ETN AGM & Workshop
27-28 March 2019
Pau, France

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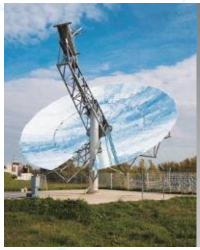

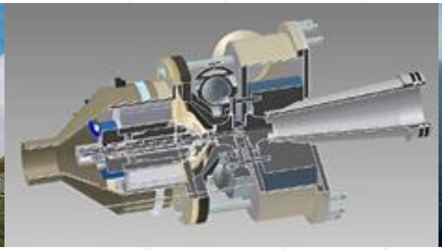

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Research & Innovation Manager
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H2020 call – LC-SC3-CC-9-2020
Industrial (Waste) Heat-to-Power conversion

Specific Challenge:

Better use of process excess/waste heat represents a significant source of energy savings for industries. In a context of reducing greenhouse gas emissions and introducing the concept of circular economy in heat management in view of industrial process electrification, European industries have a clear interest in finding new ways to capture the heat produced by their process and to reuse it or to produce electricity. The conversion of excess heat back to electricity would also improve energy efficiency, mitigate the increase of electricity consumption due to industrial electrification and thereby reduce the load on the power grids. This will also facilitate balancing the grid due to intermittent supply of electricity from renewables.

Innovative heat to (mechanical or electrical) power conversion using either organic or **supercritical CO2 cycles**, presents several benefits compared to conventional steam cycles. While organic cycles have the potential to recover low temperature heat, the supercritical CO2 cycle covers medium and high temperatures with drastically reduced footprint, higher efficiency, reduced or eliminated water requirement, reduced operational costs.

These technologies are also transferable to renewable and conventional power generation with higher efficiency and reduced footprint than established technologies.

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Scope:

Accounting for the results of previous research, proposals will integrate an industrial waste heat-to-power conversion system using one type of fluid (supercritical CO2 or organic) and demonstrate the system operation in industrial environment at an output power level of at **least 2 MW**, with improved **cost efficiency** compared to existing solutions.

In order to reach this goal all the following development areas need to be covered:

- Optimisation of thermal cycles for different temperature levels of recovered heat and constrained industrial environment, in terms of efficiency and economics (capex, opex);
- Development/improvement of design tools at components and system levels;
- Development/improvement of materials and components: heat exchangers, turbomachinery, waste heat recovery unit, power generator and electronics, etc.
- Integration and demonstration of the system in industrial environment;
- Technical, and economical life cycle assessment of heat-to-power systems adapted for at least 4 energy intensive industrial sectors, to demonstrate economic viability;
- Dissemination of the technical and economic benefits.

In the case of supercritical CO2 technology, the potential for international cooperation to facilitate technology development and market uptake should also be explored, notably to: establish mechanisms for exchange of R&D results (e.g. on materials performance); establish forum on safety issues, on standardisation of performance models; establish standards for instrumentation performance and calibration.

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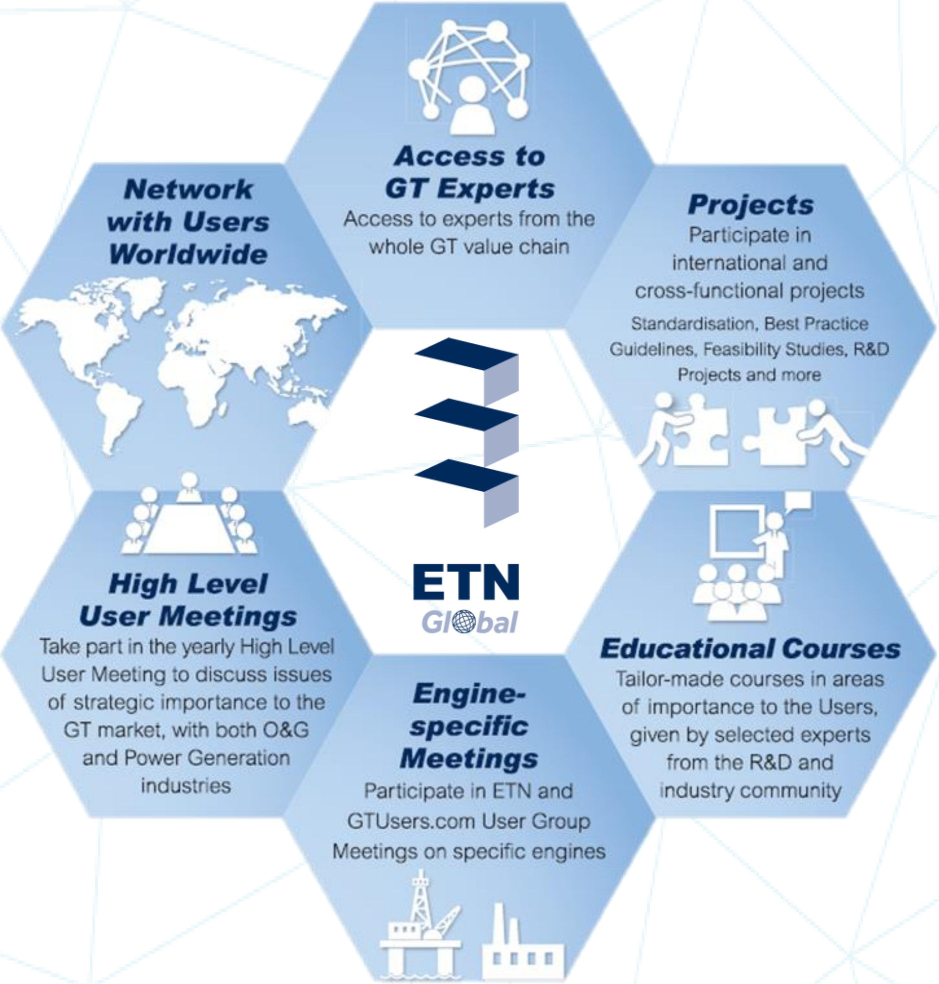
Expected Impact:

The proposals should demonstrate **cycles**, **components** and **systems designs** that are particularly suitable for industrial use with proven contributions in terms of industrial excess/waste heat use and impact on power distribution networks:

Improved cycles to achieve scalability to higher power levels, higher cost effectiveness, wider input temperature ranges, significantly reduced system size compared to steam turbines, allowing wider take up of heat recovery from more industrial processes;

Primary energy savings (GWh/year) in industry (heat recovery) and potential primary energy savings in the power generation sector, assuming full deployment in EU28; an estimation of the related **GHG emission reductions (tCO2-eq/year) shall also be given for information**.



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