Development of transportable and turnkey Chemical Plant at ICI Caldaie

Carlo Tregambe

R&D lab, ICI Caldaie SpA, via G. Pascoli 38, 37059 Campagnola di Zevio (VR) Italia

**Corresponding author:carlo.tregambe@icicaldaie.com*

1. Introduction

The activity of ICI Caldaie started 60 years ago in the business of high temperature and high-pressure steam generator system for industrial applications. Nowadays ICI Caldaie is recognized as a world leading industry in this business.

At the beginning of the 2000s ICI Caldaie began a program for the decarbonization of its products aimed at replacing fossil fuels with fuels from renewable sources and launched "ICI_LAB": a laboratory dedicated to the development of systems related to energy efficiency with particular attention to renewable energies.

The laboratory inside the production site allows for a transversal exchange of skills and a cross-fertilization between research and production, bringing two historically distant worlds closer together.

ICI's manufacturing capacity then does the rest, reducing the time that passes from the conception of a new process to its implementation and validation.

2. Technologies under development in ICI Caldaie

There are numerous lines of research active in ICI Caldaie which are co-financed by European projects. Among these, two are reaching a technological maturity such as to be able to start the pre-industrial research phase by the end of 2024.

P2X2P: with the aim of bringing the technology to TRL7 and with turnkey systems, ICI is developing (together with the project partners) a P2X2P system for the storage of renewable energy in the form of hydrogen and its subsequent use on demand. The system, built following all the applicable standards and rules and fully automated, is built inside a standard container and will thus allow easy transport and implementation at the site of use. The project of reference is **FLXnCONFU** (Grant agreement ID: 884157) and the prototype will be installed at the CCGT plant of Ribatejo in Portugal with renewable energy capture capacity up to 1 MW.

BIOGAS to H_2: as in the previous example, the goal is to bring technology at TRL7 for the pre-industrial research phase. In the **MACBETH** project (Grant agreement ID: 869896), an innovative catalytic membrane reformer for direct pure hydrogen production starting from biogas, is integrated in a transportable and turnkey system. Its production and installation comply with all applicable regulations and rules and will be able to produce up to 100 kg/day of pure hydrogen with higher efficiency than conventional reforming reactor process.

3. Methods

The continuous interaction between international university and research centers with their contribution in innovative solutions, together with a production company oriented towards innovation and equipped with laboratories for manufacturing and integration, rapid setup manufacturing unit, data acquisition and analysis tools, allows to facilitate the road between research and industrialization.

5. Conclusions

Thanks to ICI's production capacity and the proven cross-fertilization capacity between industry and university, ICI is continuing the path towards the abandonment of fossil fuels and their replacement with renewable sources in industrial processes.

6. References

FLEXnCONFU - (SOCIETAL CHALLENGES, Grant number 884157)

MACBETH – (INDUSTRIAL LEADERSHIP, Grant number 869896)