

Performance Untapped Modulation for Power and Heat via Energy Accumulation Technologies

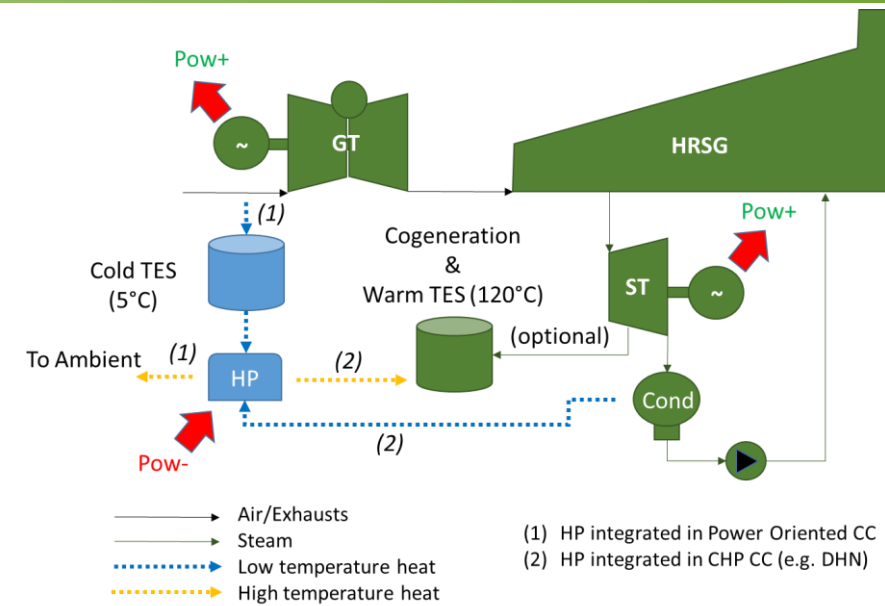
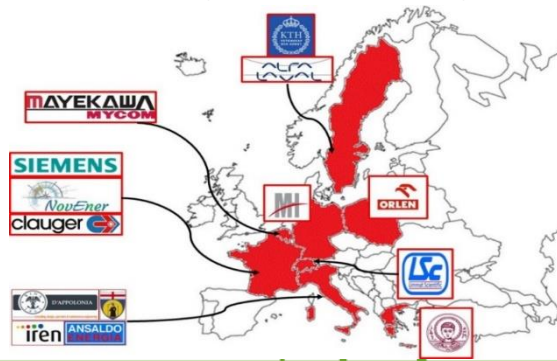
Project Objective

To enhance Combined Cycle (CC) power flexibility, the PUMP-HEAT project proposes an innovative concept based on the coupling of a fast-cycling highly efficient Heat Pump (HP) with CCs. The integrated system features Thermal Storage and predictive control for smart scheduling. The CC integration with a HP and a cold/hot thermal storage brings to a reduction of the Minimum Environmental Load (MEL) and to an increase in power ramp rates, while enabling power augmentation at full load and increasing electrical grid resilience and flexibility.

Approach

In the PUMP-HEAT Combined Cycle (PHCC), demonstrated at TRL 6:

- the HP is controlled to modulate power in order to cope with the CC primary reserve market constraints;
- the high-T heat can be exploited in district heating network;
- HP cooling can be used for gas turbine power boost
- the HP will include an innovative bi-phase expander to increase the overall efficiency.



Impact and Expected Results

The PHCC targets an initial market of around 800 M€/yr. A single PHCC plant (400MW) will allow an yearly saving of 5000t of natural gas, 72320 tCO₂ eq. emissions. PH-CC aims to become a new paradigm for GT and CC power plants, for both retrofit and new applications, paving the way for further renewable sources.

