SCORES

SELF CONSUMPTION OF RENEWABLE ENERGY BY HYBRID STORAGE SYSTEMS

Innovative renewable solutions for residential buildings

Introduction to the SCORES project
Training Course – 1st April 2022 – Lisbon, Portugal

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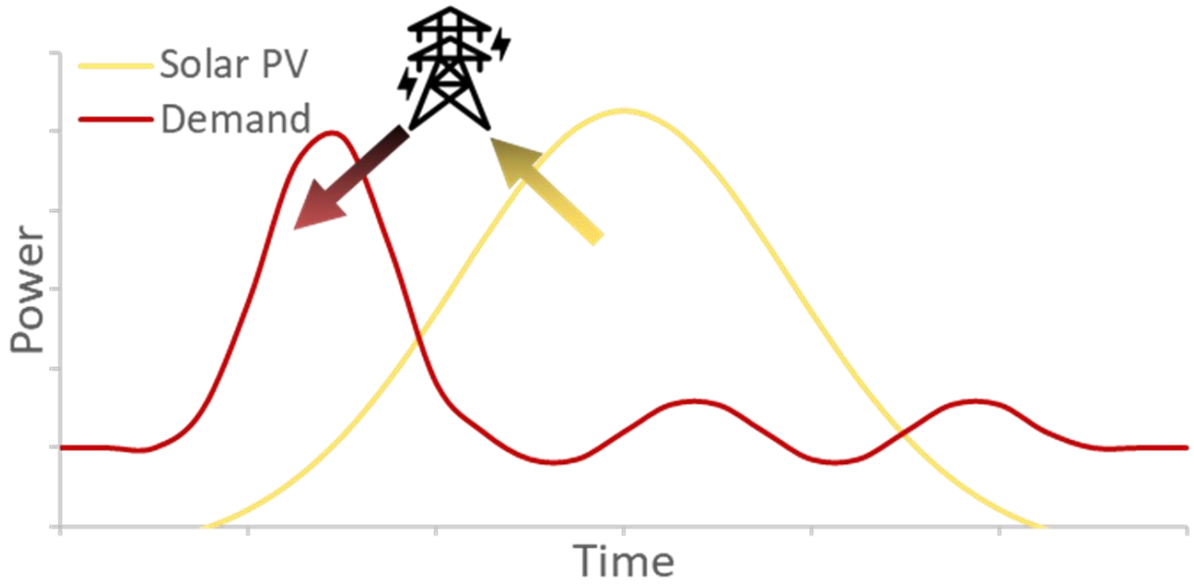
Coordinator SCORES Project

http://www.scores-project.eu/
https://www.tno.nl/en/

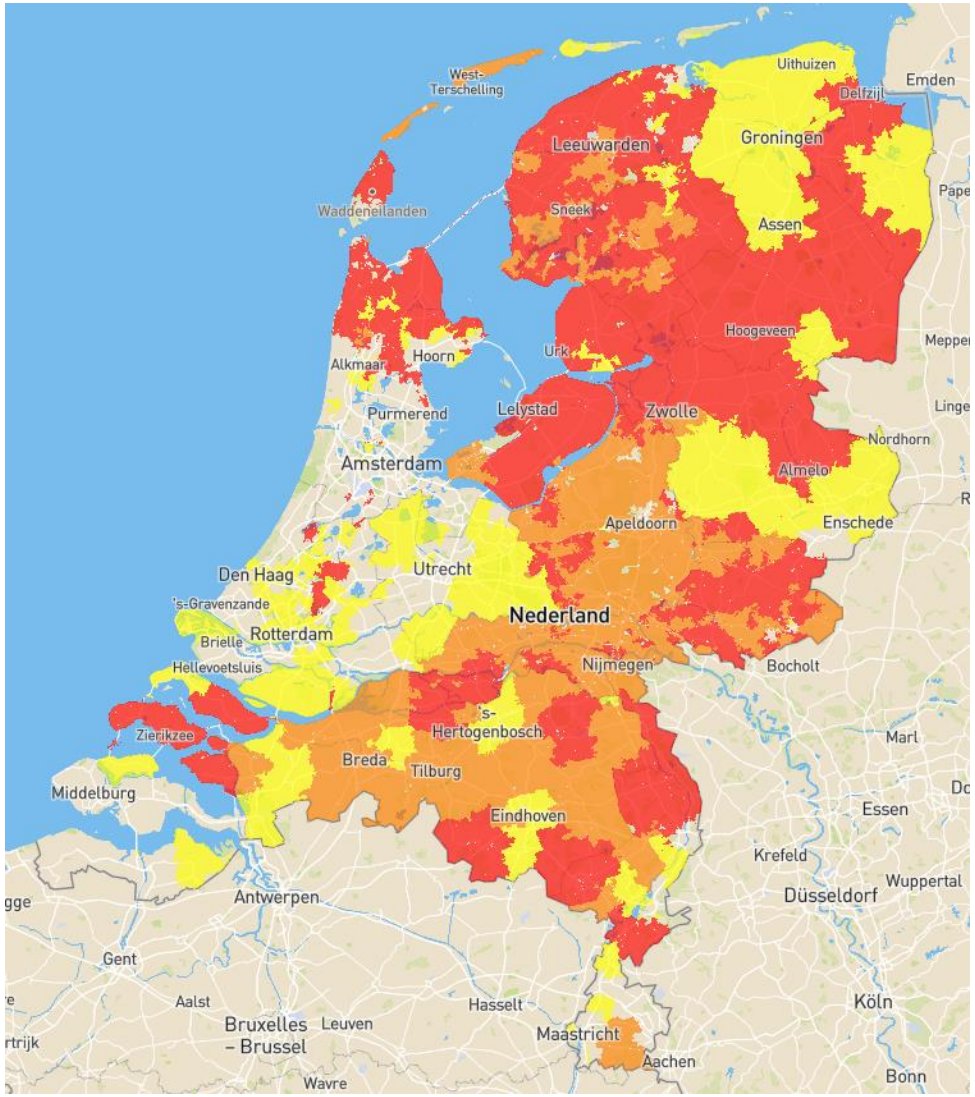
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 766464.

What is going on? → Energy Transition!



Local power grids at its limits

- In more and more area's in the EU, the power grids cannot handle additional solar PV power (example: NL)
- Peaks:
  - Summer: generation
  - Winter: consumption
- Limited possibility for installation of large scale renewables (PV parks, wind turbines)



Source: Netbeheer Nederland, transportschaarste
Yellow: threat; Orange: near congestion; red: structural congestion

SCORES project

Self-Consumption Of Renewable Energy by hybrid Storage systems

SCORES combines and optimizes the **multi-energy generation**, **storage** and **consumption** of **local renewable energy** (electricity and heat) and **grid supply**.

Via the development of compact hybrid storage technologies, integrated through a smart **Building Energy Management System**, the project optimizes the self-consumption in residential buildings, brings new sources of flexibility to the grid, and enables **reliable operation** with a **positive business case** in Europe's building stock.

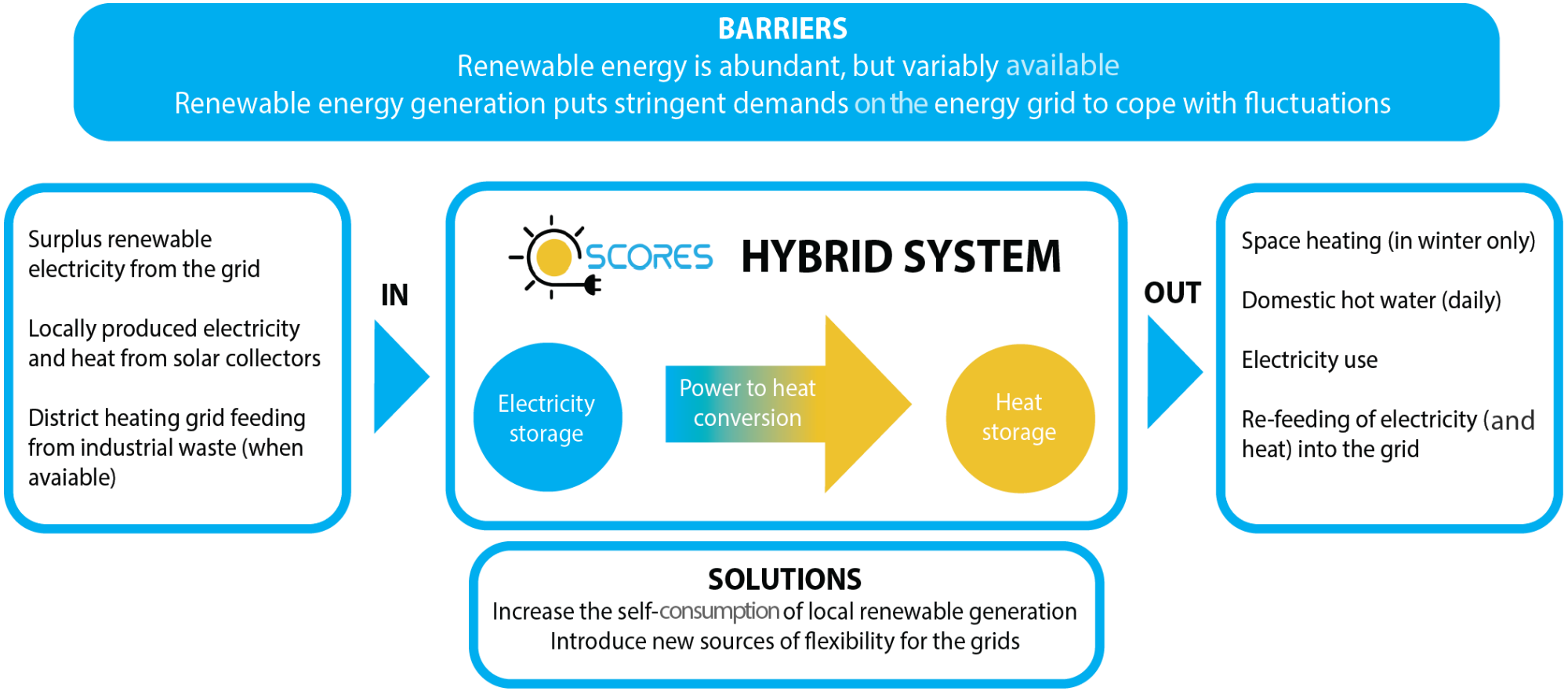
12 Partners

9 Work Packages

Budget **€6M**

Started in 2017
48 (54) Months

SCORES – Overall concept

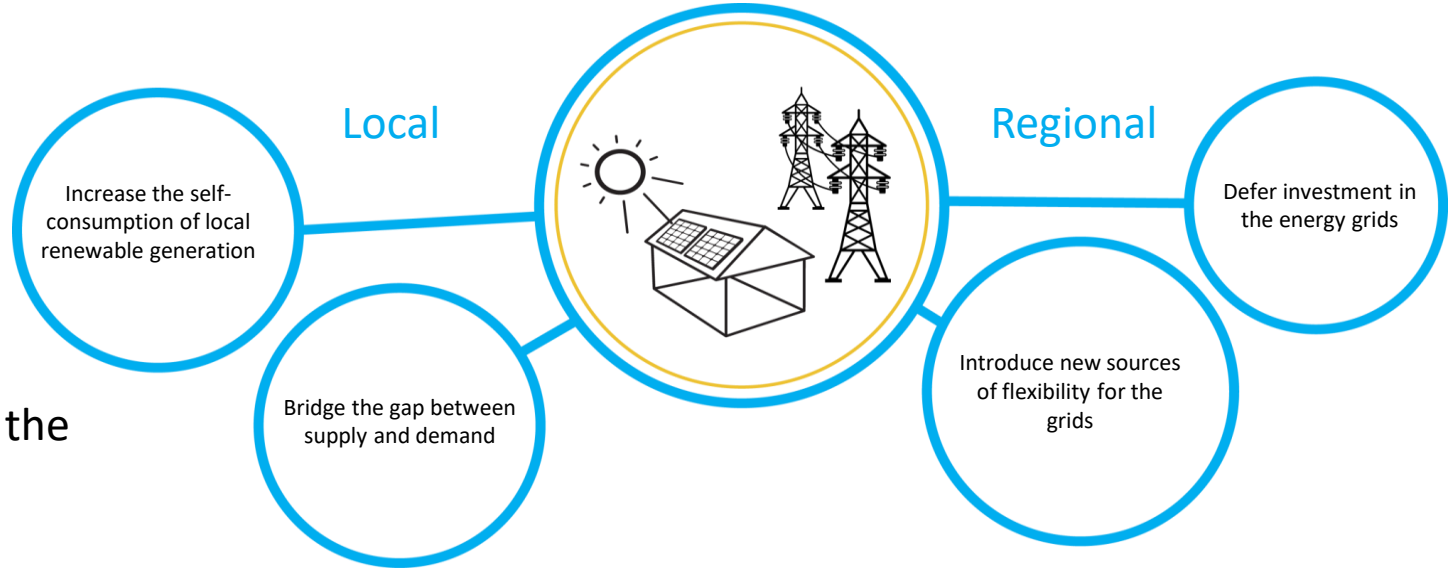


The SCORES concept is based on a hybrid system effectively and efficiently combining solutions that **harvest electricity** and heat from the sun, **store electricity**, **convert electricity into heat**, **store heat**, and **manage energy flows** in the building.

SCORES Consortium

Objectives

Demonstrate in the field the integration, optimization and operation of a building energy system including **new compact hybrid storage technologies**, that optimize supply, storage and demand of electricity and heat in residential buildings and that increases self-consumption of local renewable energy in residential buildings at the lowest cost.



Re-use of Second Life Li-ion batteries for residential electrical storage

Optimized electric driven heating with intraday PCM heat storage

High-performance water to water heat pump supplied by hybrid PV and solar collectors.

Efficient air to air heat pump for space heating with intraday PCM storage

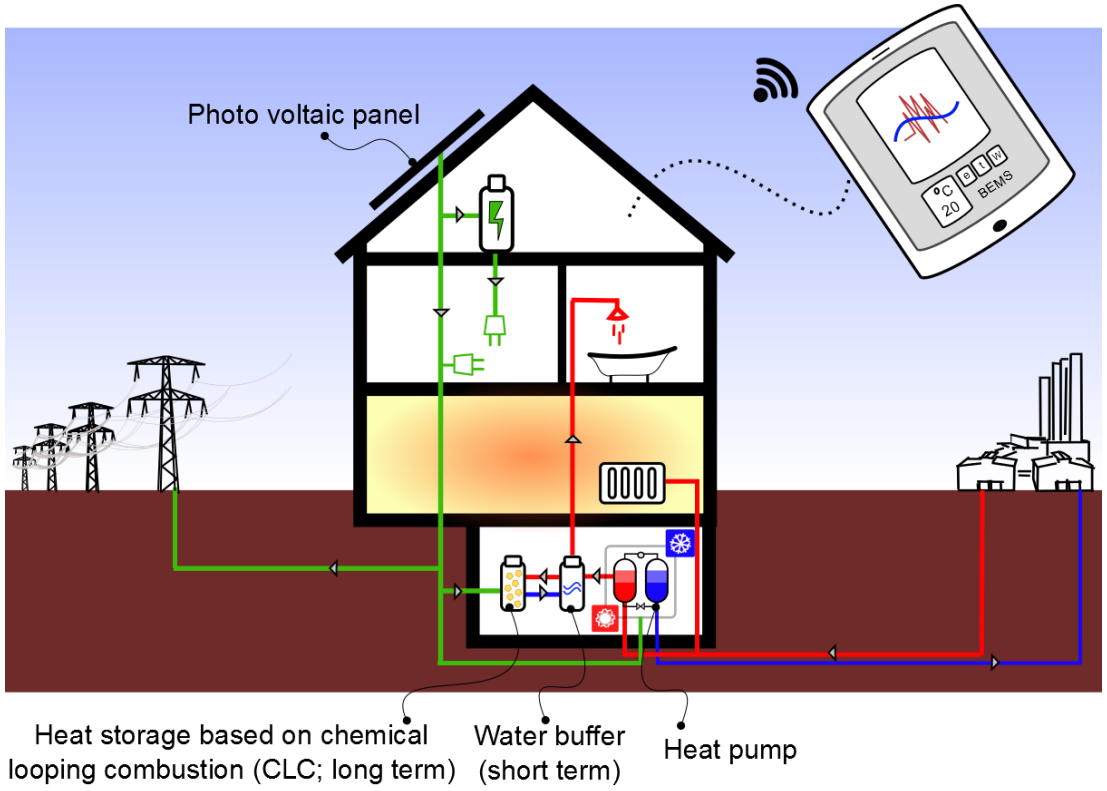
Improve and optimize compact, long term loss free heat storage technology

An integrated building energy management system

Asses the economical potential of the hybrid system

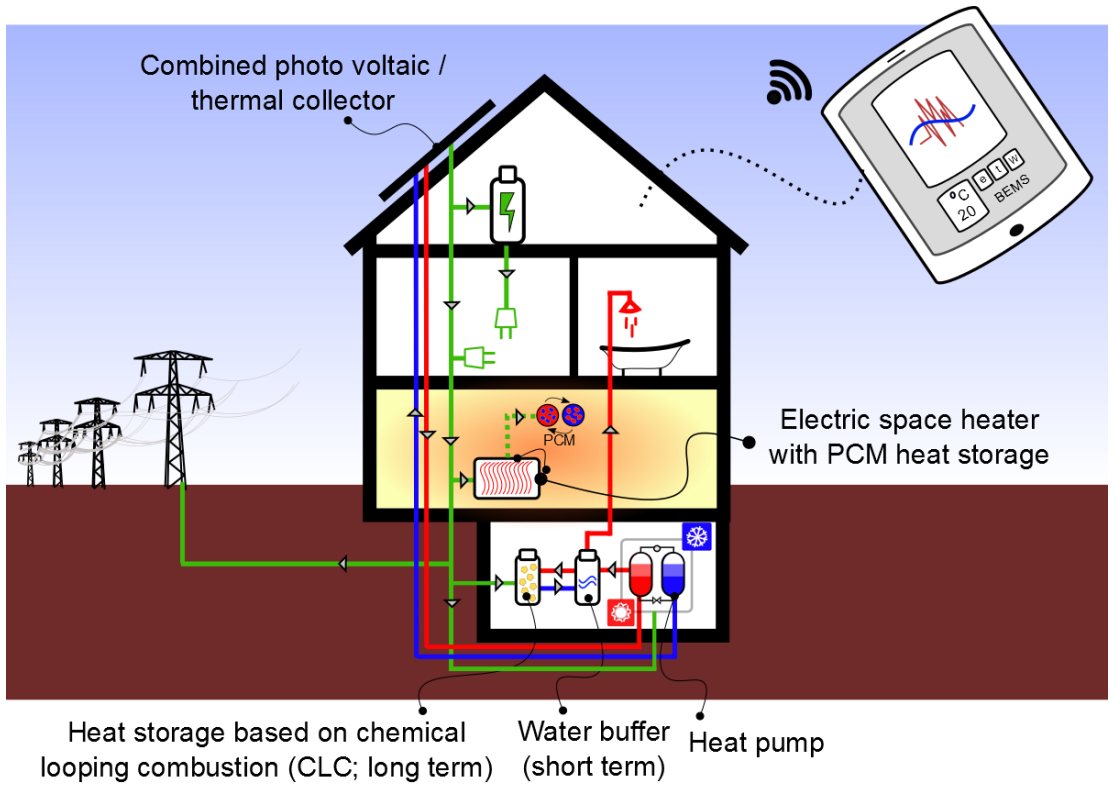
Demonstration cases

Connected to district heating grid:



Demo in Austria

Based on electric heating:



Demo in France

Demonstration

Demonstration of the integrated hybrid energy system takes place in **two real buildings** representative of different climate and energy system configurations for 3 cases:

- in Northern Europe (**Austria**) with and without a heat grid
- In Middle/Southern Europe (**France**) without a heat grid.

Agen, France

New state of the art building has been constructed, comprising of 115 small apartments and collective areas for retired people.

Gleisdorf, Austria

In Gleisdorf, an already existing residential building block is connected to both the electricity network and the local heating network.

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Technologies Overview

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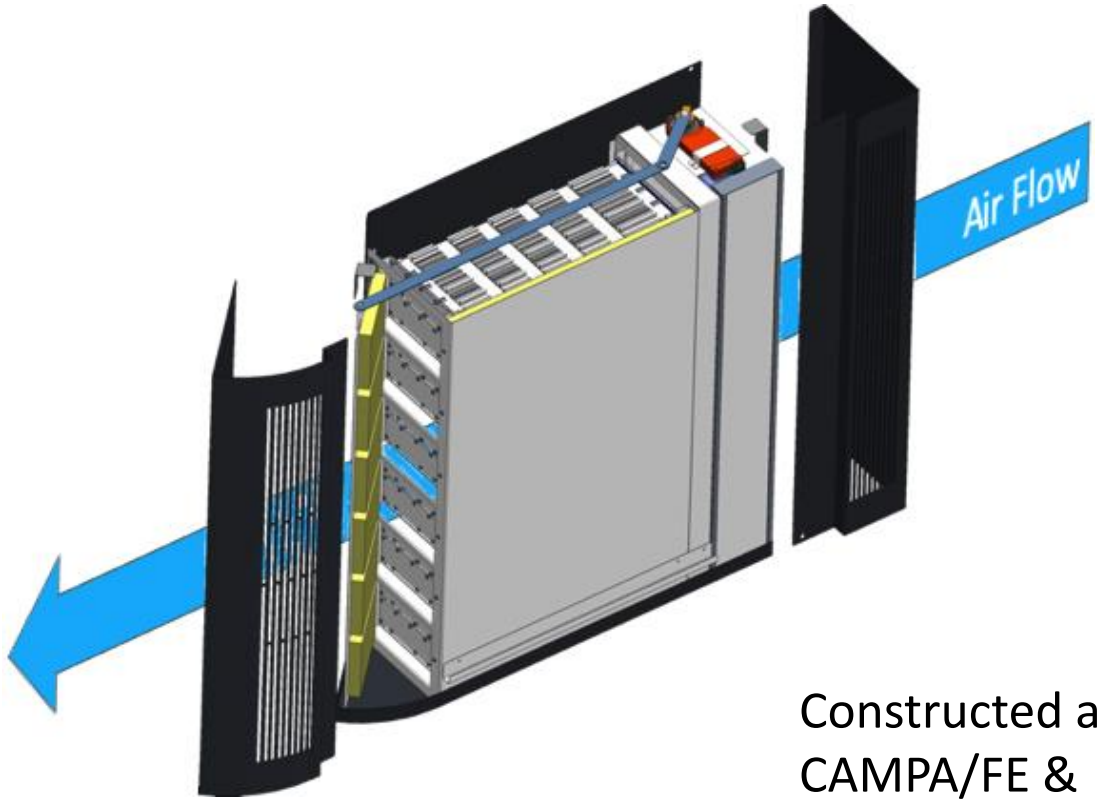
Heating with air heat pumps and PCM storage

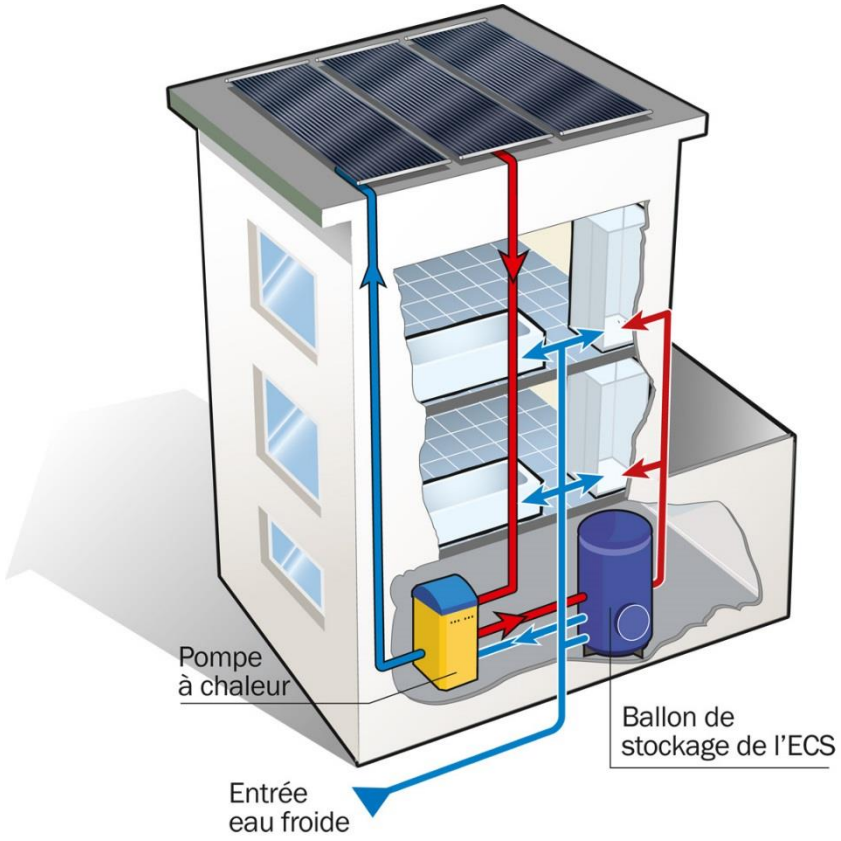
Electro Thermal storage units for ambient air comfort development (EHP)



Constructed and tested by
CAMPA/FE & France Energie Laboratory Laboratories

Solar heat & water-to-water heat pumps

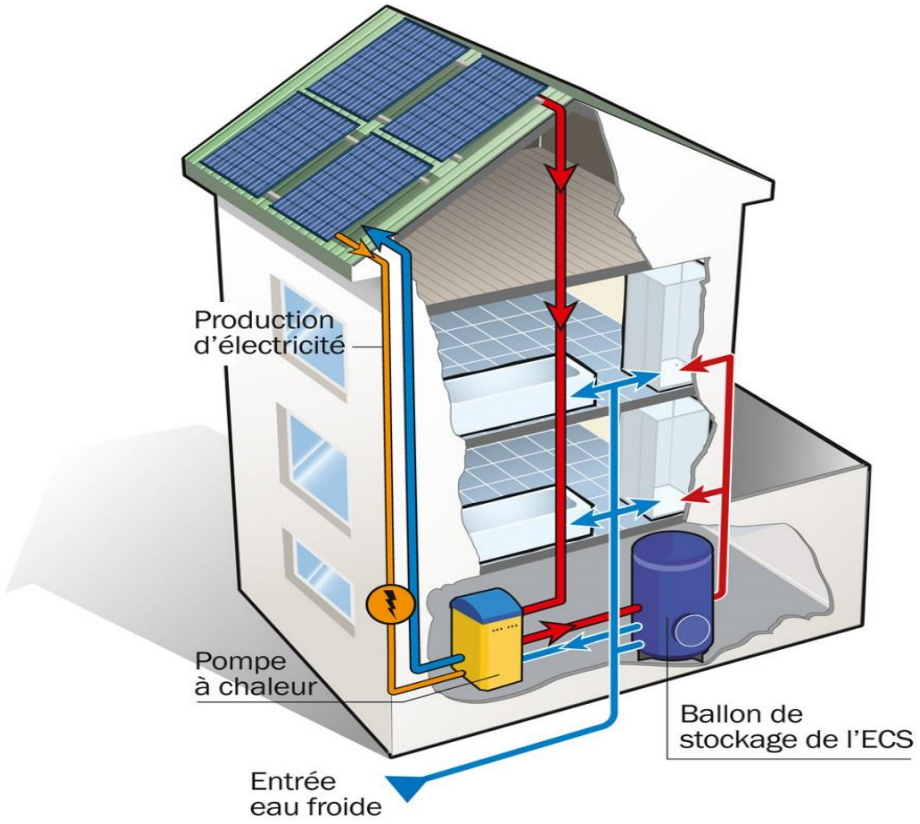
heliopacsystem®



A solution for the production of domestic hot water by means of a heat pump on a low-temperature flexible solar collector, which can be used in almost all climatic conditions.

Photovoltaic thermal hybrid solar collector (PVT)

heliopacsystem+®



PVT: Photovoltaic thermal hybrid solar collector provides both heat and electricity for collective DHW production.

This hybrid system improves the efficiency of the photovoltaic panels through heat transfer.

DEMO SITE in AGEN (France)

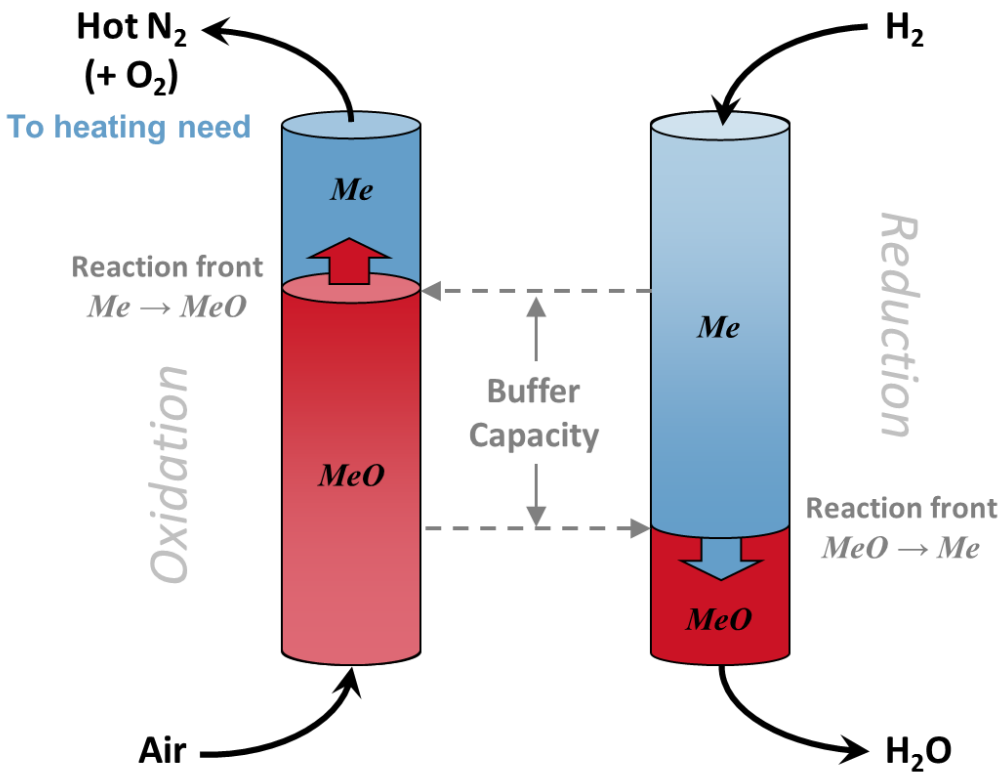
heliopacsystem+®

h)

Chemical Looping Storage (“Redox Heat”)

- A metal with specific characteristics is “looped” through oxidized and reduced states to release or store energy, respectively

- **Targeted energy storage density on system level of >1GJ/m³**

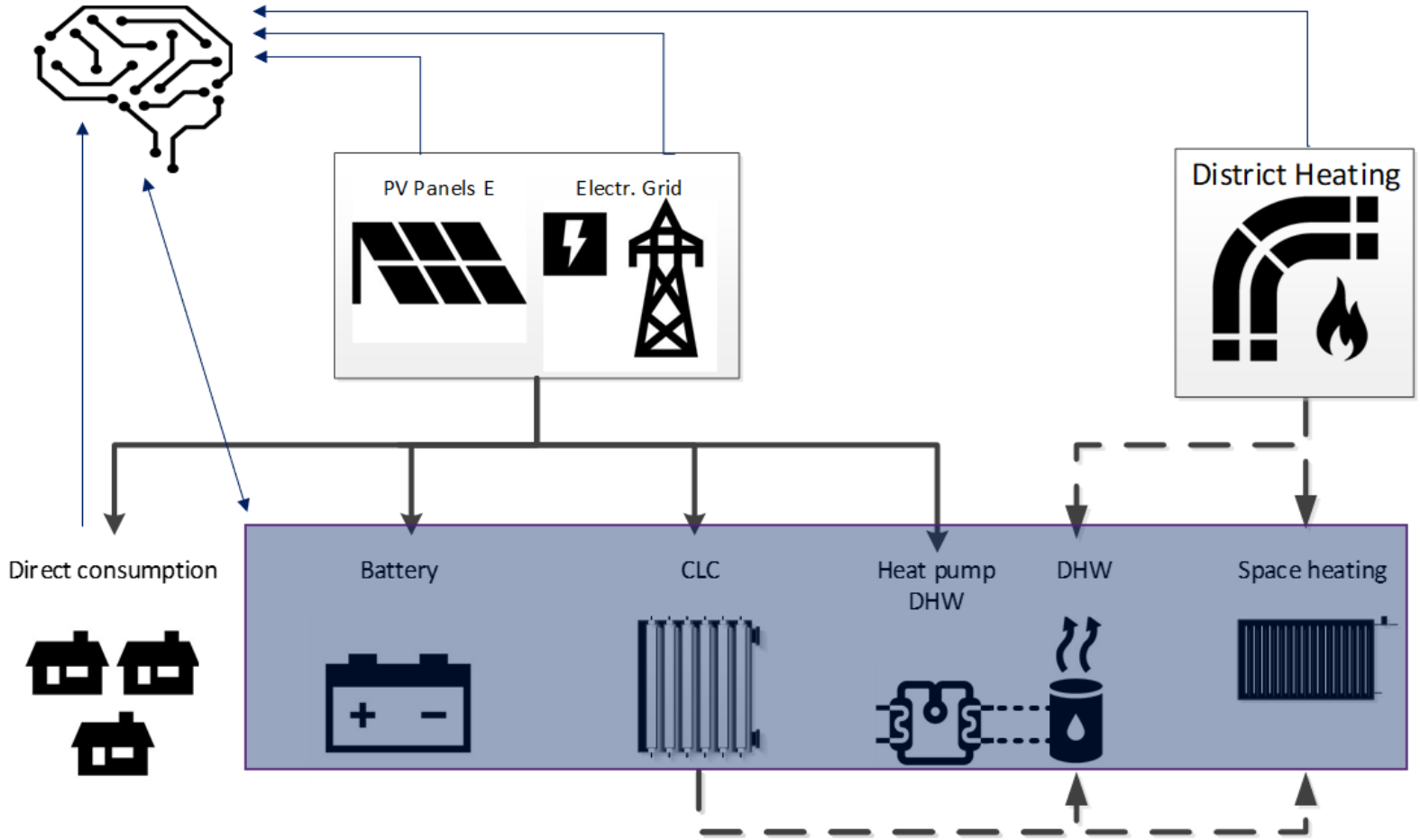


Electrical storage

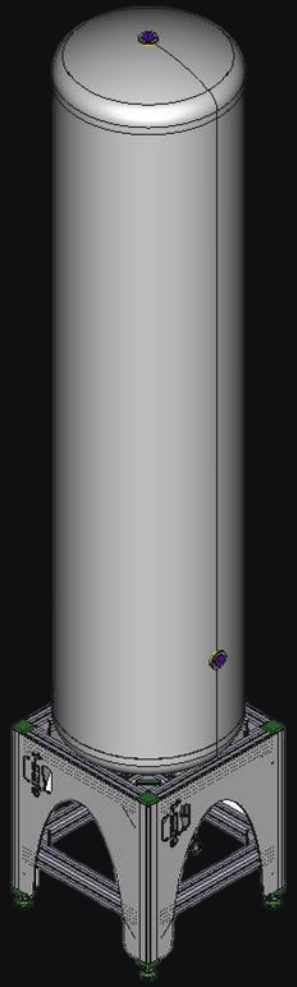
- Second life batteries
  - Refurbished battery units from electrical busses

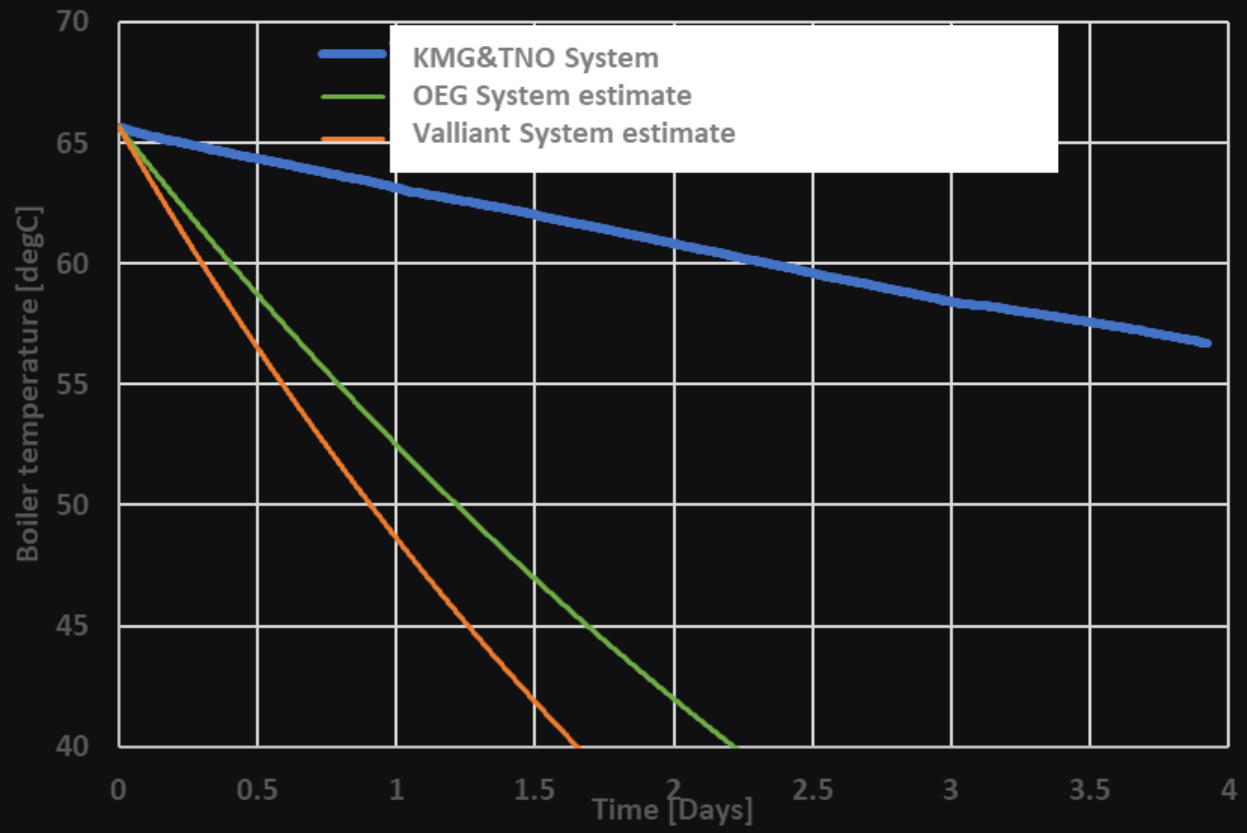
BEMS – Building Energy Managent System

- A BEMS system controls the equipment towards an optimal point based on predictions, available energy or energy cost



SCORES SPINOFF: HEAT STORAGE IN BUILDINGS





Thank you!

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