

# DEVELOPMENT OF ADVANCED CO<sub>2</sub> CYCLES FOR GAS TURBINES: SUPERCRITICAL CO<sub>2</sub> CYCLES WITH OR WITHOUT CO<sub>2</sub> CAPTURE

## Innovations and Benefits - S-CO<sub>2</sub> power cycles technology allows:

- thermodynamic efficiency > 50 % including CO<sub>2</sub> capture and oxygen production for oxy-combustion fuelled cycles;
- extremely reduced footprint related to a combined cycle with the same power due to S-CO<sub>2</sub> high density;
- remarkable increase in load flexibility and quick response thanks to the extreme compactness, the absence of steam power section and CO<sub>2</sub> capture facilities;
- CO<sub>2</sub> capture under “pipeline ready” conditions (> 100 bar) for sequestration or “enhanced gas/oil recovery” applications or “water free” shale gas extraction;
- strong integration with renewables as a back-up technology of the electric grid, with positive integrations with “power2gas” storage systems.

**Uses** - Stationary applications generating high load-flexible electric power with strong reduction of greenhouse gas emissions; naval propulsion with significant decrease in bulks and emissions and increase in efficiency using liquefied natural gas (LNG) or liquefied petroleum gas (LPG) as fuel.

**Past and Present Activities** - Important theoretical studies and predictive ready-to-apply models are under development. The current primary target is the definition of specific thermodynamic cycle configurations suitable to naval propulsion and power generation using both fossil fuels and concentrated solar power (CSP).

