FUNDACIÓN CIRCE

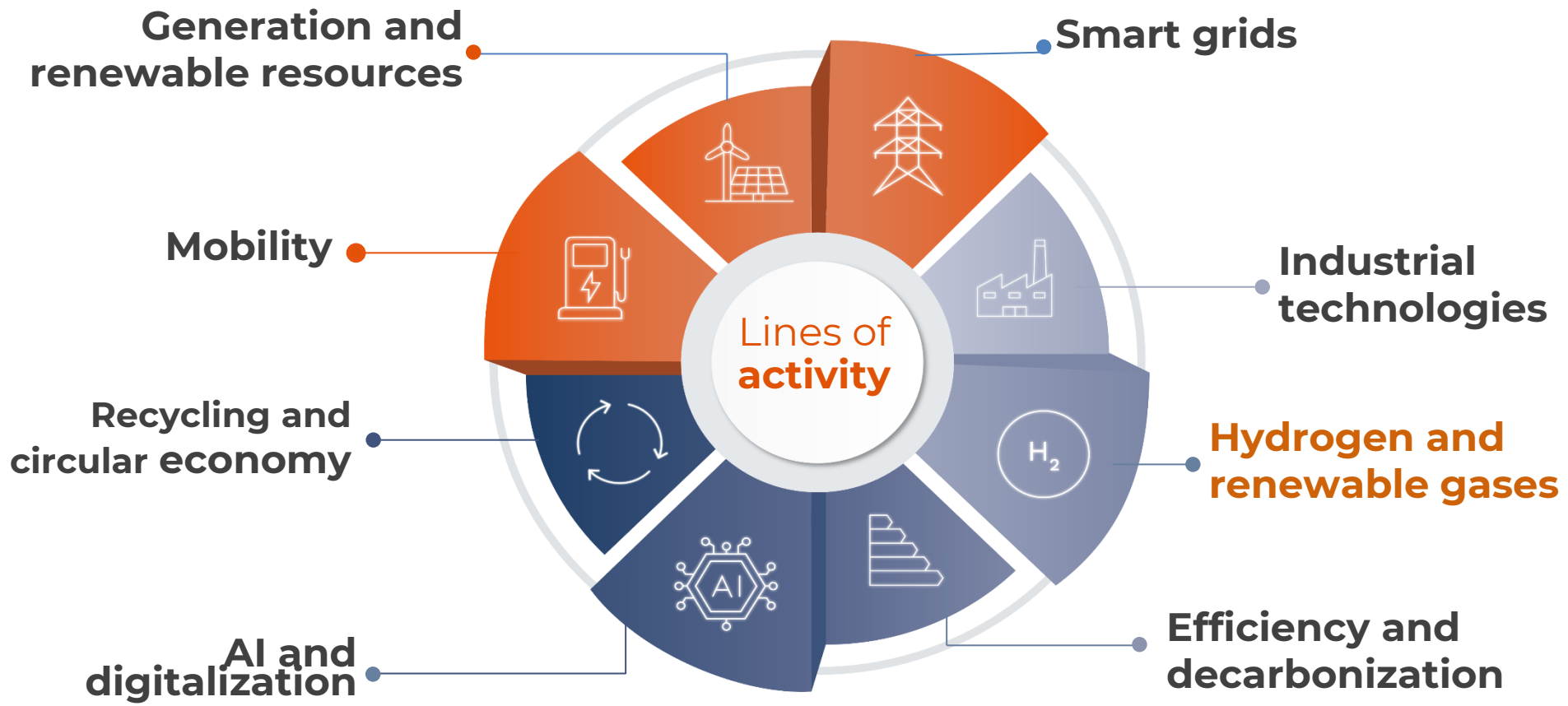
Fundación CIRCE, Marta Rabal Abad

Research centre

mrabal@fcirce.es , +34 682 042 454,

1. CIRCE description

- **100% SELF-FINANCING**
- **77 PROJECTS AWARDED IN HORIZON EUROPE (22 COORDINATED)**



2. Our hydrogen capabilities

- Sizing and design of H2 and P2G value chain, matching supply and demand, and considering the mapping of industrial off-takers and local resources.
- Hybridisation of with RES technologies, integrating H2 as vector for storage, flexibility or use, optimizing sizing and scheduling of hydrogen production systems.
- Thermochemical production from waste and biomass (i.e. pyrolysis and gasification).
- Multiphysics and CFD modelling applied to different points of the value chain (e.g. electrolyser thermal management, H2 integration in gas grid, H2 combustion in furnaces).
- Design of DC/DC and AC/DC converters to improve integration and control of electrolysers and for fuel cells integration.
- Industrial safety in H2 installations (including work with ATEX environment).

H2 4 NewAge

https://www.fcirce.es/proyectos/proyecto-h24newage

- Development of own infrastructure and lab
- H2 production and integration in industrial furnaces
- Safety, sustainability, certification

TH2ICINO

https://cordis.europa.eu/project/id/101112098/es

- Hydrogen valley development and integration
- Modelling of the integration of the electrolyser into the grid
- Develpoment of a DSS for the conceptual design of the energy valley

ALCHEMHY

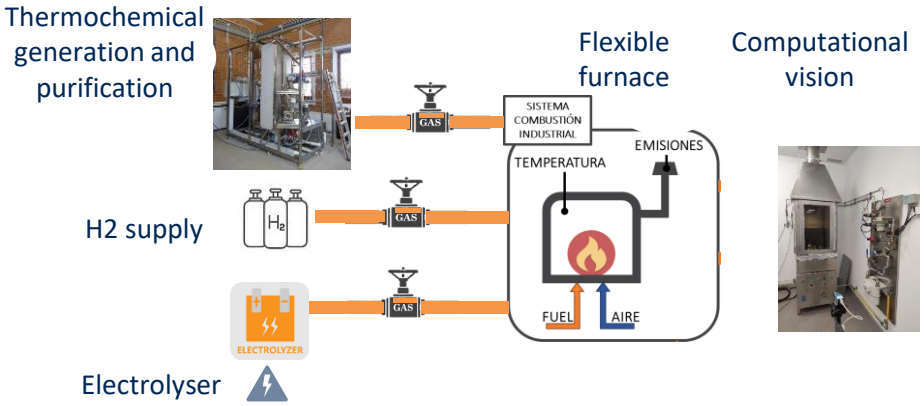
https://cordis.europa.eu/project/id/101177996

- Development of electric technologies for methanol and ammonia production
- CFD Modelling of reactors
- Simulation with integration with downstream processes

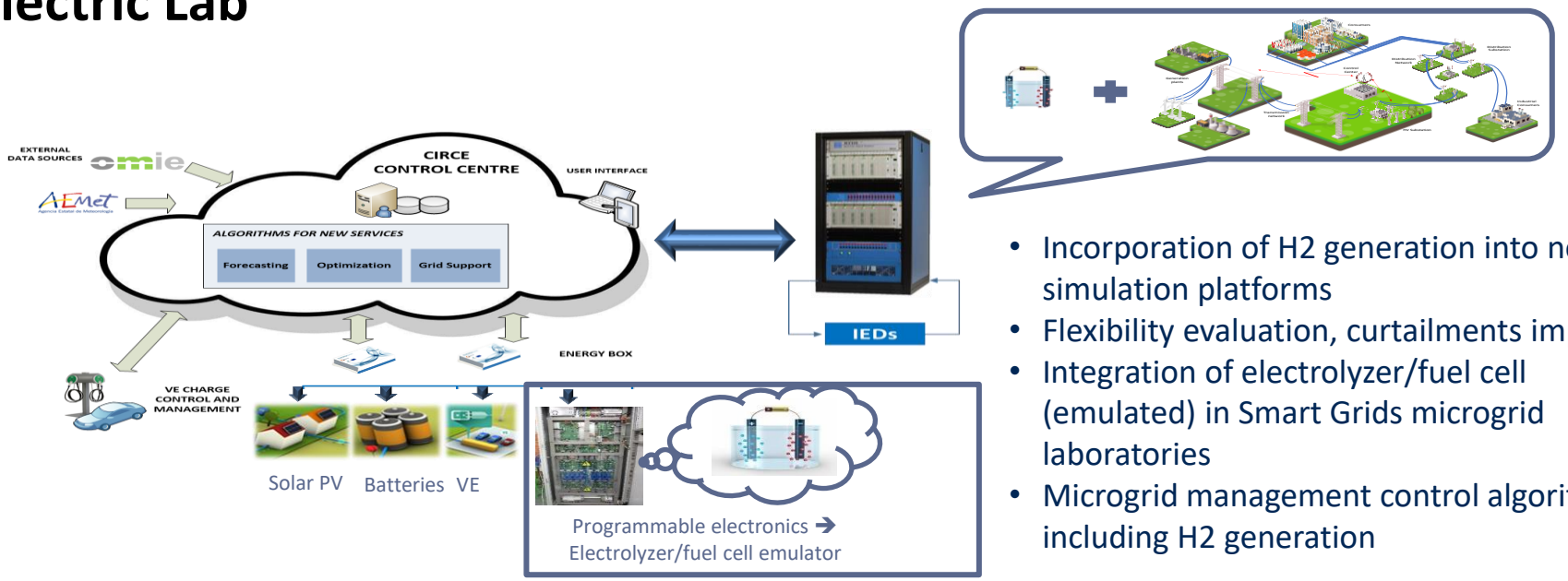
3. Lab infrastructure

Industrial H2 Lab:

- Flexible industrial furnace
- MW-assisted pilot plant for biomass pyrolysis
- Gasifier for the study of syngas production
- Water-Gas-Shift reactor
- Pilot storage facility to study H2 corrosion
- Gas distribution installation



Electric Lab



- Incorporation of H2 generation into network simulation platforms
- Flexibility evaluation, curtailments impact, …
- Integration of electrolyzer/fuel cell (emulated) in Smart Grids microgrid laboratories
- Microgrid management control algorithms, including H2 generation

4. Topics of interest in calls 2025 (I)

Topic	Experience and Contribution
HORIZON-JU-CLEANH2-2025-**01-04**	**Experience**: Manufacturing of singular power electronics, modelling and simulation capacity, curtailment management, grid modelling **Contribution:** Electrolyser use assessment for RES curtailment management, process simulations and energetic integration of equipment, electrolyser modelling and simulation, energy monitoring
HORIZON-JU-CLEANH2-2025-**01-05**	**Experience**: Process modelling, simulation and optimization, software and control systems development. **Contribution:** Integration with downstream processes, detailed modelling of co-electrolysis to optimize its performance, real-time optimization control Smart tools.
HORIZON-JU-CLEANH2-2025-**01-06**	**Experience:** Thermochemical production from waste and biomass (i.e. pyrolysis and gasification). **Contribution:** Pilot testing of H2 production from different type of biomass. Process simulation. Development of power electronics for electrified processed (e.g. microwave). Integration with downstream processes.
HORIZON-JU-CLEANH2-2025-**02-03**	**Experience:** ATEX environment, grid stability and integration, AI processes optimization, modelling and simulation capacity (DT, ROM, CFD…), software and control systems development. **Contribution:** Technical and economic impacts forecasting of new technologies, ammonia acracking modelling and simulation, power electronics for flexible electrolyzer operation, process simulation, energergy monitoring and RES integration

4. Topics of interest in calls 2025 (II)

Topic	Experience and Contribution
HORIZON-JU-CLEANH2-2025-**03-01**	**Experience:** ATEX environment, power electronics manufacturing. **Contribution:** several elements from the "kit of building blocks" (e.g., ppee, EMS and control systems for NRMM), development f software and control systems for the power train.
HORIZON-JU-CLEANH2-2025-**04-01**	**Experience:** grid stability and integration, modelling and simulation capacity, energy communities management, software development and control systems. **Contribution**: Monitoring, mangement and optimization of the community, flexibility and demand response maximization, mapping local resources, integration of multiple vectors, power electronics, biogenic streams and wáter utilization, real-time optimization of control Smart tools.
HORIZON-JU-CLEANH2-2025-**06-01** HORIZON-JU-CLEANH2-2025-**06-02**	**Experience**: Modelling and simulation capacity (DT, ROM, CFD), optimization of generation capacity, grid modelling, previous experience in conceptual design of H2 valleys (TH2INO Project) and in supporting EU regions in their H2 strategies (CLEANH2 tender). **Contribution:** Sector coupling, use and exploitation of existing infrastructures and networks, bottle neck análisis, H2 and gas distribution, optimization models.

circe
Creating together