Model Predictive Control in Microgrids

LEAP Workshop - Controls for novel concepts

Speakers : Luca Mantelli, Mario Ferrari

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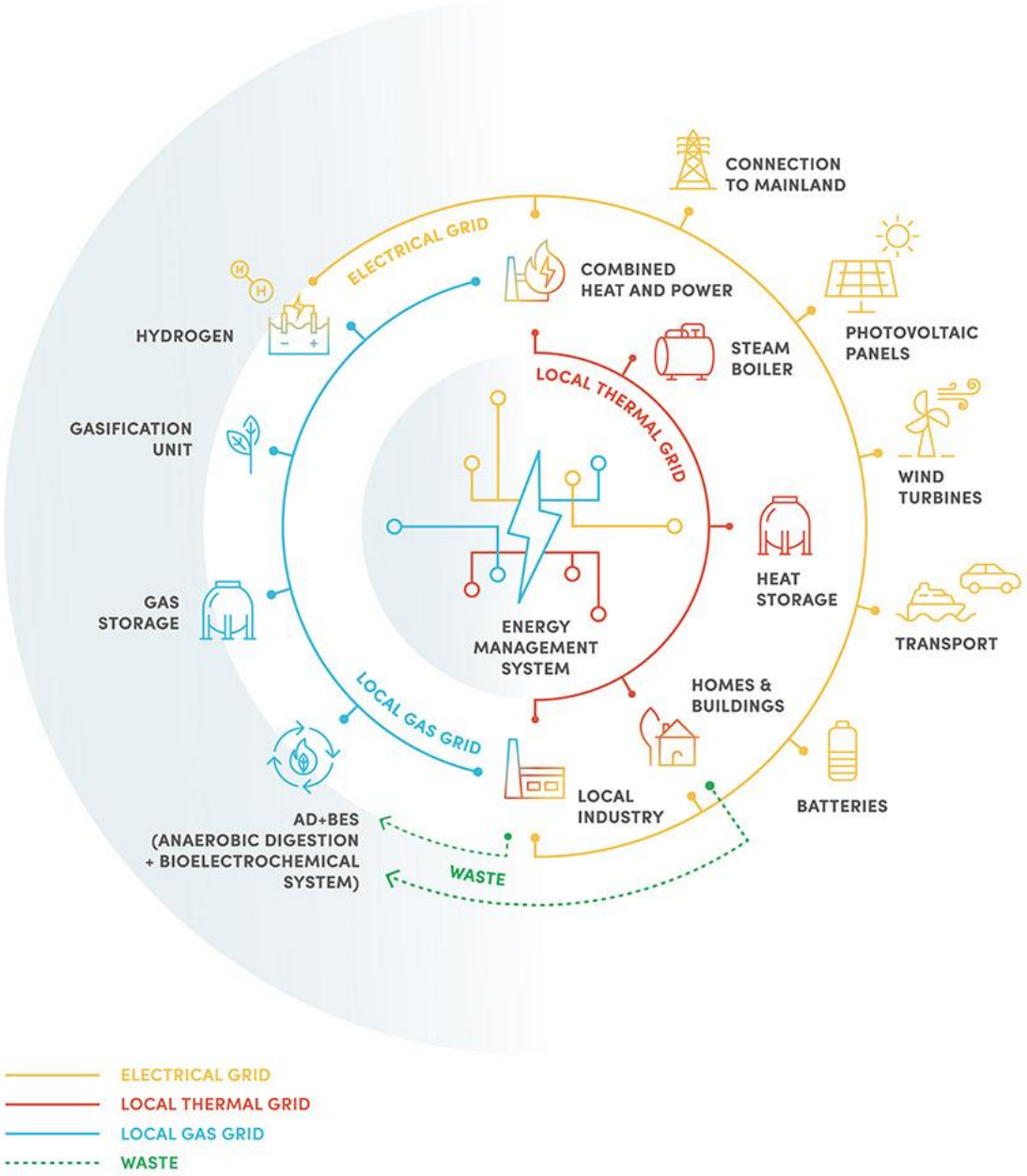
ROBINSON Project

Horizon 2020

ROBINSON aims to help **decarbonize islands** through the development of an intelligent, flexible and modular Energy Management System (EMS), better integration of Renewable Energy Sources (RES), biomass and wastewater valorization, industrial symbiosis, and the optimization and validation of innovative technologies.



ROBINSON Project - Partners

Horizon 2020

Islands need clean, cost-efficient and reliable solutions tailored to fit their geographical situation, the fluctuating population and the local economy.

AURELIA

NORCE

Università di Genova

PRIMA PROTEIN

ETN Global

PSI

LEITAT managing technologies

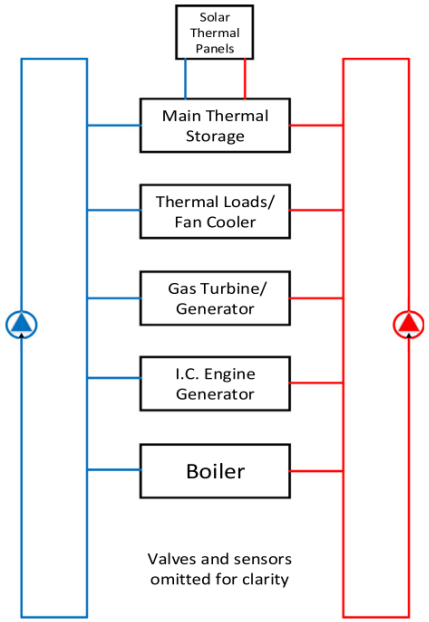
DALANE ENERGI

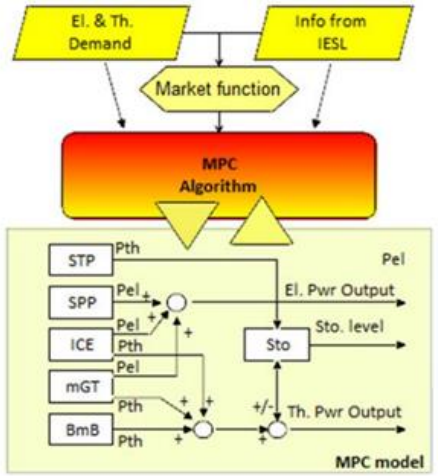
18 Partners	**10** European countries	**4** Years Oct 2020 - Sep 2024
1 Demo island Eigerøy (NO)	**2** Follower islands Crete and Western Isles	**€8.37** Budget (EU contribution≈ €7M)

Energy Management System – UNIGE experiences

EMS should **control prime movers**, choosing in real-time the optimized energy strategy that **minimizes OPEX** and **matches user demands**.

- Off-line scheduling tool
- Dynamic modeling
- Real-time optimization and control tool development
- Polygeneration microgrid facility management



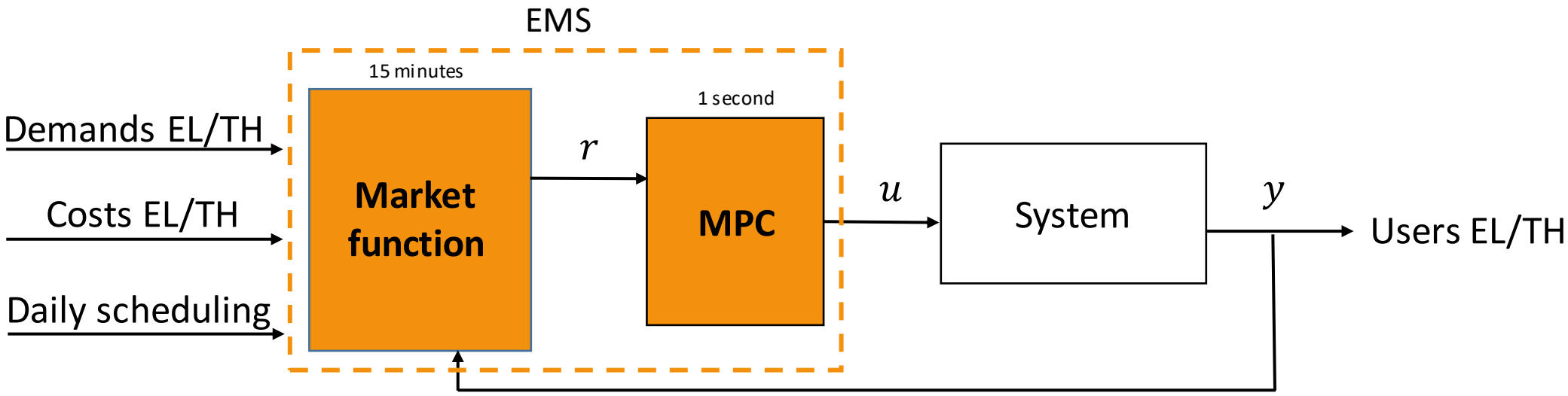


Rossi I., Banta L., Cunea A., Ferrari M., Traverso A., Traverso A. , "Real-time management solutions for a smart polygeneration microgrid", Energy Conversion and Management, Volume 112, 15 March 2016, Pages 11-20

EMS concept

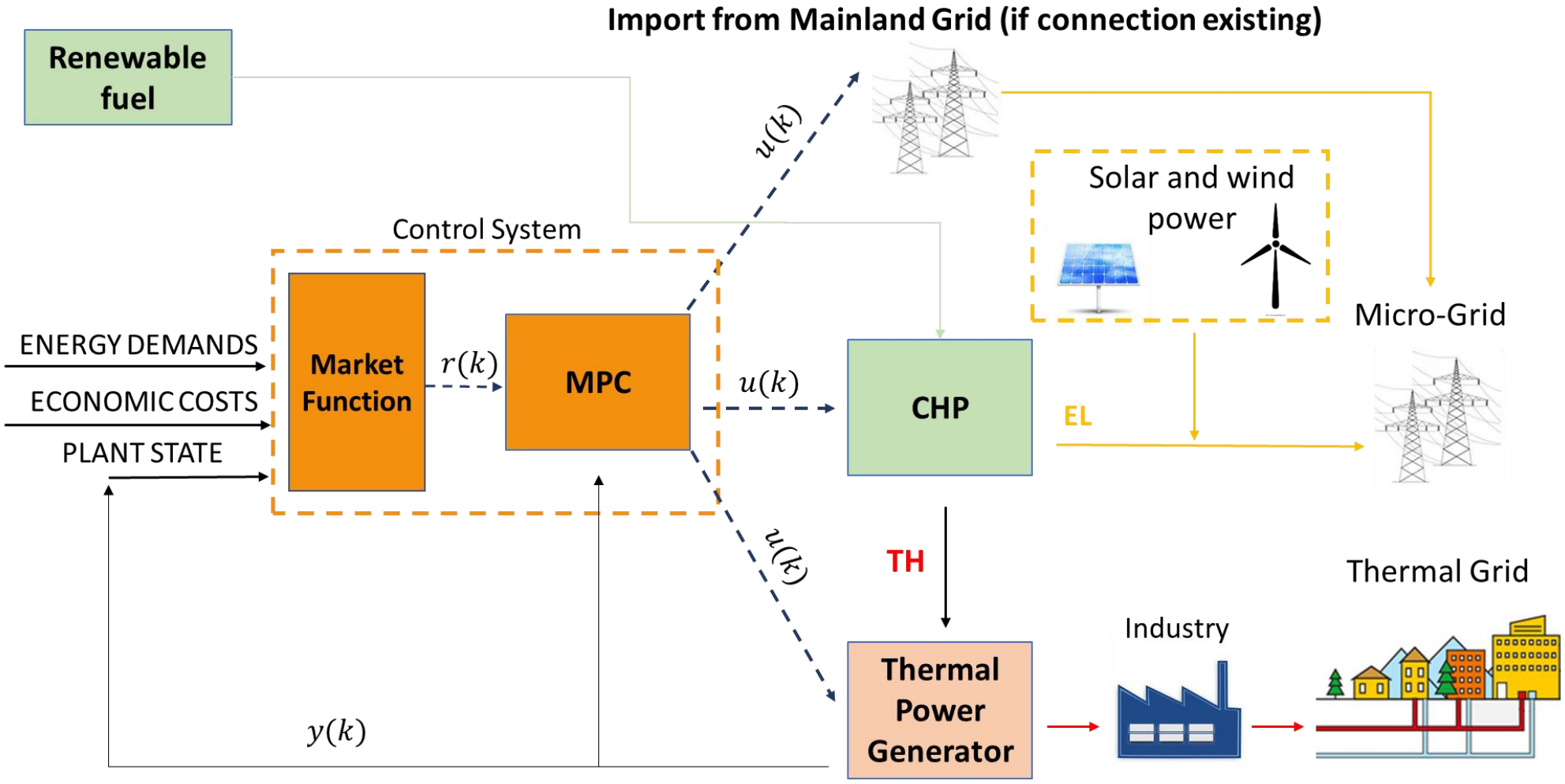
Energy Management System

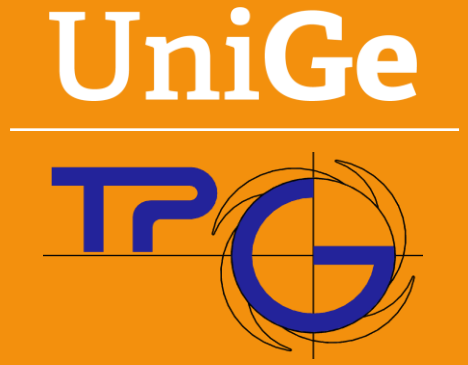
- **Optimization algorithm** defines optimum reference value of each prime mover every 15 minutes.
- **MIMO MPC** controls each prime mover, updating signal value every second and respecting facility constraints.



EMS concept

ROBINSON





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