



HYBUILD: Integration of Energy Storage systems in a Heat Pump

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HYBUILD

**INNOVATIVE COMPACT HYBRID ELECTRICAL/THERMAL STORAGE SYSTEM
FOR LOW ENERGY BUILDINGS**

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1 HYBUILD in a nutshell

- HYBUILD will develop **two innovative hybrid storage concepts**:
 1. For the **Mediterranean climate** primarily meant for **cooling energy** provision,
 2. For the **Continental climate** primarily meant for **heating and DHW** production.
- The hybrid storage concepts are based on innovative components such as a **compact sorption module**, a **high-density latent storage**, **reversible vapour compression heat pumps** and a **DC-bus interconnection**.
- The whole systems will be properly managed by **advanced controls** and **Building Energy Management Systems (BEMS)**.
- The developed solutions will be **validated in three different demo-sites**

1 HYBUILD in a nutshell

- Project start: **10/2017**
- Project end: **09/2021**
- Overall EU contribution: **5,995,840 €**
- Consortium: **21 partners, 9 countries**
- Coordination



KickOff Meeting Bruxelles 10/2017



HYBUILD storage solutions will be demonstrated across 3 pilot sites.

• Bordeaux France



• Aglantzia Cyprus



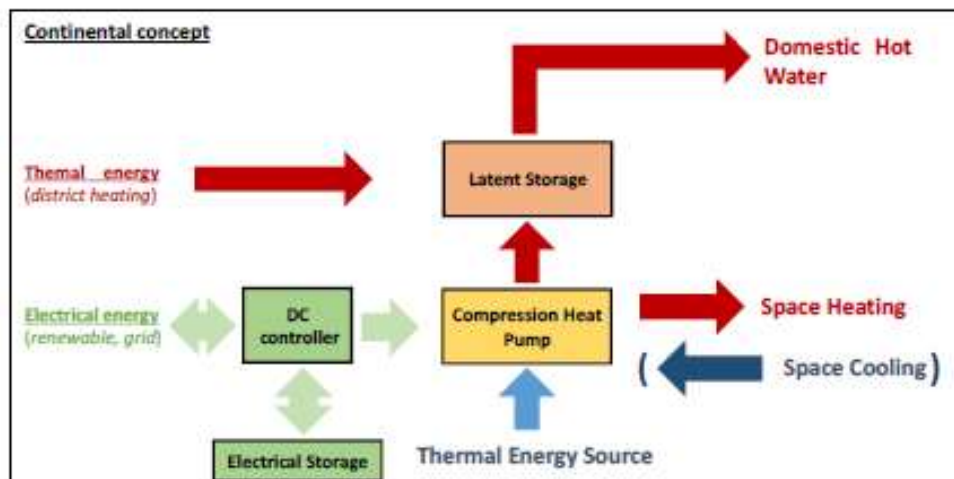
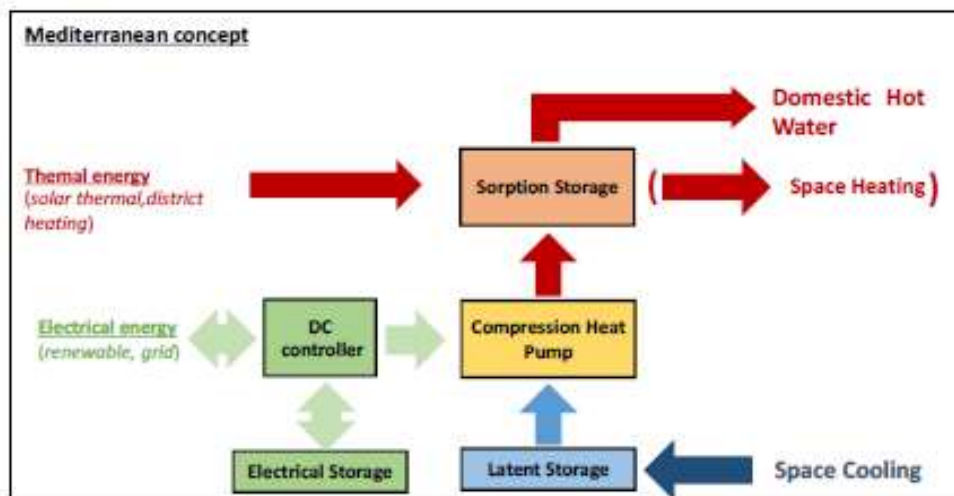
• Almatret Spain



www.hybuild.eu



2 The concept



2 concepts

1. Continental
2. Mediterranean

3 storage systems:

1. Battery (electrical energy)
2. PCM (thermal energy)
3. Sorption (thermal energy)
only for the Mediterranean concept

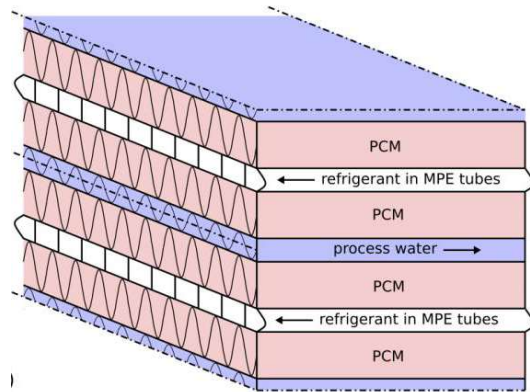
3 Innovation in HYBUILD

Innovation points addressed in the EEB-06-2017

- *High efficiency **conversion** and **storage** of surplus **renewable electricity** into **heat***
- *Multifunctional use in **both heating and cooling** applications at different temperature grades*
- *Different time scales, e.g. in **seasonal storage** of high temperature **solar heat** and **peak-shaving** in lower temperature heat–pump applications*

3 Innovation in HYBUILD

Refrigerant-PCM-Water HEX



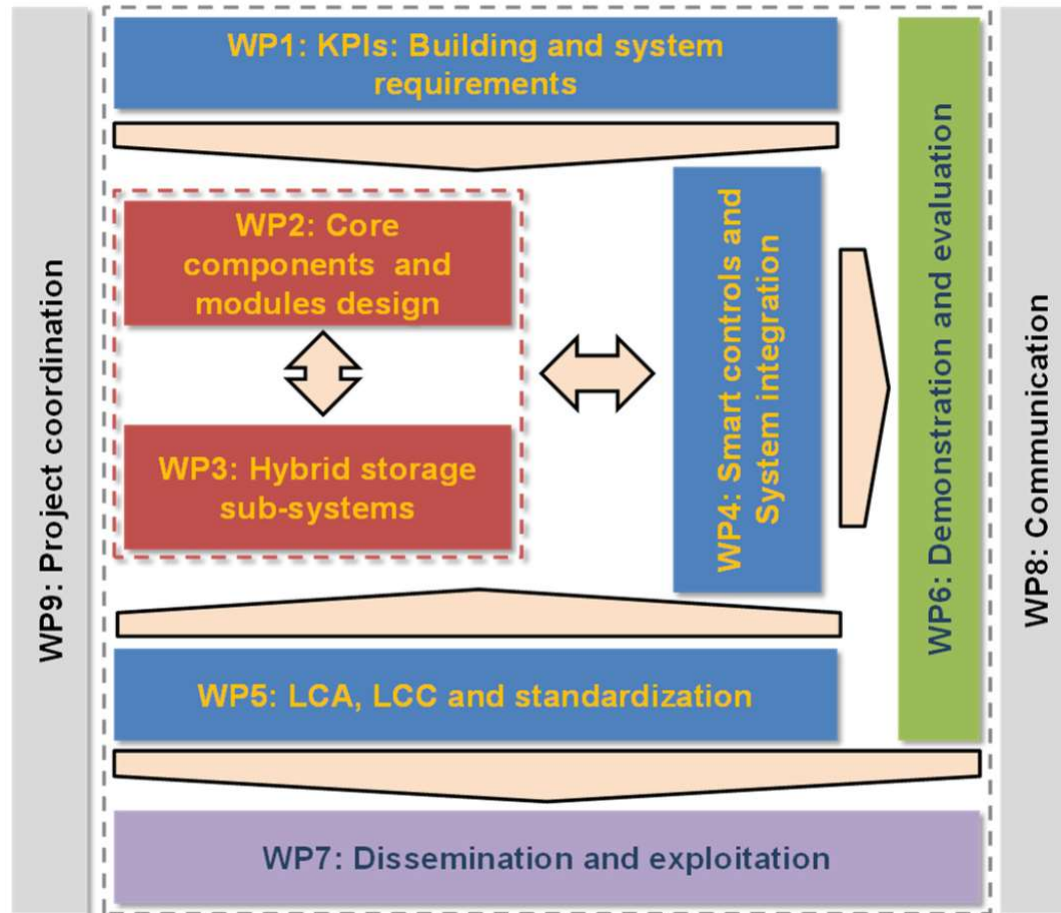
Aluminium Zeolite HEX



DC Bus Controller



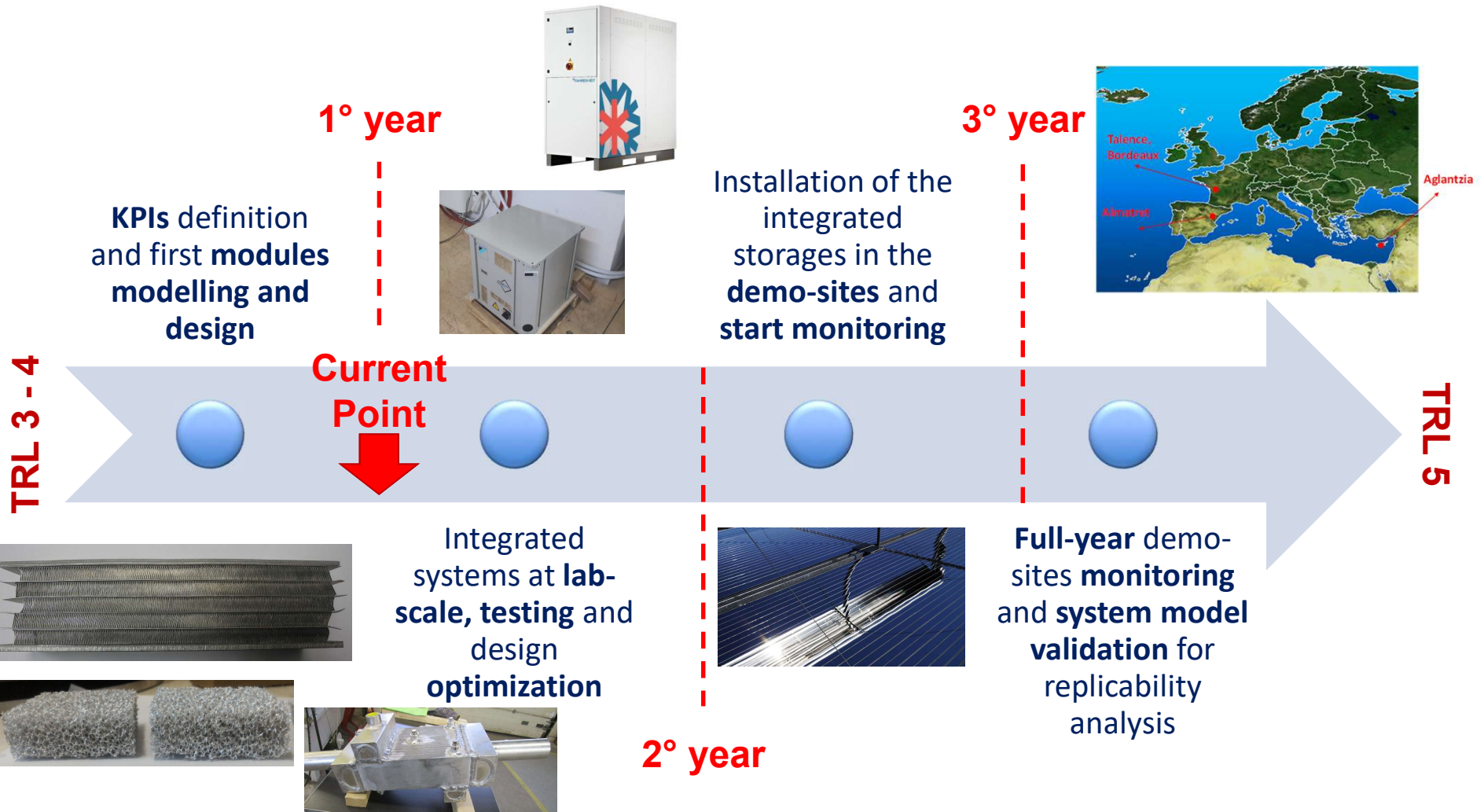
4 Implementation



9 WPs including:

- 1) The definition of boundary conditions (*WP1*)
- 2) The development and testing of the core components (*WP2*)
- 3) The dynamic simulation of the system (*WP3*)
- 4) The implementation of the control strategy (*WP4*)
- 5) The LCA and LCC analyses (*WP5*)
- 6) The installation and operation on the demo buildings (*WP6*)

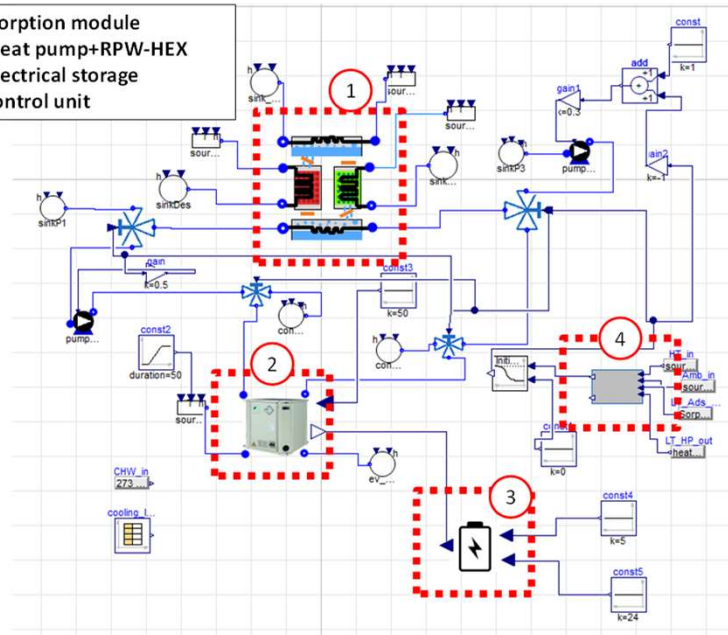
4 Implementation



5 Current status

Mediterranean system simulation flow sheet in Dymola software

- 1: sorption module
- 2: heat pump+RPW-HEX
- 3: electrical storage
- 4: control unit

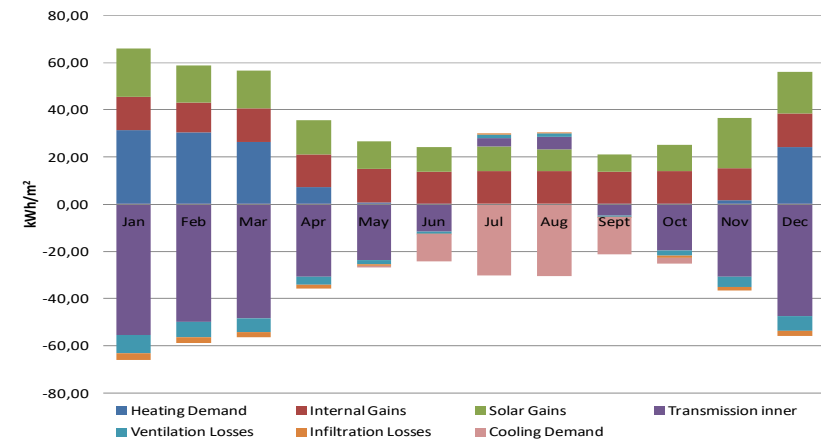


Buildings simulation results in TRNSYS software

Heat Pump Test Rig in LSBTP



Energy Balance

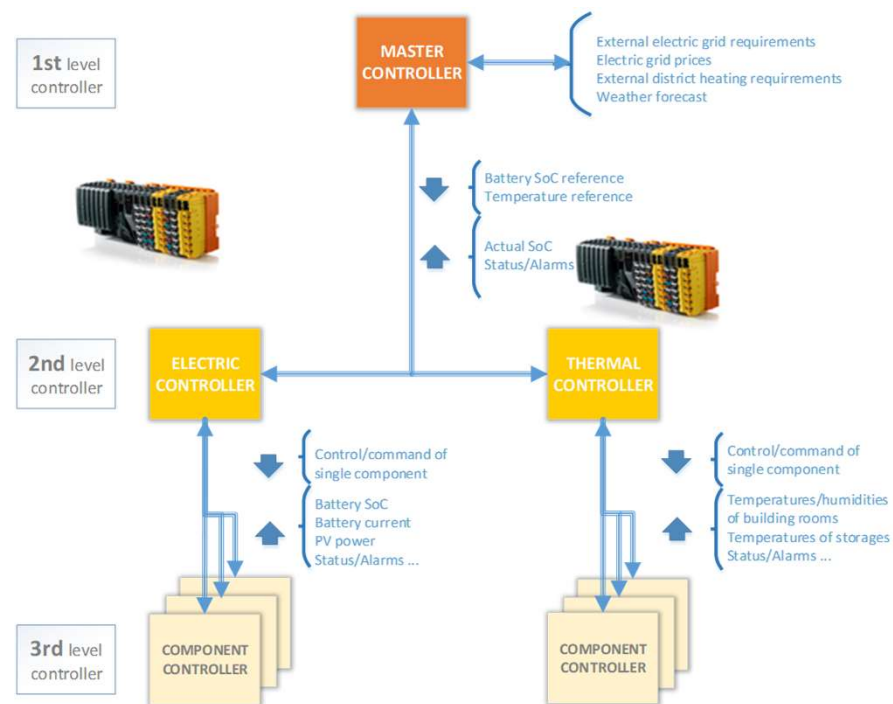


6 Next steps

Integration of subcomponents and testing



Implementation of the control strategy and operation optimization



7

Conclusions

- HYBUILD project will develop innovative fully-integrated components for hybrid electric/thermal storage solutions at domestic level
- The developed solutions will be optimized for both heating and cooling applications. Three demo sites will be employed to validate the solutions
- The boundary conditions for the design of the system are defined
- The modeling and first design phase of the components is almost completed, in the next year the complete lab-scale systems will be finalized and tested under lab-controlled conditions
- The control strategy is a key point for the efficient operation of the systems

THANK YOU

