Expected impact

New renewable multi-generation technology aimed to be at the backbone of the EU's energy system by 2050.

Simultaneous supply of different energy vectors to multiple typologies of end-users with various levels of energy use.

Operation of a thermodynamic cycle with up to 50% more efficiency in electricity production and higher operational flexibility than the baseline Organic Rankine Cycle technology.

Consortium

/company/regenby2/

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 851541

REGEN by 2

Next renewable multi-generation technology enabled by two-phase fluids machines

How

To build a first-of-its-kind prototype of the REGEN-BY-2 multi-generation technology, the project will follow 3 steps in the development process:

- **Design phase:** all the key components of the REGEN-BY-2 technology need to be designed from scratch specifically for the two-phase operation, since there is nothing alike available on the market.
- **Construction phase:** through the design technical specifications, the two-phase fluid machines will be built and the final assembly of the lab-scale prototype will take place.
- **Testing phase:** finally, the project will perform experimental tests on the two-phase expander & compressor, and will validate the operation of the lab-scale prototype of the REGEN-BY-2 multi-generation plant.

What

REGEN-BY-2 is developing a revolutionary Combined Cooling, Heating and Power (CCHP) device capable of efficiently exploiting any type of renewable thermal energy sources and waste heat recovery to satisfy the time-dependent energy demand of different end-users in a predictable and dispatchable way.

REGEN-BY-2 is based on a novel thermodynamic process, enabled by non-conventional two-phase machines (expanders and compressors) that work with fluids composed of both liquid and vapor phases circulating through them.

The REGEN-BY-2 technology and related thermodynamic cycle has been patented by the project partner TIFEO, a start-up company founded in 2018 (patent number: WO2017158511-2017-09-21).