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ETIP SNET
EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM
SMART NETWORKS FOR ENERGY TRANSITION

Parallel session name

sCO2-flex

Short presentation of the project

H2020 Project sCO2-Flex (From 01/01/2018 to 31/12/2020)

- Consortium
  - Coordination : EDF R&D
  - Industrials: Baker Hugues, Fives Cryo
  - Research Centers: UJV, CV Rez, Centro Sviluppo Materiali
  - Academics: Politecnico di Milano, Duisberg-Essen University, Stuttgart University
  - Communication : Zabala Innovation Consulting
- Overall budget: € 5 630 855
- Main Objectives:
  - Develop and validate (at simulation level the global cycle) a design of a 25MWe Brayton cycle using supercritical CO2
  - Meet long-term flexibility requirements and reduce environmental impacts and cost-effectiveness

Key exploitable results addressing energy system integration

Development of main components :

- Boiler: First design provided
- Turbomachinery: Compressor test en 2020

  Improved efficiency at low loads compared to current machines
- Heat Exchangers: Printed circuit and Brazed fins prototypes under construction / Testing in 2020 on sCO2 loops

  New perspectives in electricity production
- Flexibility: First strategies to manage rapid load variations and sCO2 management in the cycle

Lessons learned and barriers to innovation deployment

- Lack of knowledge:
  - How to operate sCO2 cycles?
  - Rethink all fluid pressure and temperature management procedures (CO2 instead of water/steam)
  - Rethink operators behavior

- No pilot
  - Less developed industrial sector
  - Regulations to be defined

Industrial network and regulations of these cycles needs to be improved

Deployment prospects of the most promising solutions

- Possible Markets:
  - Heat recovery (due to the small size of the cycle)
  - Decentralized small/medium power generation (10 - 500Mwe)
  - Concentrated solar powerplant
  - If air cooling used instead of water cooling: country where the water resource is limited

- Other markets:
  - Thermal powerplant (coal and gas)
  - Biomass powerplant
  - Nuclear ?

Needs for future R&I activities coming out of the project (if any !)

- Construction of a test loop in Europe,
  - Significant power and
  - Allow to test different components, to study and optimize the control procedures of this type of cycle and the improvement of the components

- Partnership and funding (national or European) welcome
  - All stakeholders included in the partnership (components providers, plant operators, research institutes…)
  - US project ~100M$; China project ~80M€ => impossible for an unique actor to support the full cost of a >10Mwe pilot