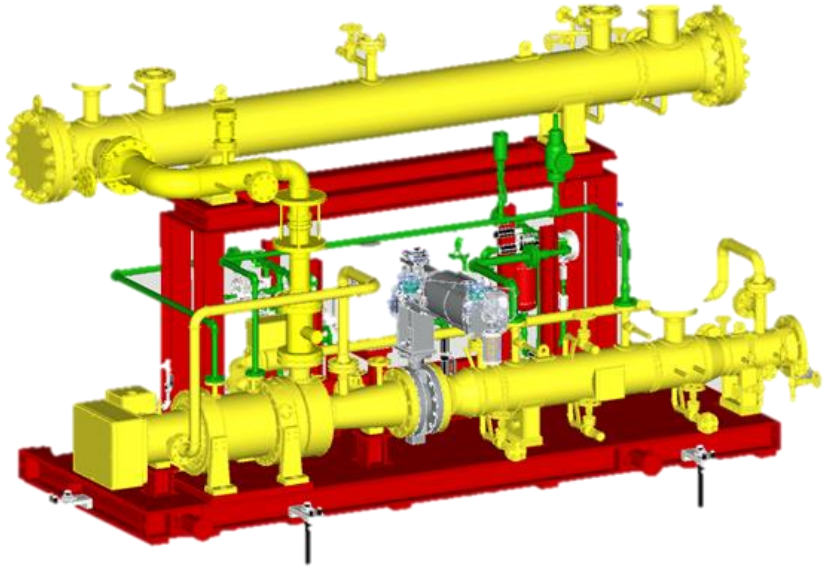
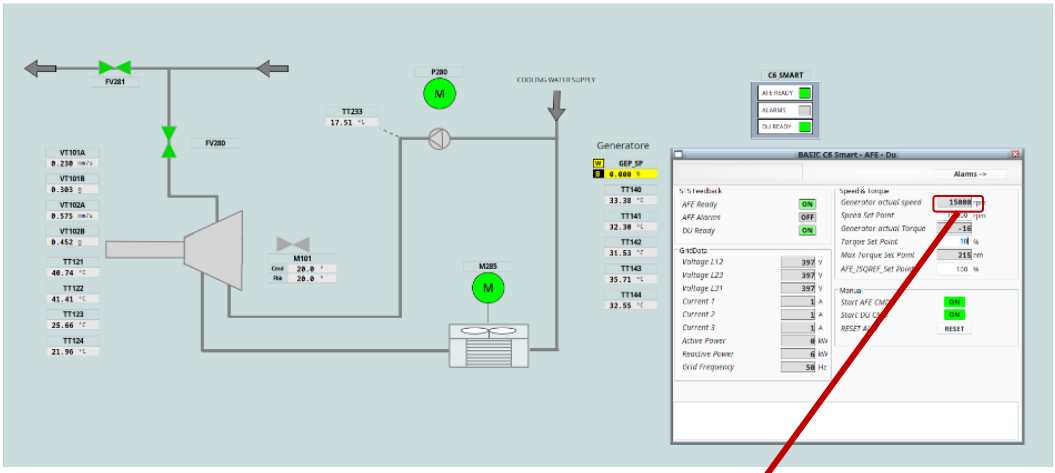
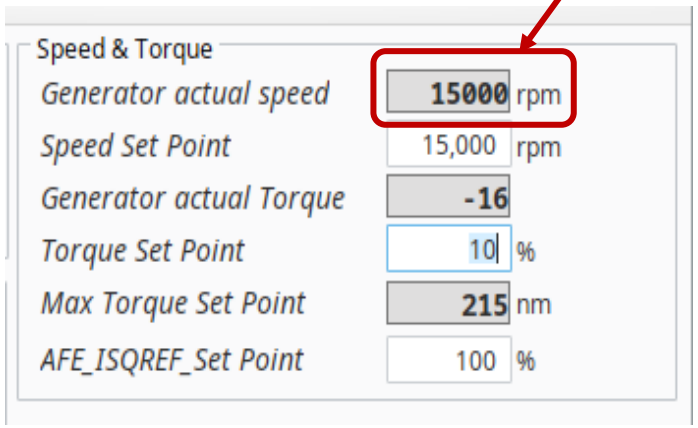


INNOVATIVE GAS EXPANDER: GAS DISTRIBUTION NETWORK

Turboexpander test bench



Test results



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